Environmental Study Report (Final after 30-Day Review and Waiting Period)
Casselman Sewage Treatment System Upgrade
Schedule 'C' Class Environmental Assessment

June 2026

Prepared for:

CORPORATION OF THE MUNICIPALITY OF CASSELMAN
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JLR No.: 16953-131

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

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1.0 Introduction

1.1 Background

In 2022, J.L. Richards & Associates Limited (JLR) was retained by the Municipality of Casselman (Municipality) to complete a Water and Wastewater Infrastructure Master Plan (Master Plan) to address treatment, capacity, and condition limitations of its water treatment plant, elevated water storage tank, water distribution system, wastewater conveyance system, sewage pumping stations and sewage treatment system (STS). The Master Plan was completed in accordance with Approach 1 of the Municipal Engineers Association (MEA) master planning process, with an ultimate objective of developing a strategy to accommodate future growth within the Municipality for the next 25 years (to 2047) that can be implemented in a prioritized fashion to improve the overall performance and reliability of the water and wastewater system. The Master Plan was completed in July 2024, through issuance of the final Phase 2 Report (JLR, July 2024).

JLR has now been retained by the Municipality to complete a Schedule C Class Environmental Assessment (Class EA) for the upgrade of the Casselman STS. The completed Master Plan fulfilled Phase 1 and Phase 2 of the Class EA process for the upgrade expansion of the Casselman STS. This Class EA study will fulfill Phases 3 and 4, resulting in the development of a preferred design concept.

1.2 Municipal Class Environmental Assessment Process

The Ontario Environmental Assessment Act (Act) sets out a planning and decision-making process so that potential environmental effects are considered before a project begins. The purpose of the Act is to provide for the protection and conservation of the natural environment (R.S.O. 1990, c.E.18, s.2).

The Municipal Class EA process is followed for common types of projects to streamline the review process while ensuring that the project meets the requirements of the Act. It involves detailed site-specific information gathering and studies, as well as consultation with the public and stakeholder agencies. Different Class EA Schedules are followed depending on the type of project to be completed and their impact on the environment. These include Schedule A, Schedule A+, Schedule B and Schedule C, each more involved than the last. In 1987, the first Class EA document, prepared by the Municipal Engineers Association (MEA) on behalf of Ontario Municipalities, was approved under the Act. Updates and amendments were subsequently made in 1993, 2000, 2007, 2011, 2015 and 2023.

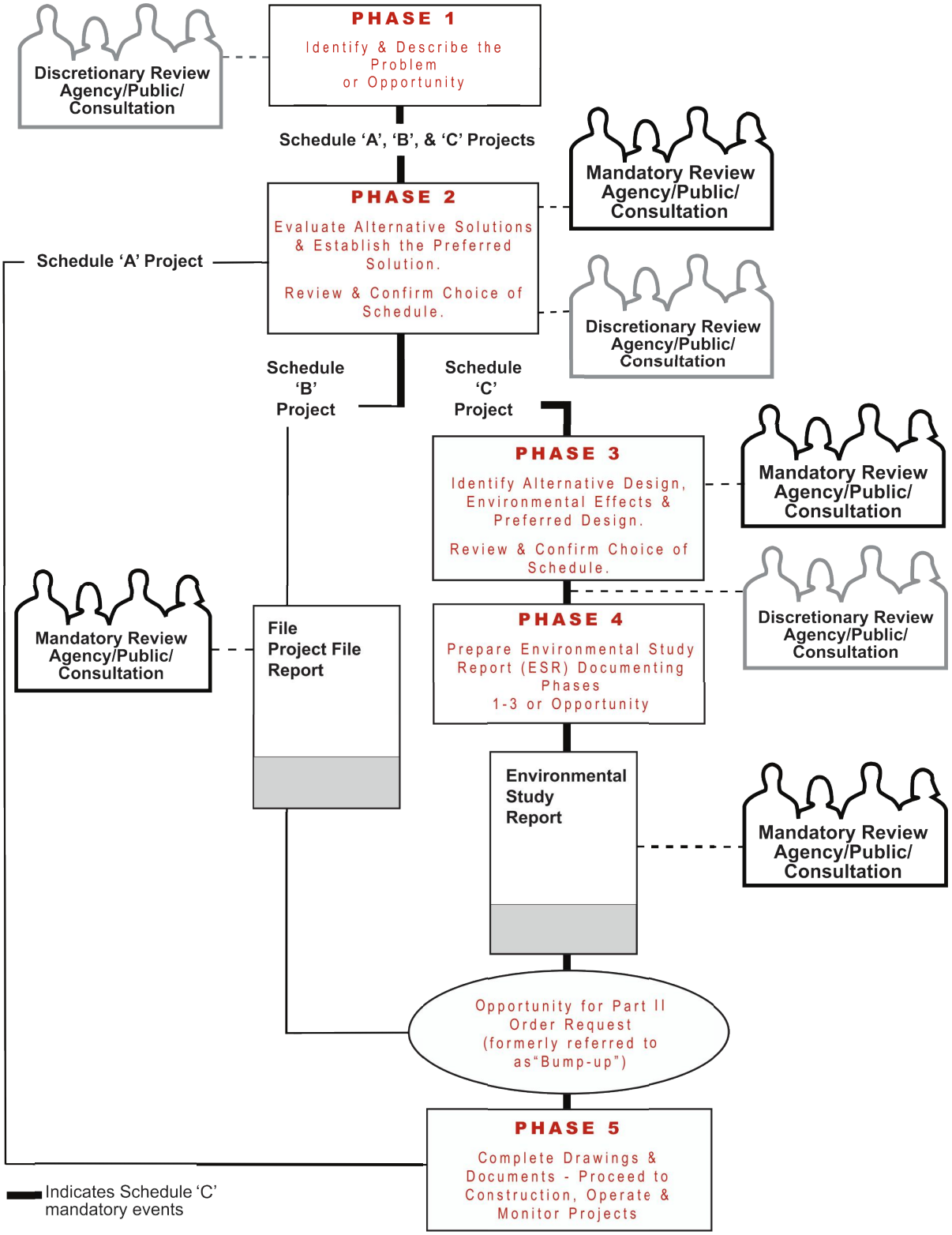
The Class EA framework (refer to Figure 1) defines the process for each type of project. For Schedule C projects, the completion of Phase 1 to Phase 4 of the Class EA process is required:

Phase 1 – Identify and Describe the Problem and/or Opportunity
Phase 2 – Identify Alternative Solutions and Establish the Preferred Solution
Phase 3 – Identify Alternative Design Concepts and Establish a Preferred Design Concept for the Preferred Solution

Phase 4 – Prepare Environmental Study Report
Phase 5 – Implementation

This Class EA is a Schedule C project under the Class EA process because the capacity of the Casselman STS will be expanded beyond its existing rated capacity and the upgrades may expand beyond its existing site boundary. Projects categorized as Schedule C undertakings have the potential for significant environmental effects, and are required to follow the full planning and design process specified under the Municipal Class EA. This includes consultation with all parties that may potentially be affected by the project, and the preparation of an Environmental Study Report (ESR) that documents the Class EA process that was followed for the project.

The ESR shall be made available for review by indigenous communities, the public and review agencies at the completion of Phase 4 for a period of 30 calendar days. This period is followed by a waiting period lasting 30 days to allow the MECP to request or notify proponents of a 'Section 16 Order' (formerly known as a 'Part II Order'). Following the 30-day waiting period, if there are no requests received from the MECP for a 'Section 16 Order', then the project may proceed to implementation (Phase 5).



PROJECT:

MUNICIPALITY OF CASSELMAN
SEWAGE TREATMENT SYSTEM EXPANSION SCHEDULE 'C' CLASS EA
CASSELMAN, ONTARIO

DRAWING:

CLASS EA PROCESS

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2.0 Phase 1: Problem and/or Opportunity

2.1 Description of Existing Conditions

2.1.1 Physical Description of the Casselman Sewage Treatment System

The Casselman STS is a seasonally discharged, lagoon-based system with polishing treatment that is rated for a treatment capacity of 2,110 m^3/day. Specific components include:

- Two (2) facultative lagoon cells (Cells A and B), each with an effective storage capacity of 115,000 m^3.
- An aerated lagoon cell (Cell C), with an effective storage capacity of 100,000 m^3.
- An alum dosing system for phosphorus precipitation dosed within the forcemain prior to the inlet of the STS.
- One Moving Bed Biofilm Reactor (MBBR) with two (2) trains to provide post-lagoon nitrification (BOD and ammonia removal), with an existing maximum hydraulic flow of 10,000 m^3/day.
- An aeration system consisting of blowers that supplies air to Cell C and the MBBR via header pipes and integrated diffusers.
- One disc filter to provide polishing removal of suspended solids and phosphorus, designed for a rated capacity of 7,000 m^3/day.
- A wet well and pumping system to convey lagoon effluent to the MBBR.
- A diversion chamber to distribute water throughout the STS.
- A gravity sewer outfall with effluent flow meter. Although there is no specific outfall capacity documented, based on past operation identified in a previous Phase 1 Report (JLR, 2017), the outfall has a capacity of minimum 17,500 m^3/day.

The treatment system is fed by the Main Sewage Pumping Station (SPS) and its associated forcemain. The Casselman STS is currently operated by the Ontario Clean Water Agency (OCWA) under the MECP Environmental Compliance Approval (ECA) No. 8160-BAHPRF, dated April 29, 2019. Refer to Figure 2 for an overview of the existing Casselman STS and study area for the Class EA. Please note that no upgrades are proposed for the effluent piping, and as such, has not been included in the study area.

ROUTE 500

LAURIER ST

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EXISTING LAGOON CELL 'A'

EXISTING LAGOON CELL 'B'

EXISTING LAGOON CELL 'C'

ALUM / BLOWER BUILDING

DISC FILTER BUILDING

MBBR TANK

Municipality of Casselman

Municipality of The Nation

Study Area
Existing Lagoon Infrastructure
Lagoons
Municipal Limits
SANITARY SEWER
Abandoned Forcemain
Existing Forcemain
Gravity

PROJECT:
MUNICIPALITY OF CASSELMAN
LAGOON EXPANSION SCHEDULE 'C' CLASS EA
CASSELMAN, ONTARIO

DRAWING:
STUDY AREA WITH EXISTING INFRASTRUCTURE

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2.1.1.1 Historical Flow Rates

The average day flow for the Casselman STS was determined to be 1,381 m³/d (~16 L/s), based on the average annual daily raw wastewater flows into the Casselman STS for the 5-year period from 2018 to 2022. The maximum day flow was determined to be 3,206 m^3/d (37 L/s), based on the average of the annual maximum day flows reported for the 5-year period from 2018 to 2022. Refer to Table 1.

Table 1: Casselman STS Raw Wastewater Flows (2018-2022).

Years	Average Day (m^3/day)	Maximum Day (m^3/day
2018	1,331	2,772
2019	1,354	2,992
2020	1,468	2,511
2021	1,310	4,457
2022	1,442	3,300
5-Year Average Flow (m^3/d)	1,381	3,206
5-Year Average Flow (L/s)	16	37
Percent (%) of Operating Capacity Used	65%	N/A

2.1.1.2 Historical Influent and Effluent Wastewater Quality

Based on a review of the Annual Wastewater Reports for the Casselman STS from 2018 to 2021 and data received from OCWA for 2022, the Master Plan summarized the following influent wastewater quality parameters in Table 2.

Table 2: Influent Wastewater Quality (2018-2022).

Parameter	2018	2019	2020	2021	2022
$CBOD_5$ (mg/L)	110	88	59	N/A	269
Total Suspended Solids (mg/L)	242	224	235	179	441
Total Phosphorous (mg/L)	5.7	8.0	5.7	7.1	7.4
Total Kjeldahl Nitrogen (mg/L)	44	49	40	60	61

The performance of the Casselman STS was also assessed between 2018 and 2022. This review is summarized in Table 3. Cells in red indicate an ECA Compliance Limit exceedance. Note that the MBBR and disc filter systems were installed and began operating in 2021. A process upset was experienced in the same year and troubleshooting the system had taken place up to Spring 2022. Therefore, the information provided in Table 3 is not reflective of the STS treatment performance with the new MBBR and disc filter system. It is also noted that, during the Class EA, OCWA identified the following operational concerns with the performance of the existing MBBR system.

- OCWA noted that they have experienced ice build-up/freezing in the MBBRs during colder months.
- OCWA noted that the media tends to float and create islands within the MBBR during January to March.
- OCWA noted that the MBBR produces a large amount of foam at certain times of the year. This foam generation was also noted by members of the public.

It is recommended that these concerns be addressed during the design of the upgrades. Addressing these concerns were added in Section 8.0.

Table 3: Effluent Wastewater Quality (2018-2022).

Parameter	Discharge Window	ECA Limit (1)	2018	2019	2020	2021	2022
$CBOD_5$ (mg/L)	Fall (Oct. 1 to Dec. 31)	15	5.8	3.8	3.0	3.2	6.3
	Winter/Spring (Jan. 1 to May 15)	25	8.2	3.2	5.6	3.0	4.9
Total Suspended Solids (mg/L)	Fall (Oct. 1 to Dec. 31)	25	36 (2)	14.8	3.9	9.7	10.6
	Winter/Spring (Jan. 1 to May 15)	25	15.8	10.0	14.0	3.0	13.3
Total Phosphorous (mg/L)	Fall (Oct. 1 to Dec. 31)	1	0.2	0.2	0.1	0.3	0.4
	Winter/Spring (Jan. 1 to May 15)	1	0.3	0.2	0.2	0.2	0.4
Total Ammonia Nitrogen (mg/L)	Fall (Oct.1 to Nov. 30)	5	0.1	5.3	0.1	1.5	1.2
	Fall (Dec.1 to 31)	12	-	-	1.0	4.9	7.7
	Winter (Jan.1 to Mar. 31)	12	-	-	-	-	9.8
	Spring (Apr.1 to May 15)	6	17 (2)	0.6	17	0.1	2.4
Hydrogen Sulphide (mg/L)	Fall (Oct.1 to Dec.31)	Not Detected	0	0	0	0	-
	Winter/Spring (Jan.1 to May 15)	0.1	0	0	0	0	-
pH	Fall (Oct.1 to Dec.31)	6.0 - 8.0	8.5 (3)	8.2	7.9	7.6	-
	Winter/Spring (Jan.1 to May 15)	6.0 - 8.0	7.8	7.8	7.8	7.6	-
E. Coli (CFU/100 mL)	Fall (Oct. 1 to Dec. 31)	200	-	-	1.4	28	60
	Winter/Spring (Jan. 1 to May 15)	200	-	-	36	67	126

(1) Per ECA No. 8160-BAHPRF (April 19, 2019)
(2) Non-Compliant per ECA No. 8225-B3HSD4 (October 3, 2018) / ECA No. 2712-6RVNRB (August 24, 2006): TSS (fall) = 25 mg/L and TAN (spring) = 16 mg/L.
(3) Compliant per ECA No. 8225-B3HSD4 (October 3, 2018) / ECA No. 2712-6RVNRB (August 24, 2006): pH limit fall and spring 6.0 to 9.5.

2.1.2 Land Use and Property Constraints

Refer to Figure 3 for the land use surrounding the STS, as well as the study area for the Class EA. The Casselman STS is located outside of the Casselman municipal boundaries within the Nation's municipal boundaries on roughly 28.4 ha of land on part of Lots 7 and 8 in Concession 6. The lagoon site has a Wastewater Treatment Site land use with a current use of "water treatment, filtration/water towers/pumping station". The existing lagoon cells take up most of the available property on the site, with an area at the southwestern corner of the site that is currently partially occupied by the existing STS buildings and MBBR, as shown in Figure 2. The adjacent land to the west consists of vacant land; a section immediately west of the STS buildings (part of the study area) is owned and used by the Municipality for snow storage during winter. Adjacent lands to the north, east, and south consist of agricultural land.

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ROUTE 500

STUDY AREA

Casselman
Sewage Treatment
Lagoons

LAURIER ST

LAND IS CURRENTLY USED BY THE MUNICIPALITY FOR SNOW STORAGE DURING WINTER

Municipality of Casselman

Municipality of The Nation

FORGET SR

Village of Casselman - Property Code Landuse
- Low Density Residential
- Medium Density Residential
- High Density Residential
- Institutional
- Vacant Land

UCPR Official Plan Landuse
- Agricultural Policy Area
- Rural Policy Area
- Urban Policy Area (Village of Casselman)
- Wastewater Treatment Site

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PROJECT:
MUNICIPALITY OF CASSELMAN
LAGOON EXPANSION SCHEDULE 'C' CLASS EA
CASSELMAN, ONTARIO

DRAWING:
EXISTING LAND USE

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2.1.3 Air Quality, Dust and Noise

MECP Guideline D-2 "Compatibility between Sewage Treatment and Sensitive Land Use" states that the recommended separation distances between property/lot line of sensitive land uses (e.g., residences) and wastewater lagoons vary between 100 m to 400 m depending on the type of pond and characteristics of the waste. Guideline D-2 states that a separation distance of 150 m is recommended for wastewater treatment plants of capacity between 500 m^3/day and 25,000 m^3/day. The closest sensitive receiver to the STS site is a private residence, located 165 m west of the site (property line to property line).

2.1.4 Source Water Protection

The Clean Water Act (2006) ensures communities protect their municipal drinking water supplies by developing collaborative, watershed-based source protection plans, and delineating vulnerable areas such as Wellhead Protection Areas (WHPAs), surface water Intake Protection Zones (IPZs), Highly Vulnerable Aquifers (HVAs), Significant Groundwater Recharge Areas (SGRAs), Event-based modelling areas (EBAs) and Issues Contributing Areas (ICAs). The Municipality is located within the South Nation Source Protection Area.

Municipal drinking water is currently sourced from the South Nation River. Raw water is treated at the Casselman Water Treatment Plant and conveyed through the water distribution system. The Casselman STS is located within or adjacent to the following vulnerable areas, as defined by the Clean Water Act (2006):

- The STS is within an HVA with a vulnerability score of 6 out of 10. An HVA has a relatively fast path for water to travel from the ground's surface down to the aquifer.

- The STS site is located approximately 780 m from an IPZ-1 and approximately 870 m from an ITZ-2 (Source Protection Plan, September 2016).

No other vulnerable areas were identified.

2.1.5 Climate Change

Climate change has the potential to impact the design of the STS upgrades through the following:

- Potential for higher volume of wastewater conveyance to the STS.
- Potential for more diluted raw wastewater.
- Potential for more frequent high-intensity or abnormal climatic events (e.g., rainfall, forest fires, draughts, windstorms, etc.), which may impact STS infrastructure and/or access.
- Potential for more frequent usage of emergency generators.

To minimize or mitigate potential climate change impacts, the following STS-specific adaptation strategies should be explored in the development of the preferred design concept:

- Ensure that the preferred solution has sufficient lagoon storage to account for a potential increase in wastewater volume due to climate change.
- Ensure the proposed treatment processes (in particular, biological treatment processes) can handle potentially diluted wastewater.
- Ensure that the site's stormwater management system (e.g., grading, swales, etc.) is capable of handling increased volumes of stormwater due to climate change.
- Ensure backup power systems are adequately sized to address increased risk of longer-duration power outages.
- To reduce greenhouse gas emissions, review fuel switching for backup power systems, the use of premium efficiency pumps or variable frequency drives, on-site renewable energy generation and sourcing concrete and steel from low embodied carbon sources.

2.1.6 Natural Environment

An overview of existing natural elements surrounding the STS is provided in Figure 4. This figure was produced using GIS data from the adopted 2022 UCPR Official Plan, obtained from the UCPR as part of this study. This figure shows that the Site is not located within an Area of Natural Scientific Interest (ANSI) nor is it located within a Significant Wetland; the nearest unevaluated wetland is located north of the Site. There are no natural watercourses or waterbodies present within the Site; however, the Coupal Municipal Drain runs adjacent to the southwestern corner of the Study Area and a tributary of Moose Creek wraps around the northeastern corner of the Study Area, it runs directly along the Site boundary. The Coupal Municipal Drain and the tributary are both considered fish habitats. It is noted that the 2022 UCPR Official Plan denotes the lagoons Cell 'A' and Cell 'B' as fish habitats, however, the lagoons are a closed isolated sewage system with no connections to natural waterbodies (except for outfall, allowing only flow from the lagoons to be discharged to the river). The Site is not located within an Aggregate Mineral Resource Site. The nearest resource sites include a bedrock mineral resource located approximately 1 km northeast and a sand mineral resource located approximately 700 m southeast of the Site.

As part of the 2024 Casselman Main SPS Upgrades, a Species at Risk (SAR) Screening Assessment was undertaken by Gemtec Consulting Engineers and Scientists Limited (Gemtec) in the area surrounding the proposed new Main SPS forcemain. The study area for that study included a large portion of the STS site, including most of the southwestern area of the site where STS upgrades are planned to be completed. Refer to Appendix C1 for the assessment report, and Figures A.1 and A.2 within Appendix C1 for the study area used for the SAR assessment. The SAR screening study included both a desktop review and a site investigation of vegetation communities, wildlife, fish habitat and SAR. Within the STS site, the desktop review identified the following SAR being found or potentially found within the Study Area. A description of each species is provided in the appended report. Key considerations are included in the below summary.

- **Bank swallow (Riparia riparia, threatened)** – Suitable foraging opportunities in open aquatic and field habitats. Any potential impacts to individual bank swallow can be mitigated by implementing avoidance and mitigation measures that do not impact the design selection process.

- **Bobolink (Dolichonyx oryzivorus, threatened) and Eastern meadowlark (Sturnella magna, threatened)** – Nesting and foraging habitat in adjacent agricultural fields. Any potential impacts to individual Bobolink or Eastern meadowlark can be mitigated by implementing avoidance and mitigation measures that do not impact the design selection process.

- **Lesser yellowlegs (Tringa flavipes, threatened)** – Potential foraging habitats within the lagoons. Any potential impacts to individual Lesser yellowlegs can be mitigated by implementing avoidance and mitigation measures that do not impact the design selection process.

- **Eastern small-footed myotis (Myotis leibii, endangered), Little brown myotis (Myotis lucifugus, endangered) and Tri-colored Bat (Perimyotis subflavus, endangered)** – Potential roosting habitats include the wooded hedgerow treed areas along the western site boundary and the anthropogenic buildings and structures within the site. Any potential impacts to individual Eastern small-footed myotis, Little brown myotis, and Tri-colored Bat can be mitigated by implementing avoidance and mitigation measures that do not impact the design selection process.

In addition to the above SARs, the following considerations were identified in the report:

- **Migrating Turtles** – The potential presence of migrating turtles between the wastewater lagoons and South Nation River was flagged. Associated avoidance and mitigation measures to protect migrating turtles were identified.

- **Fish and Fish Habitat** – Avoidance and mitigation measures for working in the vicinity of or within water were identified.

No floral or faunal SAR were observed within the project area during the site investigation completed for the above-noted study. Additional species of conservation concern (Special Concern and/or rare species) were identified during the background review included the eastern wood-pewee (Contopus virens), red-necked phalarope (Phalaropus lobatus), wood thrush (Hylocichla mustelina), and northern map turtle (Graptemys geographica). Species of Special Concern and their habitat do not receive protection under the ESA.

Please note that an ecological risk assessment of the site was also completed in March 2019 by Bowfin Environmental Consulting Inc., as part of the original upgrade of the Casselman STS. It was assumed that the findings from the most recent study superseded the findings from that report, although it is noted that the findings appear to be similar. The 2019 study report is included as Appendix C2 for reference.

Potential natural environment impacts and associated mitigation measures to be followed during detailed design and construction of the works are included in Section 6.0.

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ROUTE 500

STUDY AREA

Casselman
Sewage Treatment
Lagoons

LAURIER ST

LAND IS CURRENTLY USED BY THE MUNICIPALITY FOR SNOW STORAGE DURING WINTER

Municipality of Casselman

Municipality of The Nation

FORGET SR

Village of Casselman - Property Code Landuse
- Low Density Residential
- Medium Density Residential
- High Density Residential
- Institutional
- Vacant Land

UCPR Official Plan Landuse
- Agricultural Policy Area
- Rural Policy Area
- Urban Policy Area (Village of Casselman)
- Wastewater Treatment Site

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PROJECT:
MUNICIPALITY OF CASSELMAN
LAGOON EXPANSION SCHEDULE 'C' CLASS EA
CASSELMAN, ONTARIO

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2.1.7 Contaminated Sites and Soils Management

There are no known landfills, dumps, or federal contaminated sites near the Site. Based on previous works at the Site for the upgrades to the STS, there is no evidence to suggest the presence of underground storage tanks.

As part of the 2024 Casselman Main SPS Upgrades, an environmental drilling program was completed by Gemtec Consulting Engineers and Scientists Limited. Refer to Appendix D1 for the study report. Four (4) of the boreholes drilled as part of the program were within the STS site. Of the boreholes drilled within the site limits, the report identified that there is a section of salt impacted soils located at the north section of the Site between Lagoon Cell 'A' and Cell 'B'. Other test locations were either not sampled or found to meet Excess soils Quality standard Table 1 for Agricultural or Other property uses.

If contaminated soils are encountered during construction, appropriate disposal should be consistent with *Part XV.1 of the Environmental Protection Act* (EPA) and Ontario Regulation 153/04, Records of Site Condition, which details the requirements related to site assessment and clean up. Further, project activities involving the management of excess soil should be completed in accordance with O. Reg. 406/19 and the MECP's current guidance document titled "Management of Excess Soil – A Guide for Best Management Practices" (2014). All waste generated during construction must be disposed of in accordance with Ministry requirements.

2.1.8 Cultural Heritage Resources

Cultural heritage resources, which include archaeological resources, built heritage resources and cultural heritage landscapes, are an important aspect of the cultural environment and could be impacted by the proposed undertaking.

As part of the Master Plan, the MCM was consulted to determine if there are any known archaeological sites within the study area (i.e., the Municipality of Casselman). The MCM noted that there are no known archaeological assessments completed specific to this project. They noted two (2) known archaeological sites within the Municipality of Casselman: located approximately 400 m and 600 m, respectively, from SPS No. 6 and SPS No. 1. These sites will not be impacted by the proposed upgrades to the STS.

The Ministry of Citizenship and Multiculturalism (MCM) has developed screening checklists to assist municipalities, developers, consultants, and property owners (non heritage specialists) to determine if the study area has the potential for cultural heritage resources.

As recommended by the MCM during the Master Plan and during this Class EA, screening checklists were completed to determine whether further assessments were required to assess for potential impacts to cultural heritage resources.

2.1.8.1 Archaeological Resources

The screening checklist *Criteria for Evaluating Archaeological Potential* was completed (see Appendix E1) and concluded that the study area does not have archaeological potential because the study area has been subjected to recent, extensive and intensive disturbance.

Recent disturbance was a result of previous upgrades undertaken within the site throughout its history, including the construction of lagoon cells, buildings and underground piping. The proposed works to be undertaken as part of this Class EA are within the same previously disturbed areas. The proposed works do not include any works within natural watercourses or waterbodies. Therefore, the checklist *Criteria for Evaluating Marine Archaeological Potential* was not completed.

2.1.8.2 Built Heritage Resources and Cultural Heritage Landscapes

The screening checklist *Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes* was completed (see Appendix E2) and concluded that the study area does not have potential for built heritage resources or cultural heritage landscapes. The study area was previously evaluated by Archaeological Research Associates Ltd. (ARA) as part of the 2024 Casselman Main SPS Design Project (see Section 2.1.8.3). As part of this study, the study area was found to not include features of cultural heritage value or interest.

2.1.8.3 Studies Completed as part of the 2024 Casselman Main SPS Design Project

In addition to the screening checklists completed, technical cultural heritage studies were previously completed as part of the 2024 Casselman Main SPS upgrades design, which partially overlap with the lagoon system upgrades. The information below is included in the ESR to further document that there is low potential for cultural heritage resources within the EA study area. The study reports have not been appended to the ESR (per discussions with the MCM during the Class EA), but can be provided upon request.

A Stage 1 Archaeological Assessment (ARA, 2025) (under Project Information Form (PIF) number P1106-0051-2024 for the Main Street SPS and forcemain area which overlap with the Lagoon STS process equipment area. The Stage 1 AA determined that deep land alterations have resulted in the removal of archaeological potential from the Casselman lagoon site.

A Cultural heritage Assessment Report (ARA, 2024) was completed for the Main Street SPS and forcemain area which overlap with the Lagoon STS process equipment area. Based on ARA's review of the heritage area assessed, which included the entire study area of interest to this Class EA, no cultural heritage resources were identified within the Class EA study area.

2.1.9 Geotechnical and Hydrogeological Conditions

The Casselman area is located within the physiographic region of the Russell and Prescott sand plain with extensive Winchester clay plain located just to the south. The area is underlain by Ottawa formation limestone with extensive bedrock outcrops visible in the valley of the South Nation River at Casselman.

2.1.9.1 Geotechnical Conditions

The STS Site itself has been characterized as gently undulating with a total grade change of less than 2.5 m from the north side of the property to the south. From previous geotechnical work in the area it was found that the STS site is generally overlain by topsoil followed by a layer of silty sand (0.5 – 1.8 m thick), silty clay (2.1 – 2.9 m thick) transitioning to clayey silt

below 5.6 m, with a clay layer near 6 metres below ground surface (m bgs) and glacial till near 8.3 m bgs (Golder, 2018).

Bedrock has been characterized as sound bedrock of the Ottawa formation. In 2018, Golder conducted a drilling program to support the upgrades to the lagoon facility for the construction a pumping station, two (2) concrete tanks and a small at-grade process building on the southwestern corner of the Site. The program report is provided as Appendix D2. During the investigation, two (2) boreholes were advanced to refusal. Bedrock was encountered at depths of 13.40 m bgs (52.55 m above sea level (m asl)) and 12.65 m bgs (53.85 m asl) in BH18-03 and BH18-04, respectively. Bedrock encountered consisted of slightly fresh, thinly bedded, grey limestone with sandy dolostone interbeds. It is noted that to construct the MBBR concrete tanks, a specialized micro-pile foundation was required. No specialized foundations were required for the construction of the Alum Building, Disc Filter Building or other associated site infrastructure. Further, it is of note that sinkholes in the bedrock to the west of the lagoons along the banks of the South Nation River have been previously reported, however the 1977 Golder Associates study found no evidence of an open bedrock structure below the lagoon.

The three (3) existing lagoon cells were constructed with a compacted clay cut-off throughout the full height of the berms to control leakage and seepage. Previous assessments have suggested that there does not appear to be significant leakage from the lagoons.

It is noted that the geotechnical investigation completed for the design of the Main SPS Upgrades in 2024, seem to align with the above findings. The investigation report for the Main SPS Upgrades is provided as Appendix D3 for reference.

2.1.9.2 Hydrogeological Conditions

Two (2) monitoring wells were constructed during the 2018 Golder geotechnical investigation (study report in Appendix D2). The table below summarizes groundwater elevations identified at the time:

Borehole No.	Geologic Unit of Screened Interval	Groundwater Level Depth (m bgs)	Groundwater elevation (m asl)	Date of Measurement
18-01	Glacial Till	3.24	62.76	August 23, 2018
		2.98	63.02	November 8, 2018
18-02	Grey Silty Clay	1.80	64.03	August 23, 2018
		1.58	64.25	November 8, 2018

2.2 Growth Evaluation

2.2.1 Provincial Policy Statement

The 2024 Provincial Policy Statement (PPS) provides guidance on matters of provincial interest related to land use planning and development. The PPS states that settlement areas, such as the Municipality, shall be the focus of growth and development (section 2.1.3.1). It further contemplates that land use patterns within settlement areas shall be based on efficient use of

land, resources, and infrastructure (section 2.1.3.2). Municipal sewage and water services are the preferred form of servicing for settlement areas to support protection of the environment and minimize potential risks to human health and safety (section 3.6.2). As such, planning for sewage, water, and stormwater services shall accommodate forecasted growth in a manner that promotes the efficient use and optimization of existing services, ensures that the systems can be sustained by the water resources upon which such the services rely, and promote water conservation and water use efficiency (section 3.6.1).

2.2.2 Growth Projections

Growth projections were developed as part of the Master Plan to determine the future growth anticipated in the Municipality between 2023 and 2047. Planning periods included near/short term (2023 to 2027), medium term (2028 to 2032), and long term (2033 to 2047). All projected future growth is planned to be serviced by the Casselman STS. Refer to Table 4 and Table 5 for a summary of residential, and industrial, commercial and institutional (ICI) development.

Table 4: Future Residential Development Units and Population Projections

Development	Timeframe (1)	Units (2)	Population (3)
West of Sarah Phase 1	0-5 years	26	62
West of Sarah Phase 2	0-5 years	36	86
West of Sarah Phase 3	0-5 years	16	38
West of Sarah Phase 4	0-5 years	37	88
Casselman Developments Ltd. Phase 1	0-5 years	6	14
Casselman Developments Ltd. Phase 2A	0-5 years	6	14
Casselman Developments Ltd. Phase 2B	0-5 years	144	342
Casselman Developments Ltd. Phase 2C	0-5 years	83	197
Casselman Developments Ltd. Phase 3	0-5 years	230	546
Projet Mantineau-Hughes 866 Principale St.	0-5 years	38	90
825 Principale St.	0-5 years	9	21
17 Aquatria St. (Senior Housing) (4)	0-5 years	50	100
37 Richer Close	0-5 years	97	230
720-722 St. Joesph St.	0-5 years	6	14
736 Principale St.	0-5 years	3	7
Domaine des rapides	0-5 years	147	349
806 Principale St.	0-5 years	15	36
821 Principale St.	0-5 years	9	21
Intensification of Existing Units (5)	0-5 years	22	53
TOTAL Short-Term Growth (0-5 Years; 2023-2027)		**980**	**2309**
832 Principale St. Phase 1	5-10 years	36	86
832 Principale St. Phase 2	5-10 years	36	86
700 Principale St.	5-10 years	68	162

Development	Timeframe [1]	Units [2]	Population [3]
787 Principale St.	5-10 years	44	105
Nation View	5-10 years	466	1107
876-884 St. Isidore St.	5-10 years	70	166
Intensification of Existing Units [5]	5-10 years	22	53
TOTAL Mid-Term Growth (5-10 Years; 2028-2032)		**742**	**1763**
East of Laurier	10-25 years	300	713
Aurele Road	10-25 years	7	17
Intensification of Existing Units [5]	10-25 years	22	53
TOTAL Long-Term Growth (10-25 Years; 2033-2047)		**329**	**782**

(1) Timeframes presented herein indicate the anticipated timeline when the development will be connected to the water/wastewater services. This is not an indication of when the development can begin. The actual timing of upgrades will be contingent on the rate of development in each of the contributing areas.
(2) Unit counts provided by the Municipality. For the development areas that are already underway, the unit counts represent the unoccupied units as of December 2022.
(3) Assume 2.375 cap/unit for residential units.
(4) Assume 2 cap/unit for Senior Housing.
(5) Assume 5% intensification for existing dwelling units (1,337 units per 2021 Census) divided evenly to each timeline term.

Table 5: Future ICI Development Land Projections

Development	Timeframe	Hectares
52-54 Racine St. - Light Industrial	0-5 years	0.19 [3]
37 Richer Close - Commercial	0-5 years	0.06 [3]
TOTAL Short-Term (0-5 Years; 2023-2027)		**0.25**
Lettuce/Herb Production Facility - Industrial	5-10 years	1.74 [4]
Medical Clinic	5-10 years	1.00 [5]
TOTAL Mid-Term (5-10 Years; 2028-2032)		**2.74**
870 Principale St. - Light Commercial/Industrial	10-25 years	1.40
Vacant Farmlands South of HWY 417 - Industrial	10-25 years	16.19
Aurele Road - Light Industrial	10-25 years	0.40
625 Principale St. - Commercial [1]	10-25 years	1.65
East of Highway 417 Ramp (Ford Warehouse) [2]	10-25 years	N/A
TOTAL Long-Term (10-25 Years; 2033-2047)		**19.64**

(1) Half of the property area for 625 Principale St. has been included within the above projections, development of the other half of the area has been assumed beyond the timeline of the Master Plan.

(2) The Ford Warehouse is already currently serviced with water as of December 2022; future servicing is for wastewater only (17,550 L/day per previous sanitary calculation completed by EMEeng, November 10, 2021).
(3) Footprint presented herein represent the gross floor area (GFA). Development at 37 Richer Close has 6 new commercial space proposed.
(4) Footprint presented herein represent the land parcel area. This development will consist of retrofit of existing building and building expansion.
(5) The medical clinic proposed is a day-time medical centre. There is no overnight care being provided. Footprint presented herein represent the land parcel area.
(6) Town Hall relocation to 1 Industrial Street is not accounted for in the future ICI projections since the intent is to occupy existing building footprint.

2.2.3 Future Wastewater Flow

Future wastewater flows were developed in the Master Plan based on the historical wastewater flows summarized in Section 2.1.1.1, the growth projections summarized in Section 2.2.2, and a set of design parameters described in Master Plan reports. These are summarized in Table 6.

Table 6: Future Wastewater Flow

Demand Scenario	Short-Term (2023-2027)	Mid-Term (2028-2032)	Long-Term (2033-2047)
Total Serviced Population (1)	6,357	8,120	8,902
ICI Development Area (ha)	0.25	2.74	19.64
Future Average Day Flow (m^3/day)	2,200	2,930	4,050 (2)
Future Maximum Day Flow (m^3/day) (3)	5,148	6,856	9,477

(1) The total serviced population represents residential population only and excludes equivalent institutional households and populations.
(2) The Ford Warehouse is already currently serviced with water as of December 2022; so future wastewater flows generated by the Ford Warehouse have been added to the long-term future average daily flows (17,550 L/day per previous sanitary calculation completed by EMEeng, November 10, 2021).
(3) Future maximum day wastewater flows projections were generated by multiplying the average day flows by a peak factor of 2.34, determined from average and maximum day demand data provided in Table 1.

2.2.4 Uncommitted Hydraulic Reserve Capacity Assessment (D-5-1 Calculation)

As part of the Master Plan, an Uncommitted Hydraulic Reserve Capacity assessment was undertaken based on the MECP document entitled "Procedure D-5-1: Calculating and Reporting Uncommitted Reserve Capacity at Sewage and Water Treatment Plants" (March 1995). The assessment found that the "uncommitted" hydraulic reserve capacity of the existing Casselman STS was 145 m^3/d, which meant that the Municipality had allocated approximately 93% of the entire hydraulic reserve capacity of the lagoon treatment system. The remaining residual capacity as of December 2022 would be available to support an additional 175 residential units above the vacant/draft approved development identified by the Municipality.

2.2.5 Projected Timeline for the Upgrade of the Casselman STS

Based on a review of wastewater generation projections and growth development timelines, the Master Plan found that 80% of the STS rated capacity will be reached sometime between 2023-2028, 90% STS rated capacity will be reached sometime between 2025-2033, and the rated capacity of the STS will be reached sometime between 2026-2037.

2.3 Problem and Opportunity Statement

Based on the information identified in Phase 1, the following Problem and/or Opportunity Statement was developed:

"The Municipality of Casselman has been experiencing significant development pressures in the present, near-term and long-term. A review of the Casselman STS suggests that it is operating near its rated capacity and does not have the capacity required to accommodate projected near- and long-term growth. The Municipality of Casselman is undertaking a Municipal Class Environmental Assessment to evaluate options to expand the Casselman STS to address these capacity constraints and ensure that the long-term growth of Casselman is adequately planned for and accommodated. The Class EA will consider the level of adequacy of wastewater treatment for the lagoon treatment system and will recommend a solution to address the findings in accordance with the 2023 Municipal Class Environmental Assessment process."

3.0 Phase 2: Development of a Preferred Solution

3.1 Evaluation Methodology

To facilitate the evaluation and selection of the preferred solution during Phase 2 of the Master Plan, the evaluation process consisted of a review of the alternatives in consideration of the criteria described in Table 7.

Table 7: Summary of Evaluation Criteria

Criteria	Description
Natural Environment Considerations	Natural features, natural heritage areas, areas of natural and significant interest, designated natural areas, watercourses and aquatic habitat.
Social and Cultural Environment Considerations	Proximity of facilities to residential, commercial and institutions, archaeological resources and areas of archaeological potential, known and potential built heritage resources and cultural heritage landscapes.
Technical Feasibility	Constructability, maintaining or enhancing water/wastewater treatment, reliability and security of distribution/conveyance system, ease of connection to existing infrastructure and operating and maintenance requirements, addresses aging infrastructure, expandability.
Financial Considerations	Capital costs, Operation and Maintenance costs.

Each criterion was assigned a colour to reflect its level of impact relative to other criteria. The relative level of impact for each criterion for each potential solution was then assessed based on the colour weighting system summarized in Table 8. The option that had the least negative impact (or has the strongest positive impact) was recommended as the preferred solution. The four (4) major criteria were assigned equal weights as they were considered to have equal importance in this evaluation at the Master Plan stage.

Table 8: Detailed Evaluation Impact Level and Colouring System

Impact Level	Colour	Relative Impact
Strong Positive Impact	Green	Preferred
Minor Impact	Yellow	Less Preferred
Strong Negative Impact	Red	Least Preferred

3.2 Development of Preferred Solution

The following four (4) alternatives were identified to achieve the rated capacity upgrade required for the STS, understanding that the limitation to future upgrade is the allowable seasonal discharge to the South Nation River.

- **Alternative 1**: Status Quo
- **Alternative 2**: Maintain Lagoon-Based Treatment System; Expand Lagoon Rated Capacity
    - Alternative 2a: Maintain Current Lagoon Discharge Window and Provide Additional Lagoon Storage
    - Alternative 2b: Expand Lagoon Discharge Window to Year-Round
- **Alternative 3**: Abandon Lagoon Treatment; Convert to a Mechanical Treatment Plant on Existing Site and Expand Discharge Window to Year-Round

3.2.1 Alternative No. 1: Status Quo

The "Status Quo" alternative represents what would likely occur if none of the alternative STS solutions were implemented and the existing STS was not expanded nor upgraded to accommodate future wastewater flows. Moreover, the assumption with respect to this alternative is that the discharge window and allowable discharge rates will remain unchanged.

The analysis of future conditions in the Master Plan showed that the rated capacity of the STS would be reached sometime between 2026-2037. Moreover, the rated capacity of the STS would require nearly doubling by 2047 to accommodate long-term growth anticipated in the Master Plan. Therefore, the "status quo" or "do nothing" approach was deemed not feasible as the anticipated future wastewater flows from intense growth within the Municipality cannot be accommodated by the existing lagoon capacity.

For the above stated reasons, the alternative was not carried forward into the detailed evaluation as it did not address the Problem and Opportunity Statement.

3.2.2 Alternative No. 2: Maintain Lagoon-Based Treatment System; Expand Lagoon Rated Capacity

As described above for Alternative 1, the STS rated capacity cannot accommodate future wastewater flows anticipated in the Municipality within the Master Plan timeframe. Therefore, an alternative to expand the lagoon rated capacity and adding future treatment units is presented herein. Two sub-options have been developed to capture the different discharge scenarios.

3.2.2.1 Alternative No. 2a: Maintain Current Lagoon Discharge Window and Provide Additional Lagoon Storage

Note that under the current ECA, the STS operates with an allowable discharge between October 1 and May 15. The Winter/Spring season permits a total allowable effluent discharge volume of 502,500 m^3 between January 1 and May 15. The Fall season permits a total allowable effluent discharge volume of 267,650 m^3 between October 1 and December 31.

This alternative would include maintaining the existing lagoon discharge window, construction of a new lagoon to provide additional storage for future flow, and a new MBBR and new Disc Filter trains to allow increased effluent flow release during the discharge window.

The existing lagoon holding capacity would require expansion to accommodate the increase in wastewater influent to the STS. It was estimated that a maximum storage volume of 460,000 m^3 was required to meet future growth, which would require an expansion in storage capacity of approximately 130,000 m^3.

To accommodate this storage expansion, the Municipality would have had to purchase new lands to expand the lagoon footprint. Given the near doubling of the rated capacity requirement within long term, the land required to accommodate future wastewater flows would be significant. In addition, as per the MECP Guideline D-2, "*Compatibility between Sewage Treatment and Sensitive Land Use*", an additional 150 m of buffer land area is recommended for separation from the facility producing odours to the property line of sensitive land uses. It is noted that the additional buffer zone identified by MECP Guideline D-2 refers specifically to horizontal clearance to provide odour attenuation from sensitive land uses. This buffer zone may or may not be owned by the Municipality. As previously presented, Figure 3 shows municipally owned lands. No land near the STS is currently owned by the Municipality, so the alternative is contingent on the Municipality being able to acquire nearby lands to the existing site.

3.2.2.2 Alternative No. 2b: Expand Lagoon Discharge Window to Year-Round

This alternative would involve expanding the lagoon discharge window to year-round, maintaining the lagoon storage capacity, installing baffles within the lagoon cells, providing an additional Disc Filter for redundancy, adding new effluent disinfection and adding an additional coagulation/flocculation system for enhanced phosphorus removal.

An Assimilative Capacity Assessment (ACA) of the South Nation River was completed and appended to the Master Plan to support the development of the alternative (see Appendix B1). Consultations with the MECP and South Nation Conservation (SNC) were also completed to determine the feasibility of expanding the discharge rates and discharge windows of the lagoon ECA. The proposed effluent discharge rates, water quality objectives and limits summarized in the tables below were agreed to by the MECP.

Table 9: Proposed Casselman STS Maximum Monthly Effluent Discharge Rates and Minimum Dilution Ratios

MONTH	MAXIMUM DAILY DISCHARGE RATE	MINIMUM DILUTION RATIO
January	5,750 m^3/d	12.4
February	5,600 m^3/d	12.4
March	7,250 m^3/d	12.3
April	10,000 m^3/d	72.9
May	4,500 m^3/d	40.5
June	2,150 m^3/d	26.2
July	1,050 m^3/d	26.2
August	900 m^3/d	26.3
September	910 m^3/d	26.2
October	2,250 m^3/d	13.1
November	6,050 m^3/d	13.1
December	8,750 m^3/d	12.4

Table 10: Proposed Casselman STS Effluent Water Quality

PARAMETER	AVERAGING PERIOD	OBJECTIVE	LIMIT
$cBOD_5$	Monthly	10 mg/L	12 mg/L
TSS	Monthly	10 mg/L	12 mg/L
TP	Monthly	0.20 mg/L	0.30 mg/L
TAN			
Dec 1 to Mar 31	Monthly	9.2 mg/L	11.5 mg/L
Apr 1 to May 31	Monthly	4.8 mg/L	6.0 mg/L
Jun 1 to Sep 30	Monthly	1.0 mg/L	1.3 mg/L
Oct 1 to Nov 30	Monthly	4.0 mg/L	5.0 mg/L
E. coli			
May 1 to Oct 31	Monthly	150 CFU/100 mL	200 CFU/100 mL
pH	Single Grab	6.8 to 7.8	6.0 to 8.0

Table 11: Proposed Casselman STS Effluent Loading Limits

PARAMETER	AVERAGING PERIOD	LIMIT (kg/d)
$cBOD_5$	Annual	52.5
TSS	Annual	52.5

PARAMETER	AVERAGING PERIOD	LIMIT (kg/d)
TP	Annual	1.31
TAN		
January	Monthly	66.1
February	Monthly	64.4
March	Monthly	83.4
April	Monthly	60.0
May	Monthly	27.0
June	Monthly	2.80
July	Monthly	1.37
August	Monthly	1.17
September	Monthly	1.18
October	Monthly	11.3
November	Monthly	30.3
December	Monthly	100.6

In consultation with the supplier of the existing MBBR and Disc Filter systems, the following preliminary comments were provided during the Master Plan process:

- The proposed maximum flow rates through the MBBR and disc filter systems are equal to the existing peak design flow rates; therefore, the units can hydraulically handle the new monthly flow rates.
- The proposed TAN objectives appear to be achievable with the existing system, which will need to be confirmed using process modelling by the supplier. The stricter TAN objectives during the summer were not a concern given the expected warm temperatures.
- The proposed TP objective is reasonable for a disc filter; however, the following upgrades should be considered:
    - Provision of a second Disc filter to provide redundancy. Given the difference between allowable discharge in April (10,000 m^3/d) and the following six months (900 – 4,500 m^3/d), any prolonged system failure during April could result in excess wastewater accumulating in the lagoons, resulting in a higher risk of bypassing the tertiary treatment systems.
    - Provision of a coagulation chamber to provide a secondary point of coagulant dosing, to ensure that all reactive phosphorus is precipitated into particulate form prior to filtration.
- A new disinfection system will need to be implemented to ensure E. coli limits and objectives are met.
- Flow path should be improved within the existing lagoon cells to improve pre-treatment, and to increase MBBR aeration capacity.

3.2.3 Alternative No. 3: Abandon Lagoon Treatment; Convert to a Mechanical Treatment Plant on Existing Site and Expand Discharge Window to Year-Round

Another alternative to increase the STS rated capacity would be to abandon the existing lagoon STS, convert to a mechanical STS and expand the discharge window to year-round.

Generally speaking, a mechanical treatment plant could provide more effective treatment than the current lagoon STS for a much smaller footprint. However, mechanical systems run on a continuous basis and discharge to the receiver stream as soon as the wastewater is treated, so this alternative would require an ECA amendment to allow for continuous discharge all year around and the treated effluent requirements will be consistent with that presented in Table 9, Table 10 and Table 11. Additional raw wastewater or treated wastewater equalization storage may be necessary to balance the allowed effluent discharge flow rates.

This option presented significant capital investment as a mechanical treatment plant involves a multitude of unit processes that are not typically required in a lagoon-based treatment system, such as screening, grit removal, concrete tanks for biological treatment (e.g., aeration tanks and clarifiers), sludge treatment and disposal.

3.2.4 Evaluation of Alternative Solutions

Table 12 provides a descriptive summary and evaluation of each alternative listed above.

Table 12: Sewage Treatment System Evaluation Matrix.

	Alternative 2a – Maintain Current Lagoon Discharge Window and Provide Additional Lagoon Storage	Alternative 2b – Expand Lagoon Discharge Window to Year-Round	Alternative 3 – Abandon Lagoon Treatment, Convert to a Mechanical Treatment Plant on Existing Site and Expand Discharge Window to Year-Round
Natural Environment	• Increased footprint of the lagoon site (via construction of a new lagoon cell) will disturb the terrestrial environment around the existing agricultural land use. • Increased level of treatment for effluent will benefit the aquatic life and river water quality.	• Proposed work is limited to the existing site boundary. No significant disturbance is anticipated for terrestrial environment. • Increased level of treatment for effluent will benefit aquatic life and river water quality.	• Proposed work is limited to the existing site boundary. No significant disturbance is anticipated for terrestrial environment. • Increased level of treatment for effluent will benefit aquatic life and river water quality.
Evaluation	**Least Preferred**	**Preferred**	**Preferred**
Social and Cultural Environment	• The STS could accommodate future wastewater flows anticipated in the Master Plan timeframe. • Lagoon expansion is contingent on the Municipality being able to acquire nearby lands to the existing site that will not impact residents (i.e., odor). • Increasing lagoon footprint would require cultural heritage resource screening to determine potential for archaeological resources, built heritage resources, and cultural heritage landscapes and could result in potential impacts to these resources. • Future land use will be affected for areas surrounding the expanded lagoon site.	• The STS could accommodate future wastewater flows anticipated in the Master Plan timeframe. • No impact anticipated with respect to land use planning, cultural heritage resources (including archaeological resources, built heritage resources, cultural heritage landscapes), source water protection, as project is contained within the existing site boundary.	• The mechanical plant could accommodate future wastewater flows anticipated in the Master Plan timeframe. • No impact anticipated with respect to land use planning, cultural heritage resources (including archaeological resources, built heritage resources, cultural heritage landscapes), source water protection, as project is contained within the existing site boundary.
Evaluation	**Least Preferred**	**Preferred**	**Preferred**
Technical Feasibility	• Consultation with the MECP has confirmed the feasibility of maintaining discharge window and increasing effluent flow rate. • The storage solution can be affected by climate change (i.e., increased extreme weather events) and the Municipality runs the risk of insufficient storage. • For growth beyond the long-term (2047), additional storage will still be required. • This alternative represents inefficient use of the site with respect to the future wastewater flows.	• Consultation with the MECP has confirmed the feasibility of expanding discharge window and allowing the lagoon to discharge year-round. • This alternative involves the least construction and most efficient use of the existing infrastructure.	• A mechanical treatment plant will provide improved wastewater treatment compared to a lagoon STS for the same footprint. • The operations staff will need to be trained to operate and maintain a more complicated, new treatment system. • The level of treatment will be comparable to Alternative 2b.
Evaluation	**Less Preferred**	**Preferred**	**Less Preferred**
Financial Considerations	• Municipality will have to purchase new lands to expand the lagoon footprint. • Capital costs will include expanding the lagoon and construction, operation and maintenance of new treatment trains.	• Capital costs will include installation of new Disc Filters, disinfection, coagulant system, and improve flow path within the existing lagoon cells. • O&M costs will involve increased costs for the new treatment process and increased flow. • O&M costs for the MBBR system will likely remain the same.	• Capital costs could include decommissioning the lagoon STS and constructing a new mechanical treatment plant. • There will be significant increase to O&M costs to run the new STS facility with additional processes.
Evaluation	**Less Preferred**	**Preferred**	**Least Preferred**
Overall Evaluation	**Less Preferred**	**Preferred**	**Least Preferred**

3.2.5 Preferred Solution for the Upgrade of the Casselman STS

Following the evaluation of alternatives, the recommended preferred solution was **Alternative 2b – Maintain Lagoon-Based Treatment System; Expand Lagoon Rated Capacity; Expand Lagoon Discharge Window to Year-Round**. The proposed solution would involve:

- Maintaining existing lagoon storage and treatment facilities and improve flow path within the existing lagoon cells.
- Maintaining existing MBBR treatment process and its rated capacity.
- Provision of a second Disc filter to provide redundancy.
- Provision of a coagulation chamber to provide a secondary point of coagulant dosing, to ensure that all reactive phosphorus is precipitated into particulate form prior to filtration.
- Provision of a disinfection system to provide disinfection of effluent.
- Construction of a new building to house the disc filters and chemical systems.

3.2.6 Opinion of Probable Cost

An Opinion of Probable Cost (OPC) of $9,000,000 was provided as part of the Master Plan for the proposed STS upgrades, including completion of EA, design and construction. The following disclaimer was included:

It shall be noted that the OPC was completed using 2023 dollars value. An OPC with a Class 'D' (Indicative Estimate) level of accuracy was developed and includes allowances for design elements that have not fully been developed. Class 'D' OPCs developed for this assignment are expected to be within +/- 30%. The OPCs were developed based on experience on similar projects, professional judgment, and equipment costs provided by suppliers. The preferred solution developed is conceptual in nature for the purpose of obtaining Class 'D' cost estimates. All design parameters were noted to be confirmed during the Class EA and detailed design. Any provided estimate of costs or budget is an OPC that is based on historic construction data and does not include labour, material, equipment, manufacturing, supply, transportation or any other cost impacts in relation to COVID-19. JLR shall not be responsible for any variation in the estimate caused by the foregoing factors but will notify the Municipality of any conditions which JLR believes may cause such variation upon delivery of the estimate.

4.0 Phase 3: Development of a Preferred Design Concept

4.1 Design Basis Summary

A summary of the preferred solution developed during the Master Plan process is provided in Section 3.2.5, and a summary of the approved design criteria to be met by the proposed upgrades is provided in Table 9, Table 10 and Table 11. This information and the projected long-term (2047) future average flow of 4,050 m^3/day (Table 6) formed the design basis for the development of alternative design concepts to accommodate long-term (2047) development. Table 13 and Table 14 show the differences between the existing and proposed discharge criteria. As previously noted, the existing system is comprised of a MBBR for Total Ammonia Nitrogen (TAN) and Biological Oxygen Demand (BOD) removal, and an Alum dosing system and Disc Filter for Total Suspended Solids (TSS) and Total Phosphorous (TP) removal. Currently, although there is a design objective of 100 CFU/100 mL for *E. coli*, it is not enforced.

Table 13: Existing and Proposed Effluent Criteria.

PARAMETER	AVERAGING PERIOD	EXISTING (1)		PROPOSED	
		OBJECTIVE	LIMIT	OBJECTIVE	LIMIT
$cBOD_5$					
Jan 1 to May 15	Monthly	15 mg/L	25 mg/L	10 mg/L	12 mg/L
May 15 to Sep 30	Monthly	N/A	N/A	10 mg/L	12 mg/L
Oct 1 to Dec 31	Monthly	10 mg/L	15 mg/L	10 mg/L	12 mg/L
TSS					
Jan 1 to May 15	Monthly	15 mg/L	25 mg/L	10 mg/L	12 mg/L
May 15 to Sep 30	Monthly	N/A	N/A	10 mg/L	12 mg/L
Oct 1 to Dec 31	Monthly	10 mg/L	25 mg/L	10 mg/L	12 mg/L
TP	Monthly	0.8 mg/L	1.0 mg/L	0.2 mg/L	0.3 mg/L
TAN					
Jan 1 to Mar 31	Monthly	12.0 mg/L	12.0 mg/L	9.2 mg/L	11.5 mg/L
Apr 1 to May 15	Monthly	6.0 mg/L	6.0 mg/L	4.8 mg/L	6.0 mg/L
May 15 to May 31	Monthly	N/A	N/A	4.8 mg/L	6.0 mg/L
Jun 1 to Sep 30	Monthly	N/A	N/A	1.0 mg/L	1.3 mg/L
Oct 1 to Nov 30	Monthly	5.0 mg/L	5.0 mg/L	4.0 mg/L	5.0 mg/L
Dec 1 to Dec 31	Monthly	12.0 mg/L	12.0 mg/L	9.2 mg/L	11.5 mg/L
E. coli	Monthly	100 CFU/100 mL	200 CFU/100 mL	150 CFU/100 mL	200 CFU/100 mL
Hydrogen Sulphide					
Jan 1 to May 15	Monthly	0.1 mg/L	0.1 mg/L	N/A	N/A
Oct 1 to Dec 31	Monthly	Not Detected	Not Detected	N/A	N/A
pH	Single Grab	6.8 to 7.8	6.0 to 8.0	6.8 to 7.8	6.0 to 8.0

Notes:
(1) Per ECA No. 8160-BAHPRF (April 19, 2019).

Table 14: Existing and Proposed Maximum Daily Discharge Rates.

MONTH	EXISTING (1)		PROPOSED	
	MAXIMUM DAILY DISCHARGE RATE	MINIMUM DILUTION RATIO	MAXIMUM DAILY DISCHARGE RATE	MINIMUM DILUTION RATIO
January	5,000 m^3/d	SNR Flow/10	5,750 m^3/d	SNR Flow/12.4
February	5,000 m^3/d	SNR Flow/10	5,600 m^3/d	SNR Flow/12.4
March	5,000 m^3/d	SNR Flow/40	7,250 m^3/d	SNR Flow/12.3
April	7,000 m^3/d	SNR Flow/60	10,000 m^3/d	SNR Flow/72.9
May 1-15	7,000 m^3/d	SNR Flow/60	4,500 m^3/d	SNR Flow/40.5
May 16-31	N/A	N/A	4,500 m^3/d	SNR Flow/40.5
June	N/A	N/A	2,150 m^3/d	SNR Flow/26.2
July	N/A	N/A	1,050 m^3/d	SNR Flow/26.2
August	N/A	N/A	900 m^3/d	SNR Flow/26.3
September	N/A	N/A	910 m^3/d	SNR Flow/26.2
October	4,000 m^3/d	SNR Flow/15	2,250 m^3/d	SNR Flow/13.1
November	4,000 m^3/d	SNR Flow/10	6,050 m^3/d	SNR Flow/13.1
December	5,000 m^3/d	SNR Flow/15	8,750 m^3/d	SNR Flow/12.4

Notes:
(1) Per ECA No. 8160-BAHPRF (April 19, 2019).

4.2 Review of Treatment Technologies

To develop alternative design concepts to meet the design objectives previously identified, treatment technology suppliers were consulted, and treatment options were reviewed in more detail. This review is summarized in this section.

4.2.1 TAN and BOD Removal

During the Assimilative Capacity Study, the supplier of the existing MBBR noted that the difference in effluent discharge requirement would have minimal influence on the reactor sizing. The supplier identified the Spring discharge as the most stringent design condition, where the water temperature is low and the maximum flow conditions could reach 10,000 m^3/day, and noted that the existing MBBR would be able to perform under this condition. Through additional consultation with the supplier during Phase 3, the upgrades proposed by the supplier to ensure the TAN and BOD effluent objectives could be met included the following:

- **Increase of aeration capacity by replacing the existing three (3) 25 HP blowers and associated variable frequency drives (VFDs) with three (3) 40 HP blowers and associated VFDs.** The supplier noted that the increased aeration capacity was required to allow for increased mixing during winter and to supply sufficient oxygen during high ammonia events. The supplier confirmed that the 40 HP blowers have the same footprint as the existing blowers and would therefore not require additional building space. It is noted that the existing building housing the blowers includes space for a fourth blower, which would not be utilized as part of the proposed upgrades. This allows for potential future additional expansion of the aeration capacity in the STS.

- **A direct connection between Cell 'A' and the outlet of Cell 'C' or the MBBR inlet.** This connection is noted to be required to maintain MBBR biomass active during the summer months, when nitrification is likely achieved prior to reaching the MBBR. The likeliest solution to provide this connection is to install a small pipe directly from Cell 'A' to one of the maintenance holes between Cell 'C' and the diversion chamber. This will need to be reviewed in more detail during detailed design.

- **The addition of floating baffles in Cell 'A' and Cell 'B'.** This is proposed to prevent short-circuiting within the facultative cells and ensure more consistent and reliable pre-treatment prior to the MBBR.

As a result of these discussions, which identified that the existing MBBR, along with the identified associated upgrades, could meet the long-term treatment requirements, no alternative treatment technologies were reviewed for TAN and BOD removal. In the future, should additional upgrades be required to improve TAN and BOD removal, other alternatives such as additional aerated lagoons or in-lagoon modular treatment units (e.g., Ecofixe/Biofixe, etc.), may be explored.

The following is the only alternative that was carried forward for TAN and BOD removal:

1. Utilize existing MBBR system and complete the following associated upgrades:
    a. Increase aeration capacity by replacing existing blowers and VFDs.
    b. Install a direct connection between Cell 'A' and the MBBR to maintain MBBR biomass during summer months.
    c. Install floating baffles in Cell 'A' and Cell 'B' to minimize short-circuiting upstream of the MBBR.

4.2.2 TSS and TP Removal

The existing facility utilizes coagulation (Alum injection into the Main SPS forcemain) and a tertiary disc filter located downstream of the MBBR to achieve design objectives of 10-15 mg/L TSS and 0.8 mg/L TP. Disc filters are generally defined as a polishing treatment technology used for the removal of TSS and TP. There are many filters available on the market. One type of filter that is commonly used in combination with lagoon-based biological treatment systems is the disc filter, which are available from various suppliers. Disc filters consist of submerged or partially submerged cloth mesh discs. They are typically combined with coagulant and flocculant dosing to provide high levels of TP removal.

As part of Phase 3 of the EA, the supplier of the existing Disc Filter was consulted to confirm if any upgrades were required to achieve the long-term (2047) effluent TSS and TP requirements. Due to stricter effluent concentration requirements for TSS and TP, the increasing discharge flow and introduction of summer discharge, the supplier noted that an additional disc filter operating in parallel to the existing disc filter, and a coagulation/flocculation system located directly upstream of the disc filters would be required to meet long-term (2047) treatment requirements for TP and TSS. In addition, the supplier noted that the existing disc filter should be upgraded with an automated high-pressure cleaning system to enhance the cleaning of the filter panels during periods of elevated TSS and algal blooms. The additional disc filter was noted to be required as backup most of the time, and for parallel operation under the following scenarios:

- Q <= 7,000 m3/day and normal influent concentrations → 1 duty + 1 backup
- Q <= 7,000 m3/day and high solids / algae → Both running at half flow
- Q > 7,000 m3/day and normal influent concentrations → Both running at half flow

To achieve an effluent TP concentration of 0.2 mg/L, the disc filter supplier indicated that a coagulation/flocculation system was required. A prefabricated coagulation/flocculation tank, a chemical dosing system with dosing pumps for coagulant and flocculant, and a polymer automatic preparation system were proposed by the supplier. The process of coagulation and flocculation work together to increase the overall size of particulate matter to facilitate removal via settlement or filtration. Coagulation/flocculation tanks may vary in material, but their main function is to allow contact time for chemical dosing. For the process to take place, two (2) separate tank sections were noted to be needed, each with separate chemical dosing. The addition of the coagulation/flocculation system will decrease phosphorus concentrations but will generate more TSS. The implementation of the second disc filter is also necessary to support the increased TSS loading from the implementation of this system.

Another option for TP removal is participation in the Total Phosphorus Management (TPM) program, currently managed by the South Nation Conservation (SNC) authority. The TPM program approach is based on a broader view of pollution control that relies on the improvement

of water quality by reduction of non-point source phosphorous loads. The TPM approach requires a 4:1 offset ratio; meaning 4 kg of non-point source phosphorus (measured as TP) must be removed annually for every 1 kg of phosphorus contributed annually by point sources (e.g., sewage treatment system). The one-time fee paid by municipalities at the time of system upgrade is invested in capital projects that will contribute to reduce the total phosphorus loading to the South Nation River. The total cost of participating in the program is based on the program fee at the time of system upgrade. This fee was identified as $585.00/kg offset in 2025. The fee paid by municipalities is based on any additional loading discharged from the STS resulting from the upgrades, beyond what the MECP deems is the maximum allowable loading to the river. It is noted that the current rated TP loading from the Casselman STS is 770.15 kg/year. As part of the Environmental Compliance Approval (ECA) process, the Municipality would have to set a target for the TP loading and confirm with the MECP the final amount of TP (in kg) to be offset through the program. Written confirmation from the SNC regarding their enrollment in the TPM program would then be required.

To summarize, there are two (2) alternatives that were carried forward as options for TSS and TP removal:

1. Install a second identical disc filter (for parallel operation with existing disc filter) and install a coagulation/flocculation system directly upstream of the disc filters for enhanced TP removal.
2. Install a second identical disc filter (for parallel operation with existing disc filter) and participate in the TPM program for reduction of TP via non-point sources.

4.2.3 Disinfection for E. Coli Removal

Disinfection is a requirement due to the implementation of an enforced E. Coli limit and objective. Based on discussions with the MECP, the E. Coli criteria are applicable for all months of the year, and not only during the summer months. There are various disinfection methods available, but chlorination/dechlorination and ultraviolet (UV) disinfection are the two most common methods used for municipal wastewater treatment. Disinfection is proposed to be implemented downstream of the disc filters as a final treatment process before discharge to the South Nation River.

Chlorine disinfection is the process which uses chlorine to kill or deactivate pathogenic microorganisms in wastewater. Chlorine can be introduced as a gas, hypochlorite solution or other chlorine compounds in solid or liquid form. Chlorine is an effective disinfectant and its use as a wastewater treatment technology is well established. Some advantages for using chlorine disinfection include cost effectiveness (where dechlorination is not required), residual chlorine in effluent wastewater can prolong disinfection, flexibility in dosing control, elimination of certain noxious odours during disinfection, and its effectiveness against a wide spectrum of pathogenic organisms. Disadvantages include the potential requirement for dechlorination given that chlorine residual is toxic to aquatic life, generation of disinfection byproducts that may be more harmful, and resistance of microorganisms to low chlorine doses. Dechlorination is the process for removing residual chlorine following chlorination. Removing residual chlorine reduces the toxicity from the chlorination process before it is discharged to the environment. Common chemicals that have been used for dechlorination include sulfur dioxide, sodium bisulfate, and sodium metabisulfite.

UV Disinfection is the physical process where UV radiation is used to inactivate or destroy the genetic material of microorganisms to prevent them from reproducing. The process takes place inside a reactor. Its effectiveness is dependent on the concentration of colloidal and particulate contents in the wastewater, the intensity of UV radiation, exposure time between microorganisms and UV radiation, and the type of reactor. The advantages for using UV include its ease of operation, short contact time, no residual effects, no chemical requirements given it's a physical process, and its small footprint requirement. Disadvantages include ineffectiveness from inadequate dosage, microorganisms can sometimes repair themselves, and TSS and turbidity in wastewater may impact its effectiveness.

Based on a high-level review of the technologies and discussions with operators, UV disinfection was selected as the preferred disinfection method due to its reduced spacing requirements, ease to implementation with the existing system, ease of operation and control, no generation of disinfection byproducts, no post-treatment residuals, no requirement for additional chemicals, and competitive costing when compared to chlorination/dechlorination system. In addition, with the implementation of a second disc filter, potential concerns of UV ineffectiveness due to turbidity, especially during summer months, are greatly reduced. The following is the only alternative that was carried forward for E. Coli removal:

1. Install UV system downstream of the disc filters for tertiary disinfection.

4.3 Development of Alternative Design Concepts

This section describes the alternative design concepts developed for evaluation as part of Phase 3, based on the review treatment technologies completed in Section 4.2.

4.3.1 Review of Disc Filter and UV Implementation Options

Based on discussions with disc filter and UV system suppliers, the following has been assumed in reviewing implementation options for the new disc filter and UV system:

- New Disc Filter Unit – Identical to existing, including existing room layout.
- New UV System – Due to existing process hydraulics, will be installed within at-grade or below-grade channels. Fully redundant duty + standby operation. Located downstream of the disc filter unit(s).

Note that the existing Disc Filter Building is a post-disaster building constructed with masonry block and a 4:1 metal gable roof (gable runs north-south). It consists of two (2) main rooms: a disc filter room and a blower room. The blower room is located on the east side of the building; it includes blowers, process air piping, instrumentation panels and other miscellaneous electrical and mechanical equipment. The disc filter room is located on the west side of the building. The disc filter is placed near-grade on the floor slab in the center of the room and there are below-grade sumps on the north and south side of the disc filter for access to valves and piping at the inlet and outlet of the disc filter. The sumps are covered with grating and accessible through access hatches. The room also includes process piping, instrumentation and plumbing.

Based on a review of the drawings of the existing system, three (3) options were developed and reviewed for the implementation of the new UV system and disc filter unit.

4.3.1.1 Option DF1 – Expansion of Existing Disc Filter Building

Refer to Figure 5 for a conceptual drawing of a potential building expansion. From a process perspective, this option provides the simplest integration with the existing STS, as it allows for mirroring of the existing disc filter system and relatively simple yard piping connections and relocations. For the building expansion, the new portion of the building would likely be designed to be structurally independent from the existing building. The existing disc filter building roof, which is a gable roof with an overhang to the side where the building expansion is proposed, would need to be fully demolished and replaced to allow for the building expansion. Equipment or connections currently located on the west wall of the existing building may also need to be relocated. It is expected that to construct the expansion, a portion of the adjacent property (Municipality-owned) would need to be used during construction. It is also possible that, to provide sufficient access and operational clearance, a portion of the adjacent property may need to be annexed permanently; this will not be confirmed until detailed design. It is noted that the Zoning By-law defines the west-adjacent property as a Public Utility installation. The land designation only permits for General Commercial, Mixed Use Industrial, and Institutional but not Development Zone. Therefore, the section potentially required for the placement of the process building would require partial rezoning. Given that the property is owned by the Municipality, it is not expected that re-zoning a portion of this parcel of land would be a concern.

This option is considered feasible and will be carried forward for further evaluation.

4.3.1.2 Option DF2 – Install New Building to the West of the Existing Disc Filter Building

Refer to Figure 6 for a conceptual drawing of a potential new building location to the west of the existing Disc Filter Building. From a process perspective, this option is similar to Option DF1, with slightly longer pipe lengths. From a structural perspective, this option is simpler to design than Option DF1. Although the new building will be separate from the existing building, architecturally, the two buildings will be considered as one for clearance considerations. The main factors dictating the separation distance between the two buildings are the foundations and roof overhangs. A clearance of 5 m between the two exterior façades was chosen based on the assumption that the new building will have the identical building, foundation and overhang designs as the existing (e.g., same building height, same strip foundation depth and same 1.5 m roof overhang). For this option, no significant structural upgrades are anticipated to be required for the existing building. The new building is assumed to have approx. 25% more new building area compared to Option DF1 due to required building services, including electrical, plumbing, etc. This option will require the annexation of a portion of the adjacent snow-dump site; exact portion of land needed will be dependent on access and operational clearance requirements. Refer to the review of Option DF1 for planning considerations.

This option is considered feasible and will be carried forward for further evaluation.

4.3.1.3 Option DF3 – Install New Building to the East of the Existing Disc Filter Building

Refer to Figure 7 for a conceptual drawing of a potential new building location to the east of the existing Disc Filter Building. From a process perspective, this option is not recommended due to the large number of crossings and the inability to rely on the existing system hydraulics, which relies on gravity feed from the MBBR. To make this configuration work, it is likely that one or

(Screenshot from Village of Casselman Lagoon System Upgrades, Drawing C02, "Issued with Addenda Information Added for Convenience", dated April 19, 2019)

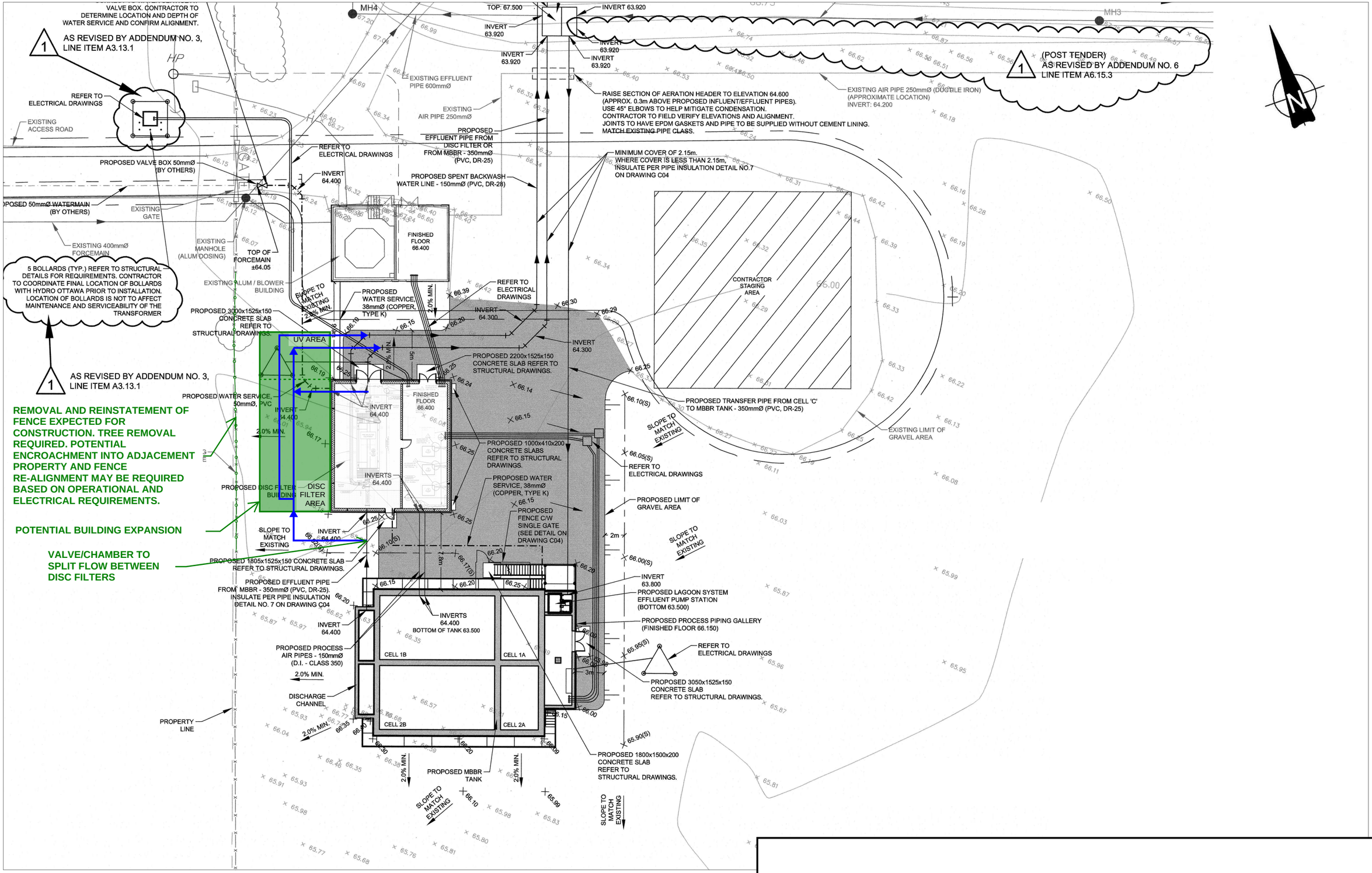


FIGURE 5
REVIEW OF DISC FILTER AND UV IMPLEMENTATION OPTIONS
OPTION DF1 - EXPANSION OF THE EXISTING DISC FILTER BUILDING

(Screenshot from Village of Casselman Lagoon System Upgrades, Drawing C02, "Issued with Addenda Information Added for Convenience", dated April 19, 2019)

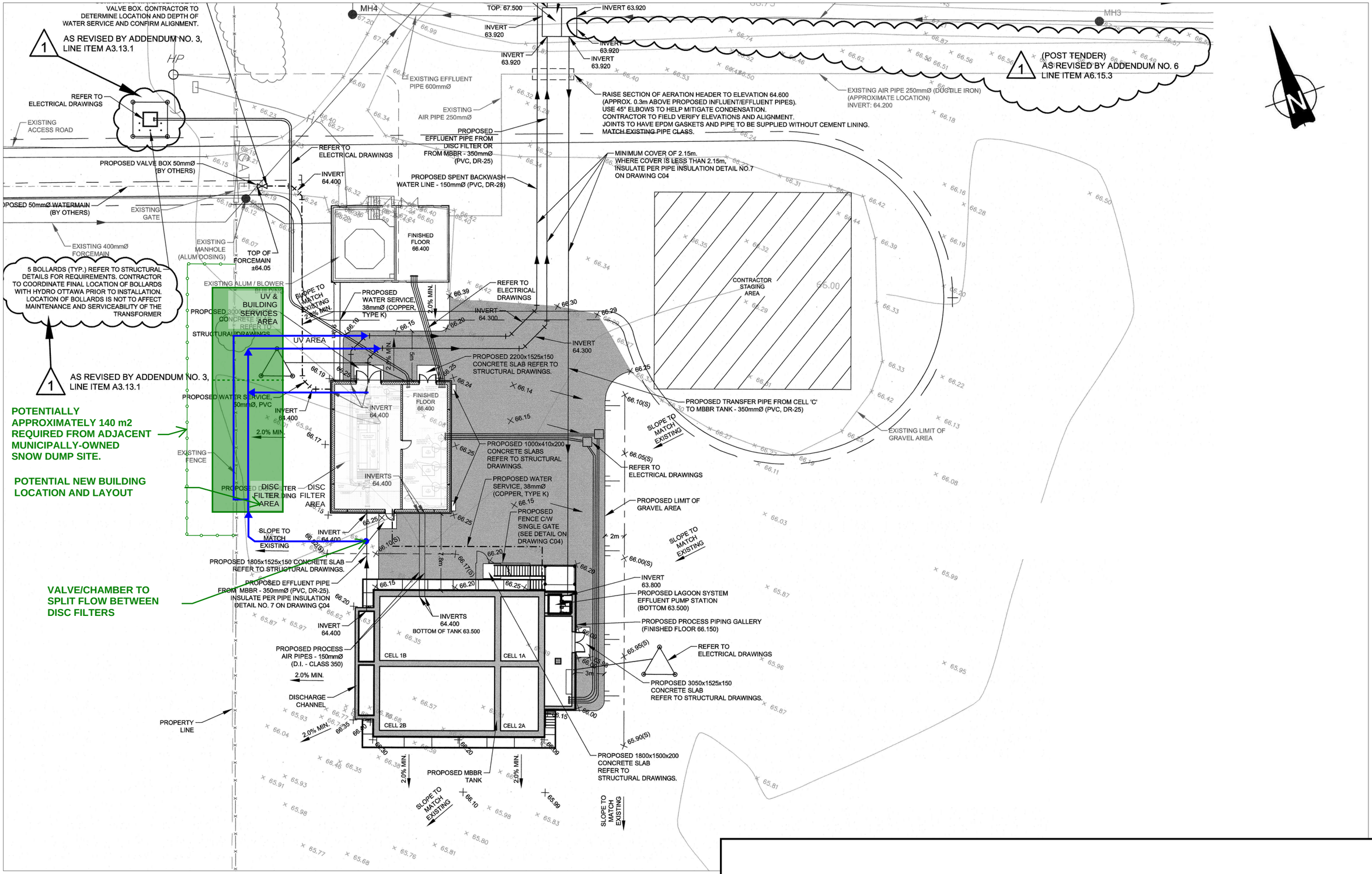


FIGURE 6
REVIEW OF DISC FILTER AND UV IMPLEMENTATION OPTIONS
OPTION DF2 - CONSTRUCT NEW BUILDING TO THE WEST OF THE EXISTING DISC FILTER BUILDING

(Screenshot from Village of Casselman Lagoon System Upgrades, Drawing C02, "Issued with Addenda Information Added for Convenience", dated April 19, 2019)

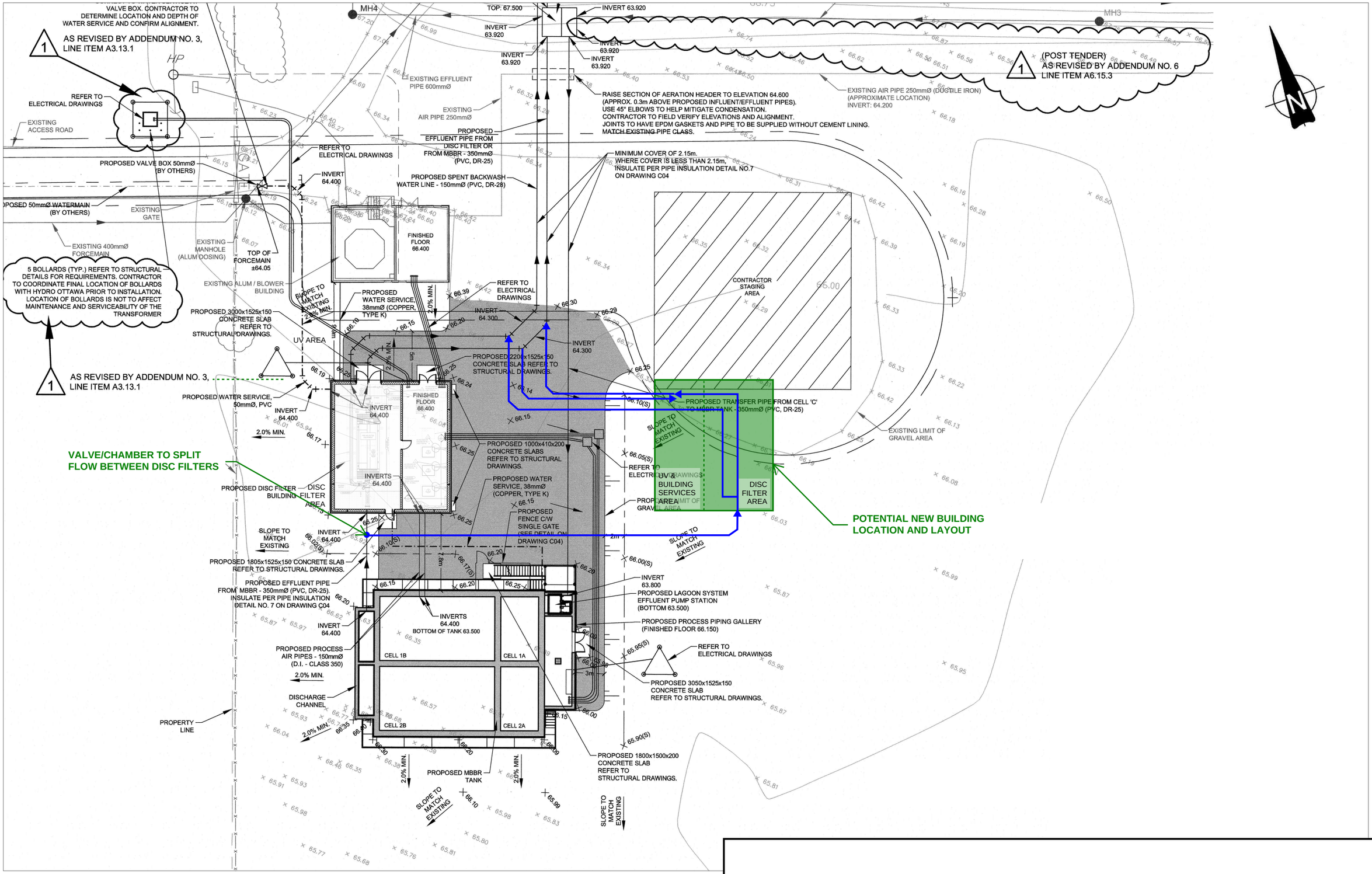


FIGURE 7
REVIEW OF DISC FILTER AND UV IMPLEMENTATION OPTIONS
OPTION DF3 - CONSTRUCT NEW BUILDING TO THE EAST OF THE EXISTING DISC FILTER BUILDING

more intermediate pumping stations, as well as various valve/flow chambers, would need to be constructed. From a structural building design perspective, this option is similar to Option DF2, except that there is more flexibility in terms of building layout given that land use and clearances are not constraints at this location. Given that the building would be located further away from the existing buildings, there is a higher likelihood that the geotechnical conditions differ from those near the existing buildings.

This option may be constructible, but is not recommended, as explained above. This option will therefore not be carried forward for further evaluation.

4.3.2 Review of TP Removal Options

4.3.2.1 Option TP1 – Participation in the TPM Program

As noted in Section 4.2.2, wastewater systems discharging to the South Nation River have the option to participate in the TPM program, which allows for the offset of TP, rather than the removal of TP to levels required b the MECP. To determine the TP loading that is expected to be offset, a review was undertaken to assess the effluent TP that is being achieved by the current system.

The current system relies on alum dosing (to the raw sewage forcemain via a precast alum injection maintenance hole) and a tertiary disc filter for TP removal. The alum dosing system consists of a 30,000 L alum storage tank and diaphragm pump with 290 L/hr capacity. The existing chemical feed system functions on a set speed and must be manually adjusted in accordance with flow rates pumped from the Main SPS. Refer to Table 15 for a review of the TP removal performance of the existing system based on alum dosage. Note that, as noted in Section 2.1.1.2, the Casselman STS only began operating normally in Spring 2022. Data highlighted in yellow indicates that data was calculated/estimated based on available data. Note that alum dosage was not tracked prior to June 2021 and in 2022.

Table 15: Casselman STS - Historical (2021 - 2024) TP Removal Performance

	Influent	Influent	Influent			Effluent
Date	Raw Sewage / Raw Flow for PAR - m³/d	Raw Sewage / Mean Total Phosphorus (TP)	Raw Sewage / Mean Coagulant Dosage (Alum)			Treated Sewage / Mean Total Phosphorus (TP)
Month-Year		mg/L	mg/L	kg/day	L/day	mg/L
May-21	1222	6.40	-	-	-	0.20
Jun-21	1099	8.07	145.6	175.7	142.7	-
Jul-21	1262	6.71	140.0	186.5	151.7	-
Aug-21	1087	5.05	142.6	156.0	127.0	-
Sep-21	1153	4.57	132.9	175.7	143.4	-
Oct-21	1309	5.09	147.4	205.9	168.2	0.35
Nov-21	1509	5.31	150.3	239.7	197.2	0.27
Dec-21	1539	4.63	143.2	228.7	187.6	0.28
Jan-22	1088	8.86	-	-	-	0.23
Feb-22	1181	8.30	-	-	-	0.42
Mar-22	2099	3.11	-	-	-	0.48
Apr-22	2122	5.32	-	-	-	0.47
May-22	1570	6.16	-	-	-	0.25
Jun-22	1398	6.72	-	-	-	-
Jul-22	1204	7.79	-	-	-	-
Aug-22	1337	8.86	-	-	-	-
Sep-22	1359	7.97	-	-	-	-
Oct-22	1099	7.37	-	-	-	0.41
Nov-22	1173	11.30	-	-	-	0.38
Dec-22	1678	6.50	-	-	-	0.43
Jan-23	1557	4.10	175.4	273.0	222.9	0.36
Feb-23	1626	9.14	191.7	311.7	254.5	0.47
Mar-23	1976	6.29	187.7	370.9	302.8	0.36
Apr-23	2305	3.73	191.0	440.3	359.5	0.51
May-23	1546	6.42	162.6	251.4	205.3	0.44
Jun-23	1231	9.22	92.3	113.6	92.7	-
Jul-23	1554	7.24	126.8	197.1	160.9	-
Aug-23	1444	4.06	84.5	122.0	99.6	-
Sep-23	1201	5.17	84.8	101.9	83.2	-
Oct-23	1210	11.40	64.5	78.0	63.7	0.09
Nov-23	1282	9.95	73.1	93.7	76.5	0.08
Dec-23	1738	10.70	63.1	109.7	89.6	0.06
Jan-24	1477	6.21	128.14	189.3	154.5	0.10
Feb-24	1586	4.71	112.90	179.1	146.2	0.20
Mar-24	1937	5.45	86.81	168.2	137.3	0.21
Apr-24	1942	6.52	70.30	136.5	111.4	0.18
May-24	1645	7.40	57.16	94.0	76.8	0.40
Jun-24	1576	5.86	53.23	83.9	68.5	-
Jul-24	1862	5.74	58.61	109.1	89.1	-
Aug-24	1794	5.65	64.94	116.5	95.1	-
Sep-24	1328	6.34	77.10	102.4	83.6	-
Oct-24	1232	4.92	77.56	95.6	78.0	0.20
Nov-24	1159	5.70	78.21	90.6	74.0	0.18
Dec-24	1360	6.18	80.58	109.6	89.5	0.26
Average:	**1479**	**6.64**	**111.1**	**171.2**	**139.8**	**0.30**
Max:	**2305**	**11.40**	**191.7**	**440.3**	**359.5**	**0.51**
Min:	**1087**	**3.11**	**53.2**	**78.0**	**63.7**	**0.06**

This table, along with Table 3 "*Effluent Wastewater Quality (2018-2022)*", show that the existing alum dosing system, with or without the disc filter, has consistently produced an effluent that is below 0.5 mg/L, exceeding the treatment requirements for the existing system (1.0 mg/L limit and 0.8 mg/L objective).

As part of the Master Plan process, upgrades were also proposed for the Main SPS, which conveys all sewage from the municipality to the STS. Scheduled for Spring 2025 to late 2027, the SPS will undergo upgrades to increase its pumping capacity and conveyance to the STS, as well as improve the alum dosing system. Specifically related to the STS, the following upgrades will be completed:

- New 400 mm forcemain to twin the existing forcemain will be installed along a new alignment, discharging to the existing splitter chamber.
- New alum dosing system will be installed with the same dosing capacity as the existing system (doubling overall capacity), but with additional instrumentation that will allow modulating of dosing pumps based on raw sewage flow. Note that no alum storage expansion is proposed as part of the upgrades, increasing the required frequency of chemical deliveries.

Based on the proposed upgrades to the Main SPS, it is expected that alum dosing will become more effective, potentially increasing its effectiveness in removing TP and TSS. The implementation of baffles in the lagoons and an additional disc filter are also expected to improve the effectiveness of TP removal, resulting in potentially lower TP effluent concentration.

Based on a review of the existing TP removal performance, the planned upgrades to the alum dosing system and the addition of baffles, we conclude that the STS should be able to consistently achieve an effluent TP concentration of 0.5 mg/L or lower, with or without the addition of a new disc filter. Based on an average rated capacity of 4,050 m3/day (note that per discussions with the MECP, they do not consider net precipitation in the TP loading calculation) and a TP concentration limit of 0.50 mg/L, a total annual TP loading of 739.13 kg is expected to be discharged from the system at design build-out, 31.03 kg less than the 770.15 kg that is currently allowed to be discharged to the South Nation River. Although 770.15 kg/year is the current annual allowable TP loading, as part of the Master Plan, a more stringent TP limit of 0.3 mg/L was established due to requiring a higher level of treatment to discharge during the summer months. A resulting maximum allowable annual loading of 443.48 kg/year was established as part of the upgrades (note again that net precipitation is not to be considered in this calculation). Using the maximum allowable annual loading of 443.48 kg and a projected TP loading of 739.13 kg, 295.65 kg of TP would need to be offset. Applying the 4:1 offsetting ratio, 1,182.6 kg of TP offsetting credits would need to be purchased to offset the exceedance in TP loading to the South Nation River. Through consultation with the MECP, the MECP were in support of setting a 0.50 mg/L limit for TP if combined with phosphorous offsetting. The estimated one-time cost of offsetting TP would therefore be approximately $692,000, based on the 2025 offsetting unit rate of $585.00/kg TP. It is noted that the MECP would need confirmation in writing from the South Nation Conversation Authority (SNC) indicating that they agree with the Municipality entering the TPM program at the proposed offsetting rates before approving this option.

This option is considered feasible and will be carried forward for further evaluation.

4.3.2.2 Option TP2 – Install a Coagulation/Flocculation System

Refer to Figure 8 for a conceptual drawing of a potential coagulation/flocculation system. Based on discussions with the supplier of the disc filter, it was determined that to achieve an effluent TP design objective of 0.2 mg/L, a coagulation/flocculation system would need to be implemented downstream of the MBBR and upstream of the disc filter(s). A system was proposed consisting of a prefabricated tank with two (2) cells (one for coagulation and one for flocculation) and mixers, a coagulant dosing system with two (2) dosing pumps, a polymer dosing system with two (2) dosing pumps, a coagulant storage tank, an automatic polymer preparation system with liquid base polymer and a liquid polymer storage tank. Based on the existing system hydraulics, the height of the tank and the tank material, it will either need to be installed at grade or partially buried. Depending on the tank material and depth of installation, there will be anti-buoyancy and soil bearing capacity considerations in designing a foundation for the tank. Access is expected via ladders and a platform. Based upon an initial size estimate, there appears to be space within the site to install the coagulation/flocculation tank; however, an expansion of the existing building or a new building will be required for the new coagulant/flocculant storage and dosing systems. We estimate that an additional 40 m^2 of building space may be required, but this is highly dependent on chemical storage capacity.

This option is considered feasible and will be carried forward for further evaluation.

4.4 Development of Preferred Design Concept

4.4.1 Summary of Alternative Design Options

The following is a summary of the alternative design options developed for evaluation.

1. Evaluation for the Preferred TP Removal Design Concept
    a. Option TP1 - Participation in the TPM Program
    b. Option TP2 – Install a Coagulation/Flocculation System. Refer to Figure 8.

2. Evaluation for the Preferred Disc Filter and UV Design Concept
    a. Option DF1 – Expansion of Existing Disc Filter Building. Refer to Figure 5.
    b. Option DF2 – New Building to the West of the Existing Disc Filter Building. Refer to Figure 6.

Note that there will be two (2) different evaluations completed. The first evaluation will be the evaluation for the preferred TP removal design concept, as the preferred TP removal design concept may impact the evaluation of the preferred Disc Filter and UV design concept.

4.4.2 Evaluation Methodology

To facilitate the evaluation and selection of the preferred design concepts, the evaluation process consisted of a review of the alternatives in consideration of the criteria described in Table 16. Certain criteria that may normally be included as Phase 3 evaluation criteria (e.g., ease of operation, proven cold-weather performance, etc.) were not used given that it was anticipated that there would be no difference in the relative impact of the assessed alternative design concepts when evaluated against these criteria.

(Screenshot from Village of Casselman Lagoon System Upgrades, Drawing C02, "Issued with Addenda Information Added for Convenience", dated April 19, 2019)

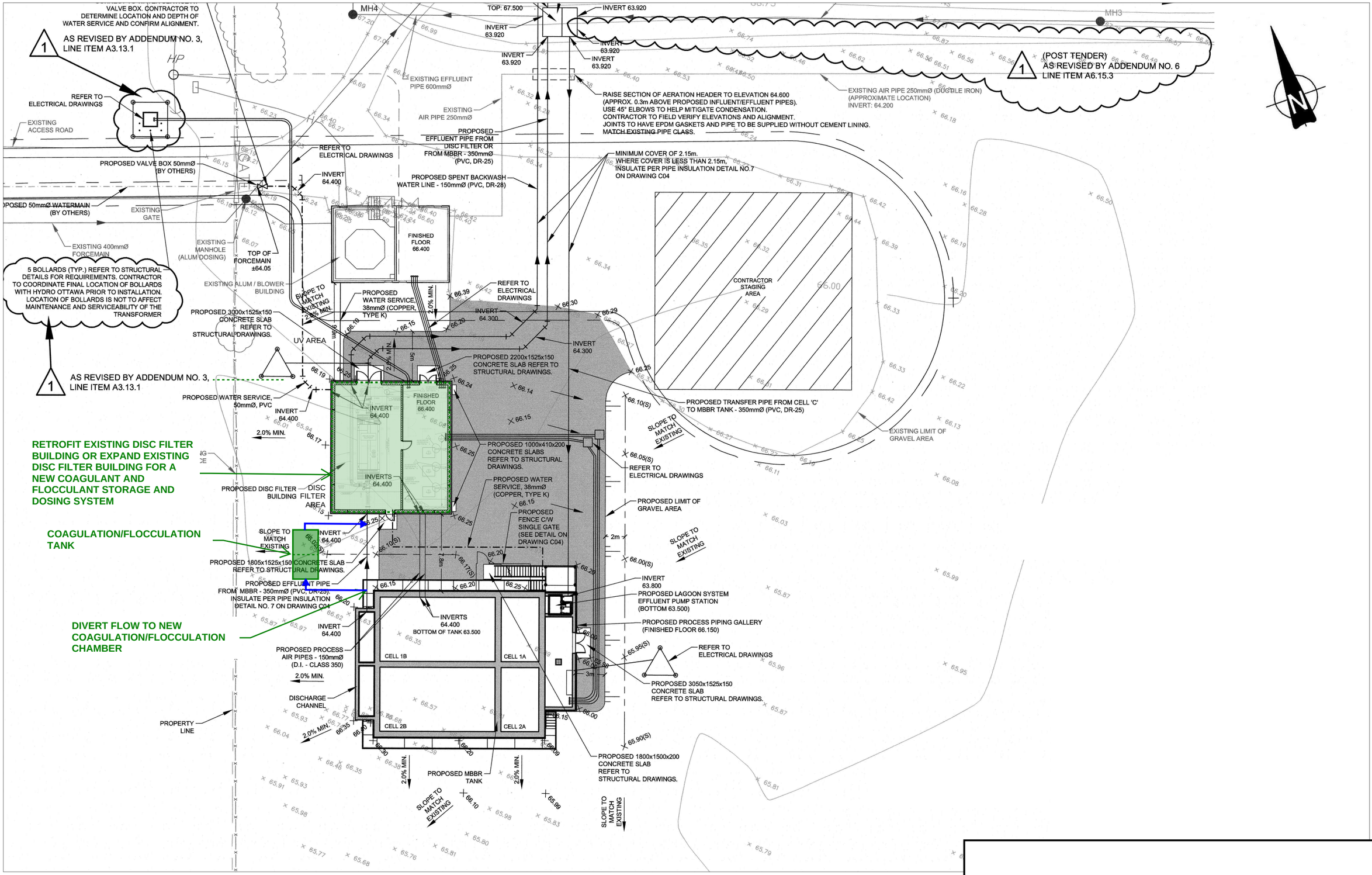


FIGURE 8
REVIEW OF TP REMOVAL OPTIONS
OPTION TP2 - INSTALL A COAGULATION/FLOCCULATION SYSTEM

Table 16: Summary of Evaluation Criteria

Criteria	Description
Natural Environment Considerations	Impact to natural features including natural heritage areas, species at risk, areas of natural and significant interest, designated natural areas, water courses and aquatic habitat.
Social and Cultural Environment Considerations	Impact to social and cultural environment features including residential, commercial and institutional areas, archaeological resources and areas of archaeological potential, known and potential built heritage resources and cultural heritage landscapes.
Impacts on Neighbouring Lands	Construction impacts to adjacent lands, and need for purchase or annexation of land.
Technical Feasibility – Constructability	Ease of connecting to existing infrastructure, ease of construction due to site conditions (geotechnical, hydrogeological, etc.), and ease of sequencing construction of the works.
Technical Feasibility - Expandability	Ease of phasing the proposed upgrades and accommodating additional future upgrade of the system.
Financial Considerations - Capital	Capital cost of the upgrades.
Financial Consideration – O&M	Costs to operate and maintain the works following the upgrades.

Each criterion was assigned a colour to reflect its level of impact relative to other criteria. The relative level of impact for each criterion for each option was then assessed based on the colour weighting system summarized in Table 17. The option that has the least negative impact (or has the strongest positive impact) was recommended as the preferred option. The seven (7) major criteria were assigned equal weights as they were considered to have equal importance.

Table 17: Detailed Evaluation Impact Level and Colouring System

Impact Level	Colour	Relative Impact
Strong Positive Impact	Green	Preferred
Minor Impact	Yellow	Less Preferred
Strong Negative Impact	Red	Least Preferred

4.4.3 Evaluation of Alternative Design Concepts

This section describes the evaluations of the alternative design concepts and the reasoning behind the development of the preferred design concept.

As part of the evaluations, opinions of probable construction cost (OPCC) were developed for the options. Note that the OPCCs are Class D cost estimates, as described below:

- Definition of Work: A description of the option with such supporting documentation as is available (definition of project typically in the order of 1 to 5 percent).
- Intended Purpose: To aid in the screening of alternative potential design concepts prior to recommending a preferred design concept (not intended to establish or confirm budgets).
- Level of Effort: Limited and expected accuracy could range from -30% to +30%.
- Dollar Value: 2025.

These OPCCs has been prepared for concept evaluation purposes from the information available at the time of the estimate. The actual construction cost will depend on actual labor and material costs, competitive market conditions, final project scope, implementation schedule and other variable factors. As a result, the final project cost will vary from the OPCCs presented herein. Because of this, project feasibility and funding needs must be carefully reviewed prior to making specific financial decisions to help ensure proper project evaluation and adequate funding.

Refer to Table 18 for the evaluation matrix used in developing the preferred TP Removal Design Concept and refer to Table 19 for the evaluation matrix used in developing the preferred Disc Filter and UV Design Concept.

Table 18: TP Removal Options Evaluation Matrix.

Criteria	Description	Alternative TP1 Participation in the TPM Program	Alternative TP2 Install a Coagulation/Flocculation System
Natural Environment Considerations	Impact to natural features including natural heritage areas, species at risk, areas of natural and significant interest, designated natural areas, water courses and aquatic habitat.	• Participation in program does not impact natural environment features within or outside the site. • Level of TP treatment will remain the same as the existing system; however, the TPM program will reduce the overall loading of phosphorus to the SNR (through the 4:1 offsetting ratio) by implementing best management practices to reduce phosphorus loading from non-point sources. Reduced phosphorus loading will benefit aquatic life and river water quality.	• Proposed work limits are within the boundaries of the existing site. When considered in combination with Option DF1 and DF2, this option does not add natural environment construction-related impacts. No significant disturbance is anticipated for terrestrial environment. • Increased level of treatment for effluent will benefit aquatic life and river water quality. • No impact to non-point sources of phosphorous.
Evaluation – Natural Environment:		**Equal Impact**	**Equal Impact**
Social and Cultural Environment Considerations	Impact to social and cultural environment features including residential, commercial and institutional areas, archaeological resources and areas of archaeological potential, known and potential built heritage resources and cultural heritage landscapes.	• Given TP is a limiting parameter, the TPM offsetting program will allow the STS to achieve a higher rated capacity, which allows for increased development. • No impacts to surrounding land use, cultural heritage resources, source water protection, or areas of archaeological potential.	• Given TP is a limiting parameter, this new treatment process will allow the STS to achieve a higher rated capacity, which allows for increased development. • Proposed work limits are within the boundaries of the existing site. When considered in combination with Option DF1 and DF2, this option does not provide additional impacts to surrounding land use, cultural heritage resources, source water protection, or archaeological potential.
Evaluation – Social and Cultural Environment:		**Equal Impact**	**Equal Impact**
Impacts to Neighbouring Lands	Construction impacts to adjacent lands, and need for purchase or annexation of land.	• No impacts to neighbouring lands.	• Proposed work limits are within the boundaries of the existing site. When considered in combination with Option DF1 and DF2, this option does not add impacts to neighbouring lands.
Evaluation – Impact to Neighbouring Lands:		**Equal Impact**	**Equal Impact**
Technical Feasibility - Constructability	Ease of connecting to existing infrastructure, ease of construction due to site conditions (geotechnical, hydrogeological, etc.), and ease of sequencing construction of the works.	• No construction required. • Participation in program is based on an established approvals process.	• Established technology that can be integrated into the treatment process rather simply. • Geotechnical conditions on site, which necessitated a specialized foundation for the MBBR, may require a specialized foundation to support the new coagulation/flocculation tank. • Equipment and piping can largely be constructed with minimal impacts to the existing system.
Evaluation – Constructability:		**Preferred**	**Less Preferred**
Technical Feasibility - Expandability	Ease of phasing the proposed upgrades and accommodating additional future upgrade of the system.	• If construction is to be phased, increase in TP loadings to be offset can also be phased, and payment would only be for loading being offset by the current phase of construction. • Offsetting can also be integrated with other phosphorus removal technologies to accommodate increased future demand.	• Treatment process (tanks, chemical dosing) can be designed to be phased and to have operational flexibility. • Process generates additional TSS, which may necessitate the need for a second disc filter earlier than for Alternative TP1.
Evaluation – Expandability:		**Preferred**	**Less Preferred**
Financial Considerations - Capital	Capital cost of the upgrades.	• The Municipality pays a fixed upfront capital cost to enter the program, based on the estimate of annual loading to be offset. Capital investment is expected to be $692,000 for the long-term (2047) upgrades, based on the 2025 offsetting unit rate of $585.00/kg.	• Estimated capital investment of approximately $920,000 (Class 'D' OPCC). • Less capital cost certainty compared to Alternative TP1.
Evaluation – Capital Cost:		**Preferred**	**Least Preferred**

Criteria	Description	Alternative TP1 Participation in the TPM Program	Alternative TP2 Install a Coagulation/Flocculation System
Financial Considerations – O&M	Costs to operate and maintain the works following the upgrades.	• There are no O&M costs of the TPM program. One time fee.	• Higher O&M cost due to chemical and energy usage, and additional equipment to operate and maintain (e.g., mixers, chemical pumps, tanks, etc.).
Evaluation – O&M Cost:		**Preferred**	**Less Preferred**
Overall Evaluation:		**Preferred**	**Less Preferred**

Table 19: Disc Filter and UV Design Concepts Evaluation Matrix.

Criteria	Description	Alternative DF1 Expansion of Existing Disc Filter Building	Alternative DF2 Install New Building to the West of the Existing Disc Filter Building
Natural Environment Considerations	Impact to natural features including natural heritage areas, species at risk, areas of natural and significant interest, designated natural areas, water courses and aquatic habitat.	• Although expansion of building is expected to be limited to the existing site, it is expected that to construct the new building expansion, tree removal along the western boundary of the site will be required. • It is not expected that the replacement of the existing disc filter building roof will have impacts to bird or bat species. • The building options are not expected to have any noticeable difference on effluent water quality.	• New building will require the removal of trees along the western boundary of the site. • The building options are not expected to have any noticeable difference on effluent water quality. • No other impacts to natural environment features are expected.
Evaluation – Natural Environment:		**Equal Impact**	**Equal Impact**
Social and Cultural Environment	Impact to social and cultural environment features including residential, commercial and institutional areas, archaeological resources and areas of archaeological potential, known and potential built heritage resources and cultural heritage landscapes.	• No impacts are expected as proposed location of building expansion and adjacent land are already disturbed.	• No impacts are expected as proposed location of new building and adjacent land are already disturbed.
Evaluation – Social and Cultural Environment:		**Equal Impact**	**Equal Impact**
Impacts to Neighbouring Lands	Construction impacts to adjacent lands, and need for purchase or annexation of land.	• The expansion of the existing building is expected to disturb the adjacent site (potentially new fencing, access to site, etc.) during construction, and may also require the partial annexation of the adjacent land (dependent on building size, access requirements, etc.). It is expected that annexation area would be less than 60 m2.	• New building will require the partial annexation and re-zoning of the adjacent municipally owned snow dump site. An area of approximately 140 m2 is expected to be required. • Construction impacts are expected to be greater than Alternative DF2 given that a larger area of the site is expected to be impacted.
Evaluation – Impacts to Neighbouring Lands:		**Preferred**	**Less Preferred**
Technical Feasibility - Constructability	Ease of connecting to existing infrastructure, ease of construction due to site conditions (geotechnical, hydrogeological, etc.), and ease of sequencing construction of the works.	• Equipment and connections along the west wall of the current disc filter building will likely need to be relocated to accommodate the expansion. • Construction of expansion to existing building is feasible but will require additional effort during the design phase and construction to sequence works such that impacts to current operations are minimized. • Site conditions are expected to be similar between the two alternatives. Specialized foundation is not expected to be required. • Portions of construction may be limited to summer months when facility is not actively operated.	• Building can be constructed separately from the existing system, with impacts only seen during installation of tie-ins to existing infrastructure. • Site conditions are expected to be similar between the two alternatives. Specialized foundation is not expected to be required.
Evaluation – Constructability:		**Less Preferred**	**Preferred**
Technical Feasibility - Expandability	Ease of phasing the proposed upgrades and accommodating additional future upgrade of the system.	• Both options can be similarly included as part of a phasing strategy. • This option may allow for greater future upgrades at the site, given that less land to the west is being used as part of the current expansion.	• Both options can be similarly included as part of a phasing strategy. • This option may allow for a simpler/less complex future upgrades at the site, given that the building is separate from the existing building/process.
Evaluation – Expandability:		**Equal Impact**	**Equal Impact**
Financial Considerations - Capital	Capital cost of the upgrades.	• Capital investment for building of approximately $1.22M (Class 'D' OPCC).	• Capital investment for building of approximately $1.28M (Class 'D' Opinion of Probable Cost).
Evaluation – Capital Cost:		**Equal Impact**	**Equal Impact**
Financial Considerations – O&M	Costs to operate and maintain the works following the upgrades.	• O&M costs are expected to the same with both options.	• O&M costs are expected to the same with both options.
Evaluation – O&M Cost:		**Equal Impact**	**Equal Impact**
Overall Evaluation:		**Equal Impact**	**Equal Impact**

4.4.4 Preferred Design Concept for the Upgrade of the Casselman STS

Following the evaluation of the Disc Filter and UV design concepts, the Municipality noted that their preferred option was Alternative DF1 – Expansion of Existing Disc Filter Building.

The preferred design concept is summarized as follows:

- Increase of aeration capacity by replacing the existing three (3) 25 HP blowers and associated variable frequency drives (VFDs) with three (3) 40 HP blowers and associated VFDs.
- Addition of a pipe connection between Cell 'A' and the outlet of Cell 'C' or MBBR inlet.
- Addition of floating baffles in Cell 'A' and Cell 'B' to prevent short-circuiting.
- Addition of a high-pressure cleaning system on the existing disc filter.
- Addition of a second similar disc filter to be operated in parallel with the existing disc filter. Disc filter will include high-pressure cleaning system.
- Participation in the SNC's TPM program to offset TP loadings that cannot be removed by the proposed treatment system (i.e., removal beyond treatment to TP concentration of 0.50 mg/L).
- Addition of a UV disinfection system downstream of the disc filters.
- Construction of a building expansion to the west of the existing disc filter building to house the new disc filter and UV systems, as well as all building services.
- Potential annexation and re-zoning of a portion of the adjacent property to accommodate building extension.

Refer to Figure 9 and Figure 10 for conceptual site plans of the preferred design concept. A Class D OPCC of $8M was developed for the preferred design concept, as described below:

- Definition of Work: A description of the option with such supporting documentation as is available (definition of project typically in the order of 1 to 5 percent).
- Intended Purpose: To establish a concept-level cost of the proposed long-term (2047) upgrades to the Casselman STS for Municipality planning purposes.
- Level of Effort: Limited and expected accuracy could range from -30% to +30%.
- Dollar Value: 2025.

The OPC was developed based on experience on similar projects, professional judgment, and equipment costs provided by suppliers. The preferred solution developed is conceptual in nature for the purpose of obtaining Class 'D' cost estimates. The actual construction cost will depend on actual labor and material costs, equipment supply and manufacturing, transportation, market conditions, project scope, implementation schedule and other variable factors. As a result, the final project cost will vary from the OPCCs presented herein. Because of this, project feasibility

(Screenshot from Village of Casselman Lagoon System Upgrades, Drawing C01, "Issued for Tender", dated January 18, 2019)

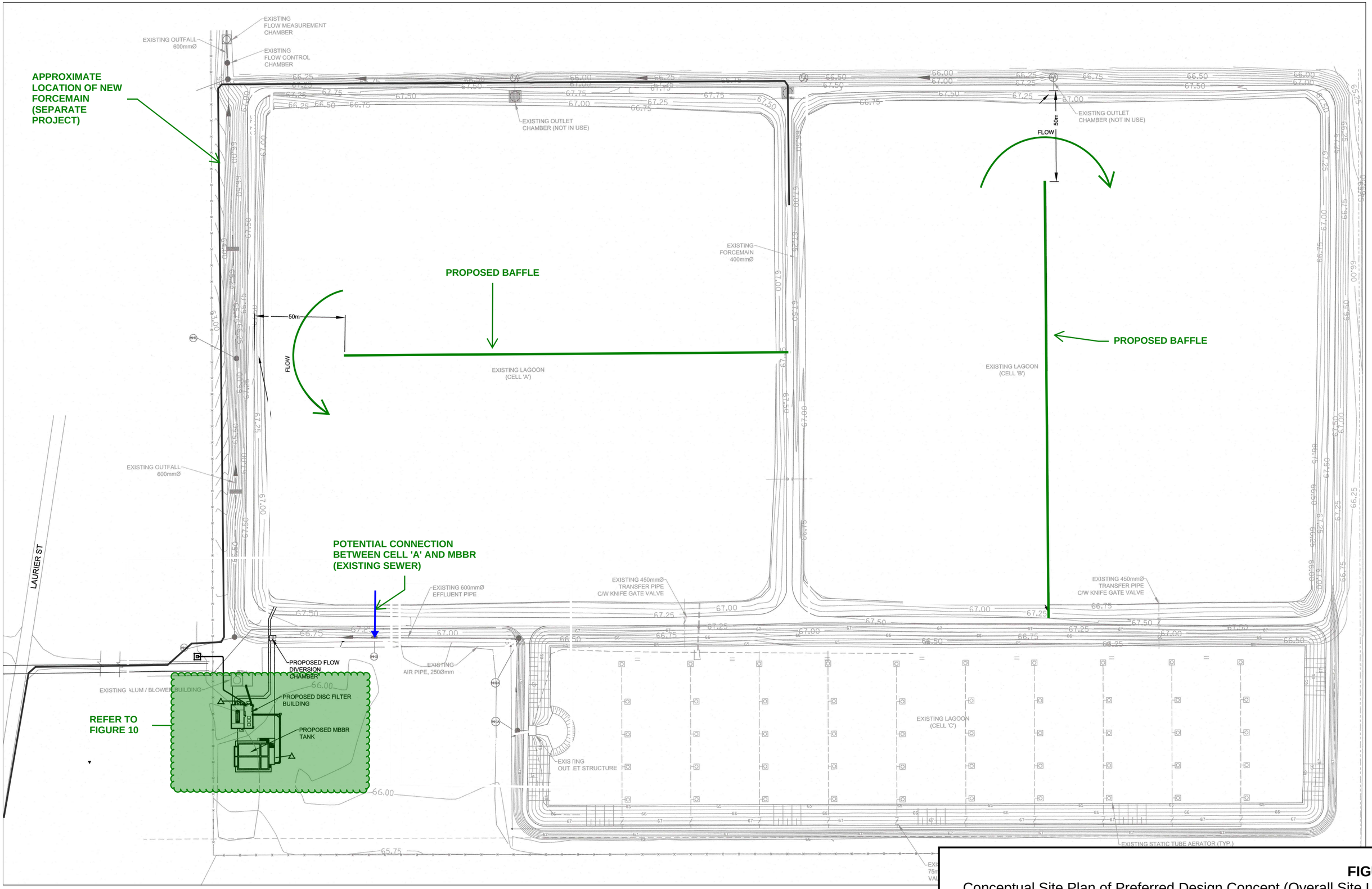


FIGURE 9
Conceptual Site Plan of Preferred Design Concept (Overall Site Layout)

(Screenshot from Village of Casselman Lagoon System Upgrades, Drawing C02, "Issued with Addenda Information Added for Convenience", dated April 19, 2019)

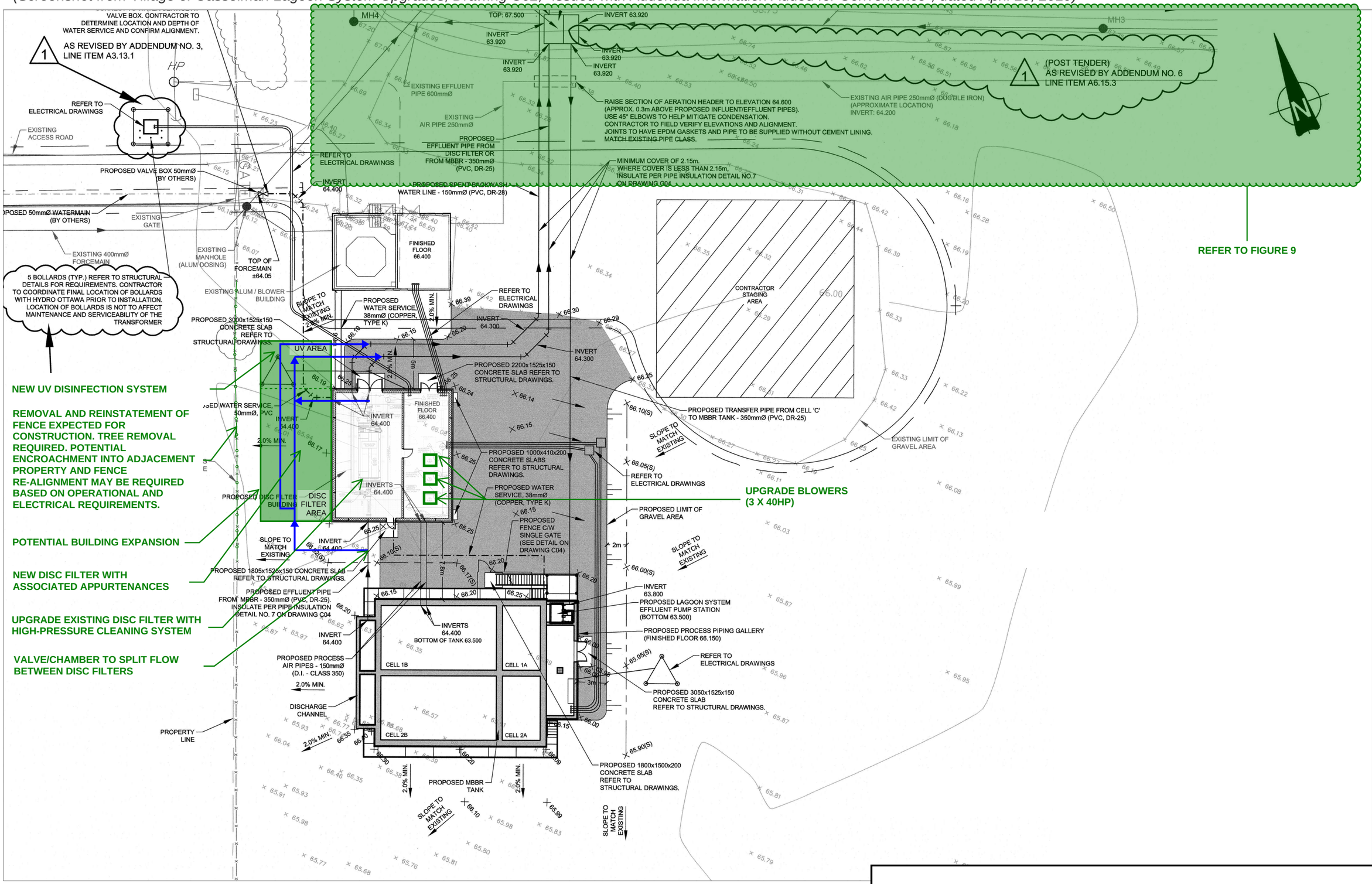


FIGURE 10
CONCEPTUAL SITE PLAN OF PREFERRED DESIGN CONCEPT (BUILDING AREA)

and funding needs must be carefully reviewed prior to making specific financial decisions to help ensure proper project evaluation and adequate funding. JLR shall not be responsible for any variation in the estimate caused by the foregoing factors but will notify the Municipality of any conditions which JLR believes may cause such variation upon delivery of the estimate.

5.0 Potential Phasing of Upgrades

Due to projected funding constraints, the Municipality requested that the proposed upgrades identified in Section 4.0 be phased to provide a more feasible path towards implementation of the upgrades. The ability to phase construction of the upgrades was a consideration in the development of the preferred design concept. A potential two-phase strategy was reviewed during the Class EA. Phase 2 represents the preferred design concept developed in Section 4.0. Phase 1 was developed to provide an interim construction phase in which the rated capacity of the system would be increased without having to complete large-scale upgrades (e.g., new disc filter, significant new infrastructure, etc.). The interim phase would alleviate pressures for municipal development that are hindered by the existing system's capacity.

The approach to developing a Phase 1 rated capacity focused on utilizing the additional capacity enabled by the expanded discharge window and optimizing the treatment capability of the existing system. Phase 1 maximum discharge rates and effluent criteria were developed through consultation with the MECP, OCWA and the supplier of the existing MBBR and disc filter systems. Through discussions with the MECP, it was determined that a phased approach was reasonable, but that the Assimilative Capacity Study (ACS) developed during the Master Plan would need to be revised to support the development of Phase 1 discharge rates and effluent criteria. Blue Sky Energy Engineering and Consulting Inc. (Blue Sky) was retained to complete the revision of the ACS. Prior to the revision of the ACS, consultations with the supplier of the existing MBBR and disc filter systems, as well as with OCWA, were completed.

The below upgrades were recommended by the supplier to establish a Phase 1 rated capacity. It is noted that in addition to these upgrades, a UV disinfection system will also be required as part of the Phase 1 Upgrades to allow for year-round discharge from the system.

- Addition of floating baffles in Cell 'A' and Cell 'B'.
- Addition of a pipe connection between Cell 'A' and the outlet of Cell 'C' or MBBR inlet.
- Increase of MBBR aeration capacity by replacing the existing three (3) 25 HP blowers and associated variable frequency drives (VFDs) with three (3) 40 HP blowers and associated VFDs.
- Upgrade of the existing disc filter's cleaning system to a high-pressure cleaning system. The new system will enhance cleaning of the filter panels during periods of elevated TSS and algal blooms, which can impact treatment capacity.

The supplier also identified system constraints to aid in establishing feasible effluent criteria and a feasible discharge regime. Operational staff were also consulted to ensure the proposed discharge regime and effluent criteria allowed for sufficient storage and operational flexibility. Based on available information, the ACS was revised by Blue Sky to define the maximum achievable effluent loading that the South Nation River could support without causing adverse impacts. This was documented in a memorandum attached to the report as Appendix G1. The memorandum was sent to the MECP for review, who approved the proposed effluent criteria

and maximum monthly discharge rates. Table 20, Table 21, and Table 22 summarize the proposed Phase 1 effluent quality objectives and limits, maximum loadings, and maximum discharge rates and dilution ratios, respectively, as identified in the memorandum.

Table 20: Existing vs. Proposed Phase 1 Effluent Criteria.

PARAMETER	AVERAGING PERIOD	EXISTING (1)		PROPOSED	
		OBJECTIVE	LIMIT	OBJECTIVE	LIMIT
$cBOD_5$					
Jan 1 to Mar 31	Monthly	15 mg/L	25 mg/L	10 mg/L	15 mg/L
Apr 1 to May 15	Monthly	15 mg/L	25 mg/L	10 mg/L	12 mg/L
May 16 to Sep 30	Monthly	N/A	N/A	10 mg/L	12 mg/L
Oct 1 to Nov 30	Monthly	10 mg/L	15 mg/L	10 mg/L	12 mg/L
Dec 1 to Dec 31	Monthly	10 mg/L	15 mg/L	10 mg/L	15 mg/L
TSS					
Jan 1 to Mar 31	Monthly	15 mg/L	25 mg/L	10 mg/L	15 mg/L
Apr 1 to May 15	Monthly	15 mg/L	25 mg/L	10 mg/L	12 mg/L
May 16 to Sep 30	Monthly	N/A	N/A	10 mg/L	12 mg/L
Oct 1 to Nov 30	Monthly	10 mg/L	25 mg/L	10 mg/L	12 mg/L
Dec 1 to Dec 31	Monthly	10 mg/L	25 mg/L	10 mg/L	15 mg/L
TP					
Oct 1 to Apr 30	Monthly	0.8 mg/L	1.0 mg/L	0.25 mg/L	0.35 mg/L
May 1 to May 15	Monthly	0.8 mg/L	1.0 mg/L	0.20 mg/L	0.30 mg/L
May 16 to Sep 30	Monthly	N/A	N/A	0.20 mg/L	0.30 mg/L
TAN					
Jan 1 to Mar 31	Monthly	12.0 mg/L	12.0 mg/L	12.0 mg/L	12.0 mg/L
Apr 1 to May 15	Monthly	6.0 mg/L	6.0 mg/L	4.8 mg/L	6.0 mg/L
May 15 to May 31	Monthly	N/A	N/A	4.8 mg/L	6.0 mg/L
Jun 1 to Sep 30	Monthly	N/A	N/A	1.0 mg/L	1.3 mg/L
Oct 1 to Nov 30	Monthly	5.0 mg/L	5.0 mg/L	4.0 mg/L	5.0 mg/L
Dec 1 to Dec 31	Monthly	12.0 mg/L	12.0 mg/L	12.0 mg/L	12.0 mg/L
E. coli	Monthly	100 CFU/100 mL	200 CFU/100 mL	150 CFU/100 mL	200 CFU/100 mL
Hydrogen Sulphide					
Jan 1 to May 15	Monthly	0.1 mg/L	0.1 mg/L	N/A	N/A
Oct 1 to Dec 31	Monthly	Not Detected	Not Detected	N/A	N/A
pH	Single Grab	6.8 to 7.8	6.0 to 8.0	6.8 to 7.8	6.0 to 8.0

Notes:
(1) Per ECA No. 8160-BAHPRF (April 19, 2019).

Table 21: Proposed Casselman STS Phase 1 Effluent Loading Limits.

PARAMETER	AVERAGING PERIOD	LIMIT (kg/d) [4]
$cBOD_5$	Annual	43.8[1]
TSS	Annual	43.8[1]
TP[2]	Annual	1.12 (410 kg/year)
TAN[3]		
January	Monthly	60.0
February	Monthly	60.0
March	Monthly	60.0
April	Monthly	42.0
May	Monthly	27.0
June	Monthly	2.80
July	Monthly	1.37
August	Monthly	1.17
September	Monthly	1.18
October	Monthly	11.3
November	Monthly	30.3
December	Monthly	60.0

Notes:
1. Based on projected average operating effluent discharge rates (Table 22) and a limit of 15.0 mg/L from Dec 1 to Mar 31 and 12.0 mg/L from Apr 1 to Nov 30.
2. Based on projected average operating effluent discharge rates (Table 22) and a limit of 0.35 mg/L from Oct 1 to Apr 30 and 0.30 mg/L from May 1 to Sep 30. Note that this value was updated following subsequent correspondences with the MECP.
3. TAN loading limits based on proposed maximum discharge rates (Table 22) and limits per Table 20.
4. Limits are based on an average daily flow of 3,316 m^3/day, which represents the rated capacity of 3,019 m^3/day, including net precipitation. Based on discussions with the MECP, permitted loading in the amended Environmental Compliance Approval is to be based on the rated capacity of the sewage works, excluding net precipitation.

Table 22: Proposed Phase 1 Maximum Daily Discharge Rates.

MONTH	PROPOSED	
	MAXIMUM DAILY DISCHARGE RATE	MINIMUM DILUTION RATIO
January	5,000 m^3/d	14.3
February	5,000 m^3/d	13.9
March	5,000 m^3/d	17.9
April	7,000 m^3/d	104.2
May	4,500 m^3/d	40.5
June	2,150 m^3/d	26.2
July	1,050 m^3/d	26.2
August	900 m^3/d	26.3
September	910 m^3/d	26.2
October	2,250 m^3/d	13.1
November	6,050 m^3/d	13.1
December	5,000 m^3/d	27.0

The proposed effluent criteria and discharge rates identified above, together with the proposed upgrades listed below, support an increase in the rated capacity of the system from 2,110 m^3/day to 3,019 m^3/day. This increase in rated capacity will allow the Municipality to exceed their near and mid-term (0-10 years) development projections (2,930 m^3/day), as identified in Table 6, with a residual capacity of 89 m3/day to accommodate long-term development.

- Addition of floating baffles in Cell 'A' and Cell 'B'.
- Addition of a pipe connection between Cell 'A' and the outlet of Cell 'C' or MBBR inlet.
- Increase of MBBR aeration capacity by replacing the existing three (3) 25 HP blowers and associated variable frequency drives (VFDs) with three (3) 40 HP blowers and associated VFDs.
- Participation in the SNC's TPM program to offset TP loadings that cannot be removed by the proposed treatment system (i.e., removal beyond treatment to TP concentration of 0.50 mg/L).
- Installation of UV disinfection system and construction of infrastructure to house new UV system.
- Upgrade of the existing disc filter's cleaning system to a high-pressure cleaning system. The new system will enhance cleaning of the filter panels during periods of elevated TSS and algal blooms, which can impact treatment capacity.

Refer to Figure 11 for a conceptual site plan of the proposed Phase 1 Upgrades. A Class D OPCC of $4.1M was developed for the proposed Phase 1 upgrades, as described below:

- Definition of Work: A description of the option with such supporting documentation as is available (definition of project typically in the order of 1 to 5 percent).
- Intended Purpose: To establish a concept-level cost of the proposed Phase 1 (interim) upgrades to the Casselman STS for Municipality planning purposes.
- Level of Effort: Limited and expected accuracy could range from -30% to +30%.
- Dollar Value: 2025.

The estimated cost of participation in the TPM program for Phase 1 is $415,000, based on offsetting 177.08 kg TP/day.

The OPC was developed based on experience on similar projects, professional judgment, and equipment costs provided by suppliers. The preferred solution developed is conceptual in nature for the purpose of obtaining Class 'D' cost estimates. The actual construction cost will depend on actual labor and material costs, equipment supply and manufacturing, transportation, market conditions, project scope, implementation schedule and other variable factors. As a result, the final project cost will vary from the OPCCs presented herein. Because of this, project feasibility and funding needs must be carefully reviewed prior to making specific financial decisions to help ensure proper project evaluation and adequate funding. JLR shall not be responsible for any variation in the estimate caused by the foregoing factors but will notify the Municipality of any conditions which JLR believes may cause such variation upon delivery of the estimate.

(Screenshot from Village of Casselman Lagoon System Upgrades, Drawing C01, "Issued for Tender", dated January 18, 2019)

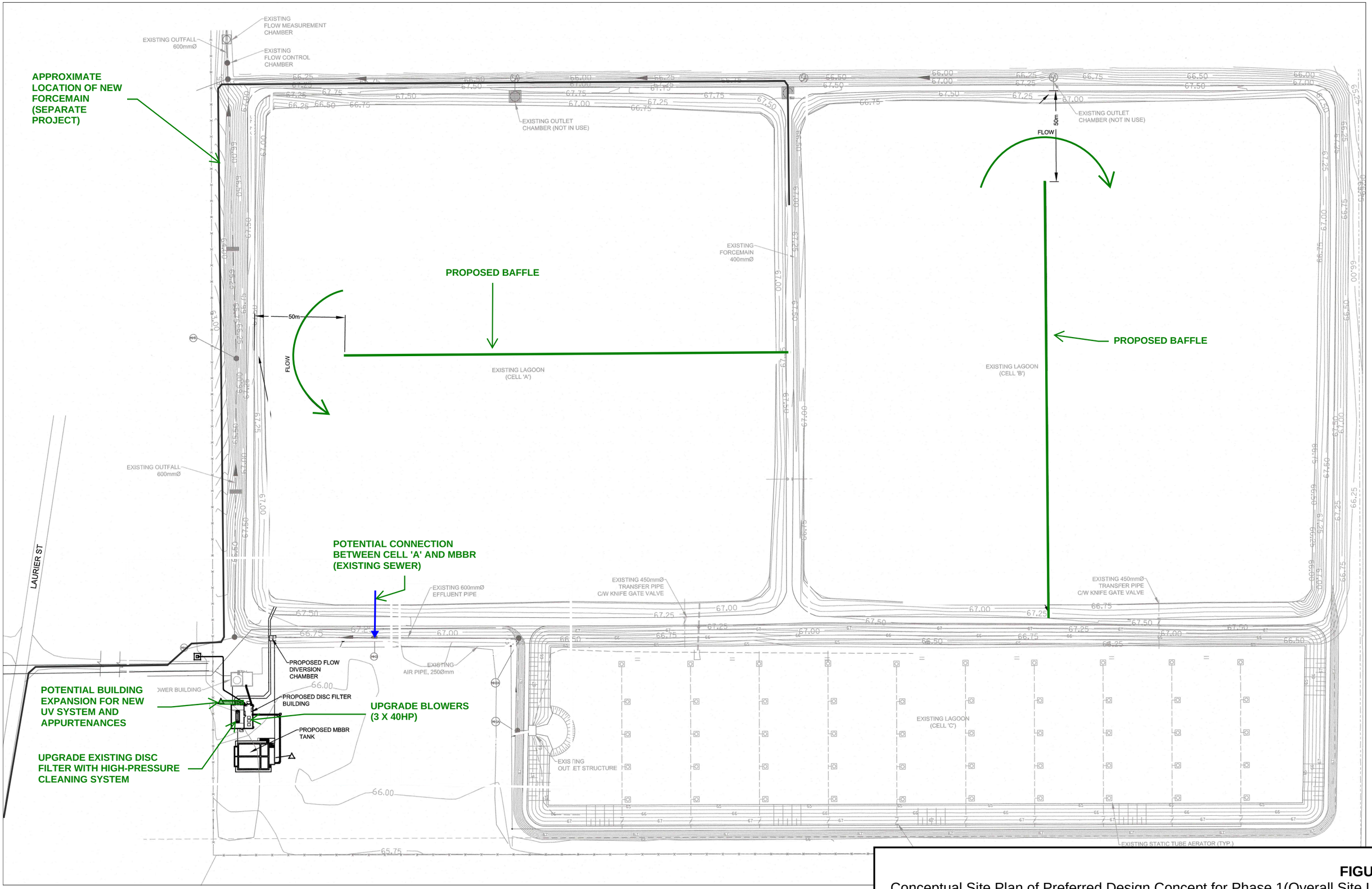


FIGURE 11
Conceptual Site Plan of Preferred Design Concept for Phase 1(Overall Site Layout)

6.0 Potential Impacts and Mitigation Measures

Impact	Mitigation Measure
The Environment	
Climate Change	Climate change mitigation measures reduce the project's impacts on climate change, such as greenhouse gas (GHG) emissions and changes to the landscape that negatively affect its carbon sequestration and storage capacity. The project's GHG emissions can be categorized as operating carbon (emitted during the operation phase) and embodied carbon (emitted during the manufacturing and construction phase). Operating carbon consists of direct emissions from combustion of fossil fuels on site while indirect emissions are from consuming energy (ex. electricity) that was generated from off-site combustion of fossil fuels. Mitigation measures should be reviewed during the design of the upgrades. Climate change adaptation refers to the impact of climate change on a project, i.e., the resilience or vulnerability of infrastructure to changing climatic conditions. Impacts of climate change on wastewater projects include property-specific concerns such as high-intensity rainfall events, flooding and electricity consumption. The design of upgrades should ensure the system has sufficient capacity and treatment ability to handle droughts, high-intensity rainfall events and increased occurrence of power outages.
Ecosystem Protection and Restoration	In general, any construction activities that may impact ecosystem form and function must be avoided where possible. Existing natural environmental features within the study area are detailed in Figure 4. Some ecosystem features of note within or located near the study area include the Coupal Municipal Drain which runs adjacent to the southwestern corner of the Study Area and a tributary of Moose Creek that wraps around the northeastern corner of the Study Area. Both waterbodies are considered fish habitats. Prior to construction, an Environmental Protection Plan should be prepared detailing the appropriate measures needed to protect these watercourses and in general the nearby ecosystem.
Species at Risk (SAR)	Potential for several species at risk were identified in Section 2.1.6. Avoidance and mitigation measures should be implemented to avoid or minimize potential impacts from the proposed upgrades. The measures include but are not limited to the implementation of erosion and sediment control practices; removing vegetation outside of species active season; daily pre-work sweeps of the construction area to ensure no species at risk are present; cease construction activities and contact qualified professional and the MECP for next steps should any SAR be identified on-site. For

	instance, construction activities can be maintained within the existing site boundary or right-of-way to minimize disruption to wildlife habitat; work can be staged to avoid spawning and breeding periods; installation of exclusion fencing around the perimeter of the construction area, etc. Proponents should also review specific mitigation measures identified in Appendix C.
Surface Water	Known surface waters within the Study Area include the Coupal Municipal Drain and Moose Creek Tributary. Measures should be included in the planning and design process to ensure that any impacts to watercourses from construction or operational activities (e.g., spills, erosion, pollution) are mitigated as part of the proposed undertakings. For instance, a stormwater management plan should be developed during the design and implementation stage and sedimentation and erosion control should be implemented during construction. Upgrades to be designed to avoid overflows and direct discharges to the river during non-discharge periods.
Soils Geology	Additional sub-surface information will be required at the site to address specific design features, as well as characterize the geotechnical conditions of the site. Design of upgrades to be based on geotechnical and hydrogeological recommendations. Include erosion and sediment control measures to protect stockpiled material.
Groundwater	The construction of the proposed building or underground infrastructure may require dewatering. Methods for discharging groundwater and water quality objectives to be determined during detailed design. Prevent soil and groundwater contamination by employing measures to avoid spills and leaks. Ensure Contractor has prepared a contingency plan, and appropriate spill containment measures on-hand in case of spills or other accidents. The potential for impacts related to groundwater conditions will be assessed through geotechnical/hydrogeological studies during design phase for the proposed works.
Cultural Heritage Resources	The proponent determined that the study area has low potential for archaeological resources, built heritage, or cultural heritage resources, as described in Section 2.1.8. **Archaeological Resources** Should previously undocumented archaeological resources be discovered, they may be a new archaeological site and therefore subject to Section 48(1) of the Ontario Heritage Act. The proponent

	or person discovering the archaeological resources must cease alteration of the site immediately and engage a licensed consultant archaeologist to carry out an archaeological assessment, in compliance with Section 48(1) of the Ontario Heritage Act. The Funeral, Burial and Cremation Services Act, 2002, S.O. 2002, c.33 requires that any person discovering human remains must cease all activities immediately and notify the police or coroner. If the coroner does not suspect foul play in the disposition of the remains, in accordance with Ontario Regulation 30/11 the coroner shall notify the Registrar, Ontario Ministry of Public and Business Service Delivery, which administers provisions of that Act related to burial sites. In situations where human remains are associated with archaeological resources, the Ministry of Citizenship and Multiculturalism should also be notified (at archaeology@ontario.ca) to ensure that the archaeological site is not subject to unlicensed alterations which would be a contravention of the Ontario Heritage Act. **Built Heritage Resources and Cultural Heritage Landscapes** The design of any proposed upgrades is to avoid any impacts to known or potential built heritage resources and cultural heritage landscapes. Construction staging areas are to be located on lands located well away from any known or potential built heritage resources and cultural heritage landscapes. If during design or construction, there is potential that a built heritage resource or cultural heritage landscape is impacted by the upgrades, a qualified person will be retained to complete cultural heritage report: existing conditions and preliminary impact assessment, which would include the following: • Identification of preliminary potential project-specific impacts on the known and potential built heritage resources and cultural heritage landscapes that have been identified, including a description of the anticipated impact to each known or potential built heritage resource or cultural heritage landscape that have been identified. • Recommended measures to avoid or mitigate potential negative impacts to known or potential built heritage resources and cultural heritage landscapes will be identified. The report will be completed prior to any ground disturbing activities. The proposed mitigation measures are to inform the next steps of project planning and design.

Construction Strategy and Site Management	
Excess Material Management	Projects activities involving the management of excess soil should be completed in accordance with O. Reg. 406/19 and the MECP's current guidance document titled "Management of Excess Soil – A Guide for Best Management Practices" (2014). All waste generated during construction must be disposed of in accordance with Ministry requirements.
Air Quality, Dust and Noise	Good practice measures for noise, dust, odour and emission control and minimization to be employed during construction and operation. Municipal by-laws and provincial regulations for working hours and noise to be followed. Air & Noise study, if required, to be undertaken during design for the implementation of a new backup generator.
Service Disruptions	The system forms part of Casselman's critical infrastructure and should remain fully operational during construction. Currently, there is no discharge during the summer months, there is potential to advance critical components of the upgrades during the summer months to minimize disruptions. Constructability should be further explored during detailed design.
Mitigation and Monitoring	Design and construction reports/plans for the proposed upgrades should be based on a best management approach that centers on the prevention of impacts, protection of the existing environment, and opportunities for rehabilitation and enhancement of any impacted areas. A list of proposed mitigation and monitoring measures should be developed during detailed design.
Public Health	For any spill or emergency condition, provide notice and make appropriate contact with emergency services and potentially affected public and agencies. Good practice measures for noise, dust, odour and emission control and minimization to be employed during construction and operation. Municipal by-laws and provincial regulations for working hours and noise to be followed.
Permits and Approvals	The proposed upgrades may require specific permits and approvals; these will be identified and obtained during the design process. These may include: • Environmental Compliance Approval (ECA) Sewage • Environmental Activity and Sector Registry (EASR) for construction dewatering • Conservation authority permits • Approvals related to the TPM program • Species at risk permits • Building Permit

	• Site Plan Approval • Approvals under the Impact Assessment Act, 2019.

7.0 Master Plan and Class EA Consultation Summary

During the Class EA, various consultation activities were completed relating to the proposed upgrade of the Casselman STS. A Project Initiation Notice was posted on the Municipality's website (www.casselman.ca) on November 28, 2024. Project initiation letters were also distributed directly to potential stakeholders, with an invitation to provide comments if applicable. A Notice for PIC No. 2 (following PIC No. 1 held on April 3, 2024, during the Master Plan) was posted on the Municipality's website (same link provided above) and distributed to stakeholders on June 26, 2025. A PIC was completed on July 10, 2025. A Notice of Study Completion was posted on the Municipality's website (same link provided above) and distributed to stakeholders on March 12, 2026. The ESR will be made available on the website for the 30-day review period, which is planned to end on April 12, 2026. Refer to Appendix A and Appendix B for consultation documentation (e.g., notices, PIC slides, stakeholder responses, etc.) from the Master Plan (Phases 1 and 2 of MCEA process) and Appendix F for the Class EA Consultation Summary.

All comments received during the Master Plan and Class EA, as well as how the comments were addressed, are summarized in Table 23 and Table 24. Table 23 includes a summary of comments from members of the public and Table 24 includes a summary of comments from agencies and Indigenous Communities. Please note that only Master Plan comments relevant to the Casselman STS upgrades are included in these tables.

Table 23: Summary of Master Plan and Class EA Comments from Members of the Public.

Stakeholder	Summary of Comment	Summary of Action
Member of Public	*2025-07-09* – Email received prior to PIC requesting additional information for the upgrade of the wastewater treatment system. Member of public requested confirmation that the Municipality will not impose on additional agricultural lands for additional lagoons.	*2025-07-09* – *E*mail response from the Municipality noting that they do not intend to change the method of treatment and they intend to maintain the lagoon-based system. The response provided clarification for the intent of the PIC to discuss the proposed continuous discharge of treated wastewater that increase the treatment capacity while maintaining the current facilities.
Member of Public	*2025-07-15* – Email received following the PIC to address the following items: 1. Would year-round operation of aerated Cell 3 increase efficiency? 2. Recommended to review existing lagoon to prevent seepage onto adjacent farmlands. 3. Requested that the term "Lagoon Expansion" and "Lagoon Buffer Area" be adjusted so as to not insinuate	1. Year-round aeration in Cell 3 will likely be required to operate the system as intended. Ultimate decision on operation of aeration systems will be by operators. 2. Noted. Based on previous investigations, seepage is not expected to be a concern. 3. Clarification for "Lagoon Buffer Area" is provided in Section

	required expansion onto neighbouring agricultural lands.	3.2.2.1. The term "lagoon expansion" was replaced by "lagoon upgrade" throughout the report.

Table 24: Summary of Master Plan and Class EA Comments from Indigenous Communities and Agencies.

Stakeholder	Summary of Comment	Summary of Action
Ottawa Region Métis Council (ORMC)	*2024-12-01* – J. Dalton provided an email response to the Notice of Commencement indicating that the ORMC does not have issues with the proposal.	N/A
Ministry of the Environment, Conservation and Parks (MECP)	*2023-06-21* – Letter response with preliminary comments in response to the Master Plan Notice of Study Commencement, which included: • List of First Nation and Metis communities to consult; • Instructions on submission of final report; • Attached MECP "Areas of Interest" document; • Attached "A Proponent's Introduction to the Delegation of Procedural Aspects of Consultation with Aboriginal Communities"; • And Attached "Client's Guide to Preliminary Screening for Species at Risk".	Noted and comments were addressed in Table 23 of the Phase 2 Master Plan Report, which provides information on how each identified item from the "Areas of Interest" document would be dealt with as part of the Master Plan; in Section 6.2, for future projects consultation; and the identified First Nation group has been consulted.
	2024-05-10 – Email response to the Notice of Master Plan stating consultation completed for the project appears complete and no further comments for the Master Plan at this time.	Noted, no action.
	2024-12-18 – J. Orpana responded to the Notice of Class EA Commencement identifying that it could be distributed to the indigenous communities. He also noted that the build-out proposed effluent objectives and limits had been approved during the Master Plan.	As part of submission of Phase 1-2 Summary Report, a response email was provided acknowledging comments and identifying updates made to Phases 1 and 2 from the Master Plan.
	2025-02-14 – In response to the Municipality's request (via JLR) to phase the STS upgrades due to funding constraints, J. Orpana acknowledged receipt and noted that a meeting could take place following the review by MECP's Tech Support staff.	N/A

Stakeholder	Summary of Comment	Summary of Action
	2025-02-24 – S. Baxter provided an email response to the Municipality's request (via JLR) to phase the STS upgrades identifying that a revised Assimilative Capacity Study would be required to support the proposed interim effluent limits. She also noted that the proponent would need to provide a written document from the South Nation Conservation Authority indicating that they are agreeable to the Municipality entering the Total Phosphorus Management Program. Following the provision of the documentation, an Engineer from Approvals would review the proposed interim limits.	An email response was provided to the MECP on February 24, 2025, noting that the proponent would work towards preparing an amendment to the Assimilative Capacity Study.
	2025-03-07 – J. Orpana acknowledged receipt of the Phase 1 and Phase 2 Summary.	N/A
	2025-05-23 – J. Orpana acknowledged receipt of JLR's request for a MECP review of the required Total Phosphorous offset for the TPM program. He also noted that V. Castro would be assigning the review task to an alternative MECP reviewer.	N/A
	2025-06-17 – S. Baxter responded to JLR's request to review TP offsetting criteria. It was noted that confirmation for offsetting could not be determined at the time given that an Approvals Branch engineer would need to review the existing system's treatment capability to meet a 0.5 mg/L TP effluent concentration. Further, there was no room relax the previously approved ACS TP effluent concentration limit.	An email response was provided to the MECP on June 19, 2025, requesting to have an engineer from the Approvals Branch review the system's TP performance and clarifying the request to increase TP loading for non-summer months.
	2025-06-25 – S. Baxter noted she would reach out once an engineer from approvals branch was assigned.	N/A
	2025-06-26 – W. Simpson requested editable format of previous data sent to MECP.	An email response was provided on June 26, 2025, with the requested information and clarification on the purpose of the TP assessment.
	2025-07-02 – W. Simpson requested weekly phosphorus data as well as details for the type of sampling. Additionally, details for the existing disc filter, proposed new disc filter, and configuration of baffles were requested.	An email response was provided on July 7, 2025, with the requested information.

Stakeholder	Summary of Comment	Summary of Action
	2025-07-18 – W. Simpson provided a summary for the evaluation of the Casselman Sewage Treatment System's expected performance for Phosphorus removal. It was noted that the existing and proposed works will consistently achieve 0.5 mg/L TP in the treated effluent 95% of the time.	N/A
	2025-11-10 – J. Orpana provided MECP review comments of the updated ACS.	N/A
	2025-12-12 – S. Baxter noted the Ministry is willing to support a TP effluent limit of 0.5 mg/L and annual TP loading of 739.13 kg as the TP assessment outlined that the existing treatment system can achieve a 0.5 mg/L in the treated effluent 95% of the time.	TP offsetting value was updated to reflect the existing system's TP level of treatment. Refer to section 4.3.2.1.
	2025-12-22 – S. Baxter provided additional comments outlining MECP phosphorus offsetting quantities.	An email response was provided on January 7, 2025, requesting reconsideration for the method of calculating total phosphorus offsetting value for phasing of the works.
	2026-01-19 – S. Baxter responded to JLR's response generally agreeing to the revised approach, and identifying that she could review updated calculations if they were sent through.	An email response was provided on January 19. 2026, with updated calculations for review.
	2026-01-22 – S. Baxter responded to JLR, identifying that all calculations appear to be correct.	N/A
Ministry of Natural Resources (MNR)	2023-06-29 – Email confirmation of receipt of Notice of Commencement and the following comment: • "Please contact the local District office at Kemptville.Inforequest@ontario.ca to obtain information regarding permits or authorizations that may be required as a result of the master plan."	Noted and comment has been addressed in Table 23 of the Master Plan Phase 2 report.

Stakeholder	Summary of Comment	Summary of Action
	2024-12-02 – J. Marks provided a letter with information sources to use to consider certain project aspects relevant to the MNR. The letter was provided in response to the Notice of Commencement and generally included: • Provincial Planning Policies • Natural hazards information sources • Fish, Wildlife and Natural Heritage • Oil, Gas and Salt Resources • Mineral Aggregate Resources • Crown Lands, Lakes, River and Forests information sources	As part of submission of Phase 1-2 Summary Report, a response email was provided to the MNR acknowledging comments and information sources provided, and providing information on how each item would be considered as part of the Class EA.
Ministry of Citizenship and Multiculturalism (MCM)	2021-06-24 – Letter response with preliminary comments in response to the Notice of Study Commencement, which included: • Advice on how to incorporate consideration of cultural heritage by outlining the technical cultural heritage studies and the level of detail required to address cultural heritage in master plans. • Instructions on screening for archaeological potential and on determining requirement for archaeological assessment. • Reporting any existing cultural heritage and/or archaeological resources in the master plan area.	Comments were addressed in Section 5.0 of the Phase 2 Master Plan Report.
	2024-01-10 – JLR inquired on archeological potential in the vicinity of the key infrastructure within the municipal boundary. MCM responded with the following: • At this time, there are no known archaeological assessments that have been undertaken specific to this project. • There are two known archaeological sites within the Municipality of Casselman: located approximately 400 m and 600 m from SPS No.6 and SPS No.1.	Noted in Section 5.0 of the Phase 2 Master Plan Report.

Stakeholder	Summary of Comment	Summary of Action
	2024-05-10 – Letter response to the Notice of Master Plan with detailed report comments.	JLR provided a response email back to the MCM on July 2, 2024, noting which comments have been addressed in the Phase 2 Master Plan Report. MCM accepted responses and confirmed that all comments have been addressed and no additional comments or questions at this time (by email on July 4, 2024).
	2025-01-08 – A. Abrazhevich provided a letter with preliminary comments in response to the Notice of Study Commencement, which included: • Instructions on screening for archaeological (land and marine) potential and on determining requirement for archaeological assessment; • Instructions on screening for cultural heritage potential and on determining requirement for an assessment; • Notice that Stage 1 and Stage 2 archaeological assessments had been initiated and instructions to submit the report for issuance of notice of completion. • Instructions on reporting of cultural heritage and archaeological studies should potential be identified.	As part of submission of Phase 1-2 Summary Report, a response email was provided to the MTCS acknowledging comments, and providing information on how each identified item was dealt with as part of the Class EA.
	2025-05-01 – In response to JLR's submission of the Phase 1-2 Summary, A. Abrazhevich provided a response letter, which generally included the following: • Discrepancy between the study area for the Class EA and the study area for the Archaeological Assessment. • Requirement to add more information for the archaeological resources section. • Requirement to add more information for the Cultural Heritage Landscapes and Built Heritage Resources section. • Various other additional analyses and revisions.	An email was sent on May 2, 2025, clarifying that the reports were provided simply for reference, and that they were completed for a separate project whose study area intercepted the current study area. JLR requested a review of MCM's letter, as well as input on how the ESR should be approached based on the above.
	2025-06-17 – In response to JLR's clarification, A. Abrazhevich noted that the ESR should be revised to remove all references and technical studies that are not relevant to the Lagoon EA project.	ESR was revised per MCM's request. Studies for separate project were excluded.

Stakeholder	Summary of Comment	Summary of Action
	2026-04-14 – In response to the Notice of Completion, E. Leclerc provided a list of MCM comments to be addressed in the ESR.	ESR was revised per MCM's comments.
South Nation Conservation (SNC)	*2023-06-13* – Email confirmation of receipt of Master Plan Notice of Commencement and the following comment: "Possibly, once you identify the data needed for your project, please, email a data request to the contact. Data share agreements will be required."	Noted, for future Class EA/ design projects.
	2025-04-28 – In response to JLR's submission of the Phase 1-2 Summary, J. Boyer provided an email requesting an update on the status of the Class EA and Public Information Center.	An email was sent in response on May 12, 2025, providing updates on the Class EA and PIC, as well as requesting feedback on the SNC's Total Phosphorous Management program.
	2025-05-22 – J. Boyer confirmed via email that the TPM program is still active, and the 2025 cost of the program is $585.00/kg.	Information was used in Phase 3 of the Class EA.
	2026-03-30 – JLR met with the SNC on March 30, 2026. Given that distribution of the PIC notice missed the SNC, the meeting was set up to provide SNC with the background of the Class EA and the selected approach for solution. Formal meeting minutes were issued and are included in Appendix F4.	
	2026-04-15 – J. Boyer provided SNC comments in response to the Notice of Completion. It is noted that the majority of comments related to the 2019 ECA.	Email response was provided on June 16, 2026.
Eastern Ontario Health Unit (EOHU)	2024-11-29 – Email for sgardiner@eohu.ca could not be delivered.	No action taken, NOC was also sent to the general intake email info@eohu.ca.
Infrastructure Ontario (IO)	*2024-11-29* – K.H. Automated response.	N/A
Ministry of Tourism, Culture and Gaming (MTGC)	*2024-11-29* – J. Antler. Automated response.	N/A
Ontario Provincial Police	*2026-03-13* – S. Davidson provided an email response to the Notice of Completion requesting that the contact list be updated.	Project mailing list was updated accordingly.
	2024-12-04 – N. Rodaro provided an email response to the Notice of Commencement requesting that the contact list be updated.	Project mailing list was updated accordingly.

8.0 Next Steps and Study Milestones

As described in Section 1.2, upon issuance of the Study Notice of Completion, the public, Indigenous Communities, agencies, and other interested stakeholders will have 30 calendar days to review the Environmental Study Report. This period is followed by a 30-day waiting period to allow the MECP to request or notify proponents of a 'Section 16 Order'. Following the 30-day waiting period, if there are no requests received from the MECP, the project may then proceed to implementation (Phase 5).

The following next steps are recommended for the Municipality in proceeding towards implementation of the preferred design concept:

Prior to Design:

- Confirm design concept to be carried forward to design.
- Confirm phasing approach.
- If proceeding with long-term (2047) upgrades, take the necessary steps to adjust the land use or annex the adjacent property, as required for the construction of the upgrades.

During Preliminary Design:

- Confirm with OCWA MBBR operational issues identified during the Class EA and confirm with supplier solutions to these issues. The following items were noted:
  - Ice build-up/freezing in the MBBRs during colder months.
  - Floating of media and creation of islands during colder months.
  - Foaming within the MBBR at certain times of the year.
- Review the option of re-purposing the existing 25 HP MBBR blowers (proposed to be replaced) for Cell C aeration.
- Undertake consultation with the MECP to finalize WWTS effluent criteria.
- Undertake consultation with the SNC and MECP for the TPM program. Receive confirmation in writing from the SNC pertaining to the Municipality's enrolment of the Total Phosphorus Management Program.
- Undertake detailed geotechnical and hydrogeological investigations at the Site.
- Identify or apply for all necessary permits and approvals for the construction of the upgrades (e.g. amended Environmental Compliance Approval, Permit-to-take Water / Environmental Activity and Sector Registration, Utilities, etc.).

9.0 References

1. United Counties of Prescott and Russell, Adopted Official Plan, 2022.
2. Archaeological Research Associates Ltd. Draft Stage 1 Archaeological Assessment – Casselman Main SPS Upgrades, Municipality of Casselman and Municipality of The Nation Lots 8-10, Concession 6 Geographic Township of Cambridge United Counties of Prescott and Russell Former Russel County. February 4, 2025
3. Archaeological Research Associates Ltd. Draft Cultural Heritage Assessment Report – Casselman Main SPS Upgrades, Municipality of Casselman and Municipality of The Nation Lots 8-10, Concession 6 Geographic Township of Cambridge United Counties of Prescott and Russell Former Russel County. October 23, 2024

4. Golder Associates Ltd. Geotechnical and Hydrogeological Investigation, Casselman Lagoon. December 2018.
5. Metcalf & Eddy, Wastewater Engineering Treatment and Reuse, 4th Edition, 2003.
6. Ministry of the Environment, Design Guidelines for Sewage Works, 2008.
7. City of Ottawa, Ottawa Design Guidelines – Sewer, Second Edition, October 2012.
8. City of Ottawa, Technical Bulletin ISTB-2018-1 – Revisions to Ottawa Design Guidelines – Sewer dated 2012, March 2018.
9. Municipal Engineers Association, Municipal Class Environmental Assessment document, March 2023.

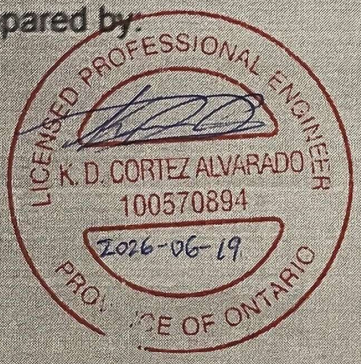
Environmental Study Report (Final after 30-Day Review and Waiting Period)
Schedule 'C' Class Environmental Assessment

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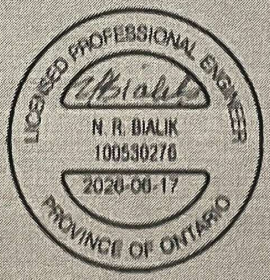
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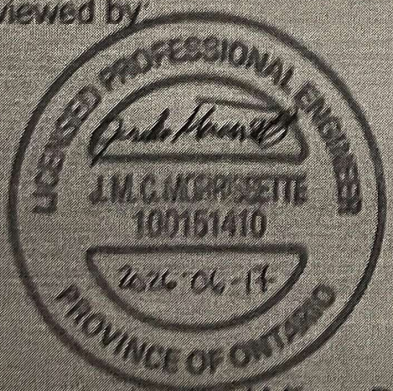
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Appendix A

Phase 1 Report

JLR No.: 16953-118
Revision: Rev 7

January 31, 2024

Phase 1 Report (Final)

Casselman Water and Wastewater Infrastructure Master Plan

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

Value through **service** and **commitment**

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Appendix H Water Model

Appendix I Wastewater Model

1.0 Introduction

1.1 Background

The Municipality of Casselman (the Municipality) initiated a Class Environmental Assessment (Class EA) Study to address treatment, capacity, and condition limitations of its water treatment plant (WTP), elevated water storage tank, water distribution system, wastewater conveyance system, sewage pumping stations and sewage treatment system through the development of a Water and Wastewater Infrastructure Master Plan. This Master Plan is being completed in accordance with the Municipal Engineers Association (MEA) Class EA Approach 1 master planning process. The ultimate objective of the Master Plan is to develop a strategy to accommodate future growth within the Municipality for the next 25 years that can be implemented in a prioritized fashion to improve the overall performance and reliability of the water and wastewater system.

The Municipality is located along Highway 417 on the South Nation River and borders the Municipality of the Nation. The Municipality is serviced by a water distribution system, consisting of the water treatment plant (WTP), elevated water storage tank, and over 22 km of watermains. The Casselman WTP has a rated capacity of 3,182 m^3/day, is owned by the Municipality and operated by the Ontario Clean Water Agency (OCWA). This facility is operated under the Ministry of the Environment, Conservation and Parks (MECP) Drinking Water License Number 173-101 and Drinking Water Works Permit No. 173-201. It provides conventional treatment through an Actiflo ® treatment system, dual media filtration, and disinfection. Additionally, raw water is treated with potassium permanganate during the summer months when influent manganese concentrations are elevated.

The Municipality is serviced by a wastewater collection system consisting of sewage treatment system (STS), six (6) sewage pumping stations (SPS), and over 30 km of sanitary sewers. The Casselman STS has a rated capacity of 2,110 m^3/day and consists of two (2) facultative lagoon cells (Cells ‘A’ and ‘B’), an aerated lagoon cell (Cell ‘C’), an aeration system, a phosphorous removal system, a wetwell and pumping system to convey lagoon effluent to two Moving Bed Biofilm Reactor (MBBR) process trains, a disc filter, and an effluent flow meter. This facility is operated under the MECP Environmental Compliance Approval (ECA) No. 8160-BAHPRF dated April 29, 2019.

Refer to Figure 1 for a location plan and overview of the water and wastewater infrastructure.

J.L. Richards & Associates Limited (JLR) was retained by the Municipality in 2021 to assist in the preparation of the Master Plan. The main purpose of this Phase 1 Report is to summarize the findings from the first phase of the Master Plan process. This includes a comprehensive description of the existing water distribution, wastewater collection and treatment systems. The current conditions associated with these systems are also documented, along with existing and future servicing constraints. This information has been used in the development of a Problem and Opportunity Statement that will form the basis for undertaking Phase 2 of the Master Plan process.

N

Casselman Sewage Treatment System

SPS No. 6
819 PRINCIPALE ST

SPS No. 1
(MAIN)
16 BRISSON ST

Elevated Water Storage Tank
756 BREBEUF ST

Water Treatment Plant
832 LAVAL ST

SPS No. 4
839 LAVAL ST

SPS No. 5
738 DES CHENES ST

SPS No. 2
47 ISABELLE ST

SPS No. 3
35 INDUSTRIEL ST

PRINCIPALE ST

LAURIER ST

ST-ISIDORE RD

HIGHWAY 417

South Nation River

Municipality of The Nation

Municipality of The Nation

Legend

Existing Infrastructure

- Elevated Water Storage Tank
- Water Treatment Plant
- Sewage Pumping Station

0 100 200 400 600 800

Meters

1:12,500

PROJECT:

MUNICIPALITY OF CASSELMAN
WATER AND WASTEWATER MASTERPLAN
MUNICIPALITY OF CASSELMAN, ONTARIO

DRAWING:

STUDY AREA AND OVERVIEW OF KEY INFRASTRUCTURE

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1.2 Summary of Previous and Ongoing Work

The following is a list of recent, previously completed, and ongoing water and wastewater infrastructure works within Casselman:

- Wastewater Annual Reports – completed for 2017 to 2022
- Water Annual Reports – completed for 2017 to 2022
- Lagoon Upgrades – completed in 2021 to include the Moving Bed Biofilm Reactor (MBBR) and disc filtration system
- Extension of Municipal Servicing South of Highway 417 – Water and Wastewater System Projected Servicing Upgrades – completed in 2019 by JLR
- Water and Wastewater CAD/GIS Update – completed in 2021 by JLR
- Highway #417 Watermain Looping – tendered 2022; as-builts 2023 by JLR
- Uncommitted Reserve Capacity Wastewater D-5-1 Calculation – completed in 2023 by JLR
- New Pump Station and Section of Sanitary Sewer located South of Highway 417 – ongoing by JLR
- WTP Upgrades to address THM and Manganese treatment issues – ongoing by JLR
- Development review services – ongoing by JLR
- Development Charge Update – ongoing by Watson in coordination with JLR

1.3 Class Environmental Assessment and Master Planning

The *Ontario Environmental Assessment Act* (EA Act), enacted in 1976, formally recognizes the Municipal Class Environmental Assessment (Class EA) process and outlines requirements for EA approval. The Municipal Class EA process and Master Planning process applies to municipal infrastructure projects, including roads, water, and wastewater projects. To ensure that environmental impacts and effects are considered for each project as per the EA Act, proponents are required to generally follow the planning process set out in the Municipal Class EA Guidelines, prepared by the Municipal Engineers Association (MEA) (2015) (www.municipalclassea.ca). The Class EA process includes the following stages:

- Phase 1: Problem and/or opportunity identification.

- Phase 2: Identification and evaluation of alternative solutions to determine a preferred solution to the problem or opportunity. This Phase also compiles an environmental 'inventory', identifies impacts, and outlines mitigation measures.

- Phase 3: Identification and evaluation of design concepts for the preferred solution. A detailed evaluation of the environmental effects and mitigation measures are addressed during this project Phase.

- Phase 4: Complete and place Environmental Study Report on Public Record. The Report will document Phases 1 through 3 and summarize the consultation undertaken throughout the planning process and is considered valid for a 10-year period.

- Phase 5: Implementation and monitoring.

Since projects may vary in their environmental impact, they are classified in terms of the following schedules:

- Schedule 'A' projects usually have minimal environmental effects and generally include normal or emergency operational and maintenance activities. These projects are pre-approved under the Class EA planning process. Projects within this category are subject to Phases 1 and 5.

- Schedule 'A+' projects are pre-approved projects similar to Schedule 'A', however, the public is to be advised prior to project implementation.

- Schedule 'B' projects have the potential for some adverse environmental impacts and, therefore, the proponent is required to proceed through a screening process, including consultation with affected parties. Generally, these projects include improvements and minor expansions to existing facilities. Projects within this category are subject to Phases 1, 2 and 5.

- Schedule 'C' projects have the potential for greater environmental impacts and are subject to all five Class EA Phases. Generally, these projects include the construction of new facilities and major expansions to existing facilities.

A Master Plan is conducted under the framework of the MEA Class EA Process. It is a planning tool that identifies infrastructure requirements for existing and future land use, through the application of environmental assessment principles, and is intended to satisfy Phases 1 and 2 of the Class EA process. The Municipal Class EA guideline identifies four (4) basic approaches of the Master Planning process, including:

- Approach No.1: This approach concludes at the end of Phases 1 and 2 of the Municipal Class EA Process. With this approach, the Master Plan is being completed at a broad level of assessment and may require further detailed assessment at the project-specific level depending on the nature of the project.

- Approach No.2: This approach also concludes at the end of Phases 1 and 2 of the Municipal Class EA Process. However, the level of detail (i.e., investigation, consultation and documentation) fulfills the requirements for Schedule 'B' projects.

- Approach No.3: This approach involves the preparation of a Master Plan document at the conclusion of Phase 4 of the Municipal Class EA Process. The level of detail of the Master Plan document can fulfill requirements for Schedule 'B' and/or Schedule 'C' projects.

- Approach No.4: This approach involves integration with the approvals under the Planning Act.

The Casselman Water and Wastewater Infrastructure Master Plan has followed Approach No. 1, which involves the preparation of a Report at the conclusion of Phases 1 and 2. In this case, the Master Plan has been completed at a broad level of assessment thereby requiring more detailed investigations at a project-specific level in order to fulfill the Municipal Class EA documentation requirements for any specific Schedule 'B' and 'C' projects identified within the Master Plan.

This Master Plan should be reviewed every five years to determine the need for detailed formal review and/or updates. Potential changes, which may trigger the need for an update, include:

- Major changes to the original assumptions
- Major changes to components of the Master Plan
- Significant new environmental effects
- Major changes in the proposed timing of projects within the Master Plan based on changed conditions relative to the original projections/predictions

2.0 Phase 1 Methodology

2.1 Project Initiation Meeting and Site Visits

A project initiation meeting was held on April 19, 2022, with representatives from the Municipality and JLR to confirm roles and responsibilities, project understanding, proposed work plan and schedule and to review current and historical issues associated with the Municipality's water/wastewater systems.

A visual on-site multi-discipline site review was undertaken on May 27, 2022, at the Casselman WTP and six (6) sewage pump stations (SPS), to verify conditions of the existing equipment and infrastructure. The review completed and data obtained were limited to visual observations and discussion with OCWA operators. No special lift devices or ladders were mobilized during the assignment and no destructive or exploratory testing or inspection was carried out. Confined spaces (i.e., wet wells, tanks, etc.) were not included in the scope of the review with the exception of where visual observations could be made outside of the confined space area. The condition assessment was not undertaken at the sewage treatment system (STS) since the facility has undergone major upgrades recently.

2.2 Compilation and Review of Existing Documentation

A comprehensive inventory of historical reports, studies, and drawings related to the water and wastewater treatment and conveyance systems was developed based previous and current works being completed in the Municipality (as noted in Section 1.2). This documentation was reviewed, and a number of key documents are referenced herein. In addition, historical WTP, STS, and SPS operating data were provided by OCWA. The data were reviewed and analysed to establish current operating conditions for each system.

2.3 Consultation Planning and Contact with Stakeholders

A Stakeholder Consultation Plan was developed and reviewed with the Municipality, taking into consideration mandatory requirements and objectives of effective consultation with the public and other potential stakeholders, as outlined in the MEA Class EA document (refer to Appendix 'A' for a copy of the Stakeholder Consultation Plan, dated May 31, 2022). The Plan identifies potential stakeholders, defines the level of consultation, establishes appropriate means of contact, and provides a schedule highlighting the general timing of contact. Consultation includes project notification to the public and potential stakeholders, and one (1) Public Information Centre to be held during Phase 2.

A Project Initiation Notice was posted on the Municipality's website (https://en.casselman.ca/services/water_and_sewer) on June 9, 2022. Project initiation letters were also distributed directly to potential stakeholders, with an invitation to provide comments. Refer to Appendix 'B' for a copy of the Notice and Appendix 'C' for responses received to date and an updated stakeholder tracking list.

2.4 Technical Memoranda

The following technical memoranda (TM) were completed as part of Phase 1 of the Master Plan process:

- TM 1A Water Treatment Plant and Sewage Pumping Stations Condition Assessment, dated November 18, 2022, was prepared to summarize a condition assessment of the WTP and six (6) SPS buildings and process infrastructure (refer to Appendix 'D')
- TM 1B Linear Infrastructure Condition Assessment, dated November 18, 2022, was prepared to summarize a desktop condition assessment of the linear infrastructure (refer to Appendix 'E')
- TM 2 Growth Projections, dated February 2, 2023, was prepared to summarize population and development projections for the Master Plan planning horizon (refer to Appendix 'F')

It should be noted that the above-noted TMs form much of the technical basis for Phase 1 and should be referenced as needed.

2.5 Problem and Opportunity Identification

A problem and opportunity statement was generated from Phase 1 related work and is presented in Section 7.0 of this Report.

2.6 Phase 1 Report

This Phase 1 Report was prepared to summarize the findings from the first phase of the Master Plan process and to use as a basis for the identification and evaluation of alternative options during Phase 2.

The objectives of this Report are:

- To establish 25-year future growth projections.

- To provide a description of existing conditions and constraints associated with the linear infrastructure, WTP, water storage, STS and six SPS within the Municipality, including a summary of historical water/wastewater flows and water/wastewater quality; condition assessment findings of these infrastructure; and updates and findings from the existing water and wastewater models to incorporate more recent development.

- To provide a summary of the D-5-1 calculation (i.e., uncommitted reserve capacity assessment) completed for the STS.

- To provide timing for when rated capacities of the WTP and STS will be reached.

- To establish proposed design basis for future servicing needs.
- To identify land use and planning constraints, and natural environment constraints.
- To establish a Problem/Opportunity Statement.
- To confirm Phase 2 methodology and next steps.

3.0 Design Basis

3.1 Growth Projections (TM 2)

The Casselman Growth Projections Technical Memorandum (TM 2) was prepared in February 2023 for the Municipality to summarize future growth anticipated in Municipality within the master planning timeframe; it is attached in Appendix F. Although TM 2 provides the necessary background information regarding the County Official Plan and growth allocations, it shall be noted that the information regarding future developments, unit counts, existing serviced population and future population provided in this section of the Master Plan supersedes the information presented in TM 2. Information presented in this section of the Master Plan was developed in consultation with the Municipality's Planning Services Department, Buildings Department and Watson & Associates Economics Ltd in mid-2023.

The following key updates have been implemented since TM 2:

- The Municipality is 100% Urban Settlement Area and designated for growth (see Figure 2). The Municipality's Planning Department has requested that a 5% intensification of existing residential units be carried for this Master Plan. This means that approximately 67 units (based on 1,337 units of existing dwellings per 2021 Census) should be accounted for intensification within the established built-up areas of the Municipality via infill, redevelopment, additional residential units, etc.

- The Municipality's growth projection differs from the growth forecast established through the UCPR OP in 2022. The Municipality's Planning Department and Buildings Department has provided information regarding proposed and committed development across Casselman, as illustrated in Figure 3 and Figure 4, and detailed in Section 3.2.

- In addition, as a part of ongoing work, the Municipality has separately retained Watson & Associates Economists Ltd. (Watson) to undertake analysis of existing and future serviced units and population within the Municipality to complete their Development Charges Update. Watson noted a total of 1,695 units and 4,048 people are currently serviced by municipal water and wastewater within the Municipality, excluding the institutional population, at a unit density of 2.39 persons per unit. The existing serviced population, units and density are used as design basis in the Master Plan Phase 1 Report.

N

PRINCIPALE ST

LAURIER ST

Municipality of The Nation

Municipality of The Nation

South Nation River

ST-ISIDORE RD

PRINCIPALE ST

HIGHWAY 417

Legend

Parcel_PropCode_All

LandUse

- Low Density Residential
- Medium Density Residential
- High Density Residential
- Commercial
- Industrial
- Institutional
- Parks and Open Space
- Vacant Land

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PROJECT:

MUNICIPALITY OF CASSELMAN
WATER AND WASTEWATER MASTER PLAN
CASSELMAN, ONTARIO

DRAWING:

LAND USE INVENTORY

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Medical Clinic
Commercial (2.5 ac / 1 ha)
Timeframe: 5-10 years

870 Principale St.
Light Commercial/Industrial (3.45 ac / 1.40 ha)
Units: 30
Timeframe: 10-25 years

West of Sarah
Residential Units: 115
Phase 1: 26 Units
Phase 2: 36 Units
Phase 3: 16 Units
Phase 4: 37 Units
Timeframe: 0-5 years

Projet Mantineau-Hughes
866 Principale St.
Residential Units: 38
Timeframe: 0-5 years

Domaine des rapides
Residential Units: 147
Timeframe: 0-5 years

Nation View
Residential Units: 466
Timeframe: 5-10 years

825 Principale St.
Residential Units: 9
Timeframe: 0-5 years

832 Principale St.
Residential Units: 72
Phase 1: 36 Units
Phase 2: 36 Units
Timeframe: 5-10 years

821 Principale St.
Residential Units: 9
Timeframe: 0-5 years

Casselman
Sewage
Treatment
Plant

806 Principale St.
Residential Units: 15
Timeframe: 0-5 years

Industrial
(Lettuce/Herb
Production Facility)
(4.3 ac / 1.74 ha)
Timeframe: 5-10 years

787 Principale St.
Residential Units: 44
Timeframe: 5-10 years

876-884 St. Isidore St.
Residential Units: 70
Timeframe: 5-10 years

East of Laurier
Residential Units: 300
Timeframe: 10-25 years

Casselman Developments Limited
Residential Units: 469
Phase 1: 6 Units
Phase 2A: 6 Units
Phase 2B: 144 Units
Phase 2C: 83 Units
Phase 3: 230 Units
Timeframe: 0-5 years

736 Principale St.
Residential Units: 3
Timeframe: 0-5 years

700 Principale St.
Residential Units: 68
Timeframe: 5-10 years

17 Aquatria St.
(Senior Housing)
Residential Units: 50
Timeframe: 0-5 years

720-722 St. Joseph St.
Residential Units: 6
Timeframe: 0-5 years

37 Richer Close
Residential Units: 97
Commercial Units: 6 (0.16 ac / 0.06 ha)
Timeframe: 0-5 years

Vacant Farmlands South of HWY 417
Industrial
20-25 1 ac lots (10.12 ha)
Timeframe: 10-25 years

Aurele Road
Light Industrial
(1.01 ac / 0.4 ha)
Timeframe: 10-25 years

52-54 Racine St.
Light Industrial Manufacturing
(0.46 ac / 0.19 ha)
Timeframe: 0-5 years

Aurele Road
Residential Units: 7
Timeframe: 10-25 years

East of Highway 417 Ramp (Ford Warehouse)
Existing Water Connection
Units: 0
Timeframe: 10-25 years

Vacant Farmlands South of HWY 417
Industrial
10-15 1ac lots (6.07 ha)
Timeframe: 10-25 years

625 Principale St.
Commercial: (4 ac / 1.65 ha)
Timeframe: 10-25 years

PRINCIPALE ST
LAURIER ST
ST-ISIDORE RD
HIGHWAY 417
South Nation River
Municipality of The Nation

PROJECT:
MUNICIPALITY OF CASSELMAN
WATER AND WASTEWATER MASTER PLAN
CASSELMAN, ONTARIO

DRAWING:
DEVELOPMENT FORECAST

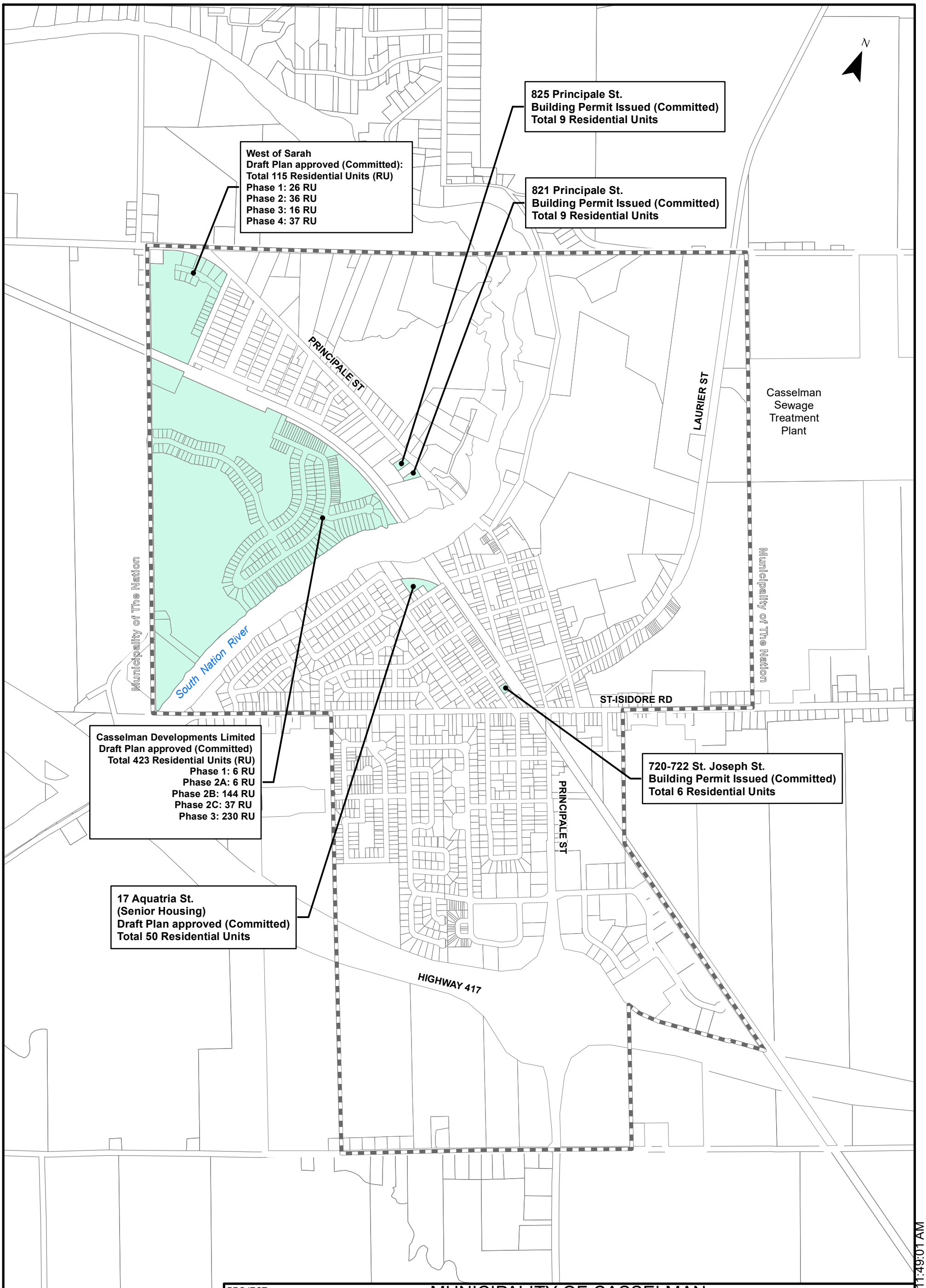
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PROJECT:

MUNICIPALITY OF CASSELMAN
WATER AND WASTEWATER MASTER PLAN
CASSELMAN, ONTARIO

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COMMITTED UNITS

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3.2 Planning Periods

For the purposes of this Master Plan, population and flow projections and servicing recommendations have been categorized for the near term (2023 to 2027), medium term (2028 to 2032), and long term (2033 to 2047) planning periods. Based on the information presented in the Figures above and consultation with the Municipality, future residential units and population and industrial, commercial, and institutional (ICI) land use projections are summarized by these timeframes in the Table 1 and Table 2. The growth presented in these tables has been used as the design basis for this Master Plan.

Table 1: Future Residential Development Units and Population Projections

Development	Timeframe [1]	Units [2]	Population [3]
West of Sarah Phase 1	0-5 years	26	62
West of Sarah Phase 2	0-5 years	36	86
West of Sarah Phase 3	0-5 years	16	38
West of Sarah Phase 4	0-5 years	37	88
Casselman Developments Ltd. Phase 1	0-5 years	6	14
Casselman Developments Ltd. Phase 2A	0-5 years	6	14
Casselman Developments Ltd. Phase 2B	0-5 years	144	342
Casselman Developments Ltd. Phase 2C	0-5 years	83	197
Casselman Developments Ltd. Phase 3	0-5 years	230	546
Projet Mantineau-Hughes 866 Principale St.	0-5 years	38	90
825 Principale St.	0-5 years	9	21
17 Aquatria St. (Senior Housing) [4]	0-5 years	50	100
37 Richer Close	0-5 years	97	230
720-722 St. Joesph St.	0-5 years	6	14
736 Principale St.	0-5 years	3	7
Domaine des rapides	0-5 years	147	349
806 Principale St.	0-5 years	15	36
821 Principale St.	0-5 years	9	21
Intensification of Existing Units [5]	0-5 years	22	53
TOTAL Short-Term Growth (0-5 Years; 2023-2027)		**980**	**2309**
832 Principale St. Phase 1	5-10 years	36	86
832 Principale St. Phase 2	5-10 years	36	86
700 Principale St.	5-10 years	68	162
787 Principale St.	5-10 years	44	105
Nation View	5-10 years	466	1107
876-884 St. Isidore St.	5-10 years	70	166
Intensification of Existing Units [5]	5-10 years	22	53
TOTAL Mid-Term Growth (5-10 Years; 2028-2032)		**742**	**1763**

Development	Timeframe [1]	Units [2]	Population [3]
East of Laurier	10-25 years	300	713
Aurele Road	10-25 years	7	17
Intensification of Existing Units [5]	10-25 years	22	53
TOTAL Long-Term Growth (10-25 Years; 2033-2047)		**329**	**782**

(1) Timeframes presented herein indicate the anticipated timeline when the development will be connected to the water/wastewater services. This is not an indication of when the development can begin. The actual timing of upgrades will be contingent on the rate of development in each of the contributing areas.
(2) Unit counts provided by the Municipality. For the development areas that are already underway the unit counts represent the unoccupied units as for December 2022.
(3) Assume 2.375 cap/unit for residential units.
(4) Assume 2 cap/unit for Senior Housing.
(5) Assume 5% intensification for existing dwelling units (1,337 units per 2021 Census) divided evenly to each timeline term.

Table 2: Future ICI Development Land Projections

Development	Timeframe	Hectares
52-54 Racine St. - Light Industrial	0-5 years	0.19 [3]
37 Richer Close - Commercial	0-5 years	0.06 [3]
TOTAL Short-Term (0-5 Years; 2023-2027)		**0.25**
Lettuce/Herb Production Facility - Industrial	5-10 years	1.74 [4]
Medical Clinic	5-10 years	1.00 [5]
TOTAL Mid-Term (5-10 Years; 2028-2032)		**2.74**
870 Principale St. - Light Commercial/Industrial	10-25 years	1.40
Vacant Farmlands South of HWY 417 - Industrial	10-25 years	16.19
Aurele Road - Light Industrial	10-25 years	0.40
625 Principale St. - Commercial [1]	10-25 years	1.65
East of Highway 417 Ramp (Ford Warehouse) [2]	10-25 years	N/A
TOTAL Long-Term (10-25 Years; 2033-2047)		**19.64**

(1) Half of the property area for 625 Principale St. has been included within the above projections, development of the other half of the area has been assumed beyond the timeline of the Master Plan.
(2) The Ford Warehouse is already currently serviced with water as of December 2022; future servicing is for wastewater only (17,550 L/day per previous sanitary calculation completed by EMEeng, November 10, 2021).
(3) Footprint presented herein represent the gross floor area (GFA). Development at 37 Richer Close has 6 new commercial space proposed.
(4) Footprint presented herein represent the land parcel area. This development will consist of retrofit of existing building and building expansion.
(5) The medical clinic proposed is a day-time medical centre. There is no overnight care being provided. Footprint presented herein represent the land parcel area.

(6) Town Hall relocation to 1 Industrial Street is not accounted for in the future ICI projections since the intent is to occupy existing building footprint.

3.3 Natural Environmental

As illustrated in Figure 5 below, the 2022 UCPR OP has indicated some Areas of Natural and Scientific Interest (ANSI) which represents lands and waters containing natural landscapes or features that are important for natural heritage, protection, appreciation, scientific study and/or education.

Moreover, a section of the South Nation River that runs through Casselman is designated a Source Water Protection Intake Zone 1 and contains areas of fish habitat.

Refer to Figure 5, which identifies other significant landforms, groundwater areas, and source water protection zones located within the study area. Limitations associated with natural environment constraints will be further explored in Phase 2.

N

Casselman Sewage Treatment Plant

PRINCIPALE ST

LAURIER ST

Municipality of The Nation

PS #6

PS #1

South Nation River

PS #4

ST-ISIDORE RD

PS #5

PS #2

PRINCIPALE ST

PS #3

HIGHWAY 417

Legend

- PUMPING STATION
- SANITARY SEWER
- MUNICIPAL BOUNDARY
- LAGOON

UCPR 2022 OFFICIAL PLAN

- ANSI, Earth Science
- FLOODPLAIN
- FISH HABITAT
- FISH HABITAT
- KARST
- ABANDONED MINE 1000m BUFFER
- GROUND WATER RECHARGE - WATER QUANTITY
- GROUNDWATER VULNERABILITY - WATER QUALITY

SOURCE WATER PROTECTION

- INTAKE PROTECTION ZONE 1
- INTAKE PROTECTION ZONE 2

PROJECT:

MUNICIPALITY OF CASSELMAN
WATER AND WASTEWATER MASTER PLAN
CASSELMAN, ONTARIO

DRAWING:

NATURAL ENVIRONMENTAL CONSTRAINTS

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DESIGN:	MK
DRAWN:	TB
CHECKED:	SS
JLR NO:	16953-118
DRAWING NO.:	FIGURE 5

File Location: P:\16000\16953-118 - Casselman Infrastructure Masterplan\3-Production\1-Civil\GIS\16953-118 Figure5_NaturalConstraints.mxd

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4.0 Description of Existing Conditions – Water/Wastewater Facilities

4.1 Water Treatment Plant

The Casselman WTP is located at 832 Laval Street and has a rated capacity of 3,182 m^3/day, as per the Permit to Take Water (PTTW 6067-9EGMS2) and Drinking Water Works Permit (DWWP 173-201, Issue 2). It is owned by the Municipality and operated by the Ontario Clean Water Agency (OCWA). It provides conventional treatment through an Actiflo ® treatment system, dual media filtration, and disinfection (primary using chlorine and UV; secondary using chloramination with ammonium sulphate). Additionally, raw water is treated with potassium permanganate during the summer when influent manganese (Mn) concentrations are exasperated. As previously noted in the list of ongoing work, JLR is currently completing design work at the WTP to lower treated manganese (Mn) and total trihalomethane (THM) concentrations in the distribution system.

4.1.1 Historical Flow Rates

The Casselman WTP treated daily flow data over the past five (5) years (2018 to 2022) was used to determine the current water demands for the water distribution system. Table 3 below summarizes the average day, maximum day and peak hour demands within Casselman.

Table 3: Casselman Water Demands (2018-2022)

Years	Average Day (m^3/day)	Maximum Day (m^3/day)	Peak Hour (m^3/day)
2018	994	2,154	Not available
2019	961	2,051	Not available
2020	1,010	1,744	Not available
2021	1,052	1,864	Not available
2022	1,139	2,029	Not available
5-Year Average Demand (m^3/day)	1,031	1,968	2,953 (1)
5-Year Average Demand (L/s)	12	23	34 (1)
Percent (%) of Rated Capacity Used	Not applicable	62%	Not applicable

(1) Peak hour demand calculated using a theoretical peaking factor of 1.5 times the maximum day demand, MECP Design Guidelines for Drinking Water Systems (2008)

The average day demand was taken as the average of the treated water flow reported for every day over the past five (5) years, which was calculated to be 1,031 m^3/d (12 L/s). The maximum day demand was taken as the average of the maximum day flow reported for each of the past five (5) years, which was calculated to be 1,968 m^3/d (23 L/s). As the peak hourly data was not specifically recorded, the peak hour demand was estimated using a theoretical peaking factor of 1.5 times the maximum day demand, as recommended in Ministry of the Environment,

Conservation, and Parks (MECP) Design Guidelines for Drinking Water Systems (2008) for a community of this size, which resulted in a peak hour demand of 2,953 m^3/d (34 L/s).

4.1.2 Future Water Demands

The design parameters used to calculate the future water demands of the water distribution system are summarized in Table 4.

Table 4: Design Parameters – Future Water Demand

Future Water Flow Projection – Design Parameters		
Parameter	**Residential**	**Industrial / Commercial / Institutional**
Average Day Flow (1)	350 L/cap/day	35,000 L/ha/day (Light Industrial) 45,000 L/ha/day (Typical Industrial) 28,000 L/ha/day (Commercial)
Maximum Day Flow (2)	1.92 x Average Day	1.92 x Average Day
Peak Hour Flow (1)	1.5 x Maximum Day	1.5 x Maximum Day
(1) MECP Design Guidelines for Drinking Water Systems (2008) (2) Peak factor determined from average and maximum day demand data provided in Table 3		

Based on these design parameters, the future growth present in Table 1, the projected short, mid and long-term water demands were calculated and are presented in Table 5.

Table 5: Future Water Demands

Demand Scenario	**Short-Term (2023-2027)**	**Mid-Term (2028-2032)**	**Long-Term (2033-2047)**
Total Serviced Population (1)	6,357	8,120	8,902
ICI Development Area (ha)	0.25	2.74	19.64
Future Average Day (m^3/day)	1,850	2,580	3,690
Future Maximum Day (m^3/day)	3,552	4,954	7,085
Future Peak Hour (m^3/day)	5,328	7,430	10,627
(1) The total serviced population represents residential population only and excludes equivalent institutional households and populations.			

4.1.3 Projected Timing for Casselman WTP Expansion

Based on water demands and growth development timelines a graph representing the projected maximum day water demand from the WTP and anticipated timing to reach 80%, 90%, and 100% of the rated capacity was prepared. Refer to Figure 6, below.

This graph indicates that based on the growth numbers presented in this Master Plan, 80% of the WTP rated capacity will be reached by the end of 2023, 90% WTP rated capacity will be reached by the end of 2024, and the rated capacity of the WTP will be reached by the end of 2025.

The Municipality indicated that based on historical building permit applications, they see 50 units per year. For the purpose of projecting timing for the next expansion, a scenario has been created on Figure 6 to demonstrate the historic trending based on 50 new residential units (excluding ICI

development) being brought online per year for the next 25 years. Based on this new scenario, it is anticipated that 80% of the WTP rated capacity will be reached sometime in 2028, 90% WTP rated capacity will be reached sometime in 2032, and the rated capacity of the WTP will be reached sometime in 2035.

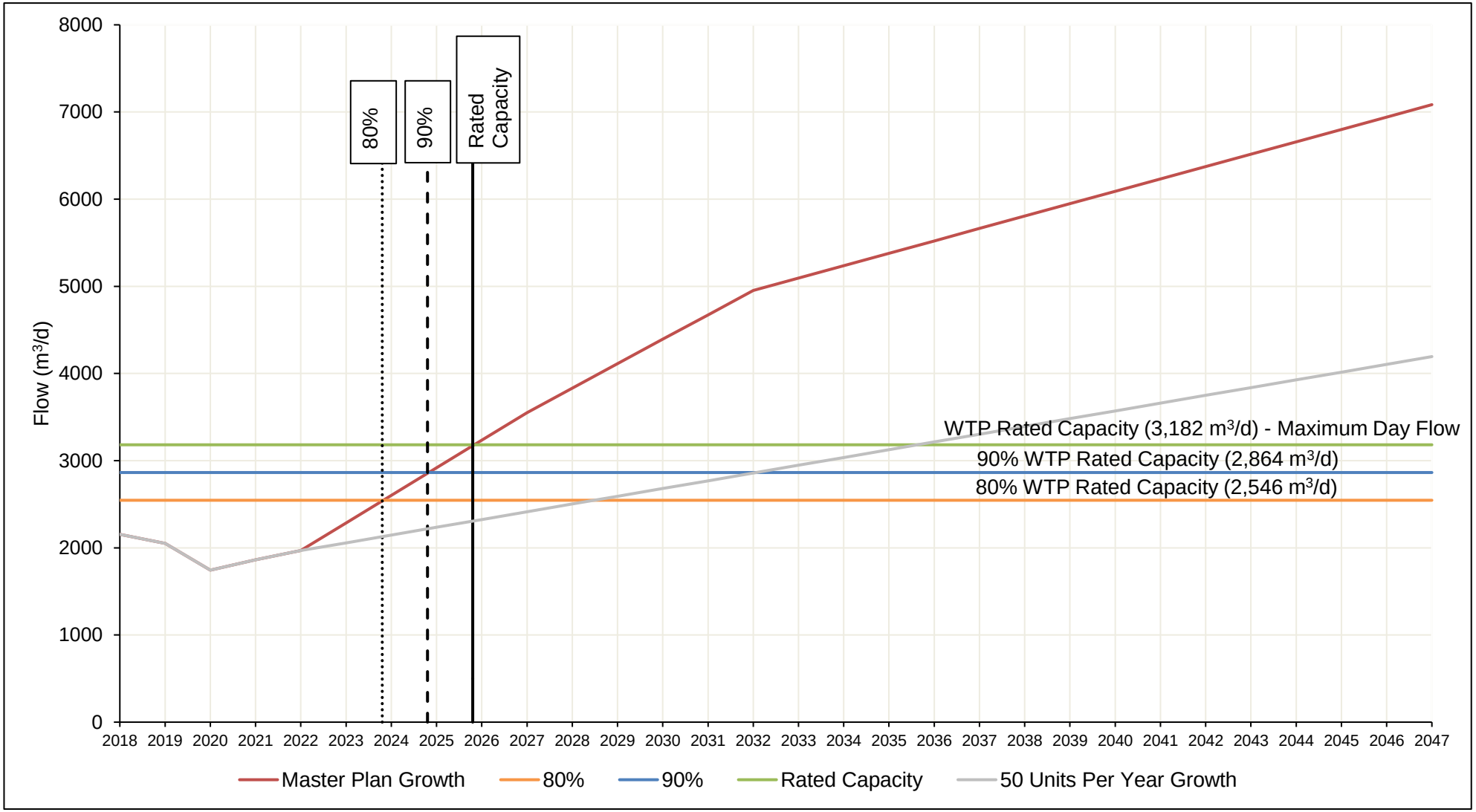


Figure 6: Casselman WTP Flow Projection

4.1.4 Water Quality

A review was completed of the Annual Water Reports for the Casselman WTP from 2018 to 2022. The notable adverse water quality incidents comprised of trihalomethane (THM) exceedances (reported twice (2) in 2018, once (1) in 2019, thrice (3) in 2021) and turbidity exceedances from the Actiflo ® filter effluent (reported thrice (3) in 2019 and twice (2) in 2020). With exception to these water quality issues, it is reported that the system complies with all other regulations for microbiological, chlorine residual, organic and inorganic parameter concentrations in the distribution system.

OCWA provided JLR with water quality parameters of concern in raw water (Table 6) and treated water (Table 7) from 2018 to 2022. It was noted by OCWA that Mn concentrations in raw water sourced from the South Nation River have been elevated, as a result Mn concentrations in treated water from the Casselman WTP have been elevated, as observed in Table 7. A new Maximum Acceptable Concentration (MAC) for Mn of 0.12 mg/L and aesthetic objective (AO) of 0.02 mg/L was recently established in the Guidelines for Canadian Drinking Water Quality and is anticipated to become a near-future requirement in Ontario. As evidenced in Table 7, the WTP is not currently meeting this federal guideline.

In addition, as recently as June/July 2023, the Municipality's water system experienced an event during which the drinking water turned brown. This incident is thought to have been triggered by high influent Mn concentrations compounded with low to no river flow typically experienced in the South Nation River from June to September (per South Nation Conservation data). A water quality advisory was issued at this time by the Eastern Ontario Health Unit (EOHU) as residents experienced brown water in their taps. The EOHU noted, per news articles covering the water advisory, that the water meets Ontario Drinking Water Standards (AO of 0.05 mg/L) and is safe to drink but recommends another source water for babies and infants, who may be more vulnerable to elevated Mn levels.

OCWA also noted that elevated THM concentrations are a persistent issue in finished water, especially during spring and summer operations. THMs are regulated disinfection by-products (DBPs) and are formed when natural organic matter (NOM) present in a source water reacts with chlorine (Cl) used for disinfection. Based on the last five years of data, THM concentrations have approached or exceeded the MAC in finished water, 100 µg/L, as observed in Table 7. Colours have been used in the table to indicate annual average concentrations exceeding the AO or approaching the MAC (yellow) and exceeding the MAC (red). Raw water dissolved organic carbon (DOC) / total organic carbon (TOC) data (Table 6) show that nearly all organic content is dissolved (5-year average of 94% of TOC made up of DOC), which is a probable causation of elevated THM concentrations.

Moreover, it has been noted by OCWA that Actiflo ® filter effluent exceeds turbidity guidelines: 95% of monthly measurements less than <0.3 NTU and no single measurement to exceed 1 NTU; and have had to been reported to the MECP.

Table 6: Casselman Raw Water Quality Annual Averages (2018-2022)

Parameter	2018	2019	2020	2021	2022
Mn (mg/L)	0.24	0.17	0.16	0.13	0.14
Dissolved Organic Carbon (mg/L)	7.59	7.91	6.84	7.08	6.85
Total Organic Carbon (mg/L)	7.83	8.26	7.34	8.44	7.30
Turbidity (NTU)	N/A	N/A	12.73	10.57	12.80

Table 7: Casselman Treated Water Quality Annual Averages (2018-2022)

Parameter	Limit (*Regulation)*	2018	2019	2020	2021	2022
THM (µg/L)	100 *MAC* (1)	97	102	86	121	96
Mn (mg/L)	0.02 *AO* (2) 0.12 *MAC* (2)	0.06	0.09	0.05	0.05	0.06
DOC (mg/L)	5 *AO* (1)	4.65	3.83	3.33	3.38	2.60
TOC (mg/L)	N/A	4.83	4.81	4.15	4.42	3.20
Turbidity (NTU)	1 *MAC* (1)	N/A	0.83	0.50	0.66	0.71

(1) Ontario Drinking Water Standards, Objectives and Guidelines (June 2006)
(2) Guidelines for Canadian Drinking Water Quality – Manganese (May 2019)

4.2 Water Storage

The Casselman Elevated Tank is located at 758 Brebeuf Street and was originally constructed in 1977. The following table summarizes the key parameters of the elevated tank.

Table 8: Casselman Elevated Storage Tank Parameters

Parameter	Value
Physical Characteristics of the Elevated Tank	
Internal Tank Diameter	11.6 m (1)
Overflow Elevation	118 m (2)
Base Elevation of the Elevated Tank	67 m (2) (3)
Operating Characteristics of the Elevated Tank	
Operating Level – High	115.64 m (4)
Operating Level – Low	106.23 m (4)
Top Water Level (Max)	118 m (5)
Low Water Level (Min)	82 m (5)
Total Usable Volume	3,801 m^3 (6)

(1) Obtained from the Inspection Report completed by Landmark Municipal Services 2019.
(2) Obtained from Landmark Structures Co. Casselman Elevated Tank Mixing System Drawings.
(3) High point of the tank arc.
(4) Operating levels provided by OCWA. Low level is 90% of overflow. High level is 98% of overflow.
(5) Obtained from the WaterCAD® Model for existing operating conditions; under maximum day demand plus fire flow gives system minimum pressure 140 kPa (20 psi) when all pumps at the WTP are turned off. Low water level corresponds to level at bottom of C in Figure 7. High water level corresponds to level at top of B in Figure 7.
(6) Usable volume based on overflow elevation and low water level and internal diameter.

Per MECP Design Guidelines for Drinking-Water Systems (2008), total treated water storage within the system should at least amount to the sum of the required equalization storage (B), fire storage (A) and emergency storage (C) allowances, as depicted in Figure 7 below.

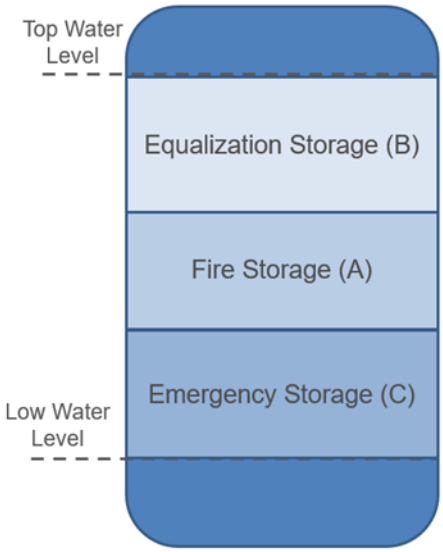


Figure 7: Total Required Treated Water Storage

Based on these Guidelines, Table 9 provides a summary of the estimated existing, short, mid and long-term total storage requirements for the Municipality. Note, the equivalent service population was estimated assuming a 350 L/cap/d average usage which is in line with the domestic water demand recommended by the MECP Design Guidelines (2008).

Based on the information available, the existing treated water storage volume is sufficient for the current and up to the 5-year future demand relative to the MECP requirements. It is anticipated the storage capacity will be insufficient for water demands and system pressure beyond 5-years. Additional modelling will be completed in Phase 2 of the Master Plan to incorporate future development areas and investigate storage and pressure constraints.

Table 9: Water Storage Requirements

Parameter	Existing (2022)	Short-Term (2023-2027)	Mid-Term (2028-2032)	Long-Term (2033-2047)
Equivalent Population (1)	2,947	5,286	7,372	10,543
Fire Flow (2) (L/s)	109	148	169	195
Duration (2) (Hours)	2	2	3	3
A – Fire Storage (3) (m^3)	786	1,068	1,828	2,102
B – Equalization Storage (4) (m^3)	492	888	1,238	1,771
C – Emergency Storage (5) (m^3)	320	489	767	968
TOTAL STORAGE REQUIREMENT (m^3)	1,598	2,445	3,833	4,841
EXISTING AVAILABLE STORAGE (m^3)	3,801	3,801	3,801	3,801
SURPLUS (m^3)	2,203	1,357	-32	-1,040

(1) Estimated to be equal to average day demand / per capita usage of 350 L/cap/d. The equivalent population also includes ICI flow contribution.

(2) Values interpolated from Table 8-1 of the MECP Design Guidelines (2008) based on equivalent service population. Fire flow is described as the largest expected fire flow requirement in L/s and duration is length of time fire flow shall be sustained. A sensitivity analysis was completed to compare fire flow by MECP and Fire Underwriters Survey (FUS) methods. Using FUS method, Table 8, exposure distance of less than 3 m for row housing, it generates a fire flow of 9,000 L/min or 150 L/s. The MECP method generates a more conservative estimate for fire flow and is representative of holistic approach for a drinking water distribution system. As such, MECP fire flow numbers are being used for future water storage requirement calculations.

(3) Largest expected fire volume = fire flow x duration

(4) 25% of Maximum Day Demand

(5) 25% of the sum of 'A' and 'B'

4.3 Sewage Treatment System

The Casselman Sewage Treatment System (STS) has a rated capacity of 2,110 m^3/day and consists of two (2) facultative lagoon cells (Cells 'A' and 'B'), an aerated lagoon cell (Cell 'C'), an aeration system, a phosphorous removal system, a wetwell and pumping system to supply two MBBR process tanks, a disc filter, and an effluent flow meter. The system also includes the main sewage pumping station and a forcemain. This facility is operated under the MECP Environmental Compliance Approval (ECA) No. 2712-6RVNRB from August 24, 2006, until October 2, 2018. On October 3rd, 2018, the ECA was amended, and as a result, this facility was operating under ECA No. 8225-B3HSD4. The ECA was further amended in 2019 to improve the performance of the lagoon sewage treatment system and ECA No. 8160-BAHPRF dated April 29, 2019, was issued by the MECP. ECA No. 8160-BAHPRF came into effect upon completion of the modifications to the sewage treatment system identified within this approval in 2021/2022.

4.3.1 Historical Flow Rates

The average annual daily raw wastewater flows into the Casselman STS for the past five (5) years (2018-2022) were obtained from OCWA. An average day flow was calculated using the average annual daily flows of the past five (5) years (2018-2022), which was calculated to be 1,381 m³/d (16L/s). The maximum day demand was taken as the average of the maximum day reported for each of the past five (5) years, which was calculated to be 3,206 m^3/d (37 L/s). Refer to Table 10, below.

Table 10: Casselman STS Raw Wastewater Flows (2018-2022)

Years	Average Day (m^3/day)	Maximum Day (m^3/day
2018	1,331	2,772
2019	1,354	2,992
2020	1,468	2,511
2021	1,310	4,457
2022	1,442	3,300
5-Year Average Flow (m^3/d)	1,381	3,206
5-Year Average Flow (L/s)	16	37
Percent (%) of Operating Capacity Used	65%	N/A

4.3.2 Future Wastewater Flow

The design parameters used to calculate the future average day wastewater flows are the same as those previously presented in Table 4, as it is assumed future average daily water demand flows will approximate future average daily wastewater flows. In addition, the Ford Warehouse is currently serviced with water as of December 2022, so future wastewater flows generated by the Ford Warehouse have been added to the long-term future average daily flows, as advised by the Municipality. Future maximum day wastewater flows projections were generated by multiplying the average day flows by a peak factor of 2.34, determined from average and maximum day demand data provided in Table 10 above.

Table 11: Future Wastewater Flow

Demand Scenario	Short-Term (2023-2027)	Mid-Term (2028-2032)	Long-Term (2033-2047)
Total Serviced Population (1)	6,357	8,120	8,902
ICI Development Area (ha)	0.25	2.74	19.64
Future Average Day (m^3/day)	2,200	2,930	4,050 (2)
Future Maximum Day (m^3/day) (3)	5,148	6,856	9,477

(1) The total serviced population represents residential population only and excludes equivalent institutional households and populations.
(2) The Ford Warehouse is already currently serviced with water as of December 2022; so future wastewater flows generated by the Ford Warehouse have been added to the long-term future average daily flows (17,550 L/day per previous sanitary calculation completed by EMEeng, November 10, 2021).
(3) Future maximum day wastewater flows projections were generated by multiplying the average day flows by a peak factor of 2.34, determined from average and maximum day demand data provided in Table 10.

4.3.3 Uncommitted Hydraulic Reserve Capacity Assessment (D-5-1 Calculation)

In conjunction with this Master Plan, the Municipality requested JLR complete an Uncommitted Hydraulic Reserve Capacity Assessment. The results from the assessment are summarized in the sections below, and the report can be found in Appendix G.

The methodology used to determine the Uncommitted Hydraulic Reserve Capacity is based on the MECP document entitled “Procedure D-5-1: Calculating and Reporting Uncommitted Reserve Capacity at Sewage and Water Treatment Plants” (March 1995). The uncommitted reserve capacity is calculated by subtracting the total average daily flow, either the previous 3-year or 5-year average daily flow, whichever is most conservative (in this instance the previous 3-year average of 1,407 m^3/day used as a more conservative raw sewage flow approximation); and the potential daily sewage flow predicted for draft approved developments (committed hydraulic reserve capacity) from the sewage treatment rated capacity. Additionally, a 5% intensification of existing dwellings was included as part of the committed reserve flow calculation based on feedback provided by the Municipality.

4.3.3.1 Hydraulic Reserve Capacity

According to ECA No. 8160-BAHPRF (dated April 29, 2019) the lagoon treatment system has a rated raw sewage influent average daily flow capacity of 2,110 m^3/day. The hydraulic reserve capacity is obtained by subtracting the total average daily flow from the rated capacity. Based on the above, the hydraulic reserve capacity of the Casselman STS as of 2022 is 2,110 m^3/d –1,407 m^3/d = 703 m^3/day.

4.3.3.2 Committed Hydraulic Reserve Capacity

The committed and uncommitted development information used for this calculation is based on information provided by the Municipality. The Municipality indicated 612 units are committed; including 5% intensification and using appropriate unit densities this equates to a committed population increase of 1,593. Assuming an average day per person usage of 350 L/cap/d (MECP

Design Guidelines for Sewer Works 2008), the "committed" hydraulic reserve capacity is calculated as 1,593 persons x 0.35 m^3/d/cap = 558 m^3/d.

4.3.3.3 Uncommitted Hydraulic Reserve Capacity

Based on MECP Procedure D-5-1, the "uncommitted" hydraulic reserve capacity is calculated by subtracting the hydraulic reserve capacity from the "committed" hydraulic reserve capacity. The "uncommitted" hydraulic reserve capacity is 703 m^3/day - 558 m^3/d = 145 m^3/d.

As such, based on MECP Procedure D-5-1 and reported approved/draft approved development information, the Municipality has allocated approximately 93% of the entire hydraulic reserve capacity of the lagoon treatment system. The remaining residual capacity would be available to support an additional 175 residential units above the vacant/draft approved development identified by the Municipality.

4.3.3.4 Projected Timing for Casselman STS Expansion

Based on wastewater demands and growth development timelines, a graph representing the projected average daily wastewater demand of the STS and anticipated timing to reach 80%, 90%, and 100% of the rated capacity was prepared. Refer to Figure 8, below.

This graph indicates that based on the growth numbers presented in this Master Plan, 80% of the STS rated capacity will be reached by the end of 2023, 90% STS rated capacity will be reached sometime in 2025, and the rated capacity of the STS will be reached sometime in 2026.

The Municipality indicated that based on historical building permit applications, they see 50 units per year. For the purpose of projecting timing for the next expansion, a scenario has been created on Figure 8 to demonstrate the historic trending based on 50 new residential units (excluding ICI development) being brought online per year for the next 25 years. Based on this new scenario, it is anticipated that 80% of the STS rated capacity will be reached sometime in 2028, 90% STS rated capacity will be reached in 2033, and the rated capacity of the STS will be reached by the end of 2037.

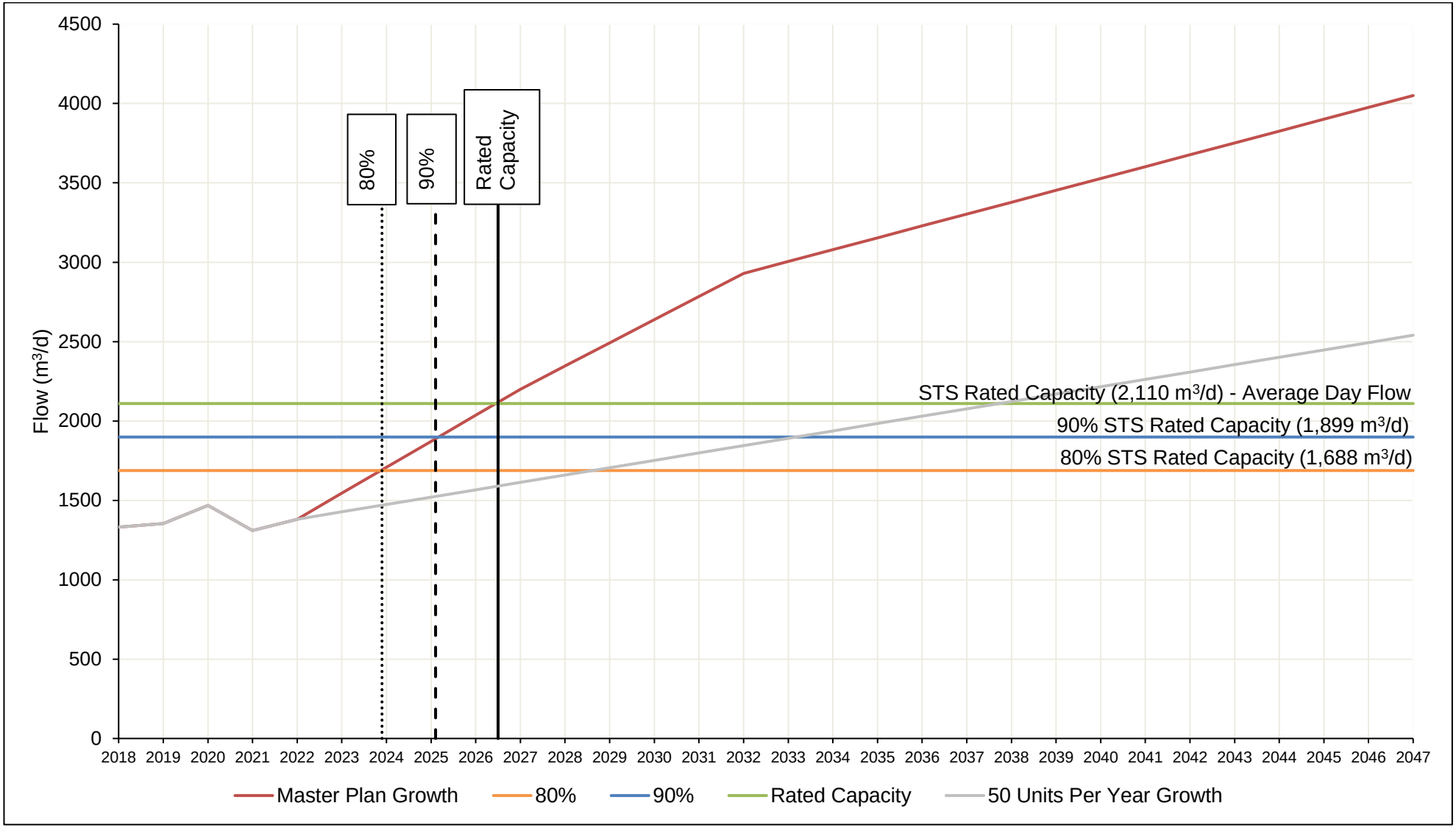


Figure 8: Casselman STS Flow Projection

4.3.4 Influent and Effluent Wastewater Quality

A review was completed of the Annual Wastewater Reports for the Casselman STS from 2018 to 2021. Data were received from OCWA for 2022. Average influent wastewater quality parameters for the past five years are summarized in Table 12 below.

Table 12: Influent Wastewater Quality (2018-2022)

Parameter	2018	2019	2020	2021	2022
$CBOD_5$ (mg/L)	110	88	59	N/A	269
Total Suspended Solids (mg/L)	242	224	235	179	441
Total Phosphorous (mg/L)	5.7	8.0	5.7	7.1	7.4
Total Kjeldahl Nitrogen (mg/L)	44	49	40	60	61

The STS is currently operating under the Amended Environmental Compliance Approval No. 8160 -BAHPRF, issued April 29, 2019. Table 13 below summarizes the effluent characteristics over the past five years; cells in red indicate an ECA Compliance Limit exceedance. Note, the MBBR and disc filter system was installed and began operating in 2021. A process upset was experienced in the same year and trouble shooting the system has been taking place up to spring 2022. Therefore, the information provided in Table 13 is not reflective of the STS treatment performance with the new MBBR and disc filter system.

Table 13: Effluent Wastewater Quality (2018-2022)

Parameter	Discharge Window	New ECA Compliance Limit (1)	2018	2019	2020	2021 (2)	2022 (2)
$CBOD_5$ (mg/L)	Fall (Oct. 1 to Dec. 31)	15	5.8	3.8	3.0	3.2	6.3
	Winter/Spring (Jan. 1 to May 15)	25	8.2	3.2	5.6	3.0	4.9
Total Suspended Solids (mg/L)	Fall (Oct. 1 to Dec. 31)	25	36 (3)	14.8	3.9	9.7	10.6
	Winter/Spring (Jan. 1 to May 15)	25	15.8	10.0	14.0	3.0	13.3
Total Phosphorous (mg/L)	Fall (Oct. 1 to Dec. 31)	1	0.2	0.2	0.1	0.3	0.4
	Winter/Spring (Jan. 1 to May 15)	1	0.3	0.2	0.2	0.2	0.4
Total Ammonia Nitrogen (mg/L)	Fall (Oct.1 to Nov. 30)	5	0.1	5.3	0.1	1.5	1.2
	Fall (Dec.1 to 31)	12	-	-	1.0	4.9	7.7
	Winter (Jan.1 to Mar. 31)	12	-	-	-	-	9.8
	Spring (Apr.1 to May 15)	6	17 (3)	0.6	17	0.1	2.4
Hydrogen Sulphide (mg/L)	Fall (Oct.1 to Dec.31)	Not Detected	0	0	0	0	-
	Winter/Spring (Jan.1 to May 15)	0.1	0	0	0	0	-
pH	Fall (Oct.1 to Dec.31)	6.0-8.0	8.5 (4)	8.2	7.9	7.6	-
	Winter/Spring (Jan.1 to May 15)	6.0-8.0	7.8	7.8	7.8	7.6	-
E. Coli (CFU/100 mL)	Fall (Oct. 1 to Dec. 31)	200	-	-	1.4	28	60
	Winter/Spring (Jan. 1 to May 15)	200	-	-	36	67	126

(1) Per ECA No. 8160-BAHPRF (April 19, 2019)
(2) MBBR and disc filter system was installed and began operating in 2021. It was noted that a process upset was experienced in the same year and trouble shooting the system has been taking place up to spring 2022. The information is not reflective of the STS treatment performance with the new MBBR and disc filter system.
(3) Non-Compliant per ECA No. 8225-B3HSD4 (October 3, 2018) / ECA No. 2712-6RVNRB (August 24, 2006): TSS (fall) =25 mg/L and TAN (spring) =16 mg/L.
(4) Compliant per ECA No. 8225-B3HSD4 (October 3, 2018) / ECA No. 2712-6RVNRB (August 24, 2006): pH limit fall and spring 6.0 to 9.5.

4.4 Sewage Pumping Stations

There are six (6) SPSs in Casselman, owned by the Municipality and operated by OCWA. Table 14 below provides information on each SPS.

Table 14: Sewage Pumping Station Inventory

Station No. (1)	Pumping Station	Pumping Station Capacity (2)	Year of Construction (Major Upgrade) (3)	Address	Operated By
1	Main	236 L/s *(118 L/s each pump)*	1978 (2006)	16 Brisson St.	OCWA
2	Isabelle St.	41 L/s *(20.5 L/s each pump)*	1988(4)	46 Isabelle St.	OCWA
3	Industriel St.	37 L/s *(37 L/s pump)*	1988	35 Industriel St.	OCWA
4	Laval	37 L/s *(18.5 L/s each pump)*	1988	839 Laval St.	OCWA
5	Des Chenes	41 L/s *(20.5 L/s each pump)*	2005	738 Des Chenes St.	OCWA
6	Northwest Quadrant	81 L/s *(40.5 L/s each pump)*	2018	819 Principale St.	OCWA

(1) Details for SPS No. 1 to No. 6 taken from available as-constructed drawings.
(2) ECA 173-W601 (September 29, 2022).
(3) Major upgrade generally includes replacement of pumps and associated electrical updates.
(4) Original construction date unknown.

5.0 Existing Conditions – Linear Infrastructure Model Updates

5.1 Water Model Update

The hydraulic water model for the Municipality of Casselman was previously updated in 2010 and again in 2019. As outlined in the memorandum *Village of Casselman, Extension of Municipal Servicing South of Highway #417 – Water and Wastewater System Projected Servicing Upgrades (JLR, May 21, 2019)*, it was determined at that time that the water model did not require a complete water demand update as the total modelled demands were found to be conservative. For the current water model update for existing conditions, the water demands have been re-adjusted to more accurately represent the flow distribution throughout the Municipality.

5.1.1 Hydraulic Model Update for Existing Conditions

The Casselman WTP treated daily flow data over the past five years (2018-2022) was used for hydraulic modelling purposes, as previously presented in Section 4, Table 3.

The average day demand was taken as the average of the treated water flow reported for every day over the past 5 years, which was calculated to be 1,031 m^3/d (12 L/s). The maximum day demand was taken as the average of the maximum day demand reported for each of the past 5 years, which is 1,968 m^3/d (23 L/s). As there was no peak hourly data specifically recorded, the peak hour demand was estimated using a theoretical peaking factor of 1.5 times the maximum day demand, as recommended by the MECP Design Guidelines for Drinking Water Systems (2008) for a community of any size, which resulted in a peak hour demand of 2,953 m^3/d (34 L/s).

The Municipality has separately retained Watson & Associates Economists Ltd. (Watson) to undertake analysis on the residential growth expected in the area. The study by Watson has provided a breakdown of existing serviced units and population for residential land use within the Municipality. A residential population density of 2.39 persons/unit was applied for existing units based on this study.

To update the water model for existing conditions, the residential parcels throughout the entire system were redistributed among the model junction nodes based on the locations of present water meters which are actively connected. Each actively connected parcel was assigned to the nearest junction node in the model.

Two (2) 'new' areas were added to the water model which represent watermain extensions constructed since the previous 2019 model update. Similar to the previously existing areas, the parcels within the 'new' areas having actively connected water meters were allocated to the nearest junction node in the model. The following 'new' areas were added in the model:

- West of Sarah Street: 9 existing units
- Casselman Developments Limited (Doré Street, Nature Street, Conservation Street, Argile Street, Barrage Street): 104 existing units

For the 'new' areas identified above, the watermains were added to the model based on pipe diameters, lengths and materials obtained from the GIS data, junction node elevations obtained from aerial satellite imagery, and roughness coefficients based on current City of Ottawa Design Guidelines.

The existing industrial, commercial and institutional (ICI) water demands were maintained from the 2010 and 2019 water model updates and allocated to the same junction nodes in the model. This included the school at Des Pommiers Street. Refer to Figure 9 for a depiction the overall water model schematic.

To calculate the water demands assigned to each junction node in the model, the existing ICI demands were deducted from the demands identified in Table 3. The total remaining demand for the residential parcels was divided by the total residential population (4,048 people including the 'new' areas) to obtain a water consumption rate per person. This consumption rate was then applied to each junction node based on the calculated population. This methodology was used to calculate the average day, maximum day and peak hour demand at each model junction node which was then input into the water model accordingly. The detailed water demand calculations are included in Appendix H.

5.1.2 Water Distribution System Design Criteria and Operating Parameters

For the design criteria under the average day, maximum day and peak hour scenarios, the following guidelines apply based on MECP Design Guidelines for Drinking Water Systems (2008):

- The maximum pressure at any point in the distribution system in unoccupied areas shall not exceed 689 kPa (100 psi), and while in occupied areas, shall not exceed 552 kPa (80 psi).
- Average Day: Pressures shall be within the range of approximately 350 kPa (50 psi) to 480 kPa (70 psi) and not less than 276 kPa (40 psi).
- Maximum Day + Fire Flow: Residual pressures at any point in the distribution system shall not be less than 140 kPa (20 psi).
- Peak Hour: Pressures shall be a minimum of 276 kPa (40 psi).

Fire flow requirements were calculated using Fire Underwriters Survey (FUS) and Ontario Building Code (OBC) requirements. The FUS method was also applied as per the City of Ottawa's Technical Bulletin ISTB-2018-02. It is understood the FUS fire flow is targeted north of Highway 417 and the OBC fire flow is targeted south of Highway 417.

Target fire flow calculations were carried out for various residential areas within the Municipality of Casselman. At least one (1) average size home was selected for each area. Table 15 below lists the representative home(s) selected to calculate the target FUS or OBC fire flow. This is also depicted in Appendix H for clarity.

Table 15: Required Fire Flows per FUS and OBC for Representative Residential Dwellings

Address	FUS Required Fire Flow (L/s)	OBC Required Fire Flow (L/s)
20 Filion St.	100	-
381 Dore St.	100	-
102 Laurier St.	83 - 100	-
106 Laurier St.		
773 Levesque Cres.	100 - 133	-
26 Desnoyers St.		
653 Des Epinettes Pl.	100	-
652 St. Anne		
782 Aurele Rd.	-	45

For existing ICI buildings, the FUS required fire flow is based on several unknown parameters such as construction type, occupancy, and sprinkler system integration. Therefore, a fire flow could not be calculated for these buildings however it is expected that they would require more fire flow than the residential dwellings due to their size.

Following the hydraulic water model update for existing conditions, the model was used to simulate the performance of the current water distribution system under existing flow conditions. The following operating parameters were used in the model simulations:

- The existing average day and peak hour scenarios assume that a single pump (labeled PMP-1 in the model) is operating at the WTP.

- The existing maximum day plus fire flow scenario assumes that two high-lift pumps (labeled PMP-1 and PMP-2 in the model) are operating at the WTP.

- The hydraulic grade line (HGL) of the existing standpipe is 100.52 m (standpipe is 90% full) as provided by OCWA in April 2023 (see email correspondence in Appendix H). This water level represents the normal low operating level before the pumps would be activated at the WTP. The noted HGL was modelled for all demand scenarios.

5.1.3 Water Model Simulation Results

The results of the model simulations are depicted in Figure 10, Figure 11, and Figure 12; and summarized in Table 16 and Table 17, where the percentage of junction nodes within each applicable range is reported.

Table 16: Existing Pressures under Average Day Demand and Peak Hour Demand

Pressure Range			Percentage of Junctions	
Pressure Range (kPa)			Existing Average Day Demand	Existing Peak Hour Demand
	Less than	276	0.0%	0.0%
276	up to	350	54.5%	71.2%
350	up to	400	45.0%	28.3%
400	up to	450	0.5%	0.5%
450	up to	500	0.0%	0.0%
500	up to and incl.	552	0.0%	0.0%
	Greater than	552	0.0%	0.0%

Under the existing average day demand condition, slightly over half of the junction nodes are between 276 kPa and 350 kPa and the remaining nodes are between 350 kPa and 450 kPa. Under peak hour demand conditions, the table above shows that the majority of junction nodes are between 276 kPa and 350 kPa, and a smaller percentage of the junction nodes are between 350 kPa and 450 kPa. Therefore, under both average day and peak hour demand, all of the junction nodes exceed the minimum pressure of 276 kPa (40 psi) as recommended in the MECP design guidelines.

Table 17: Existing Available Fire Flows under Maximum Day Demand

Maximum Day Demand + Fire Flow			Percentage of Junctions
Fire Flow Range (L/s)			Existing Maximum Day Demand
	Less than	30	0.0%
30	up to	45	3.7%
45	up to	67	1.1%
67	up to	83	7.9%
83	up to	100	11.6%
100	up to	117	10.1%
117	up to	150	33.3%
150	up to and incl.	200	14.8%
	Greater than	200	17.5%
	Less than	30	0.0%

The methodology used to calculate the fire flow requirements is outlined in Section 5.1.2. The required fire flow for each area was calculated and compared to the available fire flows computed from the water model. It was found that all areas in Casselman meet the required FUS and OBC fire flows, except at the following three (3) locations:

- Dead end watermain on Laurier Street: The residential houses and elementary school (Sainte-Euphémie Pavillion) on Laurier Street are supplied by a dead end 150 mm diameter watermain. For the residential properties, it was determined that the required fire flow per FUS is between 83 L/s and 100 L/s. For the school, the OBC minimum fire flow requirement for a two-story residential dwelling is 45 L/s and a school of this size would have an FUS fire flow requirement greater than that. The water model shows that the dead end watermain on Laurier Street has available fire flows below 83 L/s, so it does not meet the required fire flow. This is attributed to the length and size of the dead end watermain, which increases head losses along the pipe.
- Northwest area south of Principale Street: The FUS required fire flow was calculated to be 100 L/s based on a representative home on Filion Street. The water model shows that this area does not achieve the required fire flow from the water distribution system. This is attributed to this area being further away from the standpipe and at a higher topographic elevation than the surrounding areas.
- Riviere Nation North Road: It is noted that the water model shows an available fire flow of 47 L/s at the end of the dead end watermain on Riviere Nation North Road, which is below the minimum FUS requirements for that area. This is attributed to the length and size of the dead end watermain, which increases head losses along the pipe. This 150 mm diameter watermain supplies fire flow to a small number of residential houses.

Casselman Water Model
Overall Model Schematic

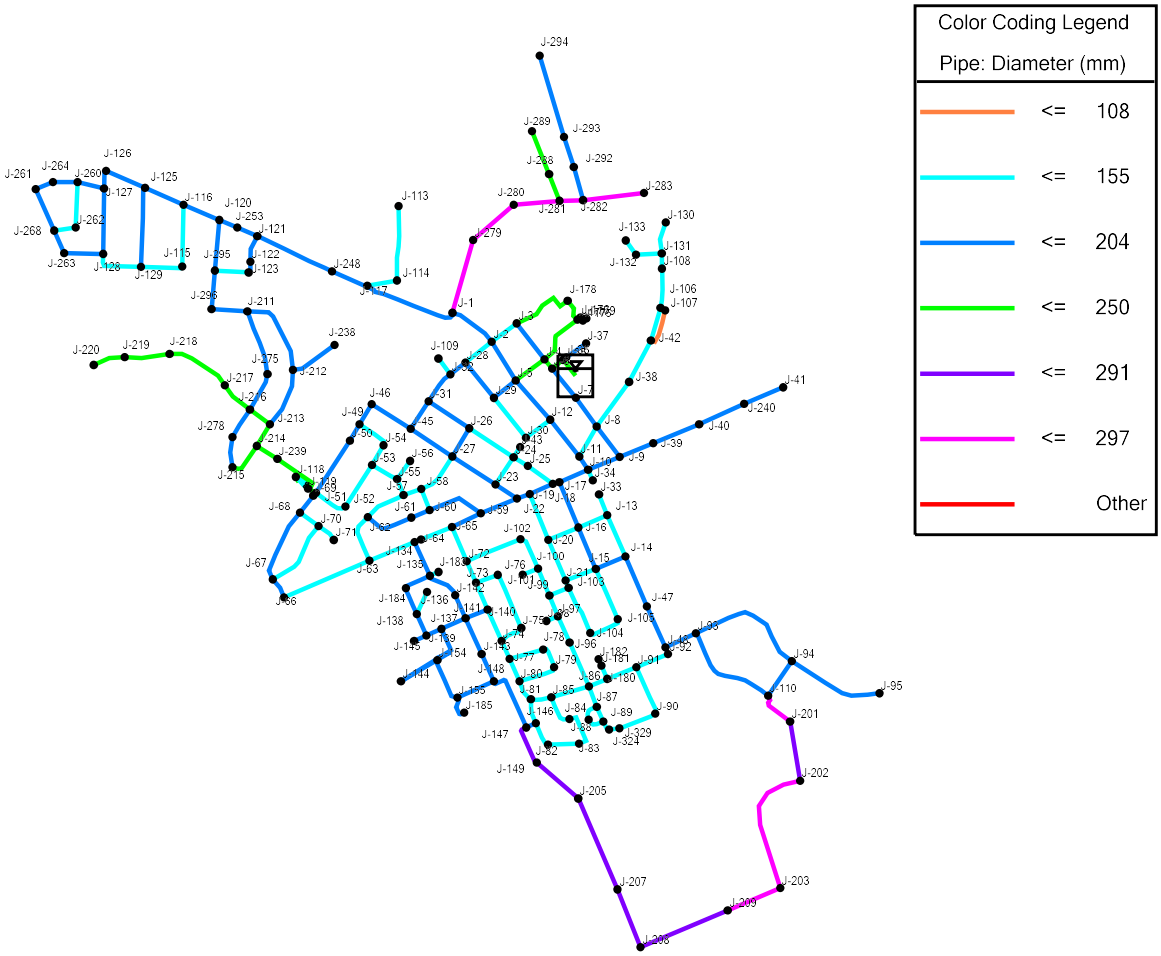


Figure 9: Overall Water Model Schematic

Casselman Water Model
Average Day Demand - Existing
1 Pump on, Standpipe HGL= 100.52 m

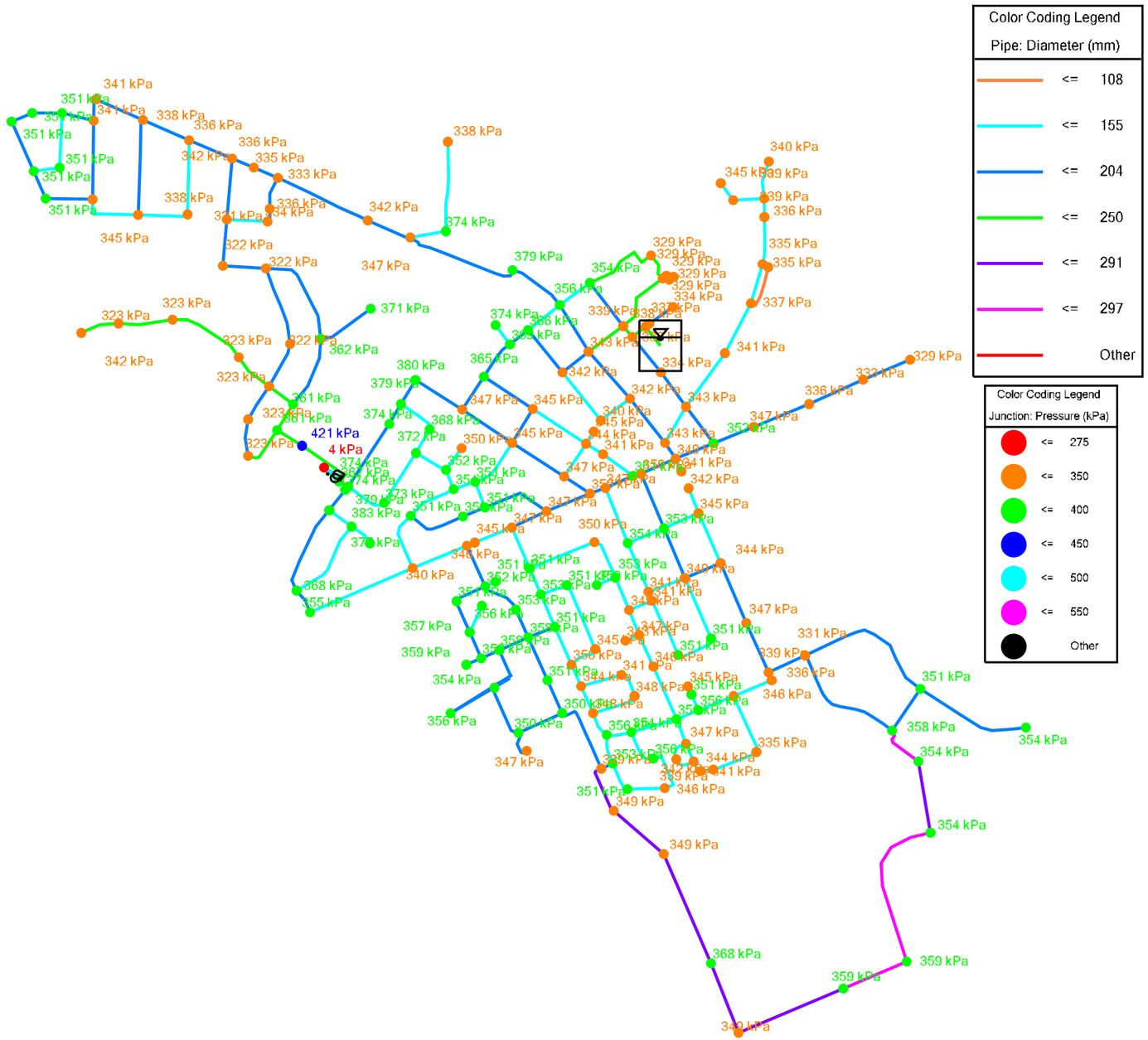


Figure 10: Existing Average Day Demand (1-Pump On)

Casselman Water Model
Peak Hour Demand - Existing
1 Pump on, Standpipe HGL= 100.52 m

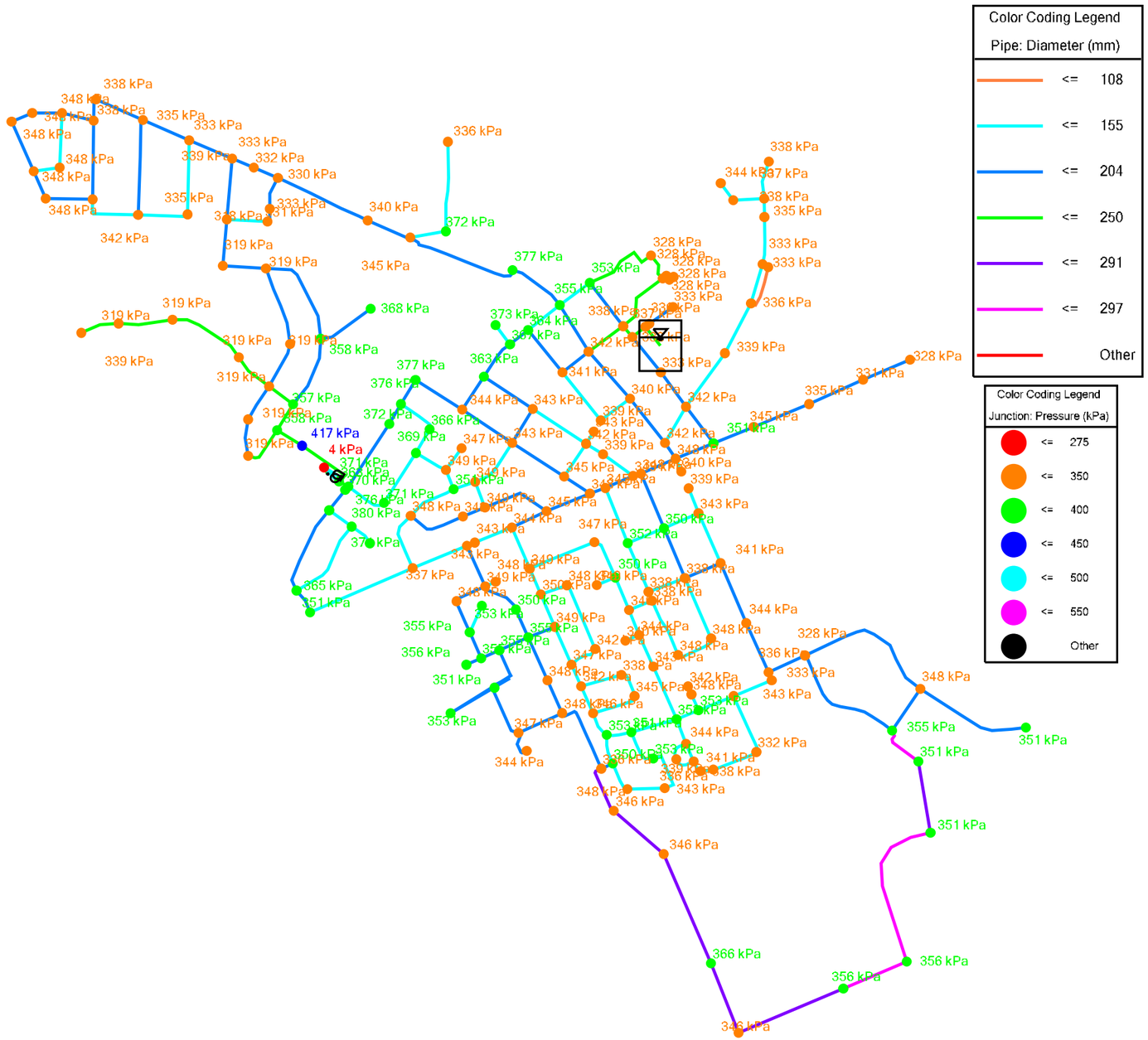


Figure 11: Existing Peak Hour Demand (1-Pump On)

Casselman Water Model

Maximum Day Demand + Fire Flow - Existing

2 Pumps on, Standpipe HGL= 100.52 m

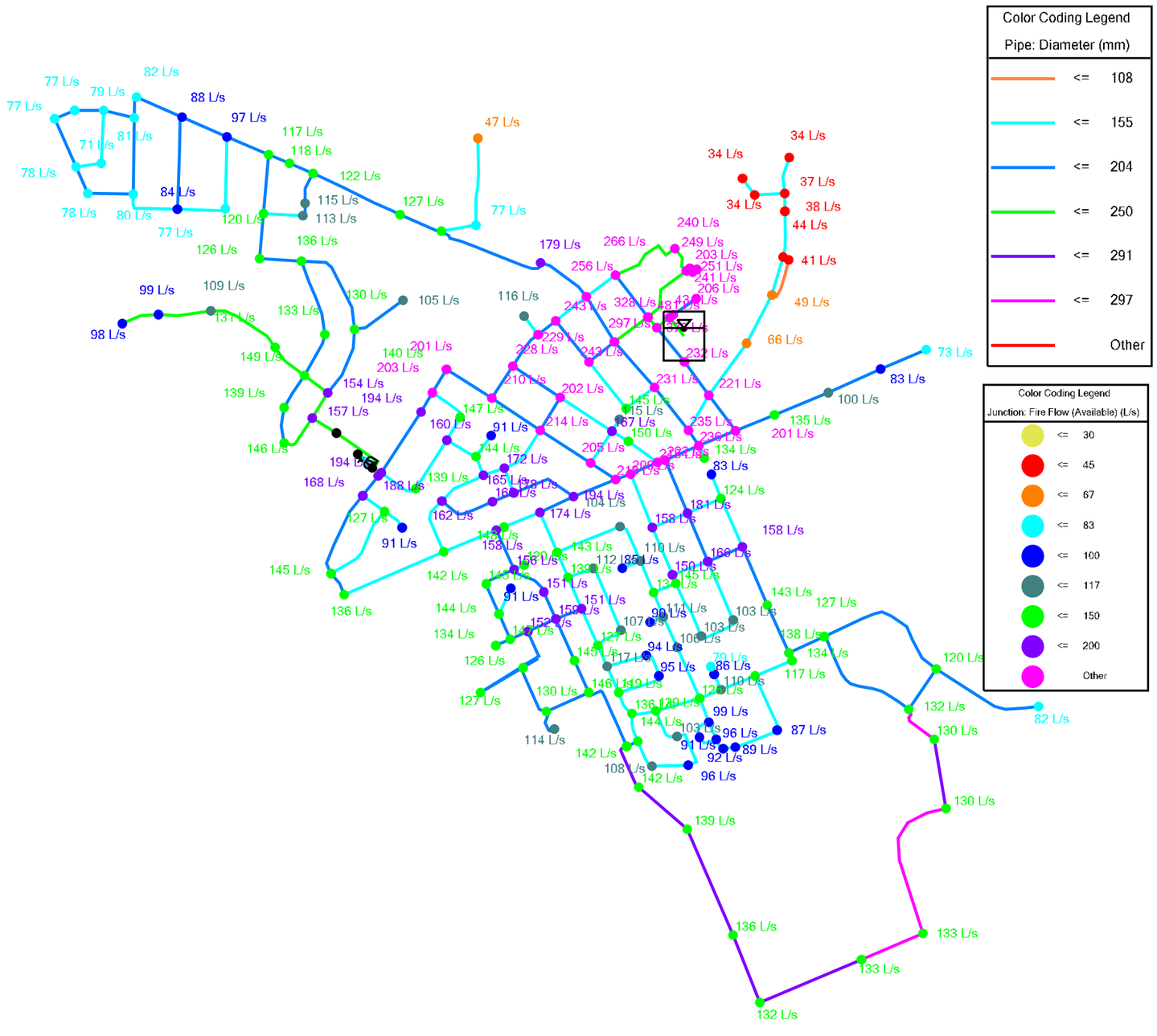


Figure 12: Existing Max Day Demand + Fire Flow (2-Pumps On)

5.2 Wastewater Model Update

5.2.1 Sanitary Sewer Flows

Standard design parameters have been used to develop peak theoretical sanitary sewage flows for the Municipality's sanitary sewer analysis completed in the sanitary sewer design sheet. The design parameters have been used to represent theoretical peak flows that may or may not be reflective of the actual flow being generated within a given sewershed. The actual flow generation will vary with population demographics; type of ICI establishments; ground conditions, groundwater table elevation; construction practices, and other factors.

5.2.1.1 Standard Design Parameters

The standard peak flow design parameters are used for the design of new sewers and pumping stations. They provide a set of conditions that are sufficiently conservative to establish peak sewer design capacities with a factor of safety to account for a certain degree of system degradation over time. Within the Municipality, the City of Ottawa Sewer Design Guidelines have been used to develop parameters for the design flows and are summarized below:

- Residential Average Flow: 350 L/c/day
- Commercial Average Flow: 28,000 L/ha/day
- Institutional Average Flow: 28,000 L/ha/day
- Average Industrial Flow: 35,000 L/ha/day
- Peaking Factor (Residential): Harmon Equation (2.0< P.F.< 4.0)
- Harmon Correction Factor 1.0
- ICI Peak Factor: 1.5

Note: L/c/day = Liters per capita per day
ha = gross hectare

5.2.1.2 Extraneous Flows

Sanitary sewers must be designed to convey waste discharges (the consumption flow), as well as extraneous, non-waste flow components, such as groundwater infiltration and inflow of surface runoff. Excessive extraneous flows can limit the capacity of existing sewer systems to serve expanding growth. They can also result in sewer backups, basement flooding, and increased operation and maintenance costs for pumping and treatment facilities. Conversely, successful control of extraneous flows can increase or maintain the life expectancy of the infrastructure and free available capacity for expansion and development.

The extraneous flow design allowance is added to the peak theoretical consumption flow, described earlier, to yield the total theoretical peak flow that the sewer must be designed to convey. As per the City of Ottawa Sewer Design Guidelines, a general allowance of 0.28 L/s/ha was used for the Municipality to calculate the extraneous flow component of the total flow, irrespective of the land use classification, sewer construction or soil type.

5.2.2 Theoretical Sewage Generation

The Municipality's sanitary sewer system primarily services existing residential development, but also some commercial and institutional developments and industrial areas.

5.2.2.1 Residential Development

To confirm the extent of existing development on the Municipality's sewer system the parcel GIS data was cross referenced with the latest water meter data supplied by the Municipality. It was assumed that where a water meter was present that there was an active connection to the sanitary sewer system.

The Municipality has separately retained Watson & Associates Economists Ltd. (Watson) to undertake analysis on the residential growth expected in the area. The study by Watson has provided a breakdown of existing serviced units and population for residential land use within the Municipality. The count of each unit type was extracted from the Watson data and allocated spatially across the study area on a prorated basis against the zoning information provided by the Municipality. Compared to the zoning information, the numbers provided in the Watson data combined the singles and semis as a single category, the townhouses and duplexes as a single multiple dwellings category, and apartments as a single category. The Watson data had a total of 1,695 units and 4,048 people within the Municipality, excluding the institutional totals, at an average unit density of 2.39 persons per unit.

In developing a design sheet analysis of a sanitary sewer system, it is important that the flows to the system are spatially weighted depending on population. The unit types are identified spatially to each sewershed, however, populations for each of these unit types generally vary and standard unit densities are provided by the City of Ottawa Sewer Design Guidelines and are shown in Table 18. Unit densities were prorated from the provincial guideline values to ensure that the overall population was consistent with the unit breakdown provided by Watson. The resulting population densities based on the unit breakdown in the Watson report are defined in Table 18.

Table 18: Population and Unit Breakdown

Unit Type	Zoning Unit Counts	Standard Unit Density	Study Counts	Study Unit Density	Serviced Population
Singles	963	3.4	1,245	**2.62**	3,261
Semi-Detached	143	2.7			
Townhouses	63	2.7	240	**2.04**	489
Duplex	27	2.3			
Apartments	244	1.8	210	**1.42**	298
Average / Total	1,440	2.81	1,695	**2.39**	4,048

The flow generation parameter applied to these spatially weighted populations for the analysis is 350 L/cap/day. The Harmon peaking equation (adjusted for Operational Parameters, using K = 1.0) was used to estimate peak sewage generation rates, consistent with the provincial guidelines.

5.2.2.2 Industrial, Commercial, and Institutional (ICI) Lands

The revised peak flow generation parameters specify a value of 35,000 L/ha/day to estimate flow generation rates for industrial type developments. This value is generally reserved for new or existing type developments at a Master Plan level of detail rather than specifics depending on the development type, number of employees, number of fixtures, etc. The total area of industrial lands serviced by the municipal sewer system was calculated as 22.24 ha using the zoning information in GIS.

The revised peak flow generation parameters specify a value of 28,000 L/ha/day to estimate flow generation rates for commercial and institutional type developments. This value is generally reserved for new or existing type developments at a Master Plan level of detail rather than specifics depending on the development type, number of employees, number of fixtures, etc. The total area of commercial and institutional lands serviced by the municipal sewer system was calculated as 54.97 ha using the zoning information in GIS.

A commercial and institutional peaking factor of 1.5 (per City of Ottawa Operational Parameters) was used to estimate peak sewage generation rates for both Commercial/Institutional and Industrial lands.

5.2.2.3 Total Theoretical Sewage Generation Rates

The total consumption flow, consisting of the combined commercial/institutional and residential sewage generation rates that are estimated for the site are:

- Total average inflow and infiltration: 65 L/s (=0.28L/s/ha * 233.5 ha)
- Residential average day sewage generation: 16.4 L/s (= 350 L/c/d * 4048 ppl)
- Industrial average day sewage generation: 9 L/s (=35,000 L/ha/day * 22 ha)
- Comm./Inst. average day sewage generation: 17.8 L/s (=28,000 L/ha/day * 55 ha)
- Residential Harmon peaking factor: 3.33
- ICI Harmon peaking factor: 1.5
- Total Peak Sewage Generation: 94.81 L/s (=16.4*3.33+17.8*1.5+9*1.5)

Below are the calculations leading to the Residential Harmon peaking factor, using the equation found in Figure 4.4 of the Ottawa Sewer Design Guidelines:

$$P.F. = 1 + \frac{14}{4 + \left(\frac{P}{1000}\right)^{\frac{1}{2}}} * K$$

where:

- P.F.: Peaking Factor
- K.: Correction Factor = 1.0
- P: Population

$$P.F. = 1 + \frac{14}{4 + \left(\frac{4070}{1000}\right)^{\frac{1}{2}}} * 1$$

$$P.F. = 3.33$$

5.2.3 The Sanitary Sewer Model

A spreadsheet model of the existing sanitary sewer system for the Municipality was developed by updating the existing Pipe by Pipe Design sheet. The extent of the existing network was confirmed by cross referencing parcels with the latest water meter records supplied by the Municipality and assuming that where a water meter is present that there is a connection to the sanitary sewer system, using the information linked to each parcel address found within the scope of work. The parcel addresses shed light on the land usage as well as the number of apartment units within a land parcel. The resulting sanitary sewer spreadsheet model is attached in Appendix I. The model was constructed as described below using the updated Sanitary Sewer Network, as shown in Figure 13 and Figure 14.

Sanitary sewer data such as length, slope and invert elevations were pulled from the GIS data provided by the Municipality. However, some data gaps were identified in the physical attributes of the system. In instances where slopes were missing, a value of 0.35% was assigned to the pipe to remain consistent with the other pipes within the network. The sewer slope is a key parameter in estimating the theoretical capacity of each sewer segment. In areas where invert elevations were missing, it was assumed that the upstream pipe was connected invert to invert, thus, matching the downstream end of the upstream pipe with the upstream end of the pipe for which we are missing information. Sewer sections with assumed data are highlighted in the design sheet. Sewer lengths were computed using QGIS to scale the actual pipe lengths based on the position of upstream and downstream maintenance holes provided by the GIS data.

Land parcel and zoning data were also provided by the Municipality shedding light on land use and number of units.

Sewershed areas were delineated based on lot parcels and proximity of sanitary manholes. Using spatial weighting, each sewershed area was assigned to the upstream sanitary sewer run within the area. This practice is conservative by ensuring that all pipes within the drainage area are of sufficient size to drain the entire area for which it is responsible.

The theoretical sewer capacity and corresponding flow velocity were computed using Mannings Equation. The key variables in Mannings equation are sewer diameter, sewer slope, and Mannings Roughness Coefficient (n). A roughness coefficient of 0.013 was assumed for all sewers in the spreadsheet model.

The residual capacity is defined as the theoretical sewer capacity minus the peak design flow for a given sewer segment. If the residual capacity is positive, then there is sufficient capacity in the existing sewer to accommodate calibrated peak design flow. However, if the residual capacity is negative, the sewer is considered to operate under ‘surcharged’ conditions during peak flow events.

5.2.4 Sanitary Sewer Model Results

Based on the sanitary sewer spreadsheet model the highest peak design flow with pump flow for the Municipality sanitary sewer system is 182 L/s.

The peak design flows in the spreadsheet model only accounts for a smaller 'typical wet weather flow contribution'. More intense 'annual' or 'extreme' storm events could generate higher rainfall induced extraneous flows in the system.

The spreadsheet model indicates that most sewers in the system operate under 19% capacity. The main sanitary sewer system on the south side of the river, on average operates between 2% and 28% capacity, although some sewers operate above 90% and as high as 182% capacity. The sanitary system on the north side of the river, for the most part operates under 9% capacity although some segments operate as high as 35% capacity. The spreadsheet model indicates that eight sewer segments (Table 19) have insufficient capacity to convey the peak design flow and have a negative residual capacity.

Table 19: Sanitary Sewers Over 100% Capacity

Segment	Corresponding Area/ Street	Q_d/Q_{full} (%)
MH535 – MH530	St Isidore Rd between Desnoyers St and St Joseph St	156
MH530 – MH 525	St Isidore Rd between Desnoyers St and St Joseph St	121
MH525 – MH520	St Isidore Rd between Desnoyers St and St Joseph St	163
MH305B – MH300	Intersection of Saint Joseph St and Yvon St	123
MH318 – PS1	At Pump Station 1 (Principale St and Brisson St)	182
MH620 – MH615	Intersection of St Isidore Rd and Isabelle St	116
MH290 – MH255	Intersection of Montcalm St and Sainte Therese St	104
MH255 – MH90	Intersection of Montcalm St and Saint Jean St	104

The Pipe by Pipe Design sheet indicates that an additional three segments of the sanitary sewer system are functioning close to capacity, at between 90% to 100% capacity (Table 20).

Table 20: Sanitary Sewers functioning at 90% to 100% Capacity

Segment	Corresponding Area/ Street	Q_d/Q_{full} (%)	Residual Capacity (L/s)
MH505 – MH500	Intersection of St-Joseph St and Cartier St	94	7.8
MH80 – MH317	Intersection of Brisson St and Principale St	97	11.2
MH515 – MH505	Intersection of St-Joseph St and Cartier St	91	12.7

It is noted that based on the available GIS data, the sewer segments listed in Table 21 have negative slopes and, as such, would not convey the theoretical peak flow without operating under surcharge. Sewer invert elevations are often difficult to measure in the field. For pipe sections with relatively flat slopes, compounded errors in invert measurement at the upstream and downstream maintenance holes can result in an inaccurate assessment of the slope, especially for short pipe lengths.

Table 21: Sanitary Sewers with Negative Slopes

Segment	Corresponding Area/ Street	Slope (%)
MH246 – MH825	Lafleche Blvd	-2.88
MH700 – MH695	Isabelle St between Alice St and Andre St	-0.71
MH310 – MH305B	Saint Joseph St at Yvon St	-0.16
MH295 – MH290	Sainte Therese St	-0.03
MH1500 – MH1490	Principale St near Riviere Nation Rd	-0.28
MH2025 – MH2020	Conservation St	-1.79

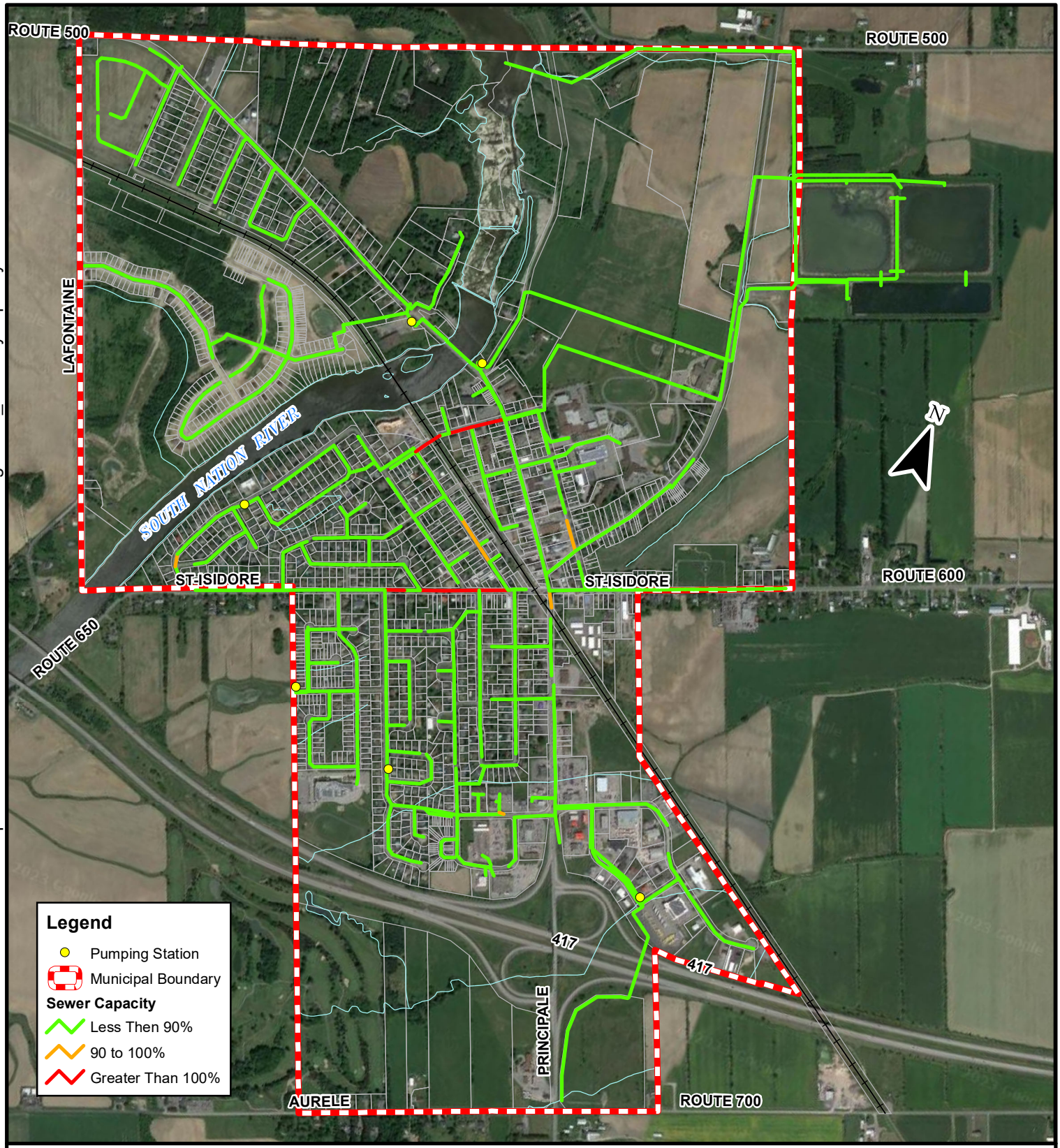
5.2.5 Pump Capacity Assessment

Flows in the design sheet were assessed against the rated and peak capacities at each pump station in the system. Table 22 summarizes the results at each station.

Table 22: SPS Capacity Assessment

SPS No.	SPS Rated Capacity (L/s)	SPS Peak Capacity (L/s)	Modelled Peak Flow (L/s) (1)
1	118	236	185
2	20.5	41	14
3	37	37	14
4	18.5	37	4
5	20.5	41	13
6	40.5	81	28
(1) Modelled peak flow from inlet sewers			

As shown in the above table, all pump stations receive flows below their rated capacity except for SPS No. 1 that receives flows greater than its rated capacity but below its peak capacity.



PROJECT:

CASSELMAN WATER AND WASTEWATER INFRASTRUCTURE MASTER PLAN

CASSELMAN, ONTARIO

DRAWING:

EXISTING SANITARY NETWORK CAPACITY

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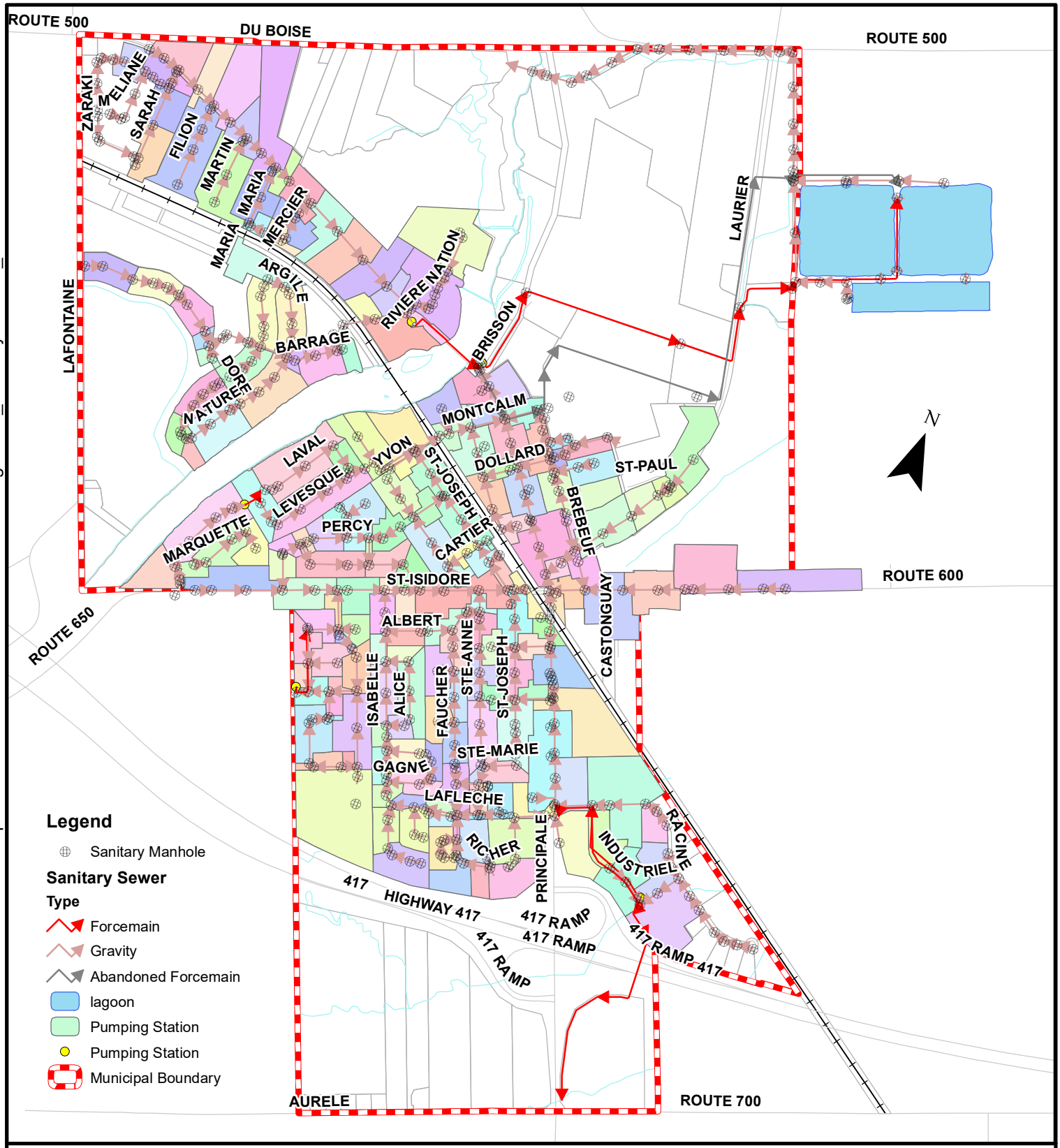
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FIGURE 13

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PROJECT:

CASSELMAN WATER AND WASTEWATER INFRASTRUCTURE MASTER PLAN

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FIGURE 14

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6.0 Condition Assessment

6.1 Water Treatment Plant and Sewage Pumping Stations (TM 1A)

A condition assessment was completed of key components of the Casselman WTP and the six (6) SPS on May 27, 2022, in order to establish each facility's existing conditions and identify replacement and/or repair needs. In addition, the Landmark Municipal Services (2019) elevated water tank inspection report which identified required repairs and associated cost estimates was reviewed. The condition assessment report, Technical TM 1A, is attached in Appendix D.

The review completed and data obtained were limited to visual observations and discussions with OCWA operators. No special lift devices or ladders were mobilized during the assignment and no destructive or exploratory testing or inspection was carried out. Confined spaces (i.e., wet wells, tanks, etc.) were not included in the scope of the review with the exception of visual observations outside of the confined space area.

The on-site assessment of the facilities included a confirmation of the key components of each facility and an assignment of a "condition rating" based on the visually observed physical condition. The condition and recommended replacement were assessed on a time basis such that the attributes that are considered "unacceptable" and "poor" conditions are to be upgraded in the short- (year 2022-2027) to mid-term (year 2028-2032); and the attributes that are rated "fair" condition will be recommended for replacement in the long term (year 2033-2047).

Based on the condition assessment, Opinion of Probable Costs were developed for each facility, in 2022-dollar value. Class 'D' OPCs developed for this assignment are expected to be within +/- 30%. The OPCs were developed based on past experience on similar projects, professional judgment, and equipment costs provided by suppliers. The "Opinion of Probable Costs" have been prepared for guidance in project evaluation and implementation from the information available at the time of the estimate. The final "Opinion of Probable Costs" of the project will depend on actual labor and material costs, competitive market conditions, final project scope, implementation schedule and other variable factors. As a result, the final "Opinion of Probable Costs" will vary from the "Opinion of Probable Costs" presented herein. Because of this, project feasibility and funding needs must be carefully reviewed prior to making specific financial decisions to help ensure proper project evaluation and adequate funding. The "Opinion of Probable Costs" does not include any costs for acquiring the necessary permits or rights-of-way for the above-specified equipment.

6.1.1 WTP

A multidisciplinary review of the WTP was completed, the Class 'D' Opinion of Probable Costs including a 30% engineering and contingency fee for short-, mid- and long-term upgrades are summarized in Table 23.

In the short term, the major items that require upgrades include the following:

- Spalling Brick Veneer
- Garage door finishes and structure
- Actiflo® and Chemical System Mechanical and Structural items (i.e., pumps, sampling system, tank remediation)

- General building mechanical items including ceiling fans, A/C, washroom fixtures
- Electrical and I&C upgrades including new electrical panels and transformers, ACP-01, PLC and HMI Ethernet

In the midterm, the major items that require upgrades include the following:

- Exterior caulking and rusted door frames
- Electrical and I&C items including MCC and FCP-21, -22, and -100
- Additional mechanical items in poor condition including the potassium permanganate chemical dosing and Actiflo® systems

In the long term, the major items that require upgrades include the following:

- Additional electrical and I&C items in fair condition but would require replacement in the long-term such as various pump controllers, indicator transmitters, and a new 250 kVA generator.
- Additional mechanical items that will require replacement in the future including the ammonia and chlorine systems, and raw water, high lift, and transfer pumps.
- Civil items including regrading, fencing, and segments of asphalt replacement.

Table 23: Summary of WTP Short, Mid and Long-Term Upgrades Opinion of Probable Construction Costs

Timeframe	Short-Term (2022-2027)	Mid-Term (2028-2032)	Long-Term (2033-2047)
Facility Costs	$ 880,500	$ 552,600	$1,079,500
Engineering and Contingency (30%)	$264,150	$ 165,780	$323,850
Total (1)	**$1,150,000**	**$720,000**	**$1,400,000**

(1) Class ‘D’ OPC in 2022-dollar value. These costs are based on past experience on similar projects, professional judgment, and equipment costs provided by suppliers and are expected to be within +/- 30%. The final "Opinion of Probable Costs" of the project will depend on actual labor and material costs, competitive market conditions, final project scope, implementation schedule and other variable factors.

6.1.2 SPSs

In a similar fashion, a multidisciplinary review of each of the Municipality’s six (6) SPSs was completed, the estimated Class ‘D’ Opinion of Probable costs including a 30% engineering and contingency fee for short-, mid-, and long-term upgrades are summarized in Table 24.

In the short term, the major items that require upgrades include the following:

- Roof replacement (SPS No. 1)
- Electrical items such as new PLC (SPS No. 1); new distribution, EYS Seals (SPS No. 2, 3, 4), and junction boxes (SPS No. 2 & 4)
- Boilers and hot water circulators (SPS No. 1)
- Review of the structural building elements (SPS No. 3) and paint touch ups (SPS No. 6)

- Piping, valves, and lighting inside the wet well (SPS No. 5)

In the midterm, the major items that require upgrades include the following:

- Concrete patch repairs (SPS No. 1) and replacement of any rusted elements (SPS No. 2)
- Piping and valves inside the wet well in poor condition (SPS No. 3)
- Electrical items (control panel, programming) needing replacement (SPS No. 4 & 5)

In the long term, the major items that require upgrades include the following:

- Replace electrical panels (SPS No. 1 & 2), distribution, and MCC (SPS No. 1)
- New screening system (SPS No. 1)

Table 24: Summary of SPS No. 1 to 6 Short, Mid and Long-Term Upgrades Opinion of Probable Construction Costs

SPS	Timeframe	Short-Term (2022-2027)	Mid-Term (2028-2032)	Long-Term (2033-2047)
SPS No. 1	Facility Costs	$260,800	$2,500	$565,000
	Engineering and Contingency (30%)	$78,240	$750	$169,500
	Total (1)	**$340,000**	**$3,000**	**$735,000**
SPS No. 2	Facility Costs	$11,500	$2,500	$72,000
	Engineering and Contingency (30%)	$3,450	$750	$21,600
	Total (1)	**$15,000**	**$3,000**	**$94,000**
SPS No. 3	Facility Costs	$89,100	$20,000	$3,000
	Engineering and Contingency (30%)	$26,730	$6,000	$900
	Total (1)	**$116,000**	**$26,000**	**$4,000**
SPS No. 4	Facility Costs	$11,500	$87,500	-
	Engineering and Contingency (30%)	$3,450	$26,250	-
	Total (1)	**$15,000**	**$114,000**	**-**
SPS No. 5	Facility Costs	$24,500	$80,000	-
	Engineering and Contingency (30%)	$7,350	$24,000	-
	Total (1)	**$32,000**	**$104,000**	**-**
SPS No. 6	Facility Costs	$2,500	-	-
	Engineering and Contingency (30%)	$750	-	-
	Total (1)	**$3,000**	**-**	**-**

(1) Class 'D' OPC in 2022-dollar value. These costs are based on past experience on similar projects, professional judgment, and equipment costs provided by suppliers and are expected to be within +/- 30%. The final "Opinion of Probable Costs" of the project will depend on actual labor and material costs, competitive market conditions, final project scope, implementation schedule and other variable factors.

6.1.3 Water Storage

In 2019, OCWA, retained Landmark Municipal Services to complete an inspection of the elevated water storage facility. The inspection consisted of the exterior and interior tank surfaces, completed using a remotely operated vehicle (ROV), and inspection of the tank's protective

coatings and linings. The inspection findings set forth several recommendations with associated probable costs. These are summarized in the following Table 25. Note that for the purposes of the condition assessment, the 2019 recommendation costs have been escalated by 30% based on Building Construction Price Index Canada for Non-Residential Building Type in Ottawa-Gatineau Area to be reflective of 2022 costs.

Table 25: Summary of Elevated Water Storage Tank Inspection Upgrades Opinion of Probable Construction Costs

Item	Opinion of Construction Probable Cost (1)
Siteworks	To be determined in Master Plan Phase 2
Security	To be determined in Master Plan Phase 2
Valve Chamber	$ 5,500
Ladder Upgrades	$72,000
Accessories	$ 10,600
Confined Space & Rescue	$ 9,000
Coatings and Linings	$ 53,500
Facility Costs 2019	$ 150,600
Facility Costs 2022 (Escalated 30%)	$ 195,780
Engineering and Contingency (30%)	$ 58,734
Total	**$ 255,000**

(1) Class 'D' OPC in 2022-dollar value. These costs are based on past experience on similar projects, professional judgment, and equipment costs provided by suppliers and are expected to be within +/- 30%. The final "Opinion of Probable Costs" of the project will depend on actual labor and material costs, competitive market conditions, final project scope, implementation schedule and other variable factors.

6.2 Linear Infrastructure (TM 1B)

A desktop condition assessment of water and wastewater conveyance piping infrastructure was undertaken. A piping inventory, including pipe diameter, material, and age, was reviewed and compared to typical industry standards for the desktop piping condition assessment. This condition assessment report is attached in Appendix E.

JLR was previously retained by the Municipality to complete a water/wastewater infrastructure GIS update. As part of the study, a large inventory of historical drawings related to these systems was provided, reviewed, and input into the GIS.

The Municipality's water network is made up of over 22 km of watermains ranging in diameter from 50 mm to 300 mm. The various watermain materials present in the system include high-density polyethylene (HDPE) and polyvinyl chloride (PVC). The age of the pipe in the system varies from 46 years old to those installed in 2021.

The Municipality's wastewater collection system is made up of over 30 km of sewer ranging in diameter from 100 mm to 825 mm. The various sewer materials present in the system include asbestos cement (AC), concrete (CONC), corrugated metal, high-density polyethylene (HDPE), and polyvinyl chloride (PVC). The age of the pipe in the system varies from 46 years old to those installed in 2021.

As noted, the oldest pipes within the water and sanitary system are 46 years old (installed in 1976). Based on pipe age alone, none will be approaching or exceeding their typical life span (75 years) within the Master Plan timeframe. However, it should be noted that the actual replacement needs would be based on a variety of factors, such as pipe type, soil and air characteristics and installation method. It is recommended that a visual assessment of the pipes is completed before replacement is considered.

A summary of estimated Opinion of Probable Costs for the long-term replacement (beyond 25 years) of water and sanitary pipes is provided in Table 26. Pricing of various piping by infrastructure type, diameter, and material was based on the City of Ottawa Master Spec Code List published March 3, 2021, and escalated by 30% based on Building Construction Price Index Canada for Non-Residential Building Type in Ottawa-Gatineau Area. As noted above, actual replacement needs would be based on a variety of factors and a visual assessment of pipes should be completed before replacement is considered.

Table 26: Summary of Linear Infrastructure Condition Assessment Long-Term Upgrades Opinion of Probable Construction Costs

Infrastructure	Length of Pipe (km)	Material	Opinion of Probable Cost (1)
Water	22.69	PVC	$ 22,600,000
	Unknown	HDPE	-
			TOTAL = $ 22,600,000
Sanitary	27.14	PVC	$ 18,300,000
	1.58	CONC	$ 1,000,000
	0.27	HDPE	$ 240,000
	0.67	AC	$ 500,000 (2)
	Unknown	Corrugated Metal	-
			TOTAL = $ 20,040,000
			TOTAL REPLACEMENT COST = $ 42,640,000

(1) Class 'D' OPC in 2022-dollar value. These costs are based on past experience on similar projects, professional judgment, and equipment costs provided by suppliers and are expected to be within +/- 30%. The final "Opinion of Probable Costs" of the project will depend on actual labor and material costs, competitive market conditions, final project scope, implementation schedule and other variable factors.
(2) Pricing based on Asbestos Cement replaced with PVC piping of equal size.

7.0 Problem and Opportunity Statement

Based on the work completed during Phase 1 of the Master Plan process, the following Problem/Opportunity Statement has been developed:

The Municipality of Casselman is serviced by communal water and wastewater systems consisting of a water treatment plant, an elevated water storage tank, over 22 km of watermains, a sewage treatment system, six sewage pumping stations, and over 30 km of sanitary sewers. In recent years, the South Nation River, the source water for the Municipality, has presented challenges with respect to raw water quality and quantity. Moreover, the Municipality has been experiencing significant development pressures at present and within the Master Plan timeline.

There is an opportunity through the Master Planning process to review the water and wastewater systems holistically and develop a strategic plan of actions that can be implemented over a logical time period and in a prioritized fashion with the intended goal of addressing future servicing needs and ensuring appropriate performance and reliability of the water and wastewater systems in short, mid and long-term planning horizons.

8.0 Phase 2 Methodology and Next Steps

This Report has been developed to summarize the Phase 1 work undertaken as part of the Master Planning process. Phase 1 has been used to identify the problems and opportunities associated with the Municipality's water and wastewater systems and to clearly define the existing conditions and constraints associated with the current system. Phase 2 of the Master Plan process will involve further definition of these systems through the development of hydraulic models and will ultimately include the identification of preferred strategies and actions to address the problems and opportunities identified in Phase 1. Options considered will include new construction, in addition to potential retrofits, upgrades and/or conservation measures to optimize the treatment and efficiency of the existing systems. More specifically, the following are planned for Phase 2:

- Model of the water and wastewater systems for future development.

- Identify and evaluate alternative solutions to address capacity and treatment issues noted in Phase 1. Develop a list of alternatives and their proposed timelines and associated costs.

- A Public Information Centre will be held as part of the public consultation program to present proposed alternatives and recommended preferred solutions. The public and other stakeholders will be given the opportunity to review and comment on the information presented.

- A Master Plan Report will be prepared to summarize Phase 2 findings incorporating public and stakeholder feedback and will be placed on record for a 30-day review period.

This report has been prepared by J.L. Richards & Associates Limited for the Municipality of Casselman's exclusive use. Its discussions and conclusions are summary in nature and cannot properly be used, interpreted or extended to other purposes without a detailed understanding and discussions with the client as to its mandated purpose, scope and limitations. This report is based on information, drawings, data, or reports provided by the named client, its agents, and certain other suppliers or third parties, as applicable, and relies upon the accuracy and completeness of such information. Any inaccuracy or omissions in information provided, or changes to applications, designs, or materials may have a significant impact on the accuracy, reliability, findings, or conclusions of this report.

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J.L. RICHARDS & ASSOCIATES LIMITED

Prepared by:



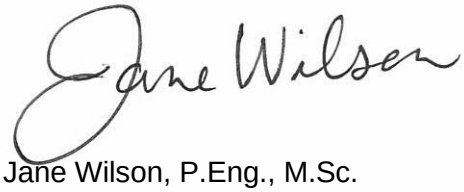
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Appendix A1

Stakeholder Consultation Plan

MUNICIPALITY OF CASSELMAN

WATER AND WASTEWATER INFRASTRUCTURE MASTER PLAN

CLASS ENVIRONMENTAL ASSESSMENT

PUBLIC CONSULTATION PLAN

DRAFT – MAY 31, 2022

Submitted by:

J.L.Richards
ENGINEERS · PLANNERS

864 Lady Ellen Place
Ottawa, ON Canada
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JLR 16953-118

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1.0 INTRODUCTION

The Municipality of Casselman (Municipality) is undertaking a Class Environmental Assessment (Class EA) Master Planning exercise to evaluate alternatives to expand and/or upgrade and the feasibility of improving water and wastewater infrastructure for future development in Casselman.

The Class EA is proceeding in accordance with the requirements of the Ontario Municipal Class EA, October 2000, as amended in 2015. Public consultation is a key element of the Class EA process. As a result, this public consultation plan has been developed to ensure that the public and other stakeholders have numerous opportunities to be involved in and to provide comments throughout the Class EA.

2.0 KEY CONSIDERATIONS

Upon review of background material, collected from our previous and ongoing working relationship with the Municipality, several considerations likely to impact the implementation of the public consultation plan emerged. They represent both opportunities and constraints for engagement and influence how this public consultation plan is structured. These considerations include the following:

- The Municipality is experiencing increased development pressures. The public consultation activity will seek meaningful inputs from the Municipal staff, Council, local developers, major industries, and other stakeholders. Approval on key milestone deliverables (e.g., population and growth) from Council must be obtained.

- It will be essential to engage key stakeholders that govern the compliance and operation of the water and wastewater system (e.g., Ontario Clean Water Agency, Ministry of the Environment, Conservation and Parks) or may influence the outcome of the planning process (e.g., indigenous communities).

- Due to the ongoing COVID-19 pandemic and the potential for in-person restrictions, the Public Information Centre (PIC) may need to be conducted virtually. A hybrid attendance model can also be explored.

- All public notices will be in both English and French.

3.0 CONSULTATION OBJECTIVES

The research and analysis conducted during the development of this public consultation plan have led to the identification of the following objectives for the consultation process for the Class EA:

- Improving understanding and involvement through effective communication and consultation among local residents and regulatory agencies.
- Ensuring the feedback provided by the public and other stakeholders is reviewed and understood by the consulting team.
- Providing easy ways for the public and other stakeholders to obtain information about the Class EA process using the Municipality website and providing project contact numbers for information.
- Encouraging participation at the PIC and other consultation activities so that the consulting team understands local concerns and issues.

4.0 TARGET GROUPS FOR CONSULTATION

To satisfy the objectives of this public consultation plan, target groups should be identified. The following list encompasses the audiences considered critical for the success of the public consultation plan. As the Class EA unfolds, additional target groups may be identified and included. The groups include the following:

The general public, including:

- Property owners adjacent to the Water Treatment Plant, Sewage Lagoons, elevated tank, and sewage pumping stations
- Municipality Residents and Business Owners
- Local developers
- Neighboring Municipalities
- Affected Indigenous communities

Government organizations and agencies, including:

- Municipality Council and Staff
- Eastern Ontario Health Unit (EOHU)

- Fisheries and Oceans Canada
- Impact Assessment Agency of Canada (IAAC)
- Infrastructure Ontario
- Ministry of Agriculture, Food and Rural Affairs (MAFRA)
- Ministry of Economic Development, Job Creation and Trade (MEDJCT)
- Ministry of Heritage, Sport, Tourism and Culture Industries (MHSTCI)
- Ministry of Indigenous Affairs (IAO)
- Ministry of Municipal Affairs and Housing (MMAH)
- Ministry of Northern Development, Mines, Natural Resources and Forestry (NDMNRF)
- Ministry of the Environment, Conservation and Parks (MECP)
- Ministry of Solicitor General (MSG)
- Ontario Provincial Police (OPP)
- South Nation Conservation (SNC)

5.0 ACCESSIBILITY STANDARD FOR CUSTOMER SERVICE

It will be critical throughout the Class EA that services are provided in accordance with the Accessibility for Ontarians with Disabilities Act. This includes having respect for persons with a disability and using all reasonable efforts to ensure they have an equal opportunity to obtain and provide input.

Throughout the Class EA, the consulting team will:

- Ensure PIC and other consultation activities, when conducted in-person, are held in buildings with barrier-free access; and
- Work with the Municipality in providing accessible formats and communications supports, upon request.

6.0 KEY MESSAGES

Consistent messages with the appropriate tone and content will improve understanding among target audiences. The message statements listed below are built on a current

understanding of the existing audiences, constraints, opportunities, and environmental concerns surrounding the Class EA. These messages should be communicated throughout the Class EA and refined, as required, as it unfolds.

- To make important servicing decisions, an implementable plan is required by the Municipality and property owners. Given the critical nature of the water and wastewater infrastructure, the ultimate planned solution(s) need to ensure the systems are reliable and robust such that it can accommodate existing and future servicing needs.

- The Municipality and consulting team members are committed to this Class EA and are placing an emphasis on a seamless, open, transparent, and traceable Class EA process.

7.0 RECOMMENDED STAKEHOLDER CONSULTATION ACTIVITES

A variety of public consultation vehicles and mechanisms are recommended to achieve the objectives of this public consultation plan. Care has been taken in selecting activities that recognize the needs of the local community and government organizations along with their specific information requirements.

7.1 Technical Steering Committee (TSC)

To facilitate the consultation process and communications between the JLR team, the Municipality, the operators and other stakeholders (when and if required), a TCS will be formed. The TSC will comprise of:

Name	Agency	Description
Pierre-Paul Beauchamp	Municipality	Director of Public Works
Yves Morrissette	Municipality	CAO
Ontario Clean Water Agency (OCWA)	OCWA	Operations Staff
Matthew Morkem	JLR	Project Manager
Susan Shi	JLR	Master Plan Lead

7.2 Public Information Centre (PIC)

PICs, either in-person or virtually, provide a good mechanism for the local community to be informed about and comment on the Class EA.

One PIC will be conducted during the Class EA process, following the Municipality's review of the draft Master Plan Report, to present the proposed alternatives and preferred solutions that were identified by the project team. The public, agencies, and other interest groups (Council members, etc.) will be given an opportunity to review and comment on the information presented.

The PIC will be designed to be welcoming and provide an opportunity for residents to speak directly with the consulting team and Municipality officials. These can take a variety combination of forms, especially during the COVID-19 pandemic (e.g., virtual or in-person formal presentations with a question-and-answer session and/or display boards with informal one-on-one discussions, etc.). The appropriate PIC format will be dictated by the complexity of the alternatives, length of slides, accessibility requirements, and public health restrictions at the time of the PIC. Residents will be encouraged to fill out comment sheets to provide feedback to the consulting team.

Once staff and public comments are incorporated, we will provide a presentation to Council outlining the outcome of this critical juncture. Subject to Council concurrence, the Master Plan Report will be finalized by incorporating review comments and a Notice of Completion will be placed on record for a 30-day review period, during which time any unresolved issues may be addressed.

7.3 Ongoing Promotion and Consultation

To engage the public and other stakeholders, Class EA and PIC notices should be placed in the information pages of local newspapers (if required), Municipality's website and posted at the Municipality office. Notices will also be direct mailed/e-mailed to identified stakeholders, agencies, and adjacent property owners. Class EA notices could also be provided to the Municipality Council to allow Councillors to inform their constituents about the Class EA.

7.4 Website

To assist the public in obtaining information about the Class EA and to provide an on-going mechanism for feedback to the consulting team, the Municipality should provide space on their website for the Class EA. Information for the website should include notices for the PIC, reports/executive summaries, technical memos and contact information.

7.5 Opportunities to Comment

At all public meetings, the public and other stakeholders should be encouraged to leave comments following the meeting. Following each consultation activity, a report would be written that summarizes and records the comments and input received from the participants.

At the beginning of the Class EA, email and voice mail feedback tools should also be established to provide the public and other stakeholders with numerous avenues to provide input and ask questions. These feedback tools should be promoted on all communications materials.

Additional informal meetings may be required, and could be considered if local residents or the business community appear disengaged or dissatisfied with the extent or frequency of consultation activities.

7.6 Timing of Public Consultation

The following schedule lists anticipated dates of key stakeholder consultation activities. These dates are subject to change as the Master Plan moves forward and based on the level of project interest shown by stakeholders.

Activity	Anticipated Date
Notice of Commencement	June 2022
Council Presentation (Growth and Development)	Summer 2022
PIC	Fall 2022
Council Presentation	Winter 2022
Notice of Completion	Early 2023

8.0 EVALUATION MECHANISMS

The following activities should be undertaken to evaluate the effectiveness of this public consultation plan:

- Reviewing attendance numbers at the PIC;
- Requesting formal and informal feedback on the consultation process at the PIC, Council meetings and on the study website;
- Tracking the number of visits to the study website and evaluating changes in traffic that occur in response to consultation events (e.g., mailing or emailing out notices); and

- Examining the number and content of emails received from the public and other stakeholders.

9.0 CONCLUSIONS

The Municipality of Casselman is undertaking an important Class EA for current and future water/wastewater infrastructure for the community.

The activities contained in this public consultation plan reflect the need to have an enhanced outreach program for local residents and regulatory agencies throughout the Class EA process. The public consultation plan has been developed ensure that the public and other stakeholders are meaningful participants in the Class EA process.

Maintaining a clear, transparent, and inclusive consultation process will help to ensure that meaningful dialogue takes place so that innovative and achievable water/wastewater servicing strategies can be realized.

Appendix A2

TM 2 Growth Projections
(February 2, 2023)

JLR No.: 16953-118
Revision: DRAFT

February 2, 2023

Casselman Water and Wastewater Infrastructure Master Plan Technical Memorandum 2

Casselman Growth Projections

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

JLR Review

Prepared by:	Reviewed by:
Marc Rivet, RPP, MCIP Associate, Senior Planner	Nikita Jariwala, M.Pl. Planner

Casselman Water and Wastewater Infrastructure Master Plan
Technical Memorandum 2
Casselman Growth Projections

The Municipality of Casselman (the Municipality) is a lower-tier municipality in the United Counties of Prescott and Russell (UCPR). UCPR has recently adopted a new Official Plan for the UCPR (pending Ministerial approval). As per the *Planning Act*, this Upper-Tier plan is required to set the growth projections for its lower-tier municipalities.

Provincial Policy Statement 2020 (PPS), Section 1.4.2 reads:

> "Where planning is conducted by an upper-tier municipality: a) the land and unit supply maintained by the lower-tier municipality identified in policy 1.4.1 shall be based on and reflect the allocation of population and units by the upper-tier municipality."

The UCPR Official Plan provides forecasts for the Municipality to the year 2046 (25-year planning horizon), as summarized in the following table:

Table 1: Casselman Population, Household, and Employment Forecasts for 2046

	Growth Study (2021)	Growth Study (2046)	Growth (2021 to 2046)
Population	4,070	5,820	1,750
Household	1,580	2,450	870
Employment	1,930	2,220	290

Source: UCPR OP September 2022 based on Growth Management Strategy, March 2022.
Note: Total population includes Census Net Undercoverage; total employment includes Usual Place of Work, Work at Home and No Fixed Workplace

ON December 15, 2022, Statistics Canada released adjusted 2021 Census of Population numbers. The 2021 Census of Population (which took place in May 2021) slightly revised Casselman's total population to 3,960 with a total number of private dwellings occupied by usual residents of 1,578. Per Census, the average household size in Casselman was 2.51 in 2021.

Per the UCPR Growth Strategy the average household size is expected to decline to 2.37 in 2046.

The Building Department provided the following statistics for the two large subdivisions in the municipality:

Date of Occupancy	**Amount of units**			
	Casselman Development		West of Sarah	Total
	Phase 1	Phase 2	Phase 1	
Prior to May 31, 2021	132	0	0	132
Prior to December 31, 2022	70	34	13	117

It is assumed the occupied units as of May 31, 2021were accounted for in the 2021 Census of Population. Based on municipal data, an additional 117 units were built and occupied to the end of year 2021. Assuming an average household size of 2.51, (117*2.51), we can estimate an additional population of 293 people to **December 2022** resulting in a **population of 4,253 and 1,695 households (maintaining an average household size of 2.51)**.

The Municipality is 100% Urban Settlement Area and designated for growth (see Figure 1). Per the UCPR Official Plan, 15% of all new residential units created during this planning horizon shall be through intensification (this includes additional residential units). This means that approximately 131 units should be within the established built-up areas of the Municipality via infill, redevelopment, additional residential units, etc. Per PPS, intensification is defined as:

> "means the development of a property, site or area at a higher density than currently exists through: a) redevelopment, including the reuse of brownfield sites; b) the development of vacant and/or underutilized lots within previously developed areas; c) infill development; and d) the expansion or conversion of existing buildings."

Intensification is permitted across the Municipality except where infrastructure is inadequate or there are significant physical constraints (including additional residential units).

UCPR Official Plan has also set a goal that a minimum target of 30% of new housing or units created by conversion, to be affordable (per Bill 23 this represents no greater than 80 per cent of the average market rent or average purchase price).

In order to meet the varied housing requirements of the Counties' residents and to provide for orderly residential development, it is the policy of the UCPR Official Plan that, subject to the availability of water and wastewater services, zoning regulations be designed to provide for a mix of 70% low-density residential development, 20% medium density development and 10% high density residential development in the Urban Policy Area (which includes the Municipality). For the purpose of this section, low-density is defined as up to 35 units per net hectare. Medium density development on full municipal services should not exceed 55 units per net hectare for townhouses or row houses, and 75 units per net hectare for apartments. High density being above these density targets.

The Municipality's Planning Department has provided information in regard to committed and proposed development across Casselman, as summarized in the following table and illustrated in Figures 2 and 3. The Municipality has development files at various stages of approval from pre-consultation, draft approval to registered plans of subdivisions which include the following breakdown of residential and employment uses:

Table 2: Committed Developments

Committed Development	Units	Minus already built / occupied (December 2022)
Casselman Developments Limited (Plan of Subdivision file number 030-S-19-002)		
Phase 1 (M-Plan Approved)	210	8 vacant / unoccupied
Phase 2 A (M-Plan Approved)	40	6 vacant / unoccupied
Phase 2B (Draft Plan Approved Only - Committed)	144	144
Phase 3 (Draft Plan Approved Only - Committed)	179	179
Total Remaining (January 2023)		337

West of Sarah (Plan of Subdivision file number 030-S-19-003)		
Phase 1 (M-Plan Approved)	45	32 vacant / unoccupied
Phase 2 (Draft Plan Approved Only - Committed)	36	36
Phase 3 (Draft Plan Approved Only - Committed)	16	16
Phase 4 (Draft Plan Approved Only - Committed)	37	37
Total Remaining (January 2023)		121

Table 3: Uncommitted Developments

Uncommitted Development	**Units**
Plan of Subdivision Applications	
Project Martineau-Hughes	38
Applications for Site Plan Approval (more than 10 units)	
Devcore	97

Not accounting for potential developments or intensification and built – occupied units in registered subdivisions, there are approximately **459 draft approved or registered and vacant / not yet occupied lots/units which are considered as committed (assumed capacity in water/wastewater treatment plant).**

According to the growth forecast, the Municipality's demand for housing is expected to be 870 units by 2046. Assuming 117 were built and occupied since the study date, the expected number of units to meet projected growth is 753 units to the year 2046.

This projection represents approximately 33 new housing starts per year which is significantly lower than recent permit activity which has been closer to the 110 units per year. This trend will need to be monitored on a yearly basis.

With Committed units (draft approved) of 459 lots/units, the Municipality will see a shortfall of approximately 294 lots/units (note registered lots which have yet to be built have not been accounted for in this approximation) to meet this forecasted growth.

Based on the intensification policies it is assumed that approximately 131 units would be developed as intensification within the built-up areas, therefore reducing the shortfall to 163 lots/units.

The Municipality's Planning Department has also been in discussion with developers (not yet approved status) for an additional 135 units. This would still represent a shortfall of approximately 28 lots/units to meet expected growth to a 2046 planning horizon. It is recommended that a density study is conducted for the remaining vacant lands to assess land needs/density to meet expected growth.

In terms of employment uses, 290 jobs are anticipated by the year 2046. Based on available supply of employment lands this target will be achievable. Further analysis may be required to confirm the amount of employment lands and determine if certain parcels may be converted to residential lands.

N

PRINCIPALE ST

LAURIER ST

Municipality of The Nation

Municipality of The Nation

South Nation River

ST-ISIDORE RD

PRINCIPALE ST

HIGHWAY 417

Legend

Parcel_PropCode_All

LandUse

- Low Density Residential
- Medium Density Residential
- High Density Residential
- Commercial
- Industrial
- Institutional
- Parks and Open Space
- Vacant Land

PROJECT:

MUNICIPALITY OF CASSELMAN
WATER AND WASTEWATER MASTER PLAN
CASSELMAN, ONTARIO

DRAWING:

LAND USE INVENTORY

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DESIGN: MK	JLR NO: 16953-118
DRAWN: TB	DRAWING NO.: FIGURE 1
CHECKED: SS	

File Location: P:\16000\16953-118 - Casselman Infrastructure Masterplan\3-Production\1-Civil\GIS\16953-118 Landuse.mxd

Plot Date: December 21, 2022 3:52:26 PM

Medical Clinic
Timeframe: Less than 10 years

870 Principale St.
Light Commercial/Industrial
Units: 30
Timeframe: Greater than 10 years

Projet Mantineau-Hughes
866 Principale St.
Units: 38
Timeframe: Less than 10 years

A- West of Sarah
JLR (2019)
Units: 134
Timeframe: Less than 10 years

Hemson (2022)
Units: 134
Timeframe: 25 years

C-North of Principale
JLR (2019)
Units: 150
Timeframe: Less than 10 years

Hemson (2022)
N/A

D-Nation View
JLR (2019)
Units: 400
Timeframe: Less than 10 years

Hemson (2022)
Units: 466
Timeframe: 25 years

832 Principale St.
Phase 1: 36 Units
Phase 2: 36 Units
Less than 10 years

817 Principale St.
Loeb-Capital Box
60 Units
Greater than 10 years

B-Casselman Developments Limited
JLR (2019)
Units: 660
Timeframe: Less than 10 years

Hemson (2022)
Units: 451
Timeframe: 25 years

E-East of Laurier
JLR (2019)
Units: 300
Timeframe: Greater than 10 years

Hemson (2022)
N/A

700 Principale St.
68 Units
Less than 10 years

Devcore
97 Uints
Less than 10 years

Industrial
20-25 1ac lots
Greater than 10 years

Industrial
10-15 1ac lots
Greater than 10 years

I-East of Highway 417 Ramp (Ford Warehouse)
JLR (2019)
Units: 0
Timeframe: Less than 10 years

Hemson (2022)
N/A

N

Municipality of The Nation

PRINCIPALE ST

LAURIER ST

Casselman
Sewage
Treatment
Plant

South Nation River

ST-ISIDORE RD

HIGHWAY 417

PROJECT:
MUNICIPALITY OF CASSELMAN
WATER AND WASTEWATER MASTER PLAN
CASSELMAN, ONTARIO

DRAWING:
DEVELOPMENT FORECAST

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JLR NO: 16953-118
DRAWING NO.:
FIGURE 2

File Location: P:\16000\16953-118 - Casselman Infrastructure Masterplan\3-Production\1-Civil\GIS\16953-118 FutureDevelopment.mxd

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COMMITTED
A- West of Sarah
JLR (2019)
 # Units: 134
Timeframe: Less than 10 years

Hemson (2022)
 # Units: 134
Timeframe: 25 years

Draft Plan approved (Committed):
Total 134 Residential Units (RU)
Phase 1: 45 RU - M-Plan approved
Phase 2: 36 RU - Draft Plan approved only (Committed)
Phase 3: 16 RU - Draft Plan approved only (Committed)
Phase 4: 37 RU - Draft Plan approved only (Committed)

870 Principale St.
Light Commercial/Industrial
 # Units: 30
Timeframe: Greater than 10 years

NOT COMMITTED
Projet Mantineau-Hughes
866 Principale St.
 # Units: 38
Timeframe: Less than 10 years

Medical Clinic
Timeframe: Less than 10 years

D-Nation View
JLR (2019)
 # Units: 400
Timeframe: Less than 10 years

Hemson (2022)
 # Units: 466
Timeframe: 25 years

NOT COMMITTED
832 Principale St.
Phase 1: 36 Units
Phase 2: 36 Units
Less than 10 years

817 Principale St.
Loeb-Capital Box
60 Units
Greater than 10 years

NOT COMMITTED
C-North of Principale
JLR (2019)
 # Units: 150
Timeframe: Less than 10 years

Hemson (2022)
N/A

COMMITTED
B-Casselman Developments Limited
JLR (2019)
 # Units: 660
Timeframe: Less than 10 years

Hemson (2022)
 # Units: 451
Timeframe: 25 years

Draft Plan approved (Committed)
Total 573 Residential Units (RU)
Phase 1: 210 RU - M-Plan approved
Phase 2A: 40 RU - M-Plan approved
Phase 2B: 144 RU - Draft Plan approved only (Committed)
Phase 3: 179 RU - Draft Plan approved only (Committed)

E-East of Laurier
JLR (2019)
 # Units: 300
Timeframe: Greater than 10 years

Hemson (2022)
N/A

NOT COMMITTED
700 Principale St.
68 Units
Less than 10 years

NOT COMMITTED
Devcore
97 Uints
Less than 10 years

Industrial
20-25 1ac lots
Greater than 10 years

Industrial
10-15 1ac lots
Greater than 10 years

I-East of Highway 417 Ramp (Ford Warehouse)
JLR (2019)
 # Units: 0
Timeframe: Less than 10 years

Hemson (2022)
N/A

PRINCIPALE ST
LAURIER ST
PRINCIPALE ST
ST-ISIDORE RD
HIGHWAY 417
Casselman Sewage Treatment Plant
South Nation River
Municipality of The Nation
Municipality of The Nation
N

PROJECT:
MUNICIPALITY OF CASSELMAN
WATER AND WASTEWATER MASTER PLAN
CASSELMAN, ONTARIO

DRAWING:
COMMITTED UNITS

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JLR NO: 16953-118
DRAWING NO.:
FIGURE 3

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Appendix A3

Municipality of Casselman Sewage Treatment System Uncommitted Hydraulic Reserve Capacity – 2022 (September 21, 2023)

J.L. Richards
& Associates Limited
343 Preston Street
Tower II, Suite 1000
Ottawa Ontario K1S 1N4
Tel: 613 728 3571
Fax: 613 728 6012

September 21, 2023
Our File: 16953-120

VIA E-MAIL ppbeauchamp@casselman.ca

Pierre-Paul Beauchamp
Director of Public Works
The Corporation of the Municipality of Casselman
751 St. Jean Street
PO Box 710
Casselman, ON K0A 1M0

Dear Mr. Beauchamp:

Re: Municipality of Casselman Sewage Treatment System
Uncommitted Hydraulic Reserve Capacity - as of December 2022 (REV 4)

This letter report summarizes the methodology and calculations used to determine the Uncommitted Hydraulic Reserve Capacity for the Municipality of Casselman Sewage Treatment System, as of December 2022.

BACKGROUND

J.L. Richards & Associates Limited (JLR) was retained by the Municipality of Casselman (the Municipality) to update calculations for uncommitted hydraulic reserve capacity of their existing lagoon-based sewage treatment system, in order to determine treatment capacity constraints on future development.

The Casselman Sewage Treatment System (Casselman STS) consists of two (2) facultative lagoon cells (Cells 'A' and 'B'), an aerated lagoon cell (Cell 'C'), an aeration system, a phosphorous removal system, a wetwell and pumping system to supply two Moving Bed Biofilm Reactor (MBBR) process tanks, a Disc Filter, and a flow measurement system. The system also includes a main sewage pumping station and a forcemain. The Casselman STS has an average rated flow capacity of 2,110 m^3/day. This facility operated under the Ministry of the Environment, Conservation and Parks (MECP) Environmental Compliance Approval (ECA) No. 2712-6RVNRB from August 24, 2006, until October 2, 2018. On October 3rd, 2018, the ECA was amended, and as a result, this facility was operating under ECA No. 8225-B3HSD4. The ECA was further amended in 2019 to improve the performance of the lagoon sewage treatment system and ECA No. 8160-BAHPRF dated April 29, 2019, was issued. ECA No. 8160-BAHPRF came into effect prior to the fall discharge in 2020, upon completion of the modifications to the sewage treatment system identified within this approval.

The following establishes the theoretical uncommitted hydraulic reserve capacity based on the most recent ECA, draft approved development information reported, and existing usage.

CANADA'S BEST MANAGED COMPANIES

September 21, 2023
Our File: 16953-120

Pierre-Paul Beauchamp, The Corporation of the Municipality of Casselman

METHODOLOGY

The methodology used to determine the Uncommitted Hydraulic Reserve Capacity is based on the MECP document titled "Procedure D-5-1: Calculating and Reporting Uncommitted Reserve Capacity at Sewage and Water Treatment Plants" (March 1995). The uncommitted reserve capacity is calculated by subtracting the total average daily flow (raw sewage flows), and the potential daily sewage flow predicted for draft approved developments (committed hydraulic reserve capacity) from the Casselman STS rated capacity. Additionally, a 5% intensification of existing dwellings was included as part of the committed reserve flow calculation based on feedback provided by the Municipality.

TOTAL AVERAGE DAILY FLOW

The average annual daily flows for the Casselman STS for the past five years (2018-2022) were obtained from the Municipality. A 3- and 5-year average were calculated using the average annual daily flows of the past five years. Table 1 below summarizes the calculated total average daily flow. MECP Procedure D-5-1 allows for the use of either a 3-year average or a 5-year average of the average daily flow. The 3-year average was used for this review since the total average daily flow was slightly more conservative with this approach.

Table 1: Total Average Daily Flow (2018-2022)

Year	Average Annual Daily Flow (m^3/day)
2018	1,331
2019	1,354
2020	1,468
2021	1,310
2022	1,442
3-Year Average (2020-2022)	**1,407**
5-Year Average (2018-2022)	**1,381**

HYDRAULIC RESERVE CAPACITY

According to ECA No. 8160-BAHPRF the Casselman STS has a rated raw sewage influent capacity of 2,110 m^3/day. The hydraulic reserve capacity may be obtained by subtracting the total average daily flow from the rated capacity. Based on the above, the hydraulic reserve capacity of the Casselman STS as of 2022 is 2,110 m^3/d –1,407 m^3/d = 703 m^3/day.

COMMITTED HYDRAULIC RESERVE CAPACITY

Committed development information used within this report is based on information provided by the Municipality. The amount of flow attributed to approved and draft approved developments and inclusion of existing dwellings intensification units is summarized in Table 2 below.

September 21, 2023
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Pierre-Paul Beauchamp, The Corporation of the Municipality of Casselman

Table 2: Committed Reserve Capacity

Development	Units	Equivalent Population [1]
New Construction – Vacant [2]	N/A	N/A
Casselman Developments Limited		
Phase 1 (M-Plan Approved)	6	14
Phase 2 A (M-Plan Approved)	6	14
Phase 2B (Draft Plan Approved Only - Committed)	144	342
Phase 2C (Draft Plan Approved Only - Committed)	37	88
Phase 3 (Draft Plan Approved Only - Committed)	230	546
West of Sarah		
Phase 1 (M-Plan Approved)	26	62
Phase 2 (Draft Plan Approved Only - Committed)	36	86
Phase 3 (Draft Plan Approved Only - Committed)	16	38
Phase 4 (Draft Plan Approved Only - Committed)	37	88
821 Principale St. (Building permit issued - Committed)	9	21
825 Principale St. (Building permit issued - Committed)	9	21
17 Aquatria St. (Senior Housing) (Draft Plan approved only – Committed) [3]	50	100
720-722 St. Joseph St. (Building permit issued - Committed)	6	14
Intensification of Existing Units		
Existing Dwellings (1,337 units per 2021 Census) [4]	67	159
Total		**1,593**
Average Committed Reserve Flow (m^3/day) [5]		**558**

[1] Assumes 2.375 people per unit (DC Bylaw Schedule 5, Municipality of Casselman, Mid-2023 to Mid-2046)
[2] The Municipality confirmed that no vacant units are to be considered in this review
[3] Assumes 2.00 people per unit for Senior Housing
[4] Assume 5% intensification for existing dwelling units
[5] Based on an average day per capita usage of 0.35 m^3/d/cap

As shown in Table 2, using the total equivalent population and an average day per person usage of 0.35 m^3/d/cap (MECP Design Guidelines for Sewer Works 2008), the "committed" hydraulic reserve capacity is calculated as 1,593 persons x 0.35 m^3/d/person = 558 m^3/d.

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UNCOMMITTED HYDRAULIC RESERVE CAPACITY

Based on MECP Procedure D-5-1, the "uncommitted" hydraulic reserve capacity is calculated by subtracting the hydraulic reserve capacity from the "committed" hydraulic reserve capacity. The "uncommitted" hydraulic reserve capacity is 703 m^3/day - 558 m^3/d = 145 m^3/d.

As such, based on MECP Procedure D-5-1 and reported approved/draft approved development information, the Municipality has allocated approximately 93% of the entire hydraulic reserve capacity of the Casselman STS. The remaining residual capacity would be available to support an additional 175 residential units above the developments noted in Table 2.

PROJECTED TIMING FOR CASSELMAN STS EXPANSION

Based on the wastewater demands presented in this report and growth development timelines confirmed by the Municipality, a graph representing the projected average daily wastewater demands of the Casselman STS and anticipated timing to reach 80%, 90%, and 100% of the rated capacity was prepared.

This graph indicates that based on the Municipality's anticipated growth numbers (as further refined during the master planning study), 80% of the STS rated capacity will be reached by the end of 2023, 90% STS rated capacity will be reached sometime in 2025, and the rated capacity of the STS will be reached sometime in 2026.

SUMMARY

Based on the current wastewater generated within the Municipality and the number of draft approved developments, the calculations presented in this report indicate that there is sufficient hydraulic reserve capacity available at the Casselman STS to service all draft approved developments, including 5% intensification of existing lots.

However, as stated in the MECP ECA No. 8160-BAHPRF, once 80% of the rated capacity limit is reached a summary of efforts made to achieve the design objectives in the Approval, including an assessment of the issues and recommendations for pro-active actions to prevent flow exceedances and operational issues, should be completed by the Municipality.

The Municipality has proactively taken steps to review their overall infrastructure needs as they are currently working with J.L. Richards & Associates on a master planning study to assess various options to improve the performance and reliability of the water and wastewater treatment and sewage collection systems to ensure they can be relied upon to accommodate current and future flows generated within the Municipality.

Since the Municipality is currently experiencing high development pressures, it is recommended that an uncommitted reserve capacity calculation is undertaken on an annual basis to review any changes to the assumptions and impact on the projected timelines and to determine the need to initiate the planning process (i.e., Class Environmental Assessment) for a Casselman STS expansion.

September 21, 2023
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Pierre-Paul Beauchamp, The Corporation of the Municipality of Casselman

Yours very truly,

J.L. RICHARDS & ASSOCIATES LIMITED

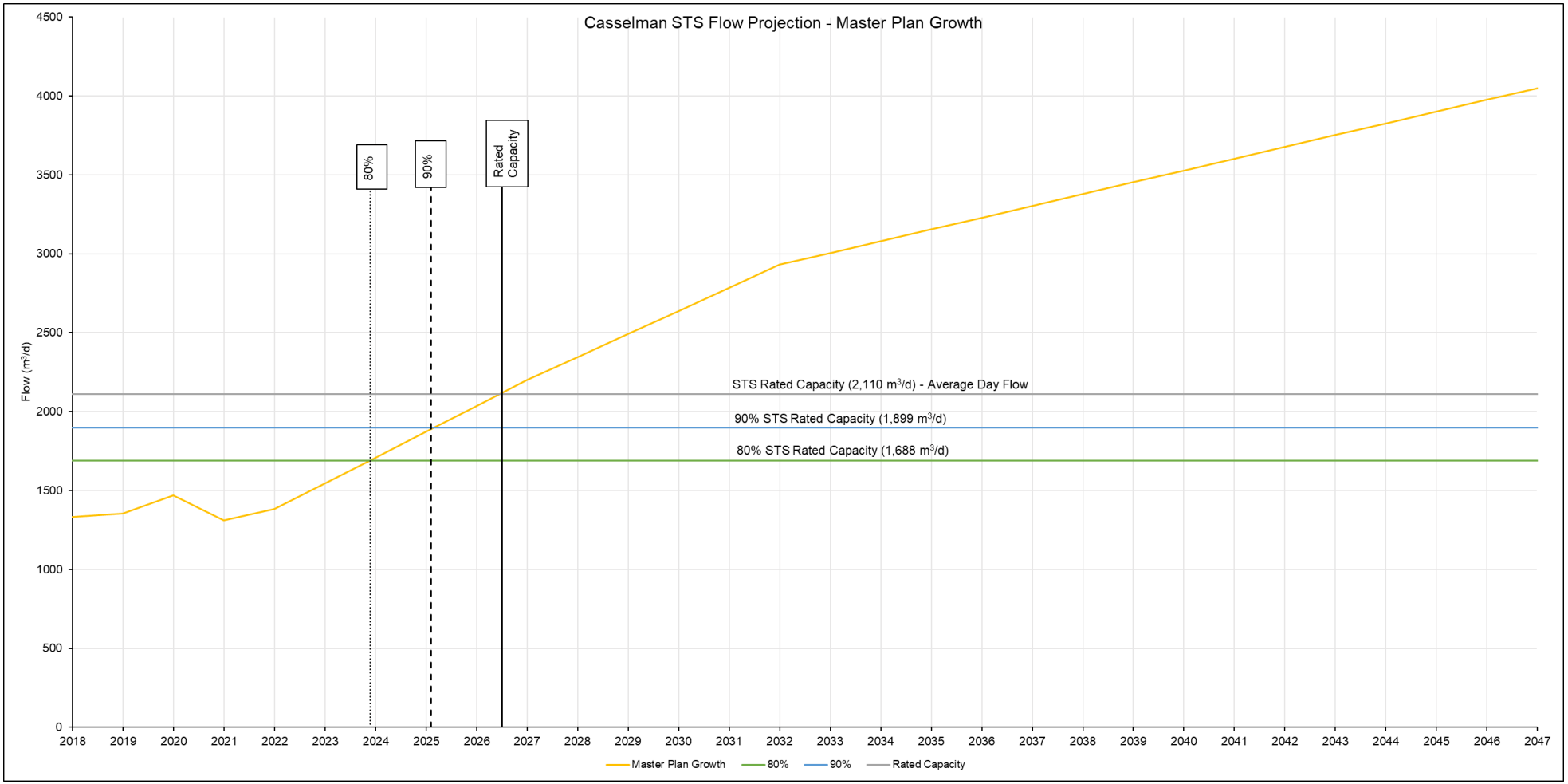
Meaghan Keon

Jordan Morrissette

Meaghan Keon, MASc., EIT
Environmental Engineering Intern

Jordan Morrissette, M.Eng., P.Eng.
Associate
Senior Environmental Engineer

MK/JM


Casselman STS Flow Projection - Master Plan Growth
Flow (m³/d)
4500
4000
3500
3000
2500
2000
1500
1000
500
0
80%
90%
Rated Capacity
STS Rated Capacity (2,110 m³/d) - Average Day Flow
90% STS Rated Capacity (1,899 m³/d)
80% STS Rated Capacity (1,688 m³/d)
2018
2019
2020
2021
2022
2023
2024
2025
2026
2027
2028
2029
2030
2031
2032
2033
2034
2035
2036
2037
2038
2039
2040
2041
2042
2043
2044
2045
2046
2047
Master Plan Growth
80%
90%
Rated Capacity

Appendix B

Phase 2 Report

JLR No.: 16953-118
Revision: After 30-Day Review Period

July 8, 2024

Phase 2 Report (Final After 30-Day Review)

Casselman Water and Wastewater Infrastructure Master Plan

J.L.Richards
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1.0 Introduction

1.1 Background

The Municipality of Casselman (the Municipality) initiated a Class Environmental Assessment (Class EA) Study to address treatment, capacity, and condition limitations of its water treatment plant (WTP), elevated water storage tank, water distribution system, wastewater conveyance system, sewage pumping stations and sewage treatment system through the development of a Water and Wastewater Infrastructure Master Plan. J.L. Richards & Associates Limited (JLR) was retained by the Municipality in 2021 to assist in the preparation of the Master Plan. This Master Plan is being completed in accordance with the Municipal Engineers Association (MEA) Class EA Approach 1 master planning process. The ultimate objective of the Master Plan is to develop a strategy to accommodate future growth within the Municipality for the next 25 years that can be implemented in a prioritized fashion to improve the overall performance and reliability of the water and wastewater system.

The Municipality is located along Highway 417 on the South Nation River and borders the Municipality of the Nation. The Municipality is serviced by a water distribution system, consisting of the water treatment plant (WTP), elevated water storage tank, and over 22 km of watermains. The Casselman WTP has a rated capacity of 3,182 m^3/day, is owned by the Municipality and operated by the Ontario Clean Water Agency (OCWA). This facility is operated under the Ministry of the Environment, Conservation and Parks (MECP) Drinking Water License Number 173-101 and Drinking Water Works Permit No. 173-201. It provides conventional treatment through an Actiflo ® treatment system, dual media filtration, and disinfection. Additionally, raw water is treated with potassium permanganate during the summer months when influent manganese concentrations are elevated.

The Municipality is serviced by a wastewater collection system consisting of sewage treatment system (STS), six (6) sewage pumping stations (SPS), and over 30 km of sanitary sewers. The Casselman STS has a rated capacity of 2,110 m^3/day and consists of two (2) facultative lagoon cells (Cells ‘A’ and ‘B’), an aerated lagoon cell (Cell ‘C’), an aeration system, a phosphorous removal system, a wet well and pumping system to convey lagoon effluent to two Moving Bed Biofilm Reactor (MBBR) process trains, a disc filter, and an effluent flow meter. This facility is operated under the MECP Environmental Compliance Approval (ECA) No. 8160-BAHPRF dated April 29, 2019.

Refer to Figure 1 for a location plan and overview of the water and wastewater infrastructure.

The main purpose of this Phase 2 Report is to summarize the findings from the second phase of the Master Plan process. The Phase 2 Report documents the work completed following the completion of the Phase 1 Report, which includes identification of possible servicing strategies to address the deficiencies, growth projections and the Problem and Opportunity statement identified in Phase 1 of the Master Plan, evaluation of the various servicing alternatives, and recommendation of preferred servicing strategies and associated costs and timing.

N

Casselman Sewage Treatment System

SPS No. 6
819 PRINCIPALE ST

SPS No. 1
(MAIN)
16 BRISSON ST

Elevated Water Storage Tank
756 BREBEUF ST

Water Treatment Plant
832 LAVAL ST

SPS No. 4
839 LAVAL ST

SPS No. 5
738 DES CHENES ST

SPS No. 2
47 ISABELLE ST

SPS No. 3
35 INDUSTRIEL ST

PRINCIPALE ST

LAURIER ST

ST-ISIDORE RD

HIGHWAY 417

South Nation River

Municipality of The Nation

Municipality of The Nation

Legend

Existing Infrastructure

- Elevated Water Storage Tank
- Water Treatment Plant
- Sewage Pumping Station

0 100 200 400 600 800

Meters

1:12,500

PROJECT:

MUNICIPALITY OF CASSELMAN
WATER AND WASTEWATER MASTERPLAN
MUNICIPALITY OF CASSELMAN, ONTARIO

DRAWING:

STUDY AREA AND OVERVIEW OF KEY INFRASTRUCTURE

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS
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DESIGN:	MK
DRAWN:	TB
CHECKED:	SS
JLR NO:	16953-118
DRAWING NO.:	FIGURE 1

File Location: P:\16000\16953-118 - Casselman Infrastructure Masterplan\3-Production\1-Civil\GIS\16953-118 Figure1_StudyArea.mxd

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1.2 Phase 1 Problem and Opportunity Statement

The Master Plan Phase 1 report was finalized on October 12, 2023, and posted on the Municipality's website (https://en.casselman.ca/services/water_and_sewer). Based on the work completed in Phase 1 of the Master Plan process, the following Problem and Opportunity Statement was developed:

"The Municipality of Casselman is serviced by communal water and wastewater systems consisting of a water treatment plant, an elevated water storage tank, over 22 km of watermains, a sewage treatment system, six sewage pumping stations, and over 30 km of sanitary sewers. In recent years, the South Nation River, the source water for the Municipality, has presented challenges with respect to raw water quality and quantity. Moreover, the Municipality has been experiencing significant development pressures at present and within the Master Plan timeline. There is an opportunity through the Master Planning process to review the water and wastewater systems holistically and develop a strategic plan of actions that can be implemented over a logical time period and in a prioritized fashion with the intended goal of addressing future servicing needs and ensuring appropriate performance and reliability of the water and wastewater systems in short, mid and long-term planning horizons."

1.3 Phase 1 Deficiencies

As established in Phase 1 of the Master Plan, population and flow projections (residential and industrial, commercial, and institutional (ICI)) have been categorized for the near term (0-5 years; 2023 to 2027), medium term (5-10 years; 2028 to 2032), and long term (10-25 years; 2033 to 2042) planning horizons.

To elaborate on the Problem and Opportunity Statement, more specifically, the following infrastructure components have been identified in Phase 1 as needing upgrades, based on the future servicing requirements for the various timeframes up to 25 years. Refer to Phase 1 Report for further information on the deficiencies.

Table 1: Water and Wastewater Infrastructure Deficiencies Identified in Phase 1

Infrastructure	Deficiency/Challenges Identified in Phase 1
Water Supply and Treatment	1. Water supply quantity and quality concerns with South Nation River. 2. 80% of the WTP rated capacity will be reached sometime between 2023-2028, 90% WTP rated capacity will be reached sometime between 2024-2032, and the rated capacity of the WTP will be reached sometime between 2025-2035. 3. WTP condition upgrades required over the next 5 to 25 years to rehabilitate the various equipment and elements of the facility.
Water Storage	4. The elevated storage tank capacity will be insufficient for water demands beyond 5 years. 5. The elevated storage tank requires condition-related upgrades.
Water Distribution System	6. Under existing conditions, all areas in Casselman meet the required system pressures; as well as the required fire flows except at the following three (3) locations: a dead end watermain on Laurier Street, northwest area south of Principale Street, Riviere Nation North Road.

Infrastructure	Deficiency/Challenges Identified in Phase 1
Conveyance System	7. Under existing conditions, there are 11 sewer segments that are >90% capacity of the peak design flow. 8 out of 11 sewer segments are insufficient to convey peak flow. 6 segments in the sewer system have negative slope.
Sewage Pumping Stations (SPS)	8. Under existing conditions, all SPSs are operating less than their firm capacity. SPS No. 1 (Main SPS that feeds into the STS) receives flow greater than its firm capacity but below its peak capacity. 9. Each SPS requires minor condition-related upgrades within the Master Plan timeframe.
Sewage Treatment System (STS)	10. 80% of the STS rated capacity will be reached sometime between 2023-2028, 90% STS rated capacity will be reached sometime between 2025-2033, and the rated capacity of the STS will be reached sometime between 2026-2037.

1.4 Phase 2 Objectives

The Casselman Water and Wastewater Infrastructure Master Plan has followed Approach No. 1, under the framework of the Municipal Class Environmental Assessment (Class EA) Process, which involves the preparation of a Report at the conclusion of Phases 1 and 2. For reference, the Class EA and Master Planning process have been fully detailed in the Phase 1 Report.

The objective of this Phase 2 report is to identify and evaluate alternative solutions to determine a preferred solution to the Problem and Opportunity Statement identified in Phase 1 (and presented in Section 1.2). This Report also outlines the evaluation methodology used to evaluate the alternatives and identifies their potential impacts and mitigation measures. Options considered include new construction, potential retrofits, and/or upgrades to optimize the treatment and efficiency of the existing water and wastewater infrastructure, in order to accommodate 25-year growth within the Municipality.

More specifically, the objectives of this Report are:

- To model future water distribution and wastewater conveyance systems for the Master Planning period of 25-years, and establish required water distribution, wastewater conveyance and SPS upgrades.

- To present an evaluation matrix with criterion by which servicing alternatives are evaluated against the natural, social/cultural, technical and financial considerations.

- To identify and evaluate alternative solutions to address treatment, capacity and storage issues associated with the linear infrastructure, WTP, water storage, STS and six SPS's within the Municipality, as established in Phase 1.

- To recommend a list of preferred alternatives, their proposed timelines, and associated costs.

- To provide mitigation measures and identify potential impacts associated with preferred alternatives, as well as any required permits or approvals.

- To conduct a council meeting and public information centre (PIC) to present proposed alternatives and recommended preferred solutions.

- To update and finalize the Master Plan Report based on comments received throughout the process and place on record for a 30-day review period.

It should be noted that the objective of a Master Planning exercise is to determine an overall "generalized solution". As such, more detailed investigations at a project-specific level will be required in order to fulfill the Class EA process required for specific Schedule 'B' and 'C' projects identified as a result of this Master Plan.

2.0 Identification and Evaluation of Servicing Strategies

2.1 Evaluation Methodology

In order to facilitate the evaluation and selection of the preferred solutions during Phase 2, the evaluation process consisted of a review of the alternatives in consideration of the criteria described in Table 2.

Table 2: Summary of Evaluation Criteria

Criteria	Description
Natural Environment Considerations	Natural features, natural heritage areas, areas of natural and significant interest, designated natural areas, watercourses and aquatic habitat.
Social and Cultural Environment Considerations	Proximity of facilities to residential, commercial and institutions, archaeological resources and areas of archaeological potential, known and potential built heritage resources and cultural heritage landscapes.
Technical Feasibility	Constructability, maintaining or enhancing water/wastewater treatment, reliability and security of distribution/conveyance system, ease of connection to existing infrastructure and operating and maintenance requirements, addresses aging infrastructure, expandability.
Financial Considerations	Capital costs, Operation and Maintenance costs.

Each criterion was assigned a colour to reflect its level of impact relative to other criteria. The relative level of impact for each criterion for each potential solution was then assessed based on the colour weighting system summarized in Table 3. The option that has the least negative impact (or has the strongest positive impact) was recommended as the preferred solution. The four (4) major criteria were assigned equal weights as they were considered to have equal importance in this evaluation at the Master Plan stage.

Table 3: Detailed Evaluation Impact Level and Colouring System

Impact Level	Colour	Relative Impact
Strong Positive Impact	Green	Preferred
Minor Impact	Yellow	Less Preferred
Strong Negative Impact	Red	Least Preferred

2.2 Water Supply and Treatment

There are a number of options to achieve the required future water demand to support the 25-year growth (and beyond) within the Municipality. The following alternatives have been identified to address the deficiencies and challenges associated with the existing water supply and treatment.

- Alternative 1: Status Quo – Maintain Water Supply from South Nation River
- Alternative 2: Increase Water Supply from South Nation River
- Alternative 3: Maintain Water Supply from South Nation River, Supplement Water Supply from Another Source
- Alternative 4: Discontinue Water Supply from South Nation River and Obtain Water from Other Sources

2.2.1 Alternative 1: Status Quo – Maintain Water Supply from South Nation River

The “Status Quo” alternative represents what would likely occur if the raw water intake quantity remained the same for the future scenarios, i.e., no increase to water supply and water treatment. The “status quo” option is always included in the evaluation as the basis for comparison.

This alternative is not feasible and will not be carried forward into the detailed evaluation. As presented in Phase 1, the increase in water demand brought by growth within the Municipality requires doubling the current maximum day demand rated capacity of the WTP within the next 25 years.

2.2.2 Alternative 2: Increase Water Supply from South Nation River

The South Nation River has historically experienced water quality challenges. As described in the Phase 1 report, as recently as June/July 2023, the Municipality’s water system experienced an elevated manganese event during which the drinking water turned brown. In addition, the Municipality currently has issues meeting turbidity and disinfection-by product (THM) guidelines, which are both likely linked to high influent organic loading from the South Nation River. When this alternative was initially discussed with the Municipality, they indicated that this is a less preferred alternative due to potential water quality concerns. There are also concerns surrounding water quantity in the South Nation River as the projected maximum day demand in the Municipality is set to double.

JLR in partnership with GEMTEC Consulting Engineering and Scientists Limited (GEMTEC) conducted a preliminary feasibility analysis (see Appendix A) to investigate the feasibility for the continued use of the South Nation River as Casselman’s drinking water source to support increasing water demands. Figure 2 shows an overview of the South Nation River within

Casselman as well as the location of key infrastructure along this section of the river: the Casselman WTP, the Casselman Weir, and the Ontario Hydroelectric dam. During low flow conditions, typically experienced from August to October, the Casselman Weir is intended to impound water to supplement streamflow.

Based on a review of available information, it was determined that, theoretically, the South Nation River would be able to support Casselman's future average day demand with the support of the Casselman Weir during low flow conditions. During a rare 200-year return period, 15-day low-flow conditions event and at the long-term future average day demand, it was estimated that the river drawdown would be a maximum of 0.16 m, a minimal value in comparison to the depth of the Casselman WTP intake, located at 7 m below the water surface. Additional studies were recommended to provide a better understanding of the storage volumes upstream of the Casselman Weir and water quality risks associated with sourcing impounded water.

Note that while the Feasibility Study demonstrated that the South Nation River has enough water to sustain the projected flow demand in Casselman for the next 25-years, climate change may threaten water quantity and thus exacerbate the water quality issues in the South Nation River. As noted by GEMTEC the South Nation River experiences low flow periods from August to October. Low to no river flow necessitating the use of impounded, stagnant water will worsen raw water quality (by lack of dilution) and intensify concerns regarding manganese and organics (i.e., disinfection byproduct formation) the Municipality currently experiences with the South Nation River. Progressive climate change resulting in hotter, dryer summers is anticipated to exacerbate water quantity and thus water quality issues in the South Nation River.

Furthermore, the expandability of the current WTP rated capacity to meet future demands is also a concern. Methods by which this may be accomplished could include additional treatment units (Actiflo® and dual media filtration) to the existing site, retrofitting the existing system with newer technology to address required upgrades and expand treatment capacity (such as dissolved air flotation, membranes), or siting and constructing a new WTP along the South Nation River on vacant lands to serve expanded service areas and future growth (the Municipality would need to purchase lands).

The cost to implement WTP retrofits/upgrades would remain significant and ultimately would not address the water quality issues in the South Nation River and potential for climate change impact to low river flows.

2.2.3 Alternative 3: Maintain Water Supply from South Nation River and Supplement from Other Sources

As described above for Alternative 2, there are long-term risks related to the South Nation River's ability to provide reliable water quality and quantity to sustain the growth anticipated in the Municipality. Therefore, an alternative of supplementing future water demand with other water sources are being proposed. Supplemental water supply can include groundwater produced in the vicinity of the Municipality; or treated water from a neighboring Municipality. Risks and benefits associated with each of these potential supplemental water supplies are discussed in Alternative 4. The current alternative is based on maintaining current water intake from South Nation River and existing WTP up to the rated capacity of 3,182 m^3/day. The water demand beyond this capacity will be supplemented by a different water source.



Figure 2: Overview of South Nation River within Casselman (GEMTEC, 2023)

This alternative involves dividing and/or blending treated water from a different source. When this alternative was initially discussed with the Municipality, they indicated that this is a less preferred alternative due to potential water quality concerns. Dividing and/or blending the Municipality by water supply may cause upset among current and future residents and developers. For instance, a subset of residents or businesses receiving treated water from the South Nation River as the source water may experience water quantity and quality threats that a subset of residents receiving water from another source may not.

This also presents challenges from a technical standpoint in terms of dividing and/or blending water services amongst the Municipality. For example, existing water distribution system will likely need to be altered and future services may require additional water storage, pumping, and/or chemical treatment depending on the source. This makes maintaining consistent water quality for all users challenging. Moreover, there are potential increased costs associated with operation and maintenance of two different water treatment systems within the Municipality.

2.2.4 Alternative 4: Discontinue Water Supply from the South Nation River and Obtain Water from Other Sources

Alternative 4 presents an option for the Municipality to discontinue use of the South Nation River as a water source, due to the risks associated with its water quality and quantity to sustain the growth anticipated in the Municipality.

Other water sources presented herein include groundwater in the vicinity of the Municipality and treated water from a neighboring Municipality.

2.2.4.1 Alternative 4a: Obtain Water from Groundwater In the Vicinity of the Municipality of Casselman

JLR in partnership with GEMTEC completed a Water Supply Feasibility Study (see Appendix A) to assess the feasibility of a new groundwater well(s) to supplement the short-, mid- and long-term development and water demand anticipated in the Master Plan timeframe.

A variety of known water sources and eskers within proximity to the Municipality were assessed as part of a desktop review (see Figure 3). Based on available information, the Crysler-Finch esker was identified as the most likely aquifer capable of supplying groundwater to the Municipality (see Figure 4). However, given the lack of available information on the characteristics of the aquifer, including the depth, extent, water quantity, and quality, intrusive studies would be required to confirm the overall feasibility to supply Casselman's water demand. The timeline for the completion of a preliminary hydrogeological assessment of the Crysler-Finch esker is expected to be a multi-year process to allow for test well siting and drilling, hydraulic testing, preliminary wellhead delineation studies, and regulatory approval. GEMTEC indicated that the Crysler-Finch esker is susceptible to influence from surface water and numerous exceedances of health-based standards (nitrate, boron, total coliform, and sodium), aesthetic objectives (sodium, sulphide, chloride, DOC, iron, manganese, colour, methane, TDS, turbidity) and operational standards (alkalinity, pH, organic nitrogen, hardness) and would require consideration during well construction, well siting, and design of new treatment systems. Additionally, no part of the esker is located within the municipal boundaries of Casselman, necessitating land-use arrangements or land procurement of a potential well field. Moreover, changing the water chemistry of the source water would need to be assessed with respect to possible effects on the distribution system.

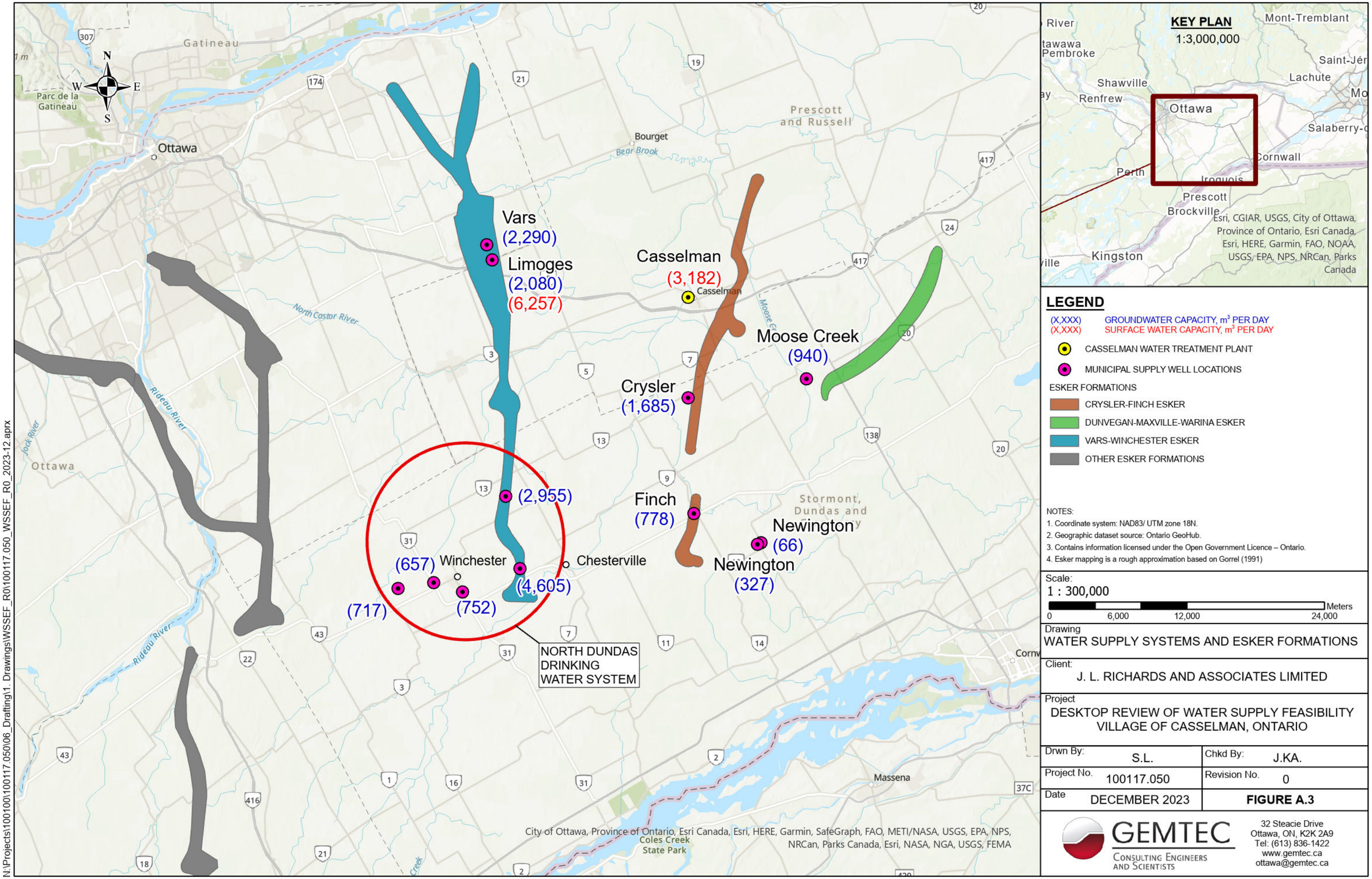
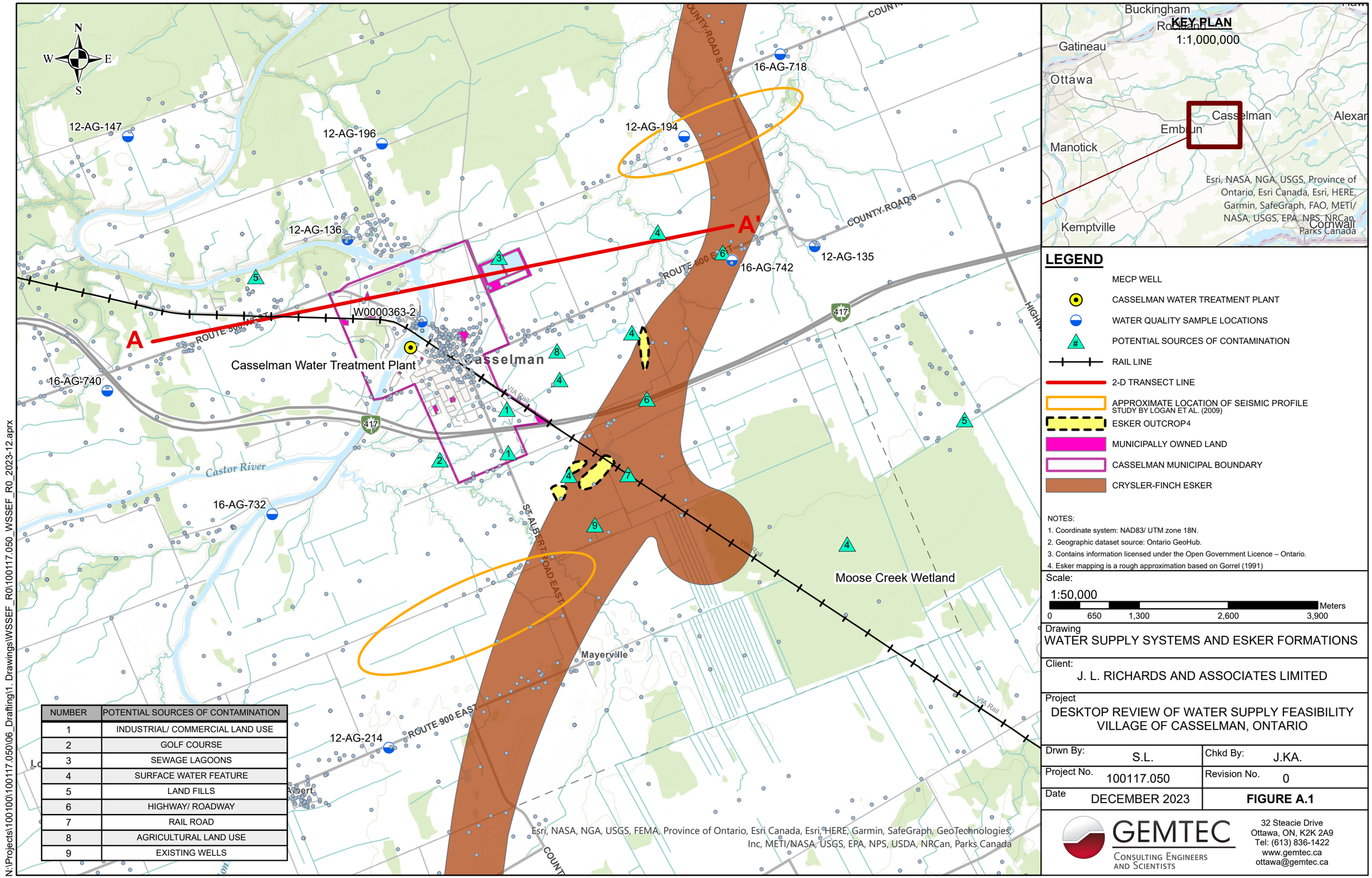


Figure 3: Water Supply Systems and Esker Formations (GEMTEC, 2023)



NUMBER	POTENTIAL SOURCES OF CONTAMINATION
1	INDUSTRIAL/ COMMERCIAL LAND USE
2	GOLF COURSE
3	SEWAGE LAGOONS
4	SURFACE WATER FEATURE
5	LAND FILLS
6	HIGHWAY/ ROADWAY
7	RAIL ROAD
8	AGRICULTURAL LAND USE
9	EXISTING WELLS

LEGEND

- MECP WELL
- CASSELMAN WATER TREATMENT PLANT
- WATER QUALITY SAMPLE LOCATIONS
- POTENTIAL SOURCES OF CONTAMINATION
- RAIL LINE
- 2-D TRANSECT LINE
- APPROXIMATE LOCATION OF SEISMIC PROFILE STUDY BY LOGAN ET AL. (2009)
- ESKER OUTCROP4
- MUNICIPALLY OWNED LAND
- CASSELMAN MUNICIPAL BOUNDARY
- CRYSLER-FINCH ESKER

NOTES:
1. Coordinate system: NAD83/ UTM zone 18N.
2. Geographic dataset source: Ontario GeoHub.
3. Contains information licensed under the Open Government Licence – Ontario.
4. Esker mapping is a rough approximation based on Gorrel (1991)

Scale: 1:50,000

0 650 1,300 2,600 3,900 Meters

Drawing: WATER SUPPLY SYSTEMS AND ESKER FORMATIONS

Client: J. L. RICHARDS AND ASSOCIATES LIMITED

Project: DESKTOP REVIEW OF WATER SUPPLY FEASIBILITY VILLAGE OF CASSELMAN, ONTARIO

Drwn By:	S.L.	Chkd By:	J.KA.
Project No.	100117.050	Revision No.	0
Date	DECEMBER 2023		**FIGURE A.1**

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Figure 4: Crysler-Finch Esker Formation (GEMTEC, 2023)

2.2.4.2 Alternative 4b: Obtain Water from the City of Clarence-Rockland

The City of Clarence-Rockland is one of the adjacent regions to the Municipality of Casselman that treats water sourced from the Ottawa River: a reliable source water in terms of quantity and quality. The City of Clarence-Rockland currently has a service agreement with the Nation Municipality for the Town of Limoges where stored, treated water in the Village of Cheney (originating from the City's WTP) is pumped to and stored in Limoges via a single transmission water main (approximately 9.7 km long, 400 mm HDPE).

A meeting was held on May 31, 2023 with members of the Municipality of Casselman, City of Clarence-Rockland, the Nation Municipality (within which the Town of Limoges resides), and JLR to discuss the feasibility of supplying water to the Casselman from the City of Clarence-Rockland. Another meeting was held on November 8, 2023 to discuss the Casselman Master Plan findings and required process for the City of Clarence-Rockland to provide treated water to Casselman. Refer to Appendix B for meeting minutes.

Clarence-Rockland stated that the connection between Limoges to Cheney took 7 years from planning to completion; therefore, they noted that a reasonable connection date to Casselman would be by 2030/2031 based on Clarence-Rocklands' estimated timeline of 3-year Class EA/Design and 3-year construction period. Clarence-Rockland confirmed that there is ample space at the WTP site to expand and to accommodate Casselman's demand. Clarence-Rockland indicated that they would require commitment from Casselman regarding connection by March 2024.

In terms of pipe routing options, Clarence-Rockland specified that a direct connection is required to connect to the Municipality, i.e., no shared watermain between the Nation and Casselman.

Based on the information collected during these meetings, JLR completed a Piped Water Supply Feasibility Study (see Appendix B) to investigate the viability of outsourcing Casselman's total future water demand. Two connection points within the City of Clarence-Rockland were identified at Cheney and at Bourget as potential options. A connection to the Cheney Water Tower proved to be the favorable option given its shorter distance. High-level hydraulic analysis was completed to assess the preferred option and determined that a watermain 22 km long with a minimum diameter of 457 mm would satisfy Casselman's water requirements for the long-term growth. Further studies should be conducted once more information becomes available from the Clarence-Rockland water distribution system to provide more accurate watermain alignment and hydraulic modelling parameters.

The Municipality of Casselman will need to complete a Schedule B Class EA for switching water supply to Clarence-Rockland.

2.2.5 Evaluation Matrix

Table 4 provides a descriptive summary and evaluation of each alternative listed above.

Table 4: Water Supply and Treatment Evaluation Matrix

	Alternative 2 – Increase Water Supply South Nation River	Alternative 3 – Maintain Water Supply South Nation River and Supplement from Another Water Source	Alternative 4a – Discontinue Water Supply from South Nation River and Obtain Water Supply from Groundwater In the Vicinity of the Municipality	Alternative 4b – Discontinue Water Supply from South Nation River and Obtain Water Supply from the City of Clarence-Rockland
Natural Environment	• The South Nation River has limited flow particularly in the summer period. • Withdrawing additional water from the river will reduce river level upstream of the dam, therefore causing negative effect on the aquatic environment.	• Maintaining the South Nation River as a water source does not provide positive effect on the aquatic environment. • Climate change impact on small stream like the South Nation River will result in significant reduction in river flow and worsening quality in the future.	• Discontinuing water intake from South Nation River will have positive effect on the aquatic environment upstream and downstream. • Withdrawing groundwater for municipal water supply will limit groundwater availability in this area.	• Discontinuing water intake from South Nation River will have positive effect on the aquatic environment upstream and downstream. • Constructing a long feeder main from Clarence-Rockland will have negative impact on the terrestrial environment during construction. • Impact to Ottawa River aquatic environment is expected to be minimal as Ottawa River is expected to have the river flow needed for Casselman's demand.
Evaluation	Least Preferred	Less Preferred	Less Preferred	Preferred
Social and Cultural Environment	• Negative social/political implications as the South Nation River generally has challenges providing adequate water quality (i.e., manganese/iron and elevated disinfection by-product formation) to support growth. • Extreme weather events have proven to cause treatment challenges which resulted in negative impact on public health and safety. • Maintaining the South Nation River as the sole water source for the Municipality will result in continued and worsening water quantity/quality issues. • Climate change will worsen the extreme weather events which may impact surface water supplies in the future. • Additional water taking activities will also have negative effects on the downstream water availability and hydro dam operation. • South Nation River water quantity may restrict future development due to limited river flow. • Existing siting and infrastructure proposed with this alternative; therefore, no cultural heritage resources will be impacted.	• Supplementing future water demand with other water sources (ex. groundwater in the vicinity of the Municipality or treated water from a neighboring Municipality) will help secure future water demands for future growth. • Potential for inconsistent water quantity/quality due to varied source waters. • Blending water from different sources can have operational challenges and will be difficult to monitor and manage. • Groundwater in this area is vulnerable to surface influences and generally contains manganese and iron which is similar to that from the South Nation River. Concerns with respect to water quality are still present. However, issues with organics/ disinfection by-product formation potential are typically low for groundwater sources. • South Nation River, combined with another water source, will be able to support the future development in the community. • Using the existing WTP and obtaining water from a neighboring municipality where it would be anticipated that the transmission watermain would be construction within existing rights-of-ways would not impact cultural heritage resources. For establishing new wells, cultural heritage resource screening required and potential impacts on undisturbed sites.	• Feasibility Study/Hydrogeological Study required to determine well field location and potential to provide adequate water supply to the Municipality's 25-year needs. This will be a multi-year study. • The establishment of new wellhead protection areas will restrict land use planning and increase risk management/ monitoring for existing prescribed drinking water threats activities. • Groundwater in this area is vulnerable to surface influences and generally contains manganese and iron which is similar to that from the South Nation River. Concerns with respect to water quality is still present. However, issues with organics/ disinfection by-product formation potential are typically low for groundwater sources. • The groundwater supply in this area is vulnerable to surface water contamination and enhanced level of treatment is expected. • Land acquisition will be required to purchase land from the Nation Municipality for the new well(s) and treatment facility. • Using the existing WTP would not impact cultural heritage resources. For establishing new wells, cultural heritage resource screening required and potential impacts on undisturbed sites.	• Receiving treated water from the City of Clarence-Rockland will ensure adequate water quantity and quality (i.e., reduced risk of disinfection by-product formation and manganese/iron) for future growth. • Current and future residents will be provided with a more reliable water source for their drinking water. • Transmission watermain piping proposed in existing rights-of-way, therefore no cultural heritage resources will likely be impacted.
Evaluation	Least Preferred	Least Preferred	Less Preferred	Preferred

	Alternative 2 – Increase Water Supply South Nation River	Alternative 3 – Maintain Water Supply South Nation River and Supplement from Another Water Source	Alternative 4a – Discontinue Water Supply from South Nation River and Obtain Water Supply from Groundwater In the Vicinity of the Municipality	Alternative 4b – Discontinue Water Supply from South Nation River and Obtain Water Supply from the City of Clarence-Rockland
Technical Feasibility	• Concerns in terms of expandability of the WTP due to limited space at the existing site. • Siting and constructing a new WTP along the South Nation River is limited by available, vacant lands. • Increased treatment requirements for increased water intake due to deteriorating river quality. • Significant risk of maintaining long-term water supply to the community.	• Dividing water services amongst the Municipality will require existing water distribution system to be altered to include additional water storage and pumping. • It will be challenging to maintain consistent water quality for all users with different source waters and treatment systems. • Changing the water chemistry of the source water would need to be assessed with respect to possible effects on the distribution system. • Operational challenges in operating and maintaining two different water treatment systems.	• Potential for well drilling and a preferred location requires confirmation by a hydrogeologist. The wellhead protection areas are driven by the future demand, and it is highly likely that a well field of multiple wellheads are required. • Consistent water quality may be achieved if provided with proper treatment. • Changing the water chemistry of the source water would need to be assessed with respect to possible effects on the distribution system. • The Municipality's water operations staff would be required to operate and maintain a new treatment system.	• New watermain is required to convey water from Clarence-Rockland to Casselman. • Infrastructure upgrades are required within the Clarence-Rockland system to deliver water to the connection point. • Additional water storage and/or treatment may be required to maintain water quantity/quality. • Existing water distribution system will likely need modifications to support the new feeder main. • Changing the water chemistry of the source water would need to be assessed with respect to possible effects on the distribution system. • Clarence-Rockland will not be able to provide treated water until year 2030. This presents a gap between when Casselman WTP reaches capacity (theoretical timeline of 2025) and when Clarence-Rockland water is available.
Evaluation	Least Preferred (Not Feasible)	Less Preferred	Less Preferred	Preferred
Financial Considerations	• High-level capital cost estimate in the $30M range. • Expanding the current WTP and/or constructing a new WTP will require the Municipality to purchase vacant lands. • Costs of retrofits/upgrades and/or new construction will be significant and ultimately do not address water quantity/quality concerns.	• High-level capital cost estimate in the $35M range. • Capital costs will include altering existing services; future services may require additional water storage, pumping, and/or chemical treatment depending on the source. • Increase in operation and maintenance costs to run two different water treatment systems within the Municipality.	• High-level capital cost estimate in the $50M range. • Capital costs will include hydrogeological studies, drilling new well(s), constructing a new groundwater treatment facility, installing new water feeder main to connect to existing distribution system, and decommissioning the existing WTP. • Future operation and maintenance costs will be to run the new groundwater treatment facility which is anticipated to be comparable to existing WTP operations.	• High-level capital costs estimate mid-term $74.2M; long-term $12.1M, to connect to the Clarence-Rockland water system. Capital costs in addition to new watermains may include a new booster pumping station, water storage, re-chlorination system, and existing system upgrades associated with bringing water from the City. • Future operation and maintenance will only involve maintaining booster pumping, water storage, re-chlorination and linear infrastructure as the Casselman WTP will be decommissioned.
Evaluation	Less Preferred	Preferred	Less Preferred	Least Preferred
Overall Evaluation	**Least Preferred (Not Feasible)**	**Less Preferred**	**Less Preferred**	**Preferred**

2.2.6 Recommended Water Supply and Treatment Alternative

The recommended long-term water supply and treatment solution is Alternative 4b – Discontinue Water Supply from South Nation River and Obtain Water from Clarence-Rockland. A Schedule B Class EA will be required for switching water supply to Clarence-Rockland. Additional public consultation activities will be undertaken during that Class EA process.

Since the City of Clarence-Rockland requires up until year 2030/2031 to upgrade its water infrastructure to be able to deliver treated water to Casselman, an interim solution needs to be investigated to bridge the gap between when Casselman WTP is anticipated to reach capacity sometime between 2025 and 2035 (as illustrated in Figure 6 of the Phase 1 Master Plan Report,) when Clarence-Rockland treated water becomes available in 2030/2031. The interim solutions involve leveraging the available capacity at Casselman WTP and may include the following.

- Interim Solution 1: Managing growth within the Municipality until treated water becomes available from Clarence-Rockland.

- Interim Solution 2: Proceeding with follow-up studies to investigate the feasibility of increasing water supply from South Nation River (Alternative 2) and supplementing water supply from groundwater source (Alternative 3). At present the Municipality is conducting a water quality testing study at the WTP to determine strategies to optimize the removal of Mn and Organics that are the precursors to THM formation to meet water quality objectives.

It is also recommended that the Municipality undertake the following steps in the interim.

- Completion of a D-5-1 Uncommitted Reserve Capacity Calculation for WTP and update on an annual basis; annual review of the water demand in comparison to WTP rated capacity.

- Ongoing monitoring and management of incoming new development.

- Promotion of water conservation and efficiency measures to reduce residential, industrial, commercial and institutional water demand. For example, with an overall reduction of 10% in water use, the short-term growth can be realized without the need to expand the existing WTP capacity. Additional reduction in water demand will prolong the timing for the required connection to Clarence-Rockland.

2.3 Water Storage

The Phase 1 Report has identified water storage deficiency in mid-term between 2028 and 2032.

There are a number of options to achieve the required rated storage capacity expansion. The additional water storage capacity may be achieved through construction of a new water storage reservoir within the Municipality, and/or along the feeder main route between Clarence-Rockland and Casselman. Several possible alternative water storage configurations are identified in the following sections. Note, the exact configuration and location of the new storage facility for the Municipality will need to be determined in the subsequent Schedule B Class EA for Water Supply,

as there are various factors that drive the evaluation process, including topography, land availability, site-specific geotechnical and hydrogeological conditions, water distribution modelling results, capital costs, operation and maintenance costs, social and environmental impacts, etc. There are generally four (4) configurations available for water storage, including a below-grade reservoir and pumping station, an at-grade reservoir and pumping station, a composite elevated tower and a standpipe.

2.3.1 Configuration 1: Below-Grade Reservoir and Pumping Station

A typical below-grade reservoir is constructed of reinforced concrete and covered with earth and vegetation. In addition to potentially more appealing aesthetics, an advantage of this configuration is that the reservoir tank can be arranged to have two (2) or more cells that can be taken offline independently, enabling maintenance or inspection activities to proceed without losing all of the storage capacity of the facility. The pumping station can be arranged to be at-grade or below-grade, but at-grade buildings are more typical and operator friendly.

On the other hand, a reservoir plus pumping station configuration relative to an elevated tower is generally more complex to maintain and would require higher operating and maintenance costs (related to the new pumping station). The new pumping station would require redundant pumping capacity (domestic and fire protection) to allow flexible operations to remove a pump from service for routine maintenance or respond to a potential equipment failure. Additionally, pumping capacity will likely be required to meet the full range of everyday domestic demands up to fire protection demands. Increased electrical consumption will result from continual pump operation required to maintain adequate water distribution system pressure at all times. In the event of a power failure, the pumping station must be equipped with a backup power supply, such as diesel driven generators. The below-grade reservoir and pumping station will have the highest capital and life cycle costs among the four (4) configurations. In addition, to fill the below-grade reservoir local pressure reduction will be required to prevent tank overflowing.

2.3.2 Configuration 2: At-Grade Reservoir and Pumping Station

Modern at-grade reservoirs are typically constructed of reinforced concrete or coated/glass-fused-to-steel with the latter being the least costly to construct. Glass-fused-to-steel tanks are preferred due to ease of installation, longevity, and lower maintenance. One disadvantage with at-grade tanks is that during maintenance or inspection, all storage capacity is unavailable since there are no internal baffles to allow parts of the tank to remain in service. Due to the wide variety of diameters and heights available for at-grade steel tanks, the area required is flexible, and usually takes up less space than a below-grade reservoir of comparable size. One advantage of an at-grade reservoir over a below-grade reservoir is that the depth at which rock is encountered has less of a bearing on the cost of the reservoir, since it sits above the ground, rather than within.

The at-grade reservoir and pumping station will have the slightly lower capital and life cycle costs compared to below-grade reservoir and pumping station. However, similar to a below-grade reservoir, an at-grade reservoir configuration requires the same pumping station infrastructure, which relative to an elevated tank is generally a more complex system resulting in increased operating and maintenance costs.

2.3.3 Configuration 3: Composite Elevated Tank

Composite elevated tanks are typically coated steel or glass-fuse-to-steel tanks located at the top of a pedestal or other support structure. The water level in the elevated tank sets the pressure in the water distribution system. The functional/usable capacity of an elevated tank is the volume of water that can be stored in the tank between the high and low water levels. Thus, provided the tank is of sufficient height, the diameter of the tank determines the functional capacity. An elevated tank needs relatively lower operation and maintenance requirements when compared to a continually operating pumping station with more equipment, valves, and ancillary systems to maintain a pressurized system. Since the elevated tank water level sets the pressure in the system, it does not require more sophisticated control systems to ensure safe and reliable water distribution system operation.

The main difference between capital and life cycle costs associated with a below- or at-grade reservoir and pumping station configuration compared to an elevated tank configuration is largely due to the pumping station.

The elevated composite tank will have significant lower cost than a below- or at-grade reservoir and pumping station. However, the cost of a composite elevated tank is typically higher than a standpipe.

2.3.4 Configuration 4: Standpipe

Standpipes are essentially ground storage tanks constructed to a height that will provide adequate system pressure in the operating range. Their diameter is constant from the ground to the top, and they are completely filled with water. The typical material of construction for a standpipe can be glass-fused-to-steel, coated steel or a combination of both. The glass-fused-to-steel tank offers the advantage of easier installation, longevity, and minimal shutdown time for maintenance.

A standpipe blends the characteristics and performance of both ground storage and elevated storage tank, with its taller design allowing water above the operating range to typically provide gravity-fed pressure. Standpipes are often used in small systems where less volume is needed, or in situations where the site has a high ground elevation relative to the system pressure.

2.3.5 Locations

The new water storage location should be selected in tandem with the storage configuration. Figure 5 identifies Municipally owned lands which may be available as potential locations for new storage. Should the preferred location for water storage, which will be identified in the Schedule B Water Supply Class EA, be located on land parcels in the adjacent municipality, the Municipality will need to investigate purchasing these lands.

N

Casselman Sewage Treatment System

SPS No. 6
819 PRINCIPALE ST

PRINCIPALE ST

LAURIER ST

Municipality of The Nation

Municipality of The Nation

South Nation River

ST-ISIDORE RD

PRINCIPALE ST

HIGHWAY 417

Legend

MUNICIPALLY OWNED LANDS

PROJECT:

MUNICIPALITY OF CASSELMAN
WATER AND WASTEWATER MASTERPLAN

MUNICIPALITY OF CASSELMAN, ONTARIO

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2.4 Water Distribution System

2.4.1 Design Parameters and Future Flow Projections

The design parameters used to calculate the future water demands are summarized in the table below. The average day flow and the peaking factor for the peak hour flow were obtained from the MECP Design Guidelines for Drinking Water Systems (2008). The maximum day flow peaking factor was determined from the average and maximum day demands from the Casselman WTP treated daily flow data (presented in Phase 1).

Table 5: Design Parameters – Future Water Demands

Future Water Flow Projection – Design Parameters		
Parameter	**Residential**	**Light Industrial / Commercial / Institutional**
Average Day Flow	350 L/cap/day	35,000 L/ha/day
Maximum Day Flow	1.9 x Average Day	1.9 x Average Day
Peak Hour Flow	1.5 x Maximum Day	1.5 x Maximum Day

Based on these design parameters, as well as the water demand under existing conditions, the projected short-term, mid-term, and long-term populations and the areas of future commercial development (established in the Phase 1 report), the following water flow projections for residential, commercial, and industrial buildings were calculated for each future scenario without accumulation from the previous scenario.

Table 6: Future Water Flow Projections per Scenario (Non-Cumulative)

Demand Scenario	Short-Term (0-5 years) L/s *(m^3/day)*	Mid-Term (5-10 years) L/s *(m^3/day)*	Long-Term (10-25 years) L/s *(m^3/day)*
Average Day	9.45 *(816.5)*	8.26 *(713.6)*	11.13 *(961.6)*
Maximum Day	17.96 *(1,551.7)*	15.69 *(1,355.6)*	21.14 *(1,827.4)*
Peak Hour	26.94 *(2,327.6)*	23.54 *(2,033.9)*	31.72 *(2,740.6)*

It is noted that the type of units expected within various residential areas and the specific type of commercial use expected within future commercial lands can have a significant influence on the water demands projected for short-term, mid-term, and long-term. With limited information currently available regarding the details of future developments, design guideline values for the projected flows have been assumed to assess system performance. Based on our experience, guideline values are generally considered conservative to account for unknowns when limited information is available and, as indicated previously, there may be opportunities to define the projected flows more specifically with further details as part of a future assignment.

2.4.2 Water Modelling

The WaterCAD hydraulic water model was used to assess the water distribution system under existing and short-term (0-5 years) demand conditions and to determine if water distribution system upgrades are required.

The following assumptions were used in these model simulations:

- A representative watermain loop was modelled within each future development area servicing over 49 units (or 50 m^3/d) as per Ottawa Design Guidelines for Water Distribution (July 2010).
- The demands for each area were distributed to the nearest representative junction node in the model.
- The existing average day and peak hour scenarios assume that a single pump (labeled PMP-1 in the model) is operating at the Water Treatment Plant (WTP).
- The existing maximum day plus fire flow scenario assumes that the two high-lift pumps (labeled PMP-1 and PMP-2 in the model) are operating at the WTP.
- The hydraulic grade line (HGL) of the existing elevated storage tank is 100.52 m (elevated water storage tower is 90% full) as provided by Ontario Clean Water Agency (OCWA) in April 2023 (refer to Phase 1 Report). This water level represents the existing normal low operating level before the pumps would be activated at the WTP. The noted HGL was modelled for all demand scenarios.

2.4.2.1 Future Conditions – No Upgrades

The tables below summarize the water model results for future short-term (0-5 years), mid-term (5-10 years), and long-term (10-25 years) under average day, maximum day, and peak hour conditions without any watermain upgrades. The only additional changes from the existing watermain infrastructure includes the representative pipes that were added to service the proposed future developments.

Table 7: Hydraulic Water Model Results – Average Day Demand

Average Day Demand			Percentage of Junctions			
Pressure Range (kPa)			Existing	Short-Term	Mid-Term	Long-Term
	Less than	276	0.0%	0.0%	0.0%	0.0%
276	up to	350	54.2%	63.5%	66.8%	73.8%
350	up to	400	45.3%	36.0%	32.7%	25.8%
400	up to	450	0.5%	0.5%	0.4%	0.4%
450	up to	500	0.0%	0.0%	0.0%	0.0%
500	up to and incl.	552	0.0%	0.0%	0.0%	0.0%
	Greater than	552	0.0%	0.0%	0.0%	0.0%

Note: It is assumed that there is no change to the existing water supply and the elevated water storage tower elevation is 100.52 m. Any future changes to the existing water supply will affect the noted results.

Under the average day demand conditions for the existing, short-term, mid-term and long-term scenarios, the table above shows that most junction nodes experience pressures between 276 kPa and 350 kPa, and a smaller percentage of the junction nodes experience pressures above 350 kPa. The system pressures decrease slightly across the future scenarios due to the increased

water demands, but all the junction nodes exceed the minimum pressure of 276 kPa (40 psi) as recommended in the MECP design guidelines.

Table 8: Hydraulic Water Model Results – Peak Hour Demand

Peak Hour Demand			Percentage of Junctions			
Pressure Range (kPa)			Existing	Short-Term	Mid-Term	Long-Term
	Less than	276	0.0%	0.0%	0.0%	0.9%
276	up to	350	70.8%	85.8%	90.6%	98.7%
350	up to	400	28.6%	13.7%	9.0%	0.4%
400	up to	450	0.5%	0.5%	0.4%	0.0%
450	up to	500	0.0%	0.0%	0.0%	0.0%
500	up to and incl.	552	0.0%	0.0%	0.0%	0.0%
	Greater than	552	0.0%	0.0%	0.0%	0.0%

Note: It is assumed that there is no change to the existing water supply and the elevated water storage tower water elevation is 100.52 m. Any future changes to the existing water supply will affect the noted results.

Under the peak hour demand conditions for the existing, short-term, mid-term and long-term scenarios, the table above shows that most junction nodes experience pressures between 276 kPa and 350 kPa, and a smaller percentage of the junction nodes experience pressures above 350 kPa. Generally, all the junction nodes exceed the minimum pressure of 276 kPa (40 psi) as recommended in the MECP design guidelines. The system pressures decrease over the future scenarios due to the increased water demands. There are a couple of junction nodes in the long-term scenario that are expected to experience pressures slightly below the minimum requirement. These are located at the dead-end services for the new developments off Principale Street.

Table 9: Hydraulic Water Model Results – Maximum Day Demand Plus Fire Flow

Maximum Day Demand + Fire Flow			Percentage of Junctions			
Fire Flow Range (L/s)			Existing	Short-Term	Mid-Term	Long-Term
	Less than	30	0.0%	0.0%	0.0%	0.0%
30	up to	45	3.7%	3.3%	0.5%	0.0%
45	up to	67	2.1%	1.9%	1.4%	5.3%
67	up to	83	7.4%	8.6%	10.4%	11.5%
83	up to	100	11.6%	11.5%	14.5%	21.1%
100	up to	117	10.0%	17.7%	17.6%	19.4%
117	up to	150	33.2%	31.6%	34.4%	20.7%
150	up to and incl.	200	14.7%	13.4%	12.2%	14.1%
	Greater than or equal to	200	17.4%	12.0%	9.0%	7.9%

Note: It is assumed that there is no change to the existing water supply and the elevated water storage tower water elevation is 100.52 m. Any future changes to the existing water supply will affect the noted results.

Under the maximum day demand plus fire flow conditions for the existing, short-term and mid-term scenarios, the table above shows that a small percentage of junction nodes are unable to supply 45 L/s of fire flow, which is the minimum fire flow requirement for a typical two-storey residential dwelling per the Ontario Building Code (OBC). The percentage of junction nodes supplying less than 45 L/s of fire flow decreases with each future growth scenario due to the increased watermain looping and connectivity to supply the new developments.

Based on the above table under the existing condition, 24.8% of junctions have fire flows below the general target Fire Underwriters Survey (FUS) fire flow requirement of 100 L/s in most areas of Casselman. Under the future short-term conditions, 25.3% of junctions have fire flows below 100 L/s. The percentage of junctions below the FUS fire flow target increases across each future scenario if no upgrades are implemented. The water model results schematics are presented in Appendix C.

The methodology used to calculate the fire flow requirements is outlined in the Phase 1 Master Plan Report. The required fire flow for each area was calculated and compared to the available fire flows anticipated from the water model. Below are the areas in Casselman under the existing and short-term scenarios that do not meet the required fire flows:

- Dead end watermain on Laurier Street: The residential houses and elementary school (Sainte-Euphémie Pavillion) on Laurier Street are supplied by a dead end 150 mm diameter watermain. For the residential properties, it was determined that the required fire flow per FUS is between 83 L/s and 100 L/s. For the school, the OBC minimum fire flow requirement for a two-story residential dwelling is 45 L/s and a school of this size would have an FUS fire flow requirement greater than that. The water model shows that the dead end watermain on Laurier Street has available fire flows below 83 L/s, so it does not meet the required fire flow. This is attributed to the length and size of the dead end watermain, which increases headlosses along the pipe.

    - Recommended Distribution Upgrade #1 as described in Section 2.4.2.2 is proposed to address this deficiency.

- Northwest area south of Principale Street: The FUS required fire flow was calculated to be 100 L/s based on a representative home on Filion Street. The water model shows that this area does not achieve the required fire flow from the water distribution system. This is attributed to this area being further away from the water tower and at a higher topographic elevation than the surrounding areas.

    - Recommended Distribution Upgrade #2 as described in Section 2.4.2.2 is proposed to address this deficiency.

- Riviere Nation North Road: It is noted that the water model shows an available fire flow of 46 L/s in the short-term scenario at the end of the dead end watermain on Riviere Nation North Road, which is above OBC requirements but below FUS requirements for that area.

This is attributed to the length and size of the dead end watermain, which increases headlosses along the pipe. This 150 mm diameter watermain supplies fire flow to a small number of residential houses.

- No upgrades are recommended at this time to address this deficiency as there appears to be only a small number of homes (approximately 5 homes) located at the end of the dead end watermain.

It is noted that Recommended Operational Upgrade #3 as described in Section 2.4.2.2 will improve available fire flows throughout the system.

2.4.2.2 Future Short-Term (0-5 years) – Recommended Upgrades

The short-term scenario is the only future scenario for which upgrades are recommended in this Master Plan, since the water supply is anticipated to remain unchanged within the next five (5) years. Once the future water supply is confirmed, the mid-term and long-term scenarios will be evaluated for the supply conditions. The following section focuses on short-term (0-5 years) recommended upgrades to address the deficiencies mentioned in Section 2.4.2.1.

Recommended Distribution Upgrade #1 (Brisson St. and Laurier St. Loop)

- Dead end watermain on Laurier Street: To address this deficiency, it is proposed to create a 300 mm watermain loop between Brisson Street and Laurier Street. This watermain loop passes through the anticipated 'Nation View' residential development proposed in the mid-term scenario. This loop will increase the available fire flow on Laurier Street in the short-term and supply the 'Nation View' development in the mid-term. The location of the proposed 300 mm watermain loop can be found in Figure 6.

Recommended Distribution Upgrade #2 (Railway Crossing)

- Northwest area south of Principale Street: To address this deficiency, it is proposed to extend the 200 mm watermain from Argile Street and install a 300 mm watermain beneath the existing rail line to connect to Francess Street, thus creating a watermain loop. This loop will increase the available fire flow in the northwest area (area west of Martin Street) in the short-term. The location of the proposed railway crossing and watermain loop can be found in Figure 6.

Recommended Operational Upgrade #3 (Elevated Storage Tank Level)

To increase pressures and achieve targeted fire flows in the short-term, the normal operating water level bandwidth in the elevated storage tank should be raised. A water level of 106.50 m was found in the model to provide the targeted fire flow of 100 L/s to the Devcore development, which does not achieve this fire flow without the upgrade. It is recommended that Casselman review and confirm the normal low operating level of 100.52 m and the existing maximum water level available in the elevated storage tank. It is noted that there was a discrepancy between the operating level provided by OCWA and the Landmark water tower drawings, however this discrepancy is not expected to change the recommendations.

Under the average day and peak hour demand scenarios in the short-term, implementing the recommended upgrades will improve system pressures while maintaining them between 276 kPa (40 psi) and 552 kPa (80 psi) in accordance with the MECP Design Guidelines and the OBC.

The improvements in fire flow availability anticipated from implementing the recommended upgrades above are shown in the table below.

Table 10: Hydraulic Water Model Results – Maximum Day Demand Plus Fire Flow

Maximum Day Demand + Fire Flow			Percentage of Junctions		
Fire Flow Range (L/s)			Existing	Short-Term - No Upgrades	Short-Term – Recommended Upgrades #1, #2, #3
	Less than	30	0.0%	0.0%	0.0%
30	up to	45	3.7%	3.3%	0.0%
45	up to	67	2.1%	1.9%	0.9%
67	up to	83	7.4%	8.6%	0.9%
83	up to	100	11.6%	11.5%	5.6%
100	up to	117	10.0%	17.7%	13.5%
117	up to	150	33.2%	31.6%	27.9%
150	up to and incl.	200	14.7%	13.4%	33.5%
	Greater than or equal to	200	17.4%	12.0%	17.7%

Under the maximum day demand plus fire flow conditions for the existing and short-term (no upgrades) scenarios, the table above shows that a small percentage of junction nodes are unable to supply 45 L/s of fire flow, which is the minimum fire flow requirement for a typical two-storey residential dwelling per the OBC. However, with the recommended upgrades implemented including the increase to the elevated storage tank water level, there are no junctions below this minimum OBC fire flow requirement. Furthermore, the junctions along Laurier Street and within the northwest area can meet the FUS required fire flows of 83 L/s and 100 L/s, respectively, and the overall system can supply the targeted fire flows with the exceptions noted below. The water model results schematic is presented in Figure 7 and Appendix C.

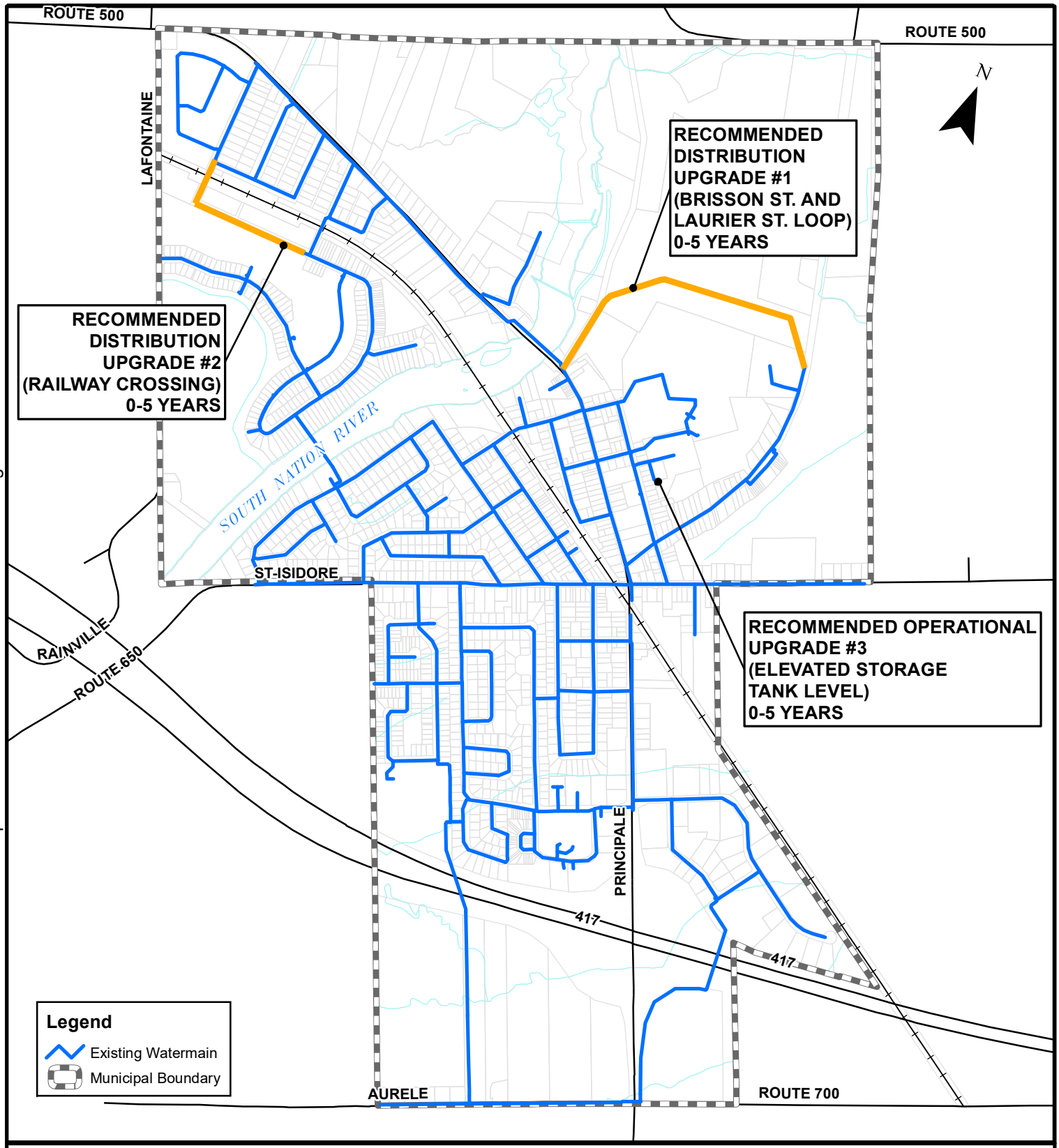
Post-Upgrade Deficiencies

The following list identifies the areas that remained below the target FUS fire flow requirements after the recommended upgrades were applied in the model. Refer to the accompanying 'Post-Upgrade Deficiencies' model schematic in in Figure 7 and Appendix C.

- Riviere Nation North Road (refer to discussion in Section 2.4.2.1);
- Elementary school water service off Laurier Street (this water service may not supply any hydrants);
- East end of St. Isidore Road (dead-end watermain);
- Principale Street north of Duhamel Street (dead-end watermain);

- Dead-end watermain on Racine Street in the industrial area (the FUS fire flow requirements for these sites would vary and on-site measures could be taken to reduce the requirement or supplement the fire flow); and
- Various extents of the existing 150 mm watermains where the available fire flow is close to the targeted FUS fire flow.

As detailed by the MECP guidelines, *water distribution systems should be designed to provide a balance between hydraulic water supply needs and water quality*. In some instances, upgrades to improve fire flow may result in a decrease in water quality as a result of increased retention time and water age. Watermains smaller than or equal to 150 mm do not always have capacity to deliver fire flows to meet today's standards. These watermains were constructed in a time where design and construction standards were different from present-day. At this time, no distribution system upgrades are recommended to address these minor deficiencies as an increase in pipe sizes may reduce water quality and/or would not be economically justifiable.



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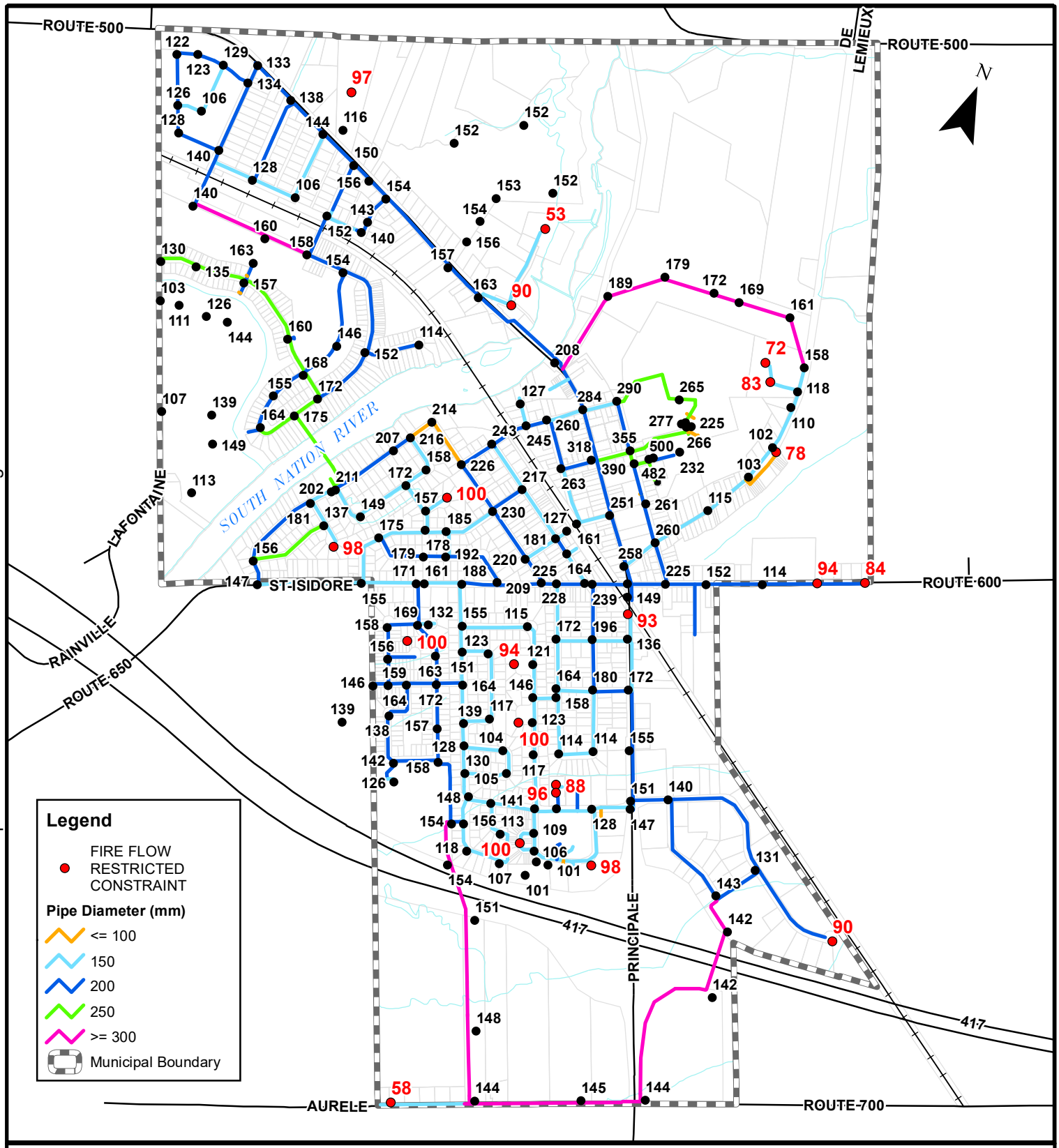
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FIGURE 6

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PROJECT:

CASSELMAN WATER AND WASTEWATER INFRASTRUCTURE MASTER PLAN

CASSELMAN, ONTARIO

DRAWING:

MAXIMUM DAY DEMAND PLUS FIRE FLOW CONDITIONS POST-UPGRADES (0-5 YEARS)

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FIGURE 7

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2.5 Conveyance System & Sewage Pumping Stations

The typical approach for determining the system upgrades required in the sanitary network is to determine the requirements in the scenario with the highest development (10-25-years) and work backwards. In the development of alternative solutions, the main principle considered is to determine if the infrastructure will be able to adequately convey the projected flow from developments, then progressively work backwards through the other analysis period to determine the timing of these upgrades. This ensures that the upgrades recommended for the 0-5-year time period would not need to be revised to meet the 5-10-year and 10-25-year requirements.

In order to improve system capacity upstream of pump station (PS) 1 and 6 the following measures can be undertaken:

- Upgrade of Pump Stations
- Gravity Sewer Infrastructure Improvements

2.5.1 Future Condition Attributes

The parameters used to determine the capacity in the system under future conditions were consistent with the City of Ottawa Sewer Design Guidelines. The average residential flow used to calculate domestic flows remains at 350 L/cap/day, the same as under existing conditions. In order to account for wet weather inflow and infiltration a general allowance of 0.28 L/s is applied to the peak extraneous flow calculation.

These previous design coefficients were only applied in areas where new developments are to be built and not in existing areas where infill developments are being constructed.

The future residential flow downstream of each sewer reach was calculated using a consistent unit density value of 2.375 person per unit.

2.5.2 Upgrade of Pump Stations

To determine the efficiency and capacity of a pump station, the peak flow upstream of the pump station is often compared to its rated capacity. In instances where the peak flow surpasses the rated capacity, it is recommended to upgrade the pump station to increase its rated capacity and in turn, be able to accommodate additional flows from future developments.

An upgrade of PS 1 under existing conditions, in addition to localized system improvements, would alleviate the downstream capacity constraints by enabling flows from the southern side of the South Nation River including the proposed Nation View development and the East of Laurier residential development to be conveyed to the pump station. Additionally, an upgrade to PS 6 in 0-5 years will be required to facilitate development on the northern side of the river, primarily from the Casselman Developments Lands, Industrial (Lettuce/Herb Production Facility), North of Principale, Projet Martineau-Hughes and West of Sarah developments.

Under future conditions, it is assumed that the pumps have been adequately upgraded to accommodate the total peak design flow upstream. In doing so, the peak flows listed below will differ from the peak flows stated in the Phase 1 existing conditions report, in which we assumed that the pump station would only accept flows up to its rated capacity.

2.5.2.1 Existing Conditions

Under existing conditions, the peak flow for PS 1 exceeds the rated capacity. The following table summarizes the results at each pump station.

Table 11: Existing Pumping Station Capacity Assessment

Pump Station	Rated Capacity (L/s)	Peak Flow (L/s)
1	118	189
2	20.5	14
3	37	14
4	18.5	4
5	20.5	13
6	40.5	28

It is recommended to implement upgrades once the pump station rated capacities have been exceeded in order to optimize their efficiency and therefore PS 1 should be upgraded under existing conditions. Upgrades should be future proofed to account for flows from longer term developments or phased to facilitate future developments.

2.5.2.2 Short-term (0-5 Year) Development

In the short-term (0–5-year) development scenario, peak flows received at PS 1 continue to exceed the pump station rated capacity. The planned developments for this time period have also resulted in peak flows beyond the rated capacity of PS 6. The new peak flows at each pump station are summarized as follows:

Table 12: Short-term (0-5 Year) Pumping Station Capacity Assessment

Pump Station	Rated Capacity (L/s)	Peak Flow (L/s)	Operating Condition
1	118	191	Beyond rated capacity
2	20.5	19	Within capacity
3	37	15	Within capacity
4	18.5	5	Within capacity
5	20.5	14	Within capacity
6	40.5	69	Beyond rated capacity

PS 1 was identified for upgrades under existing conditions and the upgrades should have accounted for the 0–5-year development. 0-5 year developments will trigger the need for upgrades of PS 6. Upgrades should be future proofed to account for loadings from long term developments.

2.5.2.3 Mid-term (5-10 Year) Development

Under the mid-term (5-10 year) development scenario, the peak flows at each pump station are as follows:

Table 13: Mid-term (5-10 Year) Pumping Station Capacity Assessment

Pump Station	Rated Capacity (L/s)	Peak Flow (L/s)	Operating Condition
1	118	216	Beyond rated capacity
2	20.5	19	Within capacity
3	37	15	Within capacity
4	18.5	7	Within capacity
5	20.5	14	Within capacity
6	40.5	73	Beyond rated capacity

The flows into PS 1, 4 and 6 have increased from the previous time period. Flows entering PS 1 and PS 6 remain above their rated capacities while flows entering PS 4 have increased but remain below the pump station rated capacity. Upgrades of PS 1 and PS 6 identified under previous time periods should have accounted for future flow or phasing of it.

2.5.2.4 Long-term (10-25 Year) Development

In the long-term (10–25-year) development scenario, the peak flows upstream of each pump station are found below:

Table 14: Long-term (10-25 Year) Pumping Station Capacity Assessment

Pump Station	Rated Capacity (L/s)	Peak Flow (L/s)	Operating Condition
1	118	258	Beyond rated capacity
2	20.5	19	Within capacity
3	37	15	Within capacity
4	18.5	7	Within capacity
5	20.5	14	Within capacity
6	40.5	75	Beyond rated capacity

Flows entering PS 2, 3, 4 and 5 have remained unchanged from the previous development period (5-10-year). Flows to PS 1 and PS 6 have increased over this same period.

2.5.2.5 Summary of Pump Station Upgrades

In summary, PS 1 and PS 6 peak flows exceed their rated capacities over the 25-year development period. PS 1 and PS 6 will require upgrades under existing conditions and 0-5-year conditions respectively, to be able to accommodate the first stages of development. These comparisons demonstrate an imminent need for upgrades of the two pumps listed previously.

2.5.3 Linear Infrastructure Capacity Improvements

2.5.3.1 Existing Conditions

Pipes were identified for capacity improvements where there was no residual capacity in the sewer, or the pipe was operating beyond 100% capacity. Incoming flow was either upstream loading or from upstream peak pump capacity flows.

Under existing conditions, a total of nine (9) sanitary sewer reaches are identified as being in need of upgrade. Where upgrades have been identified under the existing conditions, the upgrade size identified has been assessed as sufficient for up to the 25-year build-out period.

It should be noted that four (4) of the pipe upgrades are triggered by the rated capacity flow from upstream pump stations and limiting pump station capacity. Based on the outcome of future pump station analysis studies, there may not be a need for these upgrades. Two (2) of the pipe upgrades are to maintain pipe sizes where pipe sections immediately upstream and downstream are being upsized as part of the projects.

Table 15 below summarizes the upgrades identified using the design sheets in Appendix D.

Table 15: Upgrades under Existing Conditions

MH From - MH To	Location	Existing Diameter (mm)	New Diameter (mm)	Material	Triggering Development	Approximate Length (m)
620-615	St Isidore Rd between Desnoyers St and Isabelle St (1)	300	375	PVC	Existing	60
615-535	St Isidore Rd between Desnoyers St and Isabelle St (1)	300	375	PVC		50
535-530	St Isidore Rd between Desnoyers St and St-Joseph St (1)	300	375	PVC		75
530-525	St Isidore Rd between Desnoyers St and St-Joseph St (1)	300	375	PVC		110
525-520	St Isidore Rd between Desnoyers St and St-Joseph St (1)	300	450	PVC		90
305B-300	Montcalm St between Principale St and St-Joseph St	500	600	PVC		40
300-290	Montcalm St between Principale St and St-Joseph St	500	600	PVC		50
290-255	Montcalm St between Principale St and St-Joseph St	500	600	PVC		100

MH From - MH To	Location	Existing Diameter (mm)	New Diameter (mm)	Material	Triggering Development	Approximate Length (m)
255-90	Montcalm St between Principale St and St-Joseph St	500	600	PVC		110
(1) Note that the proposed new diameter for St. Isidore sewer upgrade has residual capacity for future development (beyond the Village boundary) and that the size of the sewer pipes shall be finalized during design.						

2.5.3.2 0-5 Year Development

In the 0-5-year development scenario no additional pipes, other than those identified in the existing condition, require upgrades. Design sheets for this time period are contained in Appendix D.

2.5.3.3 5-10 Year Development

In the 5-10-year development scenario no additional pipes, other than those identified in the existing condition, require upgrades. Design sheets for this time period are contained in Appendix D.

2.5.3.4 10-25 Year Development

Under the 10-25-year growth conditions, an additional 22 pipes are identified as requiring capacity improvements due to development in this time period. All of these upgrades service lands south of the river.

Table 16 below summarizes the upgrades identified using the design sheets in Appendix D.

Table 16: Upgrades under the Long-Term (10-25 Year) Time Period

MH From - MH To	Location	Existing Diameter (mm)	New Diameter (mm)	Material	Triggering Developments	Approximate Length (m)
1094-1090	Principale St between Racine St and Jeanne Mance St	350	450	PVC	Developments South of Highway 417	90
1090-1085	Principale St between Racine St and Jeanne Mance St	350	450	PVC		80
1085-1080	Principale St between Racine St and Jeanne Mance St	350	450	PVC		90
1080-1070	Principale St between Racine St and Jeanne Mance St	350	450	PVC		80

MH From - MH To	Location	Existing Diameter (mm)	New Diameter (mm)	Material	Triggering Developments	Approximate Length (m)
1070-1045	Jeanne Mance St between Principale St and Saint Joseph St	350	450	PVC		120
520-515	Saint Joseph St between St Isidore Rd and Dollard Street	450	525	PVC	South of Highway 417	105
515-505	Saint Joseph St between St Isidore Rd and Dollard Street	450	525	PVC		60
505-500	Saint Joseph St between St Isidore Rd and Dollard Street	450	525	PVC		100
500-460	Saint Joseph St between St Isidore Rd and Dollard Street	450	525	PVC		90
205-165	Principale St between St Isidore Rd and Brisson St	200	300	PVC	East of Laurier	55
165-160	Principale St between St Isidore Rd and Brisson St	250	300	PVC		90
160-155	Principale St between St Isidore Rd and Brisson St	250	300	PVC		90
155-150	Principale St between St Isidore Rd and Brisson St	250	300	PVC		85
150-115	Principale St between St Isidore Rd and Brisson St	250	300	PVC		85
115-110	Principale St between St Isidore Rd and Brisson St	300	450	PVC		80
110-90	Principale St between St Isidore Rd and Brisson St	300	450	PVC		75
90-85	Principale St between St Isidore Rd and Brisson St	525	600	PVC	East of Laurier and South of Highway 417	40
85-83	Principale St between St Isidore Rd and Brisson St	525	600	PVC		75
83-316	Principale St between St Isidore Rd and Brisson St	525	600	PVC		60

MH From - MH To	Location	Existing Diameter (mm)	New Diameter (mm)	Material	Triggering Developments	Approximate Length (m)
316-80	Principale St between St Isidore Rd and Brisson St	525	600	PVC		10
80-317	Principale St between St Isidore Rd and Brisson St	525	600	PVC		20
317-318	Principale St between St Isidore Rd and Brisson St	525	600	PVC		15

2.5.3.5 Recommended Linear Infrastructure Upgrades

The infrastructure identified as in need of upgrades, has been identified as the following seven projects, five of which address the linear infrastructure constraints and two others to improve the pump station capacities. Refer to Figure 8 identifying the extents of the projects.

Table 17 below summarizes the upgrade lengths included in each of the projects.

Table 17: Recommended Linear Infrastructure Project Upgrade

Project	Description	New or Upgraded Diameter (mm)	Approximate Total Length (m)
1a	Upgrade existing sanitary sewer sections along St. Isidore west of Principale. This project is triggered by insufficient flow under existing conditions.	375	300
1a		450	100
1b	Upgrade existing sanitary sewer sections along Montcalm, including a railway crossing. These sections are currently under capacity.	600	300
2	New sewer (approx. 700 m) to connect Brisson to Laurier for the proposed Nationview Development.	450	700
3	Upgrade existing sanitary sewer sections (approx. 450 m) along Principale and Jeanne Mance St. This project is triggered by development south of the HWY 417.	450	450
4	Upgrade existing sanitary sewer sections (approx. 750 m) along Principale St. between St-Isidore and Montcalm. This project is triggered by	300	390
4		450	155

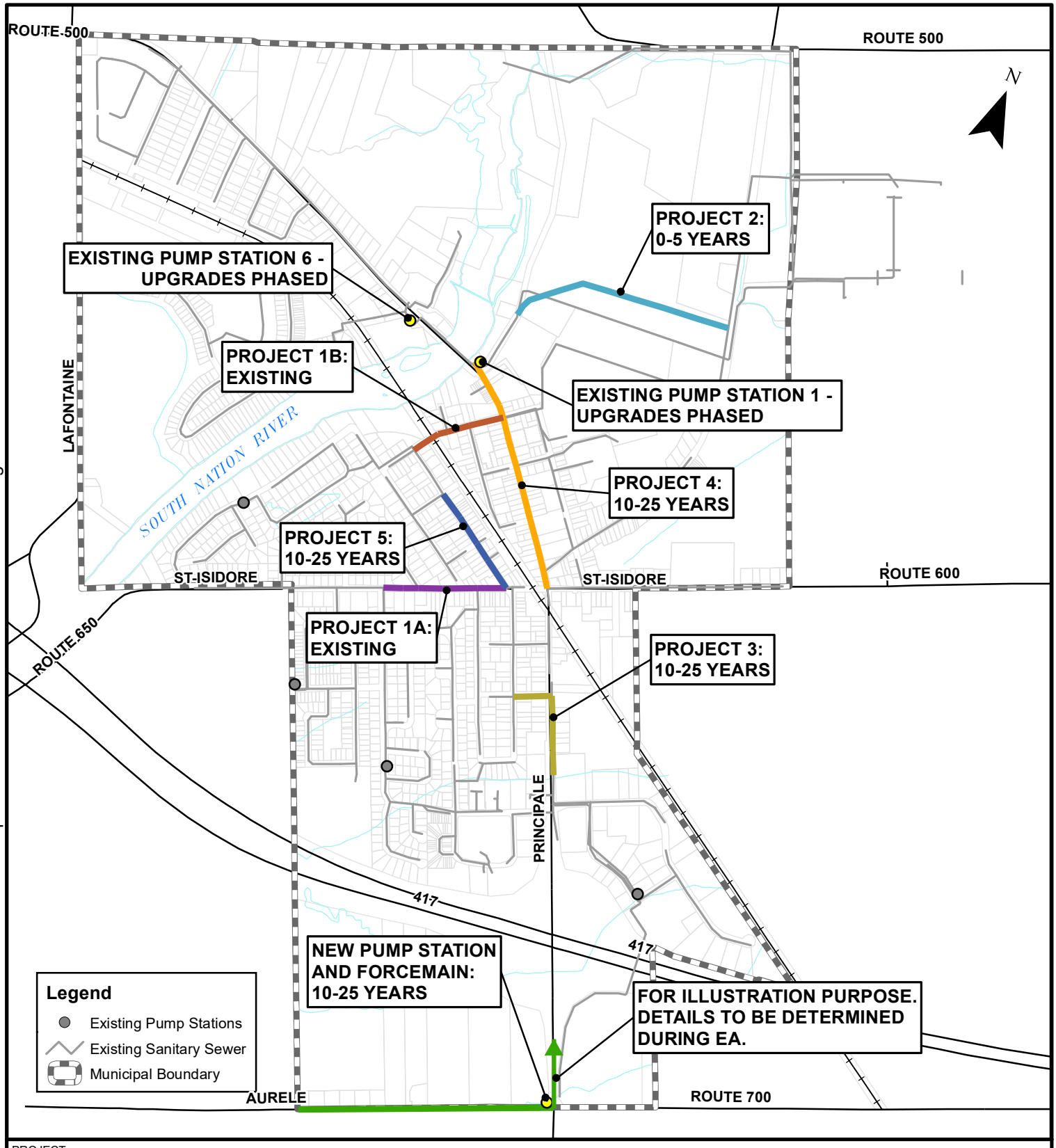
Project	Description	New or Upgraded Diameter (mm)	Approximate Total Length (m)
4	development south of the HWY 417 and East of Laurier Street.	600	205
5	Upgrade existing sanitary sewer sections (approx. 350 m) along St. Joesph St. This project is triggered by development south of the HWY 417.	525	350

Both pump station upgrades required to improve capacities are also being dealt with as separate projects, as identified in Section 2.5.2. For PS 1, this will also include upgrades of the immediate incoming sewers.

Note that the proposed new diameter for St. Isidore sewer upgrade has residual capacity for future development (beyond the Village boundary) and that the size of the sewer pipes shall be finalized during design.

2.5.4 Wastewater Servicing South of Highway 417

Phase 1 Report has identified the future development south of Highway 417 in the long-term (10-25 years). The sanitary servicing in this area will need to be implemented in that timeframe to accommodate the proposed development, as well as existing residential/commercial/industrial properties currently on septic systems. Connections will be made to convey wastewater collected in this area to the Municipality's sanitary collection system north of the Highway. The proposed wastewater servicing generally involves new sanitary sewers that runs along Aurele Road, a new Pumping Station (PS 7) and a new forcemain that discharges to a manhole north of Highway 417.



PROJECT:

CASSELMAN WATER AND WASTEWATER INFRASTRUCTURE MASTER PLAN

CASSELMAN, ONTARIO

DRAWING:

SANITARY NETWORK FUTURE PROJECTS

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DESIGN:	ML
DRAWN:	TB
CHECKED:	ML/BP
JLR #:	16953-118

DRAWING #:

FIGURE 8

File Location: P:\16000\16953-118 - Casselman Infrastructure Masterplan\3-Production\1-Civil\GIS\16953-118 Figure8.mxd

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2.6 Sewage Treatment System

The Casselman Sewage Treatment System (STS) is a seasonal-discharge lagoon-based system with polishing treatment. The treatment process consists of:

- Two (2) facultative lagoons (Cells A and B), each with an effective storage volume of 115,000 m^3
- One (1) aerated lagoon (Cell C), with an effective storage volume of 330,000 m^3
- An alum dosing system for phosphorus precipitation.
- One Moving Bed Biofilm Reactor (MBBR) to provide post-lagoon nitrification (ammonia removal), with a rated capacity of 3,500 m^3/d and peak flow rate of 5,000 m^3/d, and
- One disk filter to provide polishing removal of suspended solids and phosphorus, with a peak flow rate of 10,000 m^3/d.

The following four alternative options have been identified to achieve the rated capacity expansion required for the STS, understanding that the limitation to future expansion is the allowable seasonable discharge to the South Nation River.

- Alternative 1: Status Quo
- Alternative 2: Maintain Lagoon-Based Treatment System; Expand Lagoon Rated Capacity
    - Alternative 2a: Maintain Current Lagoon Discharge Window and Provide Additional Lagoon Storage
    - Alternative 2b: Expand Lagoon Discharge Window to Year-Round
- Alternative 3: Abandon Lagoon Treatment; Convert to a Mechanical Treatment Plant on Existing Site and Expand Discharge Window to Year-Round

2.6.1 Alternative 1: Status Quo

The “Status Quo” alternative represents what would likely occur if none of the alternative STS solutions were implemented and the existing STS was not expanded nor upgraded to accommodate future wastewater flows. Moreover, the assumption with respect to this alternative is that the discharge window and allowable discharge rates will remain unchanged.

The Phase 1 master planning analysis of future conditions showed that the rated capacity of the STS would be reached sometime between 2026-2037. Moreover, the rated capacity of the STS would require nearly doubling by 2047 to accommodate 25-year growth anticipated in the Master Plan. Therefore, the “status quo” or “do nothing” approach is not feasible as the anticipated future wastewater flows from intense growth within the Municipality cannot be accommodated by the existing lagoon capacity.

For the above stated reasons, this alternative has not been carried forward into the detailed evaluation as it does not address the Problem and Opportunity Statement.

2.6.2 Alternative 2: Maintain Lagoon-Based Treatment System; Expand Lagoon Rated Capacity

As described above for Alternative 1, the STS rated capacity cannot accommodate future wastewater flows anticipated in the Municipality within the Master Plan timeframe. Therefore, an

alternative to expand the lagoon rated capacity and adding future treatment units is presented herein. Two sub-options have been developed to capture the different discharge scenarios.

2.6.2.1 Alternative 2a: Maintain Current Lagoon Discharge Window and Provide Additional Lagoon Storage

Note, that under the current ECA the STS operates with an allowable discharge between October 1 and May 15. The Winter/Spring season permits a total allowable effluent discharge volume of 502,500 m^3 between January 1 and May 15. The Fall season permits a total allowable effluent discharge volume of 267,650 m^3 between October 1 and December 31.

This alternative would include maintaining the existing lagoon discharge window, construction of a new lagoon to provide additional storage for future flow, and a new MBBR and new Disc Filter Trains to allow increased effluent flow release during the discharge window.

The existing lagoon holding capacity would require expansion to accommodate the increase in wastewater influent to the STS. It is estimated that a maximum storage volume of 460,000 m^3 is required to meet future growth, which would require an additional 130,000 m^3 storage.

The Municipality would have to purchase new lands in order to expand the lagoon footprint. Given the near doubling rated capacity requirement within 25-years, the land required to accommodate future wastewater flows will be significant. In addition, as per the MECP Guideline D-2, "*Compatibility between Sewage Treatment and Sensitive Land Use*", an additional 150 m of buffer land area is recommended for separation from the facility producing odours to the property line of sensitive land uses. As previously presented, Figure 5 shows municipally owned lands. No land near the STS is currently owned by the Municipality, so the alternative is contingent on the Municipality being able to acquire nearby lands to the existing site.

2.6.2.2 Alternative 2b: Expand Lagoon Discharge Window to Year-Round

This alternative would involve expanding the lagoon discharge window to year-round, maintaining the lagoon storage capacity and installing baffles, providing an additional Disc Filter for redundancy, and new effluent disinfection and phosphorus removal dosing systems.

An Assimilative Capacity Assessment of the South Nation River was completed and appended to the Master Plan to support the development of this alternative (see Appendix E). Consultations with the MECP and South Nation Conservation (SNA) were also completed to determine the feasibility of expanding the discharge rates and discharge windows of the lagoon ECA. The proposed effluent discharge rates, water quality objectives and limits summarized in the tables below have been agreed to by the MECP.

Table 18: Proposed Casselman STS Maximum Monthly Effluent Discharge Rates and Minimum Dilution Ratios

MONTH	MAXIMUM DAILY DISCHARGE RATE	MINIMUM DILUTION RATIO
January	5,750 m^3/d	12.4
February	5,600 m^3/d	12.4
March	7,250 m^3/d	12.3
April	10,000 m^3/d	72.9
May	4,500 m^3/d	40.5
June	2,150 m^3/d	26.2
July	1,050 m^3/d	26.2
August	900 m^3/d	26.3
September	910 m^3/d	26.2
October	2,250 m^3/d	13.1
November	6,050 m^3/d	13.1
December	8,750 m^3/d	12.4

Table 19: Proposed Casselman STS Effluent Water Quality

PARAMETER	AVERAGING PERIOD	OBJECTIVE	LIMIT
$cBOD_5$	Monthly	10 mg/L	12 mg/L
TSS	Monthly	10 mg/L	12 mg/L
TP	Monthly	0.20 mg/L	0.30 mg/L
TAN			
Dec 1 to Mar 31	Monthly	9.2 mg/L	11.5 mg/L
Apr 1 to May 31	Monthly	4.8 mg/L	6.0 mg/L
Jun 1 to Sep 30	Monthly	1.0 mg/L	1.3 mg/L
Oct 1 to Nov 30	Monthly	4.0 mg/L	5.0 mg/L
E.coli			
May 1 to Oct 31	Monthly	150 CFU/100 mL	200 CFU/100 mL
pH	Single Grab	6.8 to 7.8	6.0 to 8.0

Table 20: Proposed Casselman STS Effluent Loading Limits

PARAMETER	AVERAGING PERIOD	LIMIT (kg/d)
$cBOD_5$	Annual	52.5
TSS	Annual	52.5
TP	Annual	1.31
TAN		
January	Monthly	66.1
February	Monthly	64.4
March	Monthly	83.4
April	Monthly	60.0
May	Monthly	27.0
June	Monthly	2.80
July	Monthly	1.37
August	Monthly	1.17

PARAMETER	AVERAGING PERIOD	LIMIT (kg/d)
September	Monthly	1.18
October	Monthly	11.3
November	Monthly	30.3
December	Monthly	100.6

In consultation with the supplier of the MBBR and Disc Filter systems, the following comments were provided:

- The proposed maximum flow rate through the MBBR and disk filter is equal to the existing peak design flow rates; therefore, the units can hydraulically handle the new monthly flow rates.
- The proposed TAN objectives appear to be achievable with the existing system, which will need to be confirmed using process modelling by the supplier. The stricter TAN objectives during the summer were not a concern given the expected warm temperatures during this period.
- The proposed TP objective is reasonable for a disk filter; however, the following upgrades should be considered:
    - Provision of a second disk filter to provide redundancy. Given the difference between allowable discharge in April (10,000 m^3/d) and the following six months (900 – 4,500 m^3/d), any prolonged system failure during April could result in excess wastewater accumulating in the lagoons which could not be discharged, resulting in an emergency overflow.
    - Provision of a coagulation chamber to provide a secondary point of coagulant dosing, to ensure that all reactive phosphorus is precipitated into particulate form prior to filtration.
- A new disinfection system will need to be implemented in order to ensure E.Coli. limits and objectives are met.
- Improve flow path within the existing lagoon cells to improve pre-treatment, and to increase MBBR aeration capacity.

2.6.3 Alternative 3: Abandon Lagoon Treatment; Convert to a Mechanical Treatment Plant on Existing Site and Expand Discharge Window to Year-Round

Another alternative to increase the STS rated capacity would be to abandon the existing lagoon STS, covert to a mechanical STS and expand the discharge window to year-round.

Generally speaking, a mechanical treatment plant could provide more effective treatment than the current lagoon STS for a much smaller footprint. However, mechanical systems run on a continuous basis and discharge instantaneously to the receiver stream as soon as the wastewater is treated, so this alterative would require an ECA amendment to allow for continuous discharge all year around and the treated effluent requirements will be consistent with that presented in Table 18,Table 19 and Table 20. Additional raw wastewater or treated wastewater equalization storage may be necessary to balance the allowed effluent discharge flow rates.

This option presents significant capital investment as a mechanical treatment plant involves a multitude of unit processes that are not typically required in a lagoon-based treatment system,

such as screening, grit removal, concrete tanks for biological treatment (e.g., aeration tanks and clarifiers), sludge treatment and disposal.

2.6.4 Evaluation Matrix

Table 21 provides a descriptive summary and evaluation of each alternative listed above.

2.6.5 Recommended Sewage Treatment System Alternative

The recommended strategy is Alternative 2b – Maintain Lagoon-Based Treatment System; Expand Lagoon Rated Capacity; Expand Lagoon Discharge Window to Year-Round. The proposed alternative will involve:

- Maintaining existing lagoon storage and treatment facilities and improve flow path within the existing lagoon cells.
- Maintaining existing MBBR treatment process and its rated capacity.
- Provision of a second disk filter to provide redundancy.
- Provision of a coagulation chamber to provide a secondary point of coagulant dosing, to ensure that all reactive phosphorus is precipitated into particulate form prior to filtration.
- Provision of a disinfection system to provide disinfection of effluent.
- Construction of a new building to house the disk filters and chemical systems.

In order to increase the capacity of the Casselman STS, a Schedule ‘C’ Municipal Class EA will need to be completed prior to design and construction. Equipment redundancy (i.e., disc filter and disinfection) should be reviewed and discussed during the Class EA and confirmed with the MECP prior to commencement of the detailed design. The opportunity to phase this project can also be reviewed during the Schedule ‘C’ Class EA.

Table 21: Sewage Treatment System Evaluation Matrix

	Alternative 2a – Maintain Current Lagoon Discharge Window and Provide Additional Lagoon Storage	Alternative 2b – Expand Lagoon Discharge Window to Year-Round	Alternative 3 – Abandon Lagoon Treatment, Convert to a Mechanical Treatment Plant on Existing Site and Expand Discharge Window to Year-Round
Natural Environment	• Increased footprint of the lagoon site (via construction of a new lagoon cell) will disturb the terrestrial environment around the existing agricultural land use. • Increased level of treatment for effluent will benefit the aquatic life and river water quality.	• Proposed work is limited to the existing site boundary. No significant disturbance is anticipated for terrestrial environment. • Increased level of treatment for effluent will benefit aquatic life and river water quality.	• Proposed work is limited to the existing site boundary. No significant disturbance is anticipated for terrestrial environment. • Increased level of treatment for effluent will benefit aquatic life and river water quality.
Evaluation	**Least Preferred**	**Preferred**	**Preferred**
Social and Cultural Environment	• The STS could accommodate future wastewater flows anticipated in the Master Plan timeframe. • Lagoon expansion is contingent on the Municipality being able to acquire nearby lands to the existing site that will not impact residents (i.e., odor). • Increasing lagoon footprint would require cultural heritage resource screening and potential impacts on undisturbed sites. • Future land use will be affected for areas surrounding the expanded lagoon site.	• The STS could accommodate future wastewater flows anticipated in the Master Plan timeframe. • No impact anticipated with respect to land use planning, cultural heritage, source water protection, archaeological resources as project is contained within the existing site boundary.	• The mechanical plant could accommodate future wastewater flows anticipated in the Master Plan timeframe. • No impact anticipated with respect to land use planning, cultural heritage, source water protection, archaeological resources as project is contained within the existing site boundary.
Evaluation	**Least Preferred**	**Preferred**	**Preferred**
Technical Feasibility	• Consultation with the MECP has confirmed the feasibility of maintaining discharge window and increasing effluent flow rate. • The storage solution can be affected by climate change (i.e., increased extreme weather events) and the Municipality runs the risk of insufficient storage. • For growth beyond the 25-year, additional storage will still be required. • This alternative represents inefficient use of the site with respect to the future wastewater flows.	• Consultation with the MECP has confirmed the feasibility of expanding discharge window and allowing the lagoon to discharge year-round. • This alternative involves the least construction and most efficient use of the existing infrastructure.	• A mechanical treatment plant will provide improved wastewater treatment compared to a lagoon STS for the same footprint. • The operations staff will need to be trained to operate and maintain a more complicated, new treatment system. • The level of treatment will be comparable to Alternative 2b.
Evaluation	**Less Preferred**	**Preferred**	**Less Preferred**
Financial Considerations	• Municipality will have to purchase new lands to expand the lagoon footprint. • Capital costs will include expanding the lagoon and construction, operation and maintenance of new treatment trains.	• Capital costs will include installation of new Disc Filters, disinfection, coagulant system, and improve flow path within the existing lagoon cells. • O&M costs will involve increased costs for the new treatment process and increased flow. • O&M costs for the MBBR system will likely remain the same.	• Capital costs could include decommissioning the lagoon STS and constructing a new mechanical treatment plant. • There will be significant increase to O&M costs to run the new STS facility with additional processes.
Evaluation	**Less Preferred**	**Preferred**	**Least Preferred**
Overall Evaluation	**Less Preferred**	**Preferred**	**Least Preferred**

3.0 Recommended Servicing Strategy, Implementation and Timing

There are a number of projects for water and wastewater infrastructure that have been identified as a result of this Master Plan. Considering the combined overall costs of these projects and that various projects are based on a number of evaluation factors; it is reasonable to expect that the projects identified would be implemented in a prioritized fashion.

Based on the various evaluations including overall problem identification Table 22 below has been developed to allow the Municipality to appropriately plan and phase the identified projects. A brief summary of the rationale and assumptions have also been included so that the list can also be potentially re-visited in the future as conditions may change and a re-ordering of the Municipality's priorities can be considered based on changing conditions and available information or previous upgrade projects that could affect future projects. It should be noted that certain projects could be advanced sooner if the Municipality deems this to be feasible.

The following tables provide the Opinion of Probable Costs for the proposed upgrades as outlined previously. It shall be noted that the Opinion of Probable Costs (OPC) were completed using 2023 dollars value. An OPC with a Class 'D' (Indicative Estimate) level of accuracy was developed for each alternative solution and includes allowances for design elements that have not fully been developed. Class 'D' OPCs developed for this assignment are expected to be within +/- 30%. The OPCs were developed based on past experience on similar projects, professional judgment, and equipment costs provided by suppliers. Design completed as part of this Master Plan is conceptual in nature for the purpose of obtaining Class 'D' cost estimates. All design parameters should be confirmed during the upcoming Class EA and detailed design. Any provided estimate of costs or budget is an OPC that is based on historic construction data and does not include labour, material, equipment, manufacturing, supply, transportation or any other cost impacts in relation to COVID-19. JLR shall not be responsible for any variation in the estimate caused by the foregoing factors but will notify the Municipality of any conditions which JLR believes may cause such variation upon delivery of the estimate.

Table 22: Overall Implementation Plan

PROPOSED SHORT-TERM PROJECTS (INITIATE ON 0-5 YEARS)				
Infrastructure Type	**Initiation Date**	**Project (Class EA Schedule)**	**Description**	**Opinion of Probable Cost**
Water Supply, Water Treatment, Water Storage	2024	Water Supply Phase 1 (Schedule B MCEA)	Complete the required EA, design and construction to switch water supply to Clarence-Rockland water system.	$ 74,200,000
	2024	Water Treatment Plant Condition Upgrades (Schedule A MCEA/ Exempt)	Complete the required upgrades at the WTP based on the results from the Condition Assessment completed and summarized in the Master Plan Phase 1 Report.	$ 1,400,000
	Ongoing	Water Quality Treatment System Upgrades (Schedule A MCEA/ Exempt)	At present the Municipality is conducting a water quality testing study to determine strategies to optimize the removal of Mn and Organics that are the precursors to THM formation to meet water quality objectives.	$ 1,600,000
Water Distribution	2024	New Watermain Section – Brisson to Laurier (Schedule A MCEA/ Exempt)	Add a new watermain (1 km 300 mm dia.) between Brisson and Laurier Street to provide looping existing watermain sections; to provide adequate fire flow for the next 25 years along Laurier Street near Sainte-Euphémie Pavillion, Casselman Catholic Elementary School.	$ 1,500,000
	2024	New Watermain Section – Carpe/Argile Street to Sarah/Francess Street (Schedule A MCEA/ Exempt)	Add a new watermain to connect Argile (through Carpe Street) to Sarah/Francess Street. Note, a section of this total length will cross the existing railway through horizontal directional drilling (HDD).	$ 1,600,000
Wastewater Collection	2024	Sewage Pumping Station No.1 Expansion Phase 1 (Schedule B MCEA with Screening)	SPS No.1 is at capacity under existing conditions. SPS No.1 rated capacity will be upgraded in a phased approach such that in Phase 1 the capacity will be expanded from 118 L/s to 236 L/s to meet the 10-year demand and beyond; this cost assumes no new building construction is required. Complete the required design, expansion and upgrades for the pump station. Twin the forcemain to the lagoons. Install new screen.	$ 7,400,000
	2023	Sanitary Sewer Upgrades Project 1A (Schedule A MCEA/ Exempt)	Upgrade existing sanitary sewer sections along St. Isidore west of Principale. This project is triggered by insufficient flow under existing conditions (refer to Figure 13 in Phase 1 MP report).	$ 1,900,000
	2027	Sanitary Sewer Upgrades Project 1B (Schedule A MCEA/ Exempt)	Upgrade existing sanitary sewer sections along Montcalm, including a railway crossing. These sections are currently under capacity.	$ 1,300,000
	2024	Sanitary Sewer Upgrades Project 2 (Schedule A MCEA/ Exempt)	New sewer (700 m) to connect Brisson to Laurier for the proposed Nationview Development.	$ 3,400,000
	2026	Sewage Pump Station No. 6 Expansion (Schedule B MCEA with Screening)	Upgrade existing pumps to rated capacity of 74 L/s from 40.5 L/s	$ 1,500,000
Sewage Treatment System	2024	Casselman Lagoon Expansion (Schedule C MCEA)	Complete the required EA, design and construction to allow year-round lagoon discharge and accommodate expansion to meet long-term growth at a rated capacity of 4,050 m^3/d, consisting of new disk filter, chemical dosing, disinfection, flow path improvement, and a new process building.	$ 9,000,000
			TOTAL SHORT-TERM COSTS	$ 104,800,000
PROPOSED MID- AND LONG-TERM PROJECTS (INITIATE IN 5-25+ YEARS)				
Infrastructure Type	**Initiation Date**	**Project**	**Description**	**Opinion of Probable Cost**
Water Supply, Water Treatment, Water Storage	2032+	Water Supply Phase 2 (Schedule B MCEA)	Provide additional water supply and storage capacity to meet long-term growth.	$ 12,100,000
Wastewater Collection	2032+	Sewage Pumping Station No.1 Expansion Phase 2 (Schedule B MECA with Screening)	Complete the required expansion and upgrades. SPS No.1 rated capacity will be upgraded in a phased approach such that in Phase 2 the capacity will be expanded from 236 L/s to 259 L/s to meet the 25-year demand. Replace existing pumps with larger pumps to accommodate firm capacity.	$ 1,200,000
	2030+	Sewage Pumping Station, Sanitary Sewer Servicing South of Hwy. 417 Construction (Schedule B MCEA with Screening)	Complete the required EA, design and new construction of sanitary sewer, pumping station and forcemain to service industrial, residential properties south of the HWY 417.	$ 11,070,000
	2032+	Sanitary Sewer Upgrades Project 3 (Schedule A MCEA/ Exempt)	Upgrade existing sanitary sewer sections (approx. 450 m) along Principale and Jeanne Mance St. This project is triggered by development south of the HWY 417.	$ 1,900,000
	2032+	Sanitary Sewer Upgrades Project 4 (Schedule A MCEA/ Exempt)	Upgrade existing sanitary sewer sections (approx. 750 m) along Principale St. between St-Isidore and Montcalm. This project is triggered by development south of the HWY 417 and East of Laurier Street.	$ 3,200,000
	2032+	Sanitary Sewer Upgrades Project 5 (Schedule A MCEA/ Exempt)	Upgrade existing sanitary sewer sections (approx. 350 m) along St. Joesph St. This project is triggered by development south of the HWY 417.	$1,500,000
			TOTAL MID- AND LONG-TERM COSTS	$ 30,970,000

4.0 Potential Impacts and Mitigation Measures

The proposed works in Table 22 will lead to potential impacts to the environment, construction strategy and site management, and/or cultural heritage resources. Table 23 presented below summarizes potential impacts, along with mitigation measures. It is recommended that impacts and mitigation measures be further reviewed and updated during the Class EA project specific planning and design stages.

Table 23: Summary of Environmental Impacts and Mitigation Measures

Impact	Mitigation Measure
The Environment	
Source Water Protection	Vulnerable areas, where drinking water sources are most at risk, were reviewed within the study area. It was found that a section of the South Nation River that runs through Casselman is designated a Source Water Intake Protection Zone (IPZ) 1. There are areas designated IPZ 2, as well as groundwater recharge and groundwater quality vulnerability within the Municipality. These areas have been depicted in Figure 5 in the Phase 1 Master Plan Report. The recommended projects resulting from completion of this Master Plan are intended to improve the performance and reliability of the drinking water systems in the 25-year planning horizon. The recommended long term strategy of switching water supply to Clarence-Rockland will eliminate any risk posed to IPZs within Casselman.
Climate Change	Climate change mitigation measures reduce the project's impacts on climate change, such as greenhouse gas (GHG) emissions and changes to the landscape that negatively affect its carbon sequestration and storage capacity. The project's GHG emissions can be categorized as operating carbon (emitted during the operation phase) and embodied carbon (emitted during the manufacturing and construction phase). Operating carbon consists of direct emissions from combustion of fossil fuels on site while indirect emissions are from consuming energy (ex. electricity) that was generated from off-site combustion of fossil fuels. Climate change adaptation refers to the impact of climate change on a project, i.e., the resilience or vulnerability of infrastructure to changing climatic conditions. Impacts of climate change on municipal water and wastewater projects include property-specific concerns such as flooding and system-wide impacts on water demand and electricity consumption.

	The recommended projects presented will enhance the Municipality's climate adaptation. Switching the water supply to Clarence-Rockland enhances the Municipality's climate adaptation as the current water supply, South Nation River, is anticipated to worsen in terms of water quantity/quality to climate change. The recommendation to allow the lagoons to discharge year round will mitigate risks associated with lagoon storage and potential overflows. Further review and consideration for greenhouse gas emissions, impacts on carbon sinks, and resilience or vulnerability is requried for the proposed undertakings during their respective Class EA. For instance, pumping required to transmit water from Clarence-Rockland to Casselman may increase GHG emissions; however longer term, ceasing to maintain and operate the Casselman WTP may decrease the Municipality's overall carbon footprint.
Contaminated Sites	Additional studies to identify waste disposal sites, contaminated sites and underground storage tanks and excess material management may be required as part of specific Class EAs or during project design.
Ecosystem Protection and Restoration	In general, any construction activities that may impact ecosystem form and function must be avoided where possible. Existing natural environmental features within the Master Plan study area are detailed in the Phase 1 Report and depicted in Figure 5. Some ecosystem features of note within or located near the study area include a section of the South Nation River that runs through Casselman that is a fish habitat and in the northeast corner of the municipal boundary there is a section of areas of natural and scientific interest (ANSI). The recommended long term strategy of switching water supply to Clarence-Rockland will eliminate any risk posed to fish habitats that reside in the South Nation River and improve these ecosystems in the river upstream and downstream of the current WTP intake. Consultation with the Ministry of Natural Resources and Forestry (MNRF), Fisheries and Oceans Canada (DFO) and applicable, local conservation authorities should be completed during the Class EA projects to determine if special measures or additional studies will be necessary to preserve and protect sensitive features within the projects area.
Species at Risk	In general, investigation of species at risk should be completed during the projects Class EA and mitigation measures should be embedded in the design and implemented during project construction. For instance, construction activities can be

	maintained within the existing site boundary or right-of-way to minimize disruption to wildlife habitat; work can be staged to avoid spawning and breeding periods. The proponent/ consultant retained to complete the proposed Class EA projects should review the "Client's Guide to Preliminary Screening for Species at Risk" (MECP, May 2019) identified within the MECP letter (see correspondence in Appendix F).
Surface Water	Known surface waters within the Master Plan study area include the the South Nation River that runs through the Municipality of Casselman. Details on the location of surface waters and other existing natural environmental features have been detailed in the Phase 1 Report and depicted in Figure 5. Measures should be included in the planning and design process to ensure that any impacts to watercourses from construction or operational activities (e.g., spills, erosion, pollution) are mitigated as part of the proposed undertakings. For instance, a stormwater management plan should be developed during the design and implementation stage and sedimentation and erosion control should be implemented during construction. The recommended long term strategy of switching water supply to Clarence-Rockland will eliminate any risk posed to surface waters within Casselman. The proponent/ consultant retained to complete the proposed Class EA projects should review the requirements identified within the MECP letter (see correspondance in Appendix F). Note, there are potential approval requirements as a result of the proposed new water supply Class EA Schedule B; this will be addressed during this undertaking.
Groundwater	There are areas designated groundwater recharge and groundwater quality vulnerability within the Municipality. These areas have been depicted in Figure 5 in the Phase 1 Master Plan Report. At this time there are no existing groundwater wells within the study area. The potential for impacts related to groundwater conditions will be assessed through geotechnical/ hydrogeological studies during the Class EA and/or design phase for the proposed works.
Construction Strategy and Site Management	
Excess Material Management	Projects activities involving the management of excess soil should

	be completed in accordance with O. Reg. 406/19 and the MECP's current guidance document titled "Management of Excess Soil – A Guide for Best Management Practices" (2014). All waste generated during construction must be disposed of in accordance with Ministry requirements.
Air Quality, Dust and Noise	Increased dust and noise can be anticipated from the various construction works of the proposed projects; impacts to air quality may occur during proposed wastewater treatment plant, sewage pumping station, or sanitary sewer upgrades projects. The potential for impacts related to air quality, dust, and noise will be assessed during the Class EA and/or design phase for the proposed works. Dust and noise control mitigation measures (ex. the MECP recommends non-chloride dust-suppressants) should be addressed and included in the construction plans to ensure that nearby residential and other sensitive land uses within the projects area are not adversely affected during construction activities.
Servicing, Utilities and Facilities	In consultation with Hydro One, it was noted that there are existing distribution assets within the study area. Ministry of Transportation (MTO) also noted that there are requirements for freeway crossings of services that would narrow down the Highway 417 crossing location, such as this Master Plan. The Ministry has authority over land use within 45 m of the Highway 417 right-of-way and 395 m from the center-point of the highway intersection. Any development within this area requires Ministry approvals, and proponents must obtain MTO permits before commencing any activities. Watermain construction that involves crossing the highway must be planned outside of the highway interchange area and must comply with the requirements of the applicable Ontario Provincial Standard Specifications, including OPSS 701, which specifically addresses watermain construction. For guidance on the installation method of any pipeline within the MTO right-of-way and highway crossing, please refer to the Highway Corridor Management Manual (2022). Early consultation with the MTO is highly recommended for activities within the control area. Pre-consultation requests with the MTO can be submitted online using the Highway Corridor Management Online Services. (see Appendix F for full correspondence). Hydro One and MTO should be consulted on individual projects during the Class EA and/or during design. Moreover, all underground and overhead infrastructure (transmission lines, telephone/internet, oil/gas, etc.) and/or potential disturbances to crossings should be identified as part of the Class EA projects and during design.

Mitigation and Monitoring	Design and construction reports/plans for the proposed projects should be based on a best management approach that centers on the prevention of impacts, protection of the existing environment, and opportunities for rehabilitation and enhancement of any impacted areas. A list of proposed mitigation and monitoring measures should be developed during the Class EA projects and/or during design for projects.
Permits and Approvals	The projects identified in this Master Plan may require specific permits and approvals; these will be identified and obtained during the projects specific Class EA and/or design. These may include: • Environmental Compliance Approval (ECA) Sewage and Air/Noise • Drinking Water Works Permit Amendment • Municipal Drinking Water License Amendment • Permit to Take Water • Environmental Activity and Sector Registry (EASR) • Conservation authority permits • Species at risk permits • MTO permits • Building Permit • Site Plan Approval • Approvals under the Impact Assessment Act, 2019. In consultation with Ministry of Natural Resources and Forestry (MNRF) it was noted that the local District office at Kemptville.Inforequest@ontario.ca should be consulted to obtain information regarding permits or authorizations that may be required as a result of the master plan (see Appendix F for full correspondence). The proponent/ consultant retained to complete the proposed Class EA projects should complete this consultation to obtain the required permits/approvals.
Cultural Heritage Resources	
Disturbance or destruction of archaeological resources Displacement of known and/or potential built heritage resources and/or cultural heritage landscapes by removal and/or demolition and/or disruption	Undertake archaeological assessment(s) to identify and evaluate resources. All archaeological assessment work must be carried out by licensed archaeologists. Identify and evaluate Built Heritage Resources and Cultural Heritage Landscapes. Avoidance, through alternative route selection. Demolition shall be considered a last resort.

5.0 Cultural Heritage Conditions

Cultural heritage resources, which includes archaeological resources, built heritage resources and cultural heritage landscapes, is an important aspect of the cultural environment and may be impacted by the proposed undertakings.

The Ministry of Citizenship and Multiculturalism (MCM) provides screening checklists to determine if the study area has cultural heritage resources. As part of this Master Plan, the MCM was consulted to determine if there are any known archaeological sites within the study area, i.e. the Municipality of Casselman. The MCM noted that there are no known archaeological assessments completed specific to this project to date. They confirmed two known archaeological sites within the Municipality of Casselman: located approximately 400 m and 600 m from SPS No.6 and SPS No.1.

For all proposed projects, the potential for disruption to cultural heritage resources is dependent on the preferred alternatives. As the Master Plan provides high level solutions for water and wastewater infrastructure needs within Casselman, in many instances an exact location for project implementation has not been defined as part of this Master Plan. Upon initiation of the project specific Class EAs identified in Table 22, cultural heritage resources screenings should be completed to determine if further assessments are to be undertaken once a preferred location is defined. When applicable, an archaeological assessment should be completed by an archaeologist licensed under the Ontario Heritage Act and/or a Cultural Heritage Existing Conditions Report should be completed by a qualified heritage consultant. The assessment report and/or existing conditions report must be submitted for MCM review prior to the completion of the Class EA and prior to any ground disturbance.

For the recommended water distribution projects (see Section 2.4.2.2 and Figure 6), the two linear infrastructure upgrades are recommended within existing infrastructure corridors and are therefore not anticipated to impact cultural heritage resources. Upgrades to the elevated storage tank involve increasing the tank water level, therefore no cultural heritage resources impact assessment is required as this is an operational upgrade.

For the WTP, the preferred alternative is completing short-term upgrades within the existing plant and in the long-term building a transmission pipe from the Clarence-Rockland WTP to supply to Casselman (see Section 2.2.4.2). A water transmission main route is proposed within existing rights-of-way based on an initial feasibility study; therefore, no cultural heritage resources will likely be impacted. However, the exact piping route would need to be determined through completion of a Schedule B MECA for switching the water supply to Clarence-Rockland at which time cultural heritage resources screening shall be completed.

Similarly for wastewater, sanitary pipe upgrades are recommended within existing infrastructure corridors and are therefore not anticipated to impact cultural heritage resources (see Section 2.5.3.5 and Figure 8). SPS No. 1 and No. 6 upgrades will be contained within the existing sites (see Section 2.5.2.5 and Figure 8), therefore no impact to cultural heritage resources is anticipated but screening will be completed upon initiation of these Schedule B MECA projects. A new SPS is proposed to service development areas south of the Highway 417 (see Section 2.5.4 and Figure 8). A preferred location for this new SPS has not been defined as part of this Master Plan as it is dependent on future development areas which are anticipated in 10-25 years.

The location of the new SPS would be determined during a Schedule B MECA, at which time cultural heritage resources screening should be completed to inform the preferred location.

The preferred wastewater treatment project is contained within the existing site boundary therefore no impact to cultural heritage resources is anticipated but screening will be completed as part of the recommended Schedule C MCEA for the Casselman STS.

6.0 Public Consultation

6.1 Stakeholder and Review Agency Consultation Activities

Consultation includes project initiation notification to the public and potential stakeholders, one council presentation, notification and completion of a public information center (PIC), notice of Master Plan completion and 30-day review period at the end of the study.

A Project Initiation Notice was posted on the Municipality's website (https://en.casselman.ca/services/water_and_sewer) on June 9, 2022. Project initiation letters were also distributed directly to potential stakeholders, with an invitation to provide comments if applicable. A council presentation was held May 23, 2023. A Notice of PIC was posted on the Municipality's website (same link provided above) and distributed to stakeholders on March 13, 2024. The PIC was completed on April 3, 2024. A Notice of Master Plan was posted on the Municipality's website (same link provided above) and distributed to stakeholders on May 10, 2024. The final Master Plan report was made available on the website for the 30-day review period, which ended June 12, 2024.

Refer to Appendix F for a copy of all Notices, council presentation and PIC slides, stakeholder responses received to date and an updated stakeholder tracking list. Table 24 below provides a summary of all comments received to date and how they have been addressed in the Master Plan.

Table 24: Summary of Stakeholder Comments

Stakeholder	Summary of Comment	Summary of Action
Ministry of Transportation (MTO)	2023-06-09 – Email confirmation of receipt of Notice of Commencement and the following comment: "Please note that the MTO has requirements for freeway crossings of services such as this that would narrow down the Highway 417 crossing location."	Noted and comment has been addressed in Table 23 of this report.
	2024-03-22 – Letter response with comments from the Notice of PIC, which included: • The Ministry has authority over land use within 45 m of the Highway 417 right-of-way and 395 m from the center-point of the	Noted and comment has been addressed in Table 23 of this report.

Stakeholder	Summary of Comment	Summary of Action
	highway intersection. Any development within this area requires Ministry approvals, and proponents must obtain MTO permits before commencing any activities. • Watermain construction that involves crossing the highway must be planned outside of the highway interchange area and must comply with the requirements of the applicable Ontario Provincial Standard Specifications, including OPSS 701, which specifically addresses watermain construction. • For guidance on the installation method of any pipeline within the MTO right-of-way and highway crossing, please refer to the Highway Corridor Management Manual (2022). • Early consultation with the MTO is highly recommended for activities within the control area. Pre-consultation requests with the MTO can be submitted online using the Highway Corridor Management Online Services. 2024-05-10 – Email response to the Notice of Master Plan stating comments provided March 22, 2024 for the PIC remain the same.	Comments from the letter received March 22, 2024 have been addressed, as noted above.
South Nation Conservation	2023-06-13 – Email confirmation of receipt of Notice of Commencement and the following comment: • "Possibly, once you identify the data needed for your project, please, email a data request to the contact. Data share agreements will be required."	Noted, for future Class EA/ design projects.
Ministry of the Environment, Conservation and Parks (MECP)	2023-06-21 – Letter response with preliminary comments in response to the Notice of Study Commencement, which included: • List of First Nation and Metis communities to consult;	Noted and comments have been addressed in Table 23 of this report, which provides information on how each identified item from the "Areas of Interest" document would

Stakeholder	Summary of Comment	Summary of Action
	• Instructions on submission of final report; • Attached MECP "Areas of Interest" document; • Attached "A Proponent's Introduction to the Delegation of Procedural Aspects of Consultation with Aboriginal Communities"; • And Attached "Client's Guide to Preliminary Screening for Species at Risk". 2024-05-10 – Email response to the Notice of Master Plan stating consultation completed for the project appears complete and no further comments for the Master Plan at this time.	be dealt with as part of the Master Plan; in Section 6.2, for future projects consultation; and the identified First Nation group has been consulted. Noted, no action.
Hydro One	2023-06-23 – Letter response with preliminary comments in response to the Notice of Study Commencement, which included: • Confirmation that Hydro One has existing distribution assets within the study area. Request for continued consultation throughout Master Plan and subsequent Class EAs.	Noted and comments have been addressed in Table 23 of this report.
Ministry of Citizenship and Multiculturalism (MCM)	2021-06-24 – Letter response with preliminary comments in response to the Notice of Study Commencement, which included: • Advice on how to incorporate consideration of cultural heritage by outlining the technical cultural heritage studies and the level of detail required to address cultural heritage in master plans. • Instructions on screening for archaeological potential and on determining requirement for archaeological assessment. • Reporting any existing cultural heritage and/or archaeological resources in the master plan area.	Comments have been addressed in Section 5.0 of this report.

Stakeholder	Summary of Comment	Summary of Action
	2024-01-10 – JLR inquired on archeological potential in the vicinity of the key infrastructure within the municipal boundary. MCM responded with the following: • At this time, there are no known archaeological assessments that have been undertaken specific to this project. • There are two known archaeological sites within the Municipality of Casselman: located approximately 400 m and 600 m from SPS No.6 and SPS No.1. 2024-05-10 – Letter response to the Notice of Master Plan with detailed report comments.	Noted in Section 5.0 of this report. JLR provided a response email back to the MCM on July 2, 2024, noting which comments have been addressed in this report. MCM accepted responses and confirmed that all comments have been addressed and no additional comments or questions at this time (by email on July 4, 2024).
Ministry of Natural Resources and Forestry (MNRF)	2023-06-29 – Email confirmation of receipt of Notice of Commencement and the following comment: • "Please contact the local District office at Kemptville.Inforequest@ontario.ca to obtain information regarding permits or authorizations that may be required as a result of the master plan."	Noted and comment has been addressed in Table 23 of this report.
City of Clarence-Rockland	2024-04-04 – The City called to request a copy of the PIC presentation once complete.	JLR provided copy of PIC slides.

6.2 Future Consultation Requirements

Future public and stakeholder consultation will be undertaken for the projects in Table 22 in accordance with the consultation requirements of their identified project Schedule, as detailed in the Section 1.3 of the Phase 1 Report.

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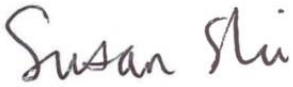
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Appendix B1

Assimilative Capacity Study of the South Nation River (February 2024)

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

MEMO

Date: February 23, 2024

To: Pierre-Paul Beauchamp
Director of Public Works
Municipality of Casselman

From: Kevin Cortez, M.Eng., EIT
J.L. Richards & Associates Limited (JLR)

CC: Carolyn Chan, P.Eng., M.A.Sc., JLR
Jordan Morrissette, P.Eng., M.Eng., JLR

Subject: Technical Memorandum – Assimilative Capacity Study of the South Nation River R1

JLR No.: 16953-133

Introduction

J.L Richards & Associates Limited (JLR) in association with Blue Sky Energy Engineering & Consulting Inc. (Blue Sky) acting as the sub-consultant, were retained by the Municipality of Casselman (the Municipality) to conduct an Assimilative Capacity Study (ACS) of the South Nation River. The findings obtained from this study will be used as a key input for the ongoing Water and Wastewater Infrastructure Master Plan, to inform the comparison of alternatives to expand the Casselman Wastewater Treatment System (WWTS) to accommodate future growth.

Background and Objectives

The Casselman WWTS operates under Amended Environmental Compliance Approval (ECA) No. 8160-BAHPRF, with a rated capacity of 2,110 m^3/day and allowable seasonal discharge to the South Nation River between October 1 and May 15. In 2022, JLR was retained by Casselman to complete a Water and Wastewater Infrastructure Master Plan in accordance with the Municipal Class Environmental Assessment requirements. Through the Master Plan process, it was determined that the anticipated future design average daily flow (ADF) of the WWTS is approximately 4,050 m^3/day.

Through preliminary consultation with the Ministry of Environment, Consultation and Parks (MECP), it was identified that to expand the discharge flow rate and/or timing of discharge from the WWTS, the Municipality must undertake an ACS, which demonstrates the impact of the proposed changes on the South Nation River.

The objectives of this Technical Memorandum are to:

- Present project background including existing conditions and stakeholder consultation activities.
- Summarize the methodology and results of the ACS.
- Comment on the impact of discharge scenarios on storage and treatment technologies.

Existing Conditions

Description of the Existing System

The Casselman WWTS is a seasonal-discharge facultative lagoon system with post-lagoon polishing treatment. The treatment train consists of:

- Two (2) facultative lagoons (Cells A and B), each with an effective storage volume of 115,000 m^3
- One (1) aerated lagoon (Cell C), with an effective storage volume of 100,000 m^3
- An alum dosing system for phosphorus precipitation.
- One Moving Bed Biofilm Reactor (MBBR) to provide post-lagoon nitrification (ammonia removal), with a rated capacity of 3,500 m^3/d and peak flow rate of 5,000 m^3/d, and
- One disk filter to provide polishing removal of suspended solids and phosphorus, with a peak flow rate of 10,000 m^3/d.

Currently, the system is operating at 65% of its total rated capacity with an ADF of 1,381 m^3/d, and a maximum day flow (MDF) of 3,206 m^3/d. Based on the wastewater demands and growth development timelines, the WWTS is projected to reach 100% of its rated capacity in 2026.

Existing ECA Discharge Regime

Under the existing ECA, effluent discharge to the South Nation River is permitted during two seasonal periods, Winter/Spring and Fall. The Winter/Spring season permits a total allowable effluent discharge volume of 502,500 m^3 between January 1 and May 15. The Fall season permits a total allowable effluent discharge volume of 267,650 m^3 between October 1 and December 31. In addition to the total allowable seasonal effluent discharge volumes, the ECA defines maximum daily discharge rates for each calendar month within the permitted period, see Table 1 below.

Table 1: Maximum Monthly Effluent Discharge Rates

DISCHARGE PERIOD	MAXIMUM DISCHARGE RATE (m^3/d)
Jan 1 – 31	5,000
Feb 1 – 28/29	5,000
Mar 1 – 31	5,000
Apr 1 – 30	7,000
May 1 – 15	7,000
Oct 1 – 31	4,000
Nov 1 – 30	4,000
Dec 1 – 31	5,000

The ECA also defines effluent concentration objectives and limits as well as seasonal loading limits for carbonaceous biochemical oxygen demand ($cBOD_5$), total suspended solids (TSS), total phosphorus (TP), hydrogen sulfide, and total ammonia nitrogen (TAN). Effluent concentration objectives and limits and seasonal loading limits are summarized in Table 2 below.

Table 2: Final Effluent Compliance Objectives and Limits

Parameter	Concentration Objective	Concentration Limit	Loading Limit
Winter/Spring (Jan 1 – May 15)			
$CBOD_5$	15 mg/L	25 mg/L	93.06 kg/d
TSS	15 mg/L	25 mg/L	93.06 kg/d
TP	0.8 mg/L	1.0 mg/L	3.73 kg/d
TAN Jan 1 – Mar 31 Apr 1 – May 15	 12.0 mg/L 6.0 mg/L	 12.0 mg/L 6.0 mg/L	 44.67 kg/d 22.33 kg/d
E. coli [1]	100 CFU/100 mL	200 CFU/100 mL	-
Hydrogen Sulfide	0.1 mg/L	0.1 mg/L	0.37 kg/d
pH	Maintained between 6.8 to 7.8, inclusive, at all times	Maintained between 6.0 to 8.0, inclusive, at all times	-
Fall (Oct 1 – Dec 31)			
$CBOD_5$	10 mg/L	15 mg/L	43.64 kg/d
TSS	10 mg/L	25 mg/L	72.73 kg/d
TP	0.8 mg/L	1.0 mg/L	2.91 kg/d
TAN Oct 1 – Nov 30 Dec 1 – Dec 31	 5.0 mg/L 12.0 mg/L	 5.0 mg/L 12.0 mg/L	 14.55 kg/d 34.89 kg/d
E. coli [1]	100 CFU/100 mL	200 CFU/100 mL	-
Hydrogen Sulfide	Not Detected	Not Detected	-
pH	Maintained between 6.8 to 7.8, inclusive, at all times	Maintained between 6.0 to 8.0, inclusive, at all times	-

1. In our understanding, *E. coli* was added in error during the previous ECA amendment, as there is no disinfection treatment at the facility and no discharge during summer months. Therefore, although this water quality parameter is measured, compliance is not enforced.

Stakeholder Pre-Consultation and Identification of Preferred Approach

MECP Pre-Consultation

On November 2nd, 2023, a consultation meeting was held with the MECP. JLR and BlueSky presented two scenarios for increasing the total discharge flow to 4,050 m^3/day. Scenario 1 proposed to increase flow during the existing discharge window, while Scenario 2 proposed to expand the discharge window to be year-round.

An analysis of Scenario 1 estimated a maximum effluent storage volume requirement of 460,000 m^3, which would require additional storage of 130,000 m^3 from the existing capacity. Maximum annual TP loading was limited to 770 kg/year as per the existing loading limits. A summary of the TP and TAN objectives and limits outlined for Scenario 1 is provided in Table 3 below.

Table 3: Scenario 1 – Seasonal Discharge TP and TAN Objectives and Limits

Parameter	Objective		Limit	
TP	Monthly	0.36 mg/L	Monthly	0.45 mg/L
TAN				
Winter (Dec 1 to Mar 31)	Monthly	8.0 mg/L	Monthly	10.0 mg/L
Spring (Apr 1 to May 15)	Monthly	4.8 mg/L	Monthly	6.0 mg/L
Fall (Oct 1 to Nov 30)	Monthly	3.6 mg/L	Monthly	4.5 mg/L

An analysis of Scenario 2 estimated a maximum effluent storage volume requirement of 315,000 m^3, which is 15,000 m^3 less than the existing capacity. Maximum annual TP loading was reduced from the existing loading limits of 770 kg/year to 476 kg/year; however a new summer TP loading of 45.7 kg would be introduced. A summary of the TP and TAN objectives and limits outlined for Scenario 2 is provided in Table 4 below.

Table 4: Scenario 2 – Year-round Discharge TP and TAN Objectives and Limits

Parameter	Objective		Limit	
TP	Monthly	0.20 mg/L	Monthly	0.30 mg/L
TAN				
Winter (Dec 1 to Mar 31)	Monthly	9.2 mg/L	Monthly	11.5 mg/L
Spring (Apr 1 to May 31)	Monthly	4.8 mg/L	Monthly	6.0 mg/L
Summer (Jun 1 to Sep 30)	Monthly	1.0 mg/L	Monthly	1.3 mg/L
Fall (Oct 1 to Nov 30)	Monthly	4.0 mg/L	Monthly	5.0 mg/L

Given the existing property limitations for expanding the storage capacity at the wastewater treatment facility, the additional buffer provided from reduced storage volume requirements, and the overall reduction in annual TP loadings, Scenario 2 was deemed the favorable option. Refer to Appendix A for meeting minutes.

SNCA Consultation

The South Nation Conservation Authority (SNCA) was contacted to discuss the ongoing Class EA study and proposed ACS approach to expand the discharge window to be year-round. From email correspondence dated November 29, 2023, SNCA confirmed that they had no concerns with respect to expanding the discharge period to year-round provided total TP loading does not exceed the current ECA limit.

Based on the consultation with the governing authorities, the ACS was completed to correspond with Scenario 2, to increase the effluent discharge window to be year-round.

Desktop Assimilative Capacity Study

A desktop assimilative capacity study of the South Nation River was undertaken by Blue Sky to develop reasonable effluent targets and discharge rates for an upgraded WWTS and assess the potential to expand the existing discharge window and increase the allowable rate of discharge based on anticipated effluent criteria. The ACS Report dated January 11, 2024 has been included in Appendix A. The study included the following components:

- Review of available data in the upstream vicinity of the effluent discharge location to establish ambient conditions and SNR flow conditions. A nearby Provincial Water Quality Monitoring Network (PWQMN) station was identified to be located approximately 1km upstream of the outfall. The station's data contained information on water quality parameters between 1970 to 2020 including BOD_5, DO, ammonia,

temperature, pH, TP, TSS, Nitrate, *E. Coli* (1970 to 2020). A Water Survey of Canada (WSC) gauge was identified to be located approximately 1km upstream of the outfall; the gauge contained river flow data from 1950 to 2021.

- Establishment of water quality ambient conditions for the South Nation River as defined by MECP and Provincial Water Quality Objectives (PWQO).
- Assessment of the effluent discharge period to be expanded to year-round discharge which eliminates the need for additional storage lagoon volume.
- Assessment of mixing zone characteristics using CORMIX.
- Recommendation of loading and water quality parameters.

Ambient Conditions

For establishing the South Nation River ambient water quality parameters, the 75th percentile is applied when characterizing ambient conditions. For dissolved oxygen (DO), low concentrations are indicators of degraded water quality; therefore 25th percentiles are typically used rather than 75th percentiles to characterize ambient conditions.

The receiving water quality is assigned Policy 1 if the ambient concentrations is less than the PWQO and Policy 2 if the ambient concentrations exceed the PWQO. The following water quality parameters were assigned Policy 1: unionized ammonia (with limited capacity between June to August), DO, and E. coli. TP was assigned Policy 2.

Given that there are no PWQO values for TSS, the Canadian Water Quality Guidelines for the Protection of Aquatic Life (CWQG) were used. For TSS the CWQG recommends a maximum increase of 5 mg/L from background levels for long-term exposures.

The 7Q20 river flow (minimum average 7-day low flow with a return period of 20 years) was also calculated on a monthly basis to represent low-flow conditions.

Results

The ACS considered an expanded yearly discharge window for its analysis. Assessment of seasonal impact from the effluent assumed the following seasonal periods:

- Winter: December 1 to March 31
- Spring: April 1 to May 31
- Summer: June 1 to September 30
- Fall: October 1 to November 30

The ACS considered the impact of stored precipitation in the lagoons on total discharge volume requirements. Using an analysis of monthly precipitation/evaporation rates, the existing lagoon cells were determined to contribute the equivalent of 297 m^3/d of stored precipitation. As a result, effluent limits were developed assuming a total equivalent effluent discharge rate of 4,347 m^3/d. Monthly discharge volumes were considered to maintain adequate dilution ratios, with a minimum value of 10:1, ensuring reasonable downstream fully mixed water quality, and providing allowances for WWTS operational flexibility.

Maximum Effluent Discharge Rates

Based on the analysis, maximum effluent discharge rates were developed for each month and are presented below in Table 5. Assuming the upgraded WWTS discharges effluent at the maximum proposed discharge rates throughout the year, a total annual volume of 1,674,050 m^3 would be discharged (equivalent to average day flow of 4,586 m^3/d). This average day flow provides sufficient flexibility to discharge the design influent ADF (4,050 m^3/d) plus the anticipated stored precipitation volume (297 m^3/d).

Table 5: Monthly Maximum Effluent Discharge Rates and Minimum Dilution Ratio

MONTH	MAXIMUM DAILY DISCHARGE RATE	MINIMUM DILUTION RATIO
January	5,750 m^3/d	12.4
February	5,600 m^3/d	12.4
March	7,250 m^3/d	12.3
April	10,000 m^3/d	72.9
May	4,500 m^3/d	40.5
June	2,150 m^3/d	26.2
July	1,050 m^3/d	26.2
August	900 m^3/d	26.3
September	910 m^3/d	26.2
October	2,250 m^3/d	13.1
November	6,050 m^3/d	13.1
December	8,750 m^3/d	12.4

CORMIX Modelling

To determine the required distance downstream of the effluent discharge to attain fully mixed conditions, a CORMIX model was performed. The results of the model are summarized in Table 6 below. Excluding the month of April, the results represent relatively small mixing zones which would result in minimal impact on the South Nation River. Despite the larger distance to attain fully mixed conditions in April (375 m), the impact on downstream total phosphorus and unionized ammonia is expected to be low due to the high dilution ratio (72.9:1) and the proposed effluent limits maintaining total phosphorus concentrations close to ambient values and unionized ammonia below the PWQO.

Table 6: Summary of Distance Required Downstream to Achieve Fully Mixed Conditions

MONTH	EFFLUENT FLOW (m^3/d)	RIVER FLOW (m^3/s)	DILUTION RATIO	DISTANCE-DOWNSTREAM TO ACHIEVE FULLY-MIXED CONDITIONS (m)
January	5,750	0.826	12.4	100
February	5,600	0.802	12.4	100
March	7,250	1.035	12.3	130
April	10,000	8.442	72.9	375
May	4,500	2.108	40.5	175
June	2,150	0.652	26.2	80
July	1,050	0.319	26.2	75
August	900	0.274	26.3	80
September	910	0.276	26.2	80
October	2,250	0.340	13.1	80
November	6,050	0.918	13.1	125

MONTH	EFFLUENT FLOW (m^3/d)	RIVER FLOW (m^3/s)	DILUTION RATIO	DISTANCE-DOWNSTREAM TO ACHIEVE FULLY-MIXED CONDITIONS (m)
December	8,750	1.251	12.4	125

Proposed Effluent Objectives and Limits

The proposed effluent objectives and limits were conducted using a mass-balance approach to ensure downstream, fully-mixed season concentrations remain at or below the PWQO at ambient (75th percentile) concentrations and low (7Q20) flows. The analysis also considered limiting the future effluent total phosphorus loadings to 770 kg/year (existing ECA limit) or less, while also considering minimizing total phosphorus loading during the critical summer period to reduce impacts on downstream, fully mixed total phosphorus concentrations. Effluent pH targets are equal to those under the existing ECA. The recommended seasonal E. coli objective and limit are consistent with targets for similar municipal WWTS's in Ontario and, in particular, facilities discharging to the South Nation River. The proposed water quality objectives and limits are summarized in Table 7 below.

Table 7: Proposed Effluent Water Quality Objectives and Limits

PARAMETER	AVERAGING PERIOD	OBJECTIVE	LIMIT
$cBOD_5$	Monthly	10 mg/L	12 mg/L
TSS	Monthly	10 mg/L	12 mg/L
TP	Monthly	0.20 mg/L	0.30 mg/L
TAN			
Dec 1 to Mar 31	Monthly	9.2 mg/L	11.5 mg/L
Apr 1 to May 31	Monthly	4.8 mg/L	6.0 mg/L
Jun 1 to Sep 30	Monthly	1.0 mg/L	1.3 mg/L
Oct 1 to Nov 30	Monthly	4.0 mg/L	5.0 mg/L
E.coli			
May 1 to Oct 31	Monthly	150 CFU/100 mL	200 CFU/100 mL
pH	Single Grab	6.8 to 7.8	6.0 to 8.0

MECP Comments and Response

Comments on the ACS Report were provided by Sarah Baxter, Surface Water Specialist, in a memorandum dated February 1, 2024, and a response was provided by Blue Sky in a memorandum dated February 16, 2024. This correspondence has been included in Appendix B. Based on MECP's comments, revised proposed effluent water quality objectives and limits were prepared as presented in Table 8, as well as proposed effluent loading limits as presented in Table 9. Following formal acceptance by MECP, these values can be used as the basis of design for comparison of design alternatives for a future Schedule C MCEA as well as future application for ECA amendment for increased treatment capacity of the lagoon system.

Table 8: Revised Proposed Effluent Water Quality Objectives and Limits

PARAMETER	AVERAGING PERIOD	OBJECTIVE	LIMIT
$cBOD_5$	Monthly	10 mg/L	12 mg/L
TSS	Monthly	10 mg/L	12 mg/L
TP	Monthly	0.20 mg/L	0.30 mg/L
TAN			
Dec 1 to Mar 31	Monthly	9.2 mg/L	11.5 mg/L
Apr 1 to May 31	Monthly	4.8 mg/L	6.0 mg/L
Jun 1 to Sep 30	Monthly	1.0 mg/L	1.3 mg/L
Oct 1 to Nov 30	Monthly	4.0 mg/L	5.0 mg/L
E.coli			
May 1 to Oct 31	Monthly	150 CFU/100 mL	200 CFU/100 mL
pH	Single Grab	6.8 to 7.8	6.0 to 8.0

Table 9: Proposed Effluent Loading Limits

PARAMETER	AVERAGING PERIOD	LIMIT (kg/d)
$cBOD_5$	Annual	52.5
TSS	Annual	52.5
TP	Annual	1.31
TAN		
January	Monthly	66.1
February	Monthly	64.4
March	Monthly	83.4
April	Monthly	60.0
May	Monthly	27.0
June	Monthly	2.80
July	Monthly	1.37
August	Monthly	1.17
September	Monthly	1.18
October	Monthly	11.3
November	Monthly	30.3
December	Monthly	100.6

Description of Required Upgrades

As noted above, the existing facultative lagoon system is anticipated to have sufficient storage capacity to accomplish the required flow balancing between months without expansion.

JLR consulted with the supplier of the MBBR and disk filter system, Veolia, to discuss whether the new effluent objectives and limits could be achieved at the new monthly flow rates, with the discussion focusing on TAN and TP. Veolia provided the following preliminary comments:

- The proposed maximum flow rate through the MBBR and disk filter is equal to their peak design flow rates; therefore, the units can hydraulically handle the new monthly flow rates.
- The proposed TAN objectives appear to be achievable with the existing system, to be confirmed using process modelling by Veolia. The stricter TAN objectives during the summer were not a concern given the expected warm temperatures during this period.

- The proposed TP objective is reasonable for a disk filter; however, Veolia recommended that the following upgrades be considered:
    - Provision of a second disk filter to provide redundancy. Given the difference between allowable discharge in April (10,000 m^3/d) and the following six months (900 – 4,500 m^3/d), any prolonged system failure during April could result in excess wastewater accumulating in the lagoons which could not be discharged, resulting in an emergency overflow.
    - Provision of a coagulation chamber to provide a secondary point of coagulant dosing, to ensure that all reactive phosphorus is precipitated into particulate form prior to filtration.

It was also acknowledged that a new disinfection system (e.g. UV or chlorination/de-chlorination) would need to be provided in order to ensure that the E.coli objective is met.

Veolia then prepared a proposal with technical recommendations related to achieving the more stringent effluent criteria, dated January 26, 2024; this proposal has been included in Appendix C. In addition to the above preliminary comments, the proposal includes recommendations to improve the flow path within the existing lagoon cells to improve pre-treatment, and to increase MBBR aeration blower capacity.

The preferred approach to upgrading the treatment system, including any phasing of upgrades, will be confirmed during the future Schedule C MCEA for expansion of the WWTS.

Conclusion

The ACS of the South Nation River was completed following recommendations outlined from consultation with the MECP and the SNCA for the increasing the effluent discharge window to be year-round. The effluent quality objectives and limits outlined within this technical memorandum were developed using a future design influent ADF of 4,050 m^3/d, and an equivalent average effluent discharge rate of 4,347 m^3/d, are anticipated to have minimal effect on the South Nation River.

J.L. RICHARDS & ASSOCIATES LIMITED

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Appendix A

ACS Report

Final Report
Assimilative Capacity Study to Support the Expansion of the Casselman WWTS

January 11, 2024

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1. Introduction

1.1 Overview

A Class Environmental Assessment (Class EA) study is underway to determine the most cost effective and environmentally sustainable approach to increasing wastewater servicing capacity to meet future growth needs in Casselman. An assimilative capacity assessment of the South Nation River is required to develop reasonable effluent targets and discharge rates for an upgraded Casselman WWTS.

Blue Sky Energy Engineering & Consulting Inc. (Blue Sky), in association with J.L. Richards & Associates Limited (JLR), has been retained to conduct a desk-top assimilative capacity study (ACS) of the South Nation River to support the Casselman WWTS Class EA study. This report summarizes the results of the ACS.

1.2 Objectives

The specific objectives of the ACS are to:

- Document data sources and assumptions used;
- Define ambient water quality and verify low flow conditions in the South Nation River;
- Complete CORMIX modelling of the mixing zone; and,
- Develop recommendations for future effluent requirements for an upgraded Casselman WWTS a future annual discharge average daily flow (ADF) value of 4,050 m^3/d.

2. Background

2.1 Current Effluent Requirements

The existing Casselman WWTS is a lagoon-based treatment system operated under amended Environmental Compliance Approval (ECA) No. 8160-BAHPRF and has a rated capacity of 2,110 m^3/d. The facility discharges directly to the South Nation River.

Effluent discharge is currently permitted during two seasonal periods, namely:

- Winter/Spring (Jan 1 to May 15): Total allowable discharge volume of 502,500 m^3; and,
- Fall (Oct 1 to Dec 31): Total allowable discharge volume of 267,650 m^3.

In addition to the total seasonal discharge volumes permitted, maximum effluent discharge rates have been defined for each calendar month, as shown in Table 2.1. Effluent concentration objectives and limits are shown in Table 2.2.

In addition to the above, the ECA specifies seasonal loading limits for $cBOD_5$, TSS TP, and hydrogen sulfide, as well as semi-seasonal loading limits for TAN. These are summarized in Table 2.3, and are based on the concentration limit (Table 2.2) and total allowable discharge volumes during each discharge period.

Table 2.1 – Existing Maximum Monthly Effluent Discharge Rates – Casselman WWTS (2,110 m^3/d)

Discharge Period	Maximum Discharge Rate	Maximum Discharge Rate Based on Dilution Ratio [1]
Jan 1 – 31	5,000 m^3/d	SNR Flow/10
Feb 1 – 28/29	5,000 m^3/d	SNR Flow/10
Mar 1 – 31	5,000 m^3/d	SNR Flow/40
Apr 1 – 30	7,000 m^3/d	SNR Flow/60
May 1 – 15	7,000 m^3/d	SNR Flow/60
Oct 1 – 31	4,000 m^3/d	SNR Flow/15
Nov 1 – 30	4,000 m^3/d	SNR Flow/10
Dec 1 – 31	5,000 m^3/d	SNR Flow/15

Notes:
1. SNR Flow = South Nation River Flow

Table 2.2 – Existing Effluent Objectives and Limits – Casselman WWTS (2,110 m³/d)

Parameter	Objective		Limit	
	Averaging Period	Value	Averaging Period	Value
$cBOD_5$				
Jan 1 to May 15	Monthly	15 mg/L	Monthly	25 mg/L
Oct 1 to Dec 31	Monthly	10 mg/L	Monthly	15 mg/L
TSS				
Jan 1 to May 15	Monthly	15 mg/L	Monthly	25 mg/L
Oct 1 to Dec 31	Monthly	10 mg/L	Monthly	25 mg/L
TP	Monthly	0.8 mg/L	Monthly	1.0 mg/L
TAN				
Jan 1 to Mar 31	Monthly	12.0 mg/L	Monthly	12.0 mg/L
Apr 1 to May 15	Monthly	6.0 mg/L	Monthly	6.0 mg/L
Oct 1 to Nov 30	Monthly	5.0 mg/L	Monthly	5.0 mg/L
Dec 1 to Dec 31	Monthly	12.0 mg/L	Monthly	12.0 mg/L
E. coli	Monthly (1)	100 CFU/100 mL	Monthly (1)	200 CFU/100 mL
Hydrogen Sulfide				
Jan 1 to May 15	Monthly	0.1 mg/L	Monthly	0.1 mg/L
Oct 1 to Dec 31	Monthly	Not Detected	Monthly	Not Detected
pH	Single Sample	6.8 to 7.8	Single Sample	6.0 to 8.0

Notes:
$cBOD_5$ – 5-day biochemical oxygen demand
TSS – total suspended solids
TP – total phosphorus
1. Monthly geometric mean

Table 2.3 – Existing Effluent Loading Limits – Casselman WWTS (2,110 m³/d)

Parameter	Averaging Period	Limit
$cBOD_5$		
Jan 1 to May 15	Seasonal	93.06 kg/d
Oct 1 to Dec 31	Seasonal	43.64 kg/d
TSS		
Jan 1 to May 15	Seasonal	93.06 kg/d
Oct 1 to Dec 31	Seasonal	72.73 kg/d
TP		
Jan 1 to May 15	Seasonal	3.73 kg/d
Oct 1 to Dec 31	Seasonal	2.91 kg/d
TAN		
Jan 1 to Mar 31	Seasonal	44.67 kg/d
Apr 1 to May 15	Seasonal	22.33 kg/d
Oct 1 to Nov 30	Seasonal	14.55 kg/d
Dec 1 to Dec 31	Seasonal	34.89 kg/d
Hydrogen Sulfide		
Jan 1 to May 15	Seasonal	0.37 kg/d
Oct 1 to Dec 31	Seasonal	-

2.2 Existing Outfall Configuration

The existing outfall is a 500 to 525 mm diameter pipe discharging approximately 75 m off the east bank of the South Nation River via a two-port diffuser. An as-built drawing of the outfall (dated 1978) is shown in Figure 2.1.

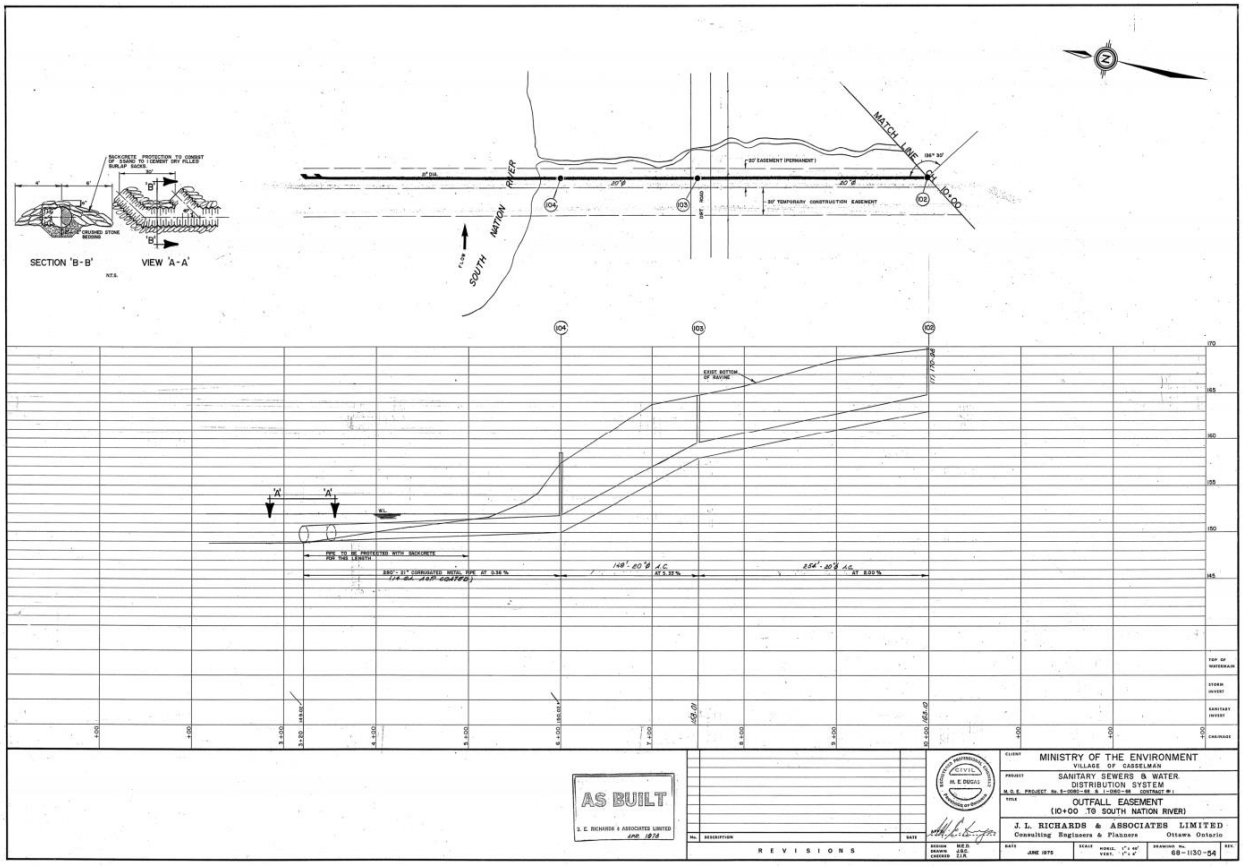


Figure 2.1 – As-Built Drawing of Existing Outfall

2.3 Available Data

In establishing ambient water quality and flow for a receiver, recent data available in the upstream vicinity of the effluent discharge location is reviewed to establish ambient conditions. In the case of the Casselman WWTS assimilative capacity assessment, a nearby Provincial Water Quality Monitoring Network (PWQMN) station is located approximately 1 km upstream of the outfall, while a Water Survey of Canada (WSC) gauge is located approximately 1 km upstream of the outfall. Information regarding the PWQMN and WSC stations is presented in Table 2.2, while their locations are presented in Figure 2.2.

Table 2.2 – Summary of Key Data Sources to Assess Ambient Conditions

Key Location Along South Nation River	Distance Relative to Plantagenet WWTS Outfall	Parameters of Interest	Period of Record Used in this Study
PWQMN Station 18207010002	1 km upstream	BOD_5, DO, ammonia, temperature, pH, TP, TSS, nitrate, E. coli	1970 – 2020
WSC Gauge 02LB013	1 km upstream	Flow	1950 – 2021

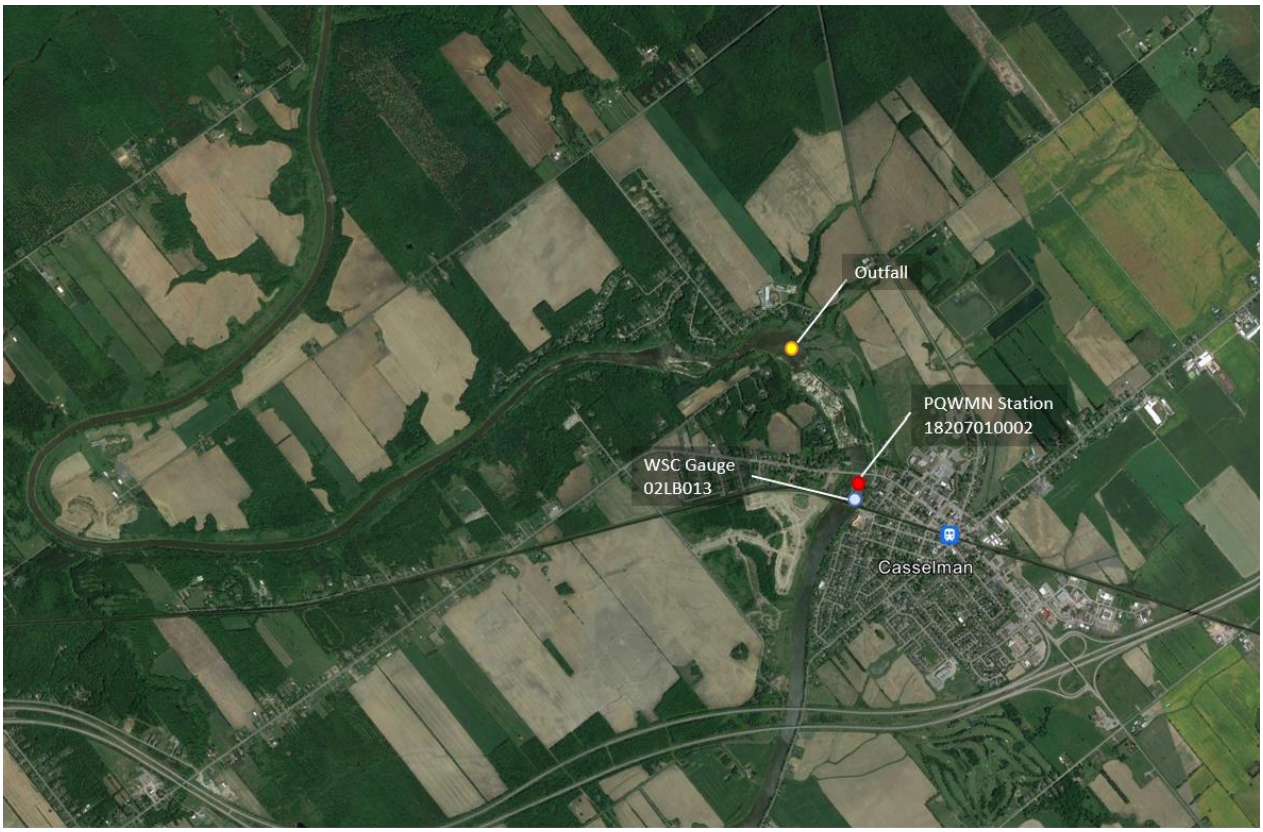


Figure 2.2 – Locations of the Outfall, WSC Gauge and PWQMN Station

3. Ambient Conditions

3.1 Water Quality

Representative background water quality can be defined by examining South Nation River water quality in the vicinity of the Plantagenet WWTP outfall. For analysis purposes, the 75th percentile threshold is applied to characterize ambient conditions, as recommended by the Ministry of the Environment (MOE), now Ministry of the Environment, Conservation and Parks (MOECP). The MOE states, "Normally the 75th percentile is used to determine background quality…".[1] The receiving water quality is assigned Policy 1 if the ambient concentration is less than the Provincial Water Quality Objective (PWQO) and Policy 2 if the ambient concentration exceeds the PWQO. The implication of being a Policy 1 or Policy 2 receiver is described briefly below.

- **Policy 1:** In areas which have water quality better than the Provincial Water Quality Objectives, water quality shall be maintained at or above the Objectives.
- **Policy 2:** Water quality which presently does not meet the Provincial Water Quality Objectives shall not be degraded further and all practical measures shall be taken to upgrade the water quality to the Objectives.

For the purposes of this analysis, PWQMN data collected over the period 1970 to 2020 were used. The findings for each parameter of interest are summarized in the sections below.

3.1.1 Total Phosphorus

The MOE PWQO state that, as an interim guideline for streams and rivers, total phosphorus (TP) should not exceed 0.03 mg/L, to prevent excessive plant growth. The statistical summary for total phosphorus concentration is shown in Table 3.1. The monthly and annual 75th percentile concentrations exceed the PWQO. Therefore, the receiver is MOE Policy 2 in the vicinity of Casselman with respect to TP.

[1] Ministry of Environment and Energy, *Water Management: Policies, Guidelines, Provincial Water Quality Objectives.* July 1994 (MOE Blue Book).

Table 3.1 – Total Phosphorous Concentrations in the South Nation River in the Vicinity of Casselman

Month	Average (mg/L)	Median (mg/L)	75th Percentile (mg/L)	Number of Observations
January	0.133	0.110	0.180	9
February	0.210	0.150	0.255	11
March	0.154	0.110	0.135	15
April	0.107	0.070	0.099	22
May	0.069	0.060	0.080	38
June	0.067	0.059	0.090	46
July	0.091	0.080	0.120	42
August	0.181	0.090	0.140	43
September	0.141	0.091	0.158	38
October	0.160	0.088	0.116	40
November	0.099	0.051	0.096	38
December	0.083	0.080	0.120	11
Overall	**0.146**	**0.110**	**0.175**	**353**
PWQO	–	–	0.030	–

3.1.2 Unionized Ammonia

The percentage of unionized ammonia in aqueous solution varies depending on the temperature and pH of the water. Ambient total ammonia, pH, and temperature are summarized in Table 3.2, Table 3.3, and Table 3.4, respectively. Synoptic pH and temperature data were used to determine daily dissociation ratios; using the daily dissociation ratios and associated daily total ammonia concentrations, it was possible to calculate daily unionized ammonia (UIA) concentrations in the South Nation River. The average, median and 75th Percentile unionized ammonia concentrations are presented in Table 3.5.

Ambient total ammonia concentrations showed limited seasonal variation. While also showing limited seasonal trends, pH in the South Nation River is elevated, which increases the ammonia dissociation ratio for this receiver. As expected, temperature varies seasonally and is quite high (>24°C) over the period June to August, also increasing the dissociation ratios for those months. Ambient UIA concentrations were, therefore, elevated over these warm months, with little to no assimilative capacity over that period; conversely, ambient (75th) percentile UIA concentrations were well below the PWQO during all other months. Therefore, the receiver can be characterized as Policy 1 for UIA, with limited assimilative capacity over the period June to August.

Table 3.2 – Total Ammonia Concentrations in the South Nation River in the Vicinity of Casselman

Month	Average (mg/L)	Median (mg/L)	75th Percentile (mg/L)	Number of Observations
January	0.31	0.31	0.32	6
February	0.35	0.33	0.51	6
March	0.15	0.11	0.15	10
April	0.12	0.09	0.13	21
May	0.07	0.07	0.10	33
June	0.08	0.07	0.10	41
July	0.08	0.07	0.09	40
August	0.13	0.11	0.15	40
September	0.10	0.08	0.13	37
October	0.08	0.05	0.09	37
November	0.06	0.05	0.08	34
December	0.05	0.05	0.07	8
Overall	**0.19**	**0.12**	**0.30**	**313**

Notes:

Ammonia concentrations as reported as mg/L as NH_3.

Table 3.3 – pH in the South Nation River in the Vicinity of Casselman

Month	Average (mg/L)	Median (mg/L)	75th Percentile (mg/L)	Number of Observations
January	7.84	7.70	8.03	5
February	7.59	7.55	7.65	7
March	7.92	7.90	8.09	11
April	8.12	8.10	8.18	19
May	8.30	8.32	8.43	31
June	8.29	8.30	8.48	39
July	8.41	8.36	8.50	34
August	8.23	8.24	8.38	37
September	8.11	8.20	8.34	31
October	8.09	8.16	8.34	33
November	8.21	8.21	8.32	32
December	8.13	8.20	8.31	10
Overall	**7.90**	**7.83**	**8.19**	**289**

Table 3.4 – Temperature in the South Nation River in the Vicinity of Casselman

Month	Average (mg/L)	Median (mg/L)	75th Percentile (mg/L)	Number of Observations
January	0.9	0.5	1.0	9
February	1.0	1.0	1.5	11
March	2.6	2.0	3.0	15
April	8.3	8.8	11.4	23
May	15.6	15.9	17.7	36
June	22.1	22.5	24.0	43
July	23.7	24.2	25.9	41
August	22.5	23.1	24.3	44
September	17.8	18.4	19.0	36
October	10.1	10.1	12.4	39
November	5.2	4.8	6.4	37
December	2.4	2.0	3.7	11
Overall	**1.8**	**1.0**	**2.5**	**345**

Table 3.5 – Unionized Ammonia Concentrations in the South Nation River in the Vicinity of Casselman

Month	Average (µg/L)	Median (µg/L)	75th Percentile (µg/L)	Number of Observations
January	1.3	1.3	1.5	2
February	1.4	1.4	1.9	2
March	2.1	0.8	2.1	6
April	2.8	2.5	3.6	17
May	5.5	4.9	8.1	25
June	9.5	8.0	13.0	34
July	22.8	8.0	17.2	30
August	20.3	9.3	16.0	32
September	4.8	4.4	6.6	27
October	2.2	1.9	3.2	28
November	1.9	1.1	2.2	26
December	0.7	0.6	0.9	7
Overall	**1.3**	**0.7**	**1.7**	**236**
PWQO	–	–	20	–

Notes:

Unionized ammonia concentrations as reported as mg/L as NH_3. As a conservative measure, the dataset includes two elevated, single-sample UIA results in July and August 2021 that impacted the calculated average concentrations for those months.

3.1.3 Dissolved Oxygen and BOD_5

For dissolved oxygen (DO), low concentrations are indications of degraded water quality; therefore 25th percentiles are typically used, rather than 75th percentiles, to characterize ambient conditions. Assuming the South Nation River is a warm water fishery, the PWQO for DO ranges from 4 to 7 mg/L from month-to-month based on temperature: cooler temperatures have a higher PWQO for DO than warmer temperatures.

Average and 25th percentile DO concentrations are presented in Table 3.6 along with the monthly PWQO (based on ambient temperature data shown in Table 3.4). In addition to DO data, 178 samples were analyzed over the review period for BOD_5, with an average concentration of 3.0 mg/L and 75th percentile value of 4.0 mg/L, suggesting low background concentrations of oxygen depleting constituents.

Based on the available data, the South Nation River is Policy 1 with respect to DO in the vicinity of Casselman. This demonstrates that there is adequate assimilative capacity available for future BOD_5 loads from an upgraded and expanded WWTP.

Table 3.6 – Dissolved Oxygen Concentrations in the South Nation River in the Vicinity of Casselman

Month	Average (mg/L)	25th Percentile (mg/L)	PWQO (1)	Number of Observations
January	9.8	8.4	7	8
February	10.1	8.7	7	9
March	10.5	10.0	7	14
April	10.8	10.2	5	19
May	9.5	9.0	5	30
June	9.3	8.0	4	37
July	8.3	7.3	4	35
August	7.7	6.5	4	38
September	7.5	7.2	5	31
October	9.2	7.9	5	31
November	11.8	11.4	6	32
December	11.7	11.0	7	7

Notes:

1. The PWQO values applied were based on the 75th percentile monthly temperatures shown in Table 3.4 assuming a warm water fishery.

3.1.4 Total Suspended Solids

There are no PWQO values for total suspended solids (TSS), however the Canadian Water Quality Guidelines for the Protection of Aquatic Life (CWQG) recommend a maximum average increase of 5 mg/L from background levels for long-term exposures. Reported PWQMN TSS concentrations are elevated throughout all months for which data are available. A statistical summary of TSS concentrations is provided in Table 3.7.

Since there is no PWQO, it is not possible to define a Policy status for the South Nation River in relation to TSS. However, to be consistent with the objectives of the CWQG, the discharge of effluent from the WWTP should not increase downstream fully-mixed concentrations by more than 5 mg/L.

Table 3.7 – Total Suspended Solids Concentrations in the South Nation River in the Vicinity of Casselman

Month	Average (mg/L)	Median (mg/L)	75th Percentile (mg/L)	Number of Observations
January	15.0	–	–	1
February	15.0	–	–	1
March	9.1	9.1	11.1	2
April	18.7	13.8	21.5	16
May	12.9	9.0	12.0	21
June	8.9	7.1	10.0	29
July	11.1	7.0	9.1	23
August	8.4	6.9	10.9	29
September	7.8	7.0	9.3	23
October	14.8	11.7	16.4	22
November	7.8	6.7	8.7	21
December	8.4	8.2	10.3	6
Overall	**9.8**	**9.7**	**14.5**	**194**

3.1.5 Nitrate

There is no PWQO for nitrate, however the CWQG recommends a long-term exposure limit of 3.0 mg/L as N, and a short-term (acute) exposure limit of 124 mg/L as N. A statistical summary of reported PWQMN nitrate concentrations is provided in Table 3.8.

During most calendar months, the ambient (75th percentile) nitrate concentration is below the CWQG long-term exposure limit. Monthly ambient (75th percentile) nitrate concentrations occasionally exceeded the long-term exposure limit (June, November and December), but were significantly below the short-term exposure limit. In addition, monthly median nitrate concentrations were below the short-term exposure limit with the exception of December. Such seasonal variability in ambient concentrations, with higher values during colder periods, is typical of surface waters such as the South Nation River.

Table 3.8 – Nitrate Concentrations in the South Nation River in the Vicinity of Casselman

Month	Average (mg/L)	Median (mg/L)	75th Percentile (mg/L)	Number of Observations
January	–	–	–	–
February	1.1	–	–	1
March	1.8	1.4	2.3	5
April	2.3	2.2	3.0	16
May	1.5	1.5	2.2	25
June	2.5	2.0	4.1	33
July	1.6	1.1	2.2	32
August	0.9	0.5	1.5	31
September	0.6	0.2	0.7	28
October	1.9	1.2	2.9	28
November	2.9	2.4	4.1	27
December	2.9	3.1	3.8	6
Overall	**2.3**	**1.9**	**3.6**	**232**

3.1.6 E. coli

A total of 15 samples were analyzed for E. coli over the review period. Individual sample results ranged from 8 to 1,800 CFU/100 mL with an overall geometric mean of 38 CFU/100 mL, which is below the PWQO of 100 CFU/100 mL. As a result, the South Nation River can be characterized as Policy 1 with respect to E. coli.

3.2 Flow

Typically for assimilative capacity analyses, the 7Q20 river flow (minimum average 7-day low flow with a return period of 20 years) represents an appropriate design condition. As described in Section 2.3, the closest stream flow gauge with relevant data is Water Survey of Canada (WSC) hydrometric station 02LB013 which is located on South Nation River approximately 1 km upstream of the Casselman outfall.

A statistical analysis of recorded flows in the South Nation River was used to determine monthly low (7Q20) flows in the receiver. The results of the low flow analysis are presented in Table 3.9, while details can be found in Appendix A. Flows in the South Nation River vary seasonally, with the lowest flows through the Summer into early Fall (June to September). The highest 7Q20 flow occurs in April, coinciding with the Spring freshet.

Table 3.9 – Results of Low Flow Analysis – South Nation River in the Vicinity of Casselman

Month	WSC Station 02LB013 Mean Flow (m^3/s)	WSC Station 02LB013 7Q20 Flow (m^3/s)
January	16.1	0.826
February	13.9	0.802
March	61.8	1.035
April	106.6	8.442
May	21.7	2.108
June	10.8	0.652
July	6.7	0.319
August	4.6	0.274
September	4.5	0.276
October	11.6	0.340
November	20.3	0.918
December	21.6	1.251

4. Determination of Effluent Limits

4.1 Methodology

A conference call was held between MECP and Blue Sky staff on October 5, 2023 to discuss a preliminary approach to completing the ACS study, with a follow-up virtual meeting on November 2, 2023. During the November 2023 meeting, alternative discharge windows were discussed (namely, retaining the existing discharge period (October 1 to May 15) or expanding to year-round discharge), and additional details presented regarding the proposed approach to defining effluent limits for a number of parameters.

Subsequently, the South Nation Conservation (SNC) was contacted to discuss the ongoing Class EA Study and proposed ACS approach. In email correspondence dated November 29, 2023, SNC confirmed that they have no concerns with respect to expanding the discharge period to year-round provided total TP loading does not exceed the current ECA limit.

Copies of correspondence and meeting notes from these consultation activities are included in Appendix C. Based on the outcome of these consultation activities with MECP and SNC, the approved ACS approach consists of the following:

- Allow the effluent discharge period to be expanded to year-round discharge. This approach eliminates the need for additional effluent storage lagoon volume.
- Consider the impact of stored precipitation in the lagoons on total discharge volume requirements. Based on an analysis of monthly precipitation / evaporation rates, the existing lagoon cells would contribute the equivalent of 297 m^3/d of stored precipitation. As a result, effluent limits were developed assuming a total equivalent annual average effluent discharge rate of 4,347 m^3/d.
- Monthly discharge volumes to consider maintaining adequate dilution ratios (minimum value of 10 : 1), ensuring reasonable downstream fully-mixed water quality, and providing allowances for WWTS operational flexibility.
- Utilize a mass-balance approach to ensure downstream, fully-mixed seasonal UIA concentrations remain at or below the PWQO at ambient (75^{th} percentile) concentrations and low (7Q20) flows. Proposed effluent TAN targets will also ensure non-toxicity at end-of-pipe.
- Limit future effluent TP loadings to 770 kg/yr (current ECA limit). Consideration will also be given to minimizing TP loadings during the critical Summer period, decreasing the annual TP loading limit if possible, as well as the impact on downstream, fully-mixed TP concentrations.
- An assessment of mixing zone characteristics using the expert system CORMIX.
- Nitrate is not currently a parameter of concern for the South Nation River. As a result, no effluent nitrate targets will be proposed.
- Effluent pH and *E. coli* targets will be consistent with targets for other municipal WWTSs in Ontario and, in particular, facilities discharging to the South Nation River.

In addition to the above, the seasonal impact of effluent on the South Nation River was assessed assuming the following seasonal periods:

- Winter: December 1 to March 31
- Spring: April 1 to May 31
- Summer: June 1 to September 30
- Fall: October 1 to November 30

4.2 Maximum Effluent Discharge Rates

Maximum effluent discharge rates were developed for each calendar month, and are presented in Table 4.1. Associated monthly minimum dilution ratios are also shown.

The proposed effluent discharge rates result in dilution ratios consistent with the required minimum design value of 10 : 1. Assuming that the upgraded Casselman WWTS discharges effluent at the maximum proposed discharge rates for all days each calendar month, a total annual volume of 1,674,050 m^3 could be discharged (equivalent to an average day flow of 4,586 m^3/d). This provides sufficient flexibility to discharge the design influent ADF (4,050 m^3/d) plus the anticipated stored precipitation volume (297 m^3/d).

Table 4.1 – Proposed Maximum Monthly Effluent Discharge Rates

Month	Maximum Daily Discharge Rate	Minimum Dilution Ratio
January	5,750 m^3/d	12.4
February	5,600 m^3/d	12.4
March	7,250 m^3/d	12.3
April	10,000 m^3/d	72.9
May	4,500 m^3/d	40.5
June	2,150 m^3/d	26.2
July	1,050 m^3/d	26.2
August	900 m^3/d	26.3
September	910 m^3/d	26.2
October	2,250 m^3/d	13.1
November	6,050 m^3/d	13.1
December	8,750 m^3/d	12.4

4.3 Effluent $cBOD_5$

There are no PWQO or CWQG targets specified for $cBOD_5$. However, the presence of carbonaceous and nitrogenous biochemical oxygen demand (cBOD and nBOD, respectively) can affect downstream DO concentrations.

An assessment of ambient water quality (see Section 3) concluded that the South Nation River is Policy 1 for DO, with historic 25th percentile concentrations at least 2.2 mg/L greater than the PWQO for all months. Furthermore, the available ambient BOD_5 concentration (ambient 75th percentile of 4.0 mg/L) suggest low background concentrations of oxygen depleting constituents.

Proposed $cBOD_5$ requirements of 10 mg/L (design objective) and 12 mg/L (design limit) are being proposed in conjunction with year-round nitrification (see Section 5.6). At the design limit, low flow conditions and ambient background concentrations, the fully mixed $cBOD_5$ concentration would increase by up to 0.59 mg/L (Winter). During the critical Summer period (June to September), the fully mixed $cBOD_5$ concentration would only increase by up to 0.29 mg/L. These increases would have minimal impact on the downstream DO concentrations.

4.4 Effluent Total Suspended Solids

There is no PWQO target specified for TSS. The CWQG recommends a maximum short-term (< 24 h period) increase of 25 mg/L above background, and a maximum increase of 5 mg/L over long-term exposures (up to 30 days).

Effluent TSS requirements of 10 mg/L (design objective) and 12 mg/L (design limit) are proposed. These are consistent with the proposed cBOD5 limits (see Section 5.3). At the design limit, low flow conditions and ambient background concentrations, the fully mixed TSS concentration would only increase by up to 0.13 mg/L, which meets the CWQG recommendation.

4.5 Effluent Total Phosphorus

The South Nation River was determined to be Policy 2 for TP (see Appendix A) and, therefore, ambient (75th percentile) concentrations exceed the PWQO of 0.030 mg/L. During the November 2023 consultation meeting with MECP, a future TP concentration limit of 0.30 mg/L was proposed (see Appendix C). This is equivalent to a total annual TP loading limit of 476 kg/year (based on a total average annual discharge volume of 4,347 m3/d), which is consistent with the target of maintaining effluent TP at or below the current ECA limit (770 kg/year). In addition to the TP limit of 0.30 mg/L, a TP objective of 0.20 mg/L is also proposed. The ambient TP concentrations and resulting downstream fully-mixed TP concentrations are shown in Table 4.2.

To minimize the environmental impact associated the effluent discharge, the combined daily maximum effluent discharge rate and TP concentration limit ensure that downstream, fully-mixed TP concentration would increase by no more than 5.2% above ambient conditions during the critical Summer (June to September) period.

Table 4.2 – Fully Mixed TP Concentration Under Proposed Effluent TP Limits and Effluent Discharge Rates

Month	Seasonal Ambient TP [1] (mg/L)	Fully-Mixed TP (mg/L)	Increase Above Ambient TP (%)
January	0.185	0.194	4.4
February	0.185	0.194	4.4
March	0.185	0.194	4.5
April	0.110	0.113	2.3
May	0.110	0.115	4.0
June	0.120	0.127	5.2
July	0.120	0.127	5.2
August	0.120	0.127	5.2
September	0.120	0.127	5.2
October	0.110	0.124	10.9
November	0.110	0.123	10.9
December	0.185	0.194	4.4
January	0.185	0.194	4.4

Notes:

1. For the purposes of assessing ambient TP concentrations, seasonal 75th percentile concentrations were utilized (Winter = Dec to Mar; Spring = Apr to May; Summer = Jun to Sep; Fall = Oct to Nov).

4.6 Effluent Total Ammonia Nitrogen

In developing TAN limits, two factors were considered: ensuring non-toxic effluent at end-of-pipe, and ensuring downstream conditions within the South Nation River meet the PWQO un-ionized ammonia (UIA) limit of 20 µg/L as NH_3 (16 µg/L as N).

Extensive research by the US EPA and others has demonstrated that a non-toxic limit for UIA ranges between 0.1 mg/L and 0.5 mg/L as NH_3, depending on the aquatic species present in the receiver. The federal Wastewater Systems Effluent Regulations (WSER) under the Fisheries Act set effluent UIA toxicity to 1.25 mg/L (at 15^{o}C). Therefore, selecting a value of 0.2 mg/L as NH_3 at end-of-pipe, which is near the low end of the US EPA range, is more conservative than, and consistent with, the requirements of WSER.

The percentage of UIA in aqueous solution varies depending on the temperature and pH of the water. In order to determine the in-stream UIA concentration, it is necessary to specify anticipated ambient temperature and pH values that can be used to estimate the ammonia dissociation ratio. To account for the seasonal variability in stream temperatures, four seasonal periods were defined: Winter (Dec to Mar); Spring (Apr to May); Summer (Jun to Sep); Fall (Oct to Nov). For each season, ambient conditions were taken to be the 75th percentile UIA concentration, and 75th percentile dissociation ratio over that period.

To confirm non-toxicity at end-of-pipe, it was necessary to define effluent temperature and pH values. Effluent pH and temperature data were available over the existing discharge window (Oct 1 to May 15). It was noted that effluent pH stabilized after the Casselman WWTS was upgraded in 2020. Analyzing single sample effluent pH over the period 2020 to 2023, it was determined that the 75th percentile pH values were 7.8 for Winter and Fall, and 7.6 for Spring. As a conservative measure, it was assumed that future

75th percentile effluent pH would be 7.8 for all seasons. Effluent is expected to continue to be stored in the lagoon prior to discharge. Using effluent temperature data over the period 2017 to 2023, 75th percentile effluent temperatures were determined to be 6.1°C in both April and November. Ambient temperatures in the South Nation River were higher in those months (6.4°C in Nov and 11.4°C in Apr, see Table 3.4). As a conservative measure, ambient seasonal South Nation River temperatures of 17.0°C, 24.2°C and 10.6°C were used to assess non-toxicity at end-of-pipe for Spring, Summer and Fall, respectively. The 75th percentile November temperature of 6.1°C in the South Nation River was used to represent worst-case Winter effluent temperatures, since it is possible that effluent temperatures of ~6°C could be possible in early December (the start of the Winter discharge period).

For the proposed effluent TAN limits to be acceptable, the downstream UIA concentration must be less than or equal to the PWQO of 20 µg/L (as NH_3), while also meeting the non-toxicity threshold of 0.2 mg/L (as NH_3) at end of pipe. Using the proposed effluent flows (see Table 5.1), it was determined that the effluent TAN limit was limited by downstream fully-mixed UIA less than the PWQO. As a result, the end-of-pipe UIA concentration would be below 0.20 mg/L for all months.

The recommended compliance limits for TAN are: 11.5 mg/L for Winter (Dec to Mar); 6.0 mg/L for Spring (Apr to May); 1.3 mg/L for Summer (Jun to Sep); and, 5.0 mg/L for Fall (Oct to Nov). These are consistent with, or more stringent than, the existing ECA discharge limits over the period Oct 1 to May 15. The proposed Summer TAN limit represents a high level of nitrification, and ensures downstream fully-mixed UIA concentrations remain under the PWQO during this critical, warm weather period. The proposed effluent ammonia limits and resulting downstream UIA concentrations at the minimum effluent dilution ratio are shown in Table 4.3.

Table 4.3 – Fully Mixed Un-ionized Ammonia Under Proposed Effluent TAN Limits and Effluent Discharge Rates

Month	Effluent TAN Limit (mg/L as N)	Seasonal Ambient UIA (1) (µg/L as NH_3)	Seasonal Dissociation Ratio (1) (%)	Fully-Mixed UIA (µg/L as NH_3)
January	11.5	1.74	1.8	19.2
February	11.5	1.74	1.8	19.3
March	11.5	1.74	1.8	19.4
April	6.0	6.19	8.0	13.4
May	6.0	6.19	8.0	19.4
June	1.3	12.74	14.3	19.4
July	1.3	12.74	14.3	19.4
August	1.3	12.74	14.3	19.3
September	1.3	12.74	14.3	19.4
October	5.0	2.73	4.1	19.3
November	5.0	2.73	4.1	19.3
December	11.5	1.74	1.8	19.3

Notes:

1. For the purposes of assessing ambient TP concentrations, seasonal 75th percentile concentrations were utilized (Winter = Dec to Mar; Spring = Apr to May; Summer = Jun to Sep; Fall = Oct to Nov).

4.7 Effluent E. coli

The current ECA specifies an E. coli compliance limit of 200 CFU/100 mL and a design objective of 150 CFU/100 mL (based on geometric mean). Despite this, other similarly sized facilities discharging to the South Nation River do not have E. coli specified over the cold-weather discharge period (e.g. November to April for Winchester WWTS).

Therefore, an E. coli compliance limit of 200 CFU/100 mL and a design objective of 150 CFU/100 mL (based on geometric mean) are proposed for the warm-weather discharge period (e.g. May to October) for an upgraded Casselman WWTS. This is consistent with the current ECA objective and limit, as well as seasonal disinfection requirements for similarly-sized municipal wastewater treatment discharging to the South Nation River.

4.8 Effluent pH

A compliance limit pH range of 6.0 to 8.0 is proposed as a single-sample limit, with a corresponding design objective of 6.8 to 7.8. This is consistent with the pH requirements stipulated in the current ECA.

5. Mixing Zone Modelling

5.1 Model Configuration

The model was developed based on the current configuration of the outfall, which consists of two 21" corrugated discharge pipes, approximately oriented along the main flow direction in the South Nation River. The discharge pipes are approximately center channel and are separated by approximately 9 m. The channel is highly irregular, with discharge located in a ponded area immediately upstream of a riffle section. CORMIX allows for either a single port outlet, or a diffuser having three or more outlets, but not a double pipe discharge. As recommended by CORMIX documentation, a double port discharge can be approximated by either modelling each port independently, or by modeling an equivalent single discharge pipe. Modeling each discharge port independently requires that the corresponding plumes do not overlap, and in this particular case, the mixing zones associated with each discharge pipe are too close to avoid interaction. Therefore, an equivalent single discharge pipe was applied for modelling purposes.

The shallow discharge location, combined with high discharge velocity relative to ambient conditions contributed uncertainty to near-field model predictions. Far-field model results are more reliable; however, the South nation River channel is highly irregular, with the discharge located in a ponded area, immediately upstream of a riffle section. Furthermore, CORMIX assumes that the river cross-section and ambient conditions are uniform down-stream of the discharge. Since the actual river cross-section, velocity, and depth is variable, additional mixing would take place and the far-field mixing results generated by CORMIX may be interpreted as conservative estimates. Definitive delineation of the mixing zone would require either field-dye studies under low-flow conditions are the development and application of a comprehensive numerical model.

The modelled location of the outfall outlet is shown in Figure 5.1.

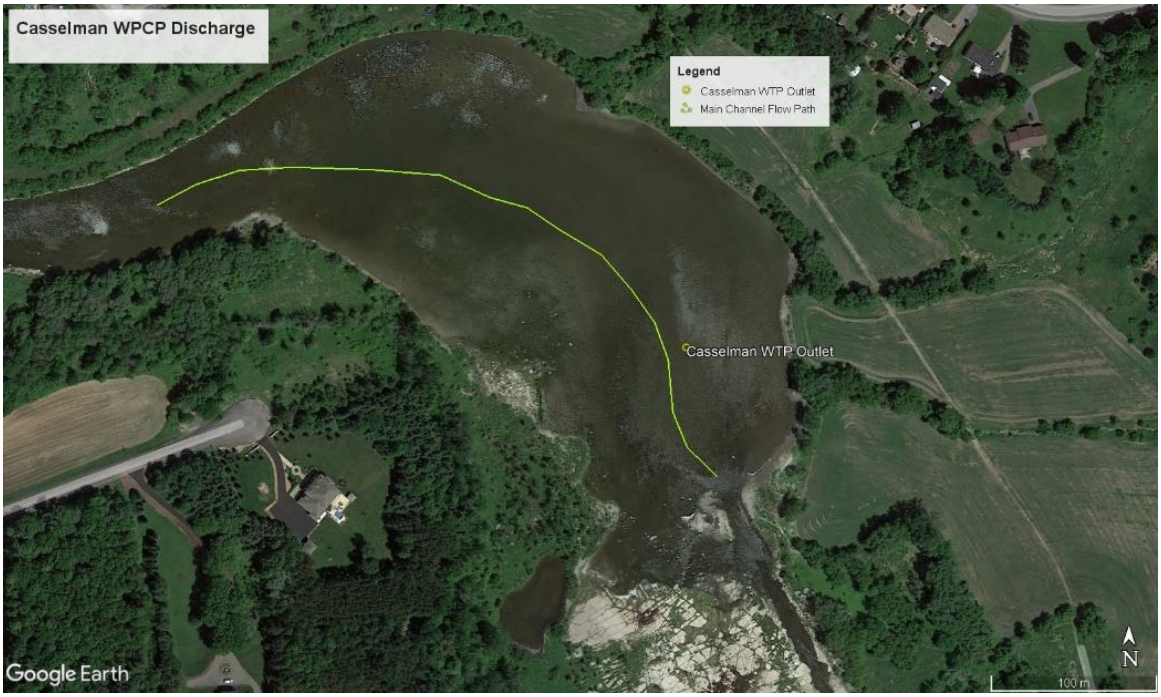


Figure 5.1 – Modelled Outfall Location

5.2 Modelling Results

Monthly modelling runs were completed using the calculated monthly 7Q20 flow (see Table 3.9) and proposed monthly maximum discharge rates (see Section 4.2, Table 4.1). The results are presented in tabular format below, with details provided in Appendix B.

Excluding April, the modelling suggests that fully-mixed conditions are achieved within 175 m or less for all months. During the critical summer discharge period (June to September), fully-mixed conditions are achieved in 80 m or less. These represent relatively small mixing zones, and would result in minimal impact on the South Nation River.

The distance to fully-mixed conditions in April is 375 m, which is significantly higher than that predicted for the other months. Despite this, the impact on downstream TP and UIA concentrations are anticipated to be low in April due to the high dilution ratio (72.9 : 1) and proposed effluent limits maintaining TP concentrations close to ambient values and UIA well below the PWQO (see Sections 4.6 and Table 4.3). Furthermore, the near-field region is modelled to be < 10 m, and the concentration excess in the plume reaches 5% by approximately 20 m (see Appendix B).

Table 5.1 – CORMIX Modelling Summary

Month	Effluent Flow (m^3/d)	River Flow (m^3/d)	Dilution Ratio	Distance Downstream to Achieve Fully-Mixed Conditions (m)
January	5,570	0.826	12.4 : 1	100
February	5,600	0.802	12.4 : 1	100
March	7,250	1.035	12.3 : 1	130
April	10,000	8.442	72.9 : 1	375
May	4,500	2.108	40.2 : 1	175
June	2,150	0.652	26.2 : 1	80
July	1,050	0.319	26.2 : 1	75
August	900	0.274	26.3 : 1	80
September	910	0.276	26.2 : 1	80
October	2,250	0.340	13.1 : 1	80
November	6,050	0.918	13.1 : 1	125
December	8,750	1.251	12.4 : 1	125

6. Summary

Proposed seasonal effluent discharge rates and associated effluent objectives and limits were developed for an upgraded Casselman WWTS and are summarized in Tables 5.1 and 5.2. These were developed for a future design influent ADF capacity of 4,050 m^3/d, and equivalent average effluent discharge rate (inclusive of stored precipitation) of 4,347 m^3/d.

Table 5.1 – Proposed Maximum Daily Effluent Discharge Rates

Date Range	Maximum Daily Discharge Rate
January	5,750 m^3/d
February	5,600 m^3/d
March	7,250 m^3/d
April	10,000 m^3/d
May	4,500 m^3/d
June	2,150 m^3/d
July	1,050 m^3/d
August	900 m^3/d
September	910 m^3/d
October	2,250 m^3/d
November	6,050 m^3/d
December	8,750 m^3/d

Table 5.2 – Proposed Effluent Objectives and Limits

Parameter	Averaging Period	Objective (mg/L unless noted otherwise)	Limit (mg/L unless noted otherwise)
$cBOD_5$	Monthly	10	12
TSS	Monthly	10	12
TP	Monthly	0.20	0.30
TAN			
Dec 1 to Mar 31	Monthly	9.2	11.5
Apr 1 to May 31	Monthly	4.8	6.0
Jun 1 to Sep 30	Monthly	1.0	1.3
Oct 1 to Nov 30	Monthly	4.0	5.0
E. coli			
May 1 to Oct 31	Monthly	150 CFU/100 mL	200 CFU/100 mL
pH	Single Grab	6.8 to 7.8	6.0 to 8.0

7. References

MOEE (1994). Policy B-1-5 – Deriving Receiving Water Based Point Source Effluent Requirements for Ontario Waters.

Appendix A
Low Flow Analysis Details

A.1. Summary of Low Flow Assessment Results

Although the period of record for the Water Survey Canada gauging station at Casselman (02LB013) spanned over 50 years, from 1972 through 2023, continuous daily flow measurements were limited. Complete seasonal daily flow information for Casselman was available for only 13 years. A complete seasonal period of record was deemed to be 90% or greater daily flow measurements. Fewer flow measurements prevented reliable estimation of most seasonal 7-day low flows. Furthermore, 13 years of record is too short to apply for estimation of seasonal 7Q20 low-flow estimates. In order to increase the available 7-day low flow data series for Casselman, and generate seasonal 7Q20 low-flows, the Water Survey Canada flow gauging station at Plantagenet (02LB005) was applied, Flow monitoring at Plantagenet spanned over 100 years from 1915 through 2023. A plot of the available seasonal 7-day low flows for both Casselman and Plantagenet is provided in Figure A.1

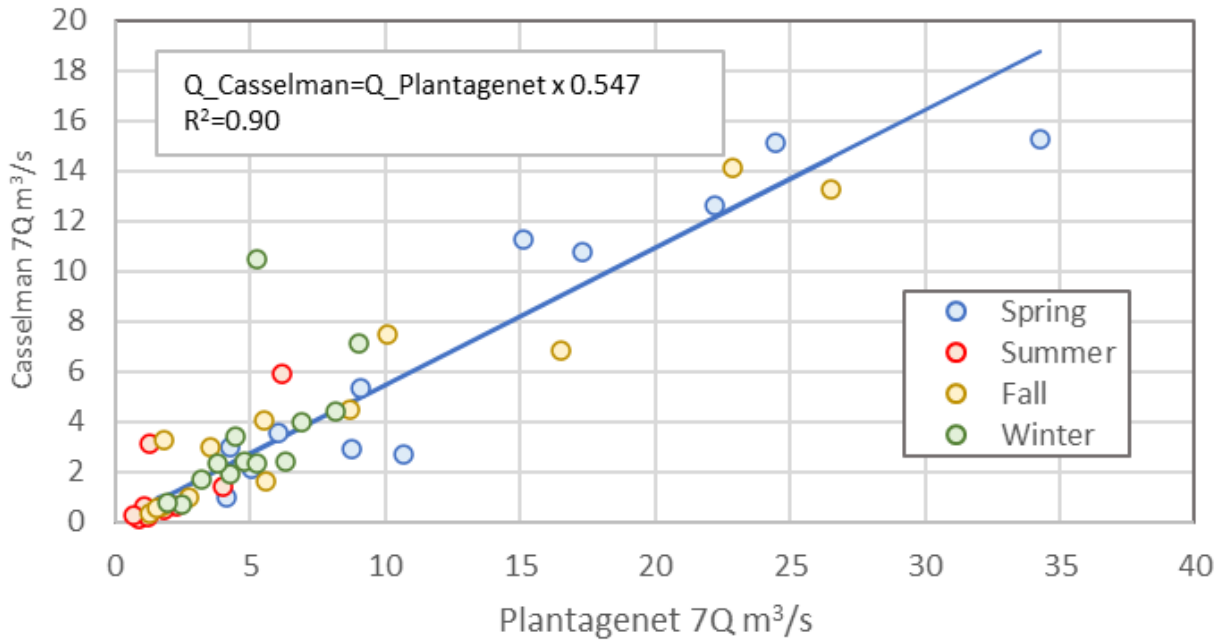


Figure A.1. Annual 7-day Low Flow for Plantagenet (02LB005) and Casselman (02LB013)

The correlation between 7-day seasonal low-flow for Plantagenet and Casselman was approximately 90%. Furthermore, the regression slope is 0.547 which is consistent with the drainage are ratio. The drainage area at Plantagenet is 3,810 km^2, while the drainage area at Casselman is 2,410 km^2, a ratio of about 63%. The regression relation illustrated on Figure 1 was applied to generate a 75 year composite low-flow series for each month for Casselman. The composite series incudes all available seasonal 7-day low-flow, and where not available, includes the low flow estimate generated using the regression relation discussed above. This composite seasonal low flow series was used to generate monthly 7Q20 low-flows and are summarized in Table A.1. The best-fit frequency distribution used for each month are also shown.

Table A.1 – Monthly 7Q20 Low Flow Estimates for the South Nation River in the Vicinity of Casselman

Month	Best-Fit Frequency Distribution	7Q20 Flow (m^3/s)
January	Log Normal	0.826
February	Log Normal	0.802
March	EVIII Method of Lowest Observed Drought	1.035
April	EVIII Method of Lowest Observed Drought	8.442
May	Log normal	2.108
June	Log normal	0.652
July	EVIII Method of Lowest Observed Drought	0.319
August	Log normal	0.274
September	EVIII Method of Lowest Observed Drought	0.276
October	EVIII Method of Lowest Observed Drought	0.340
November	EVIII Method of Lowest Observed Drought	0.918
December	Log Normal	1.251

C.2. Monthly Fitted Distribution Plots

Fitted distribution plots for each month are provided in Figures A.1 to A.12 below.

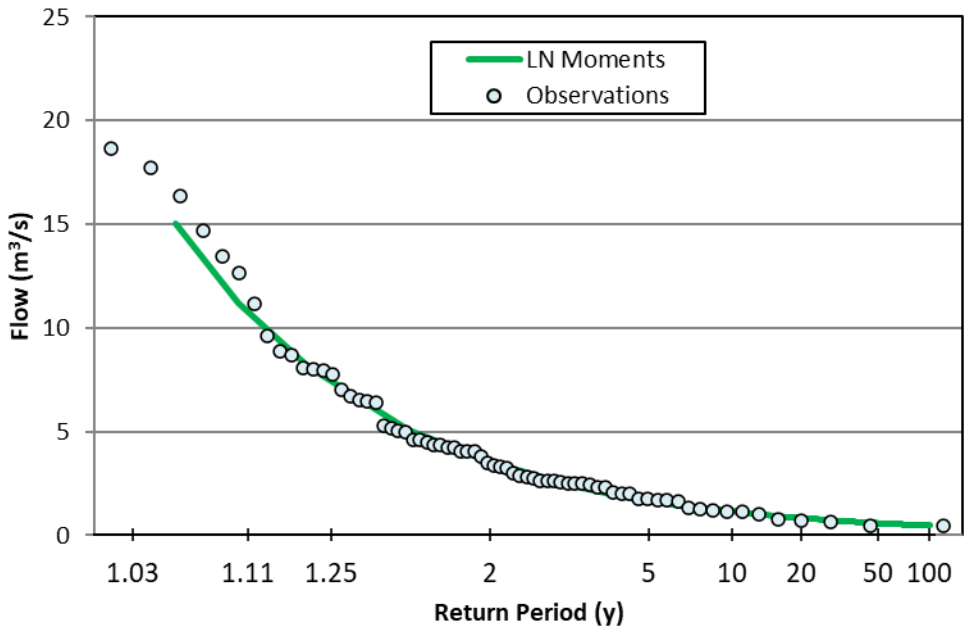


Figure A.1 January Low Flow Frequency Plot

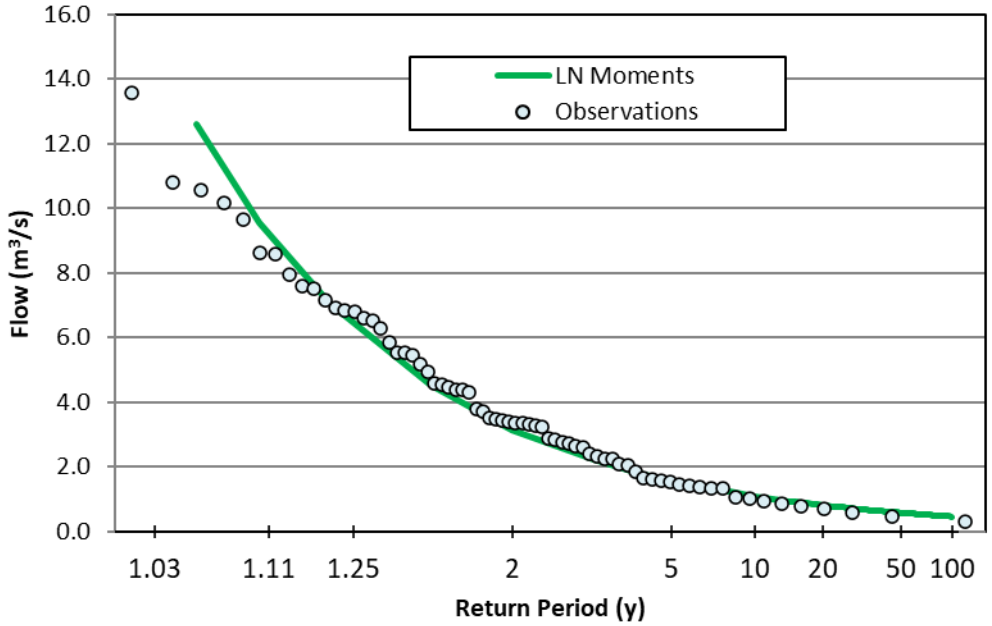


Figure A.2 February Low Flow Frequency Plot

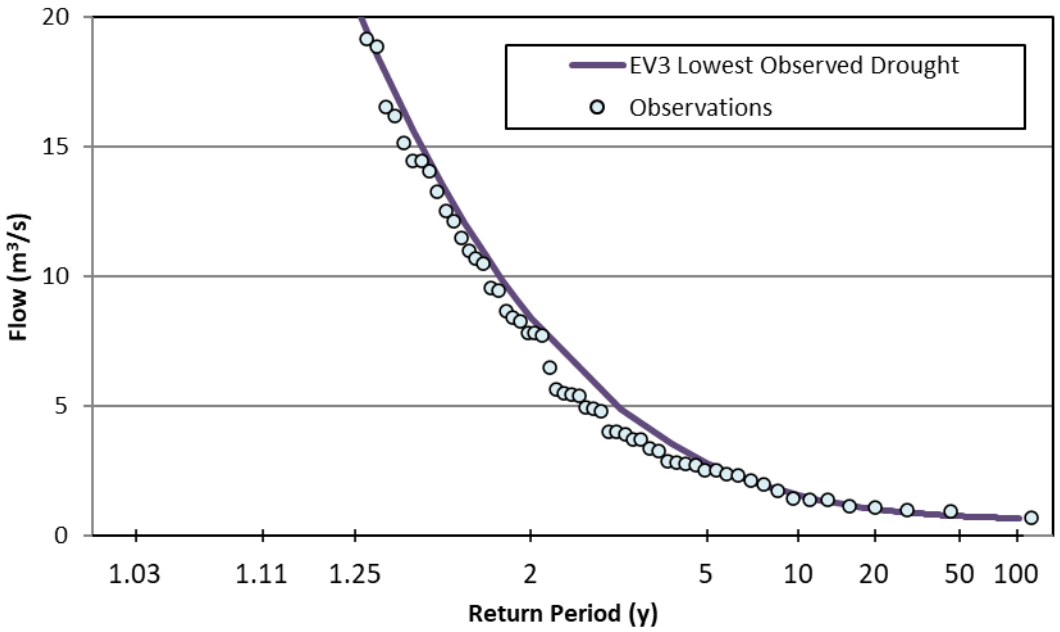


Figure A.3 March Low Flow Frequency Plot

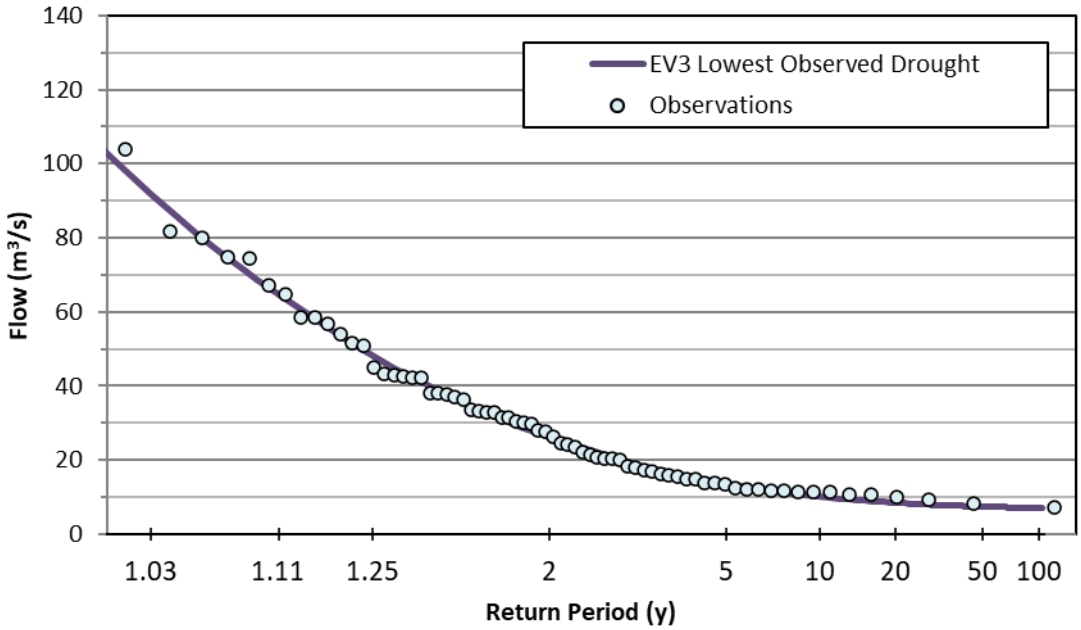


Figure A.4 April Low Flow Frequency Plot

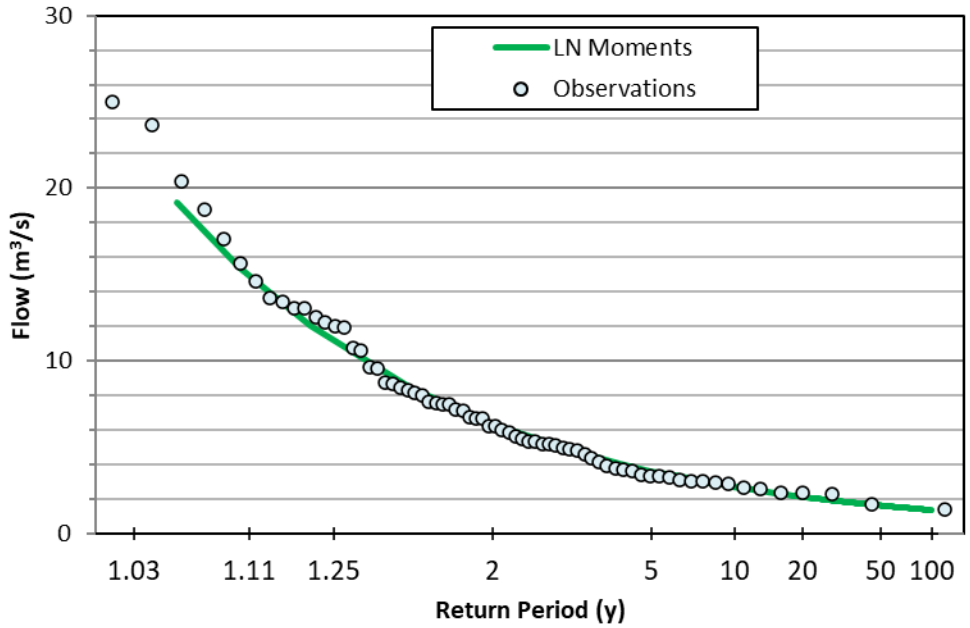


Figure A.5 May Low Flow Frequency Plot

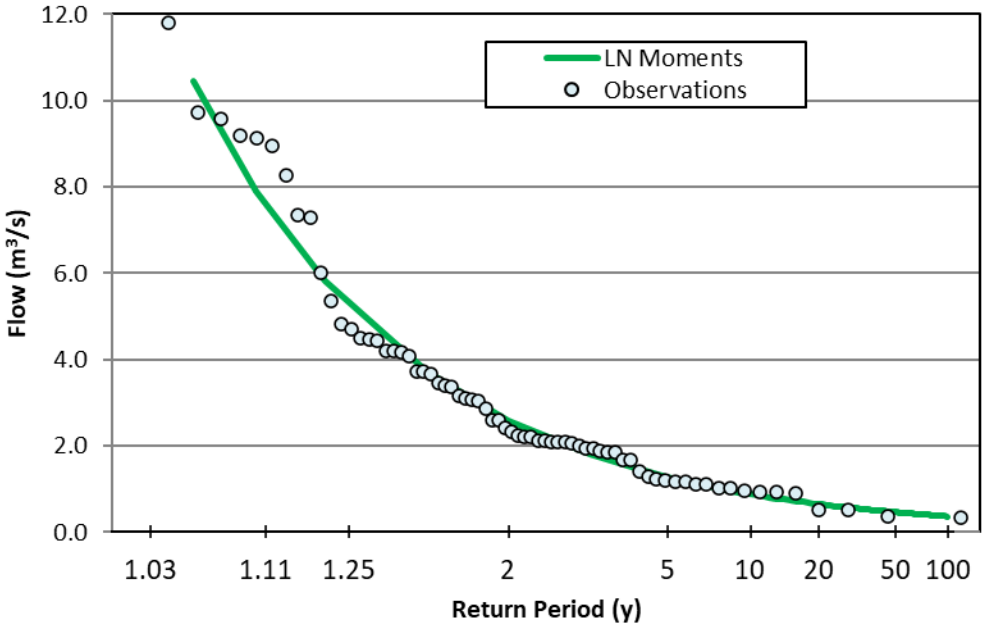


Figure A.6 June Low Flow Frequency Plot

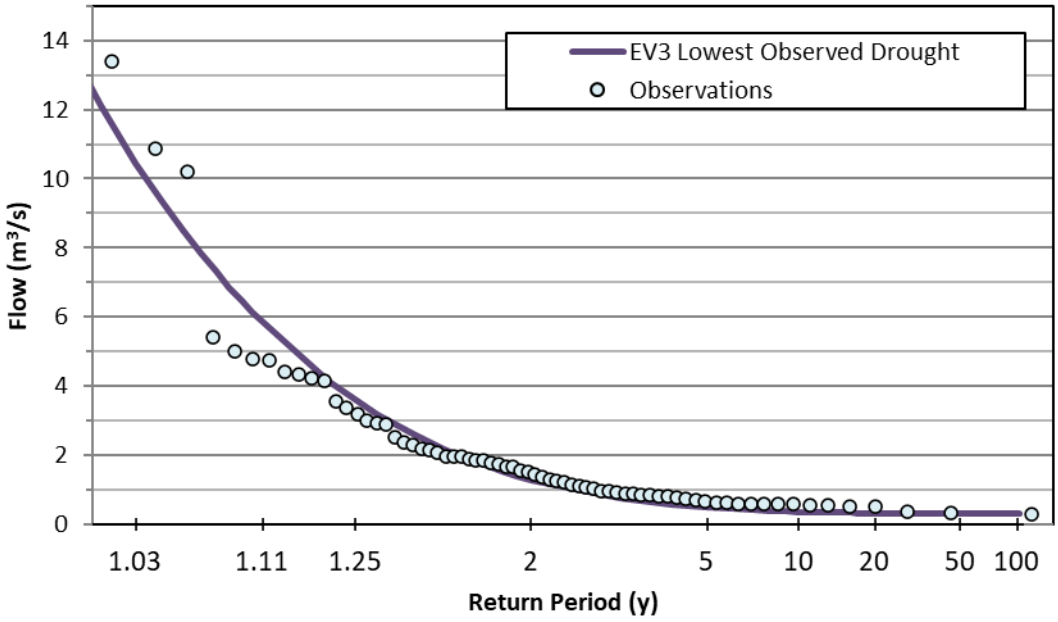


Figure A.7 July Low Flow Frequency Plot

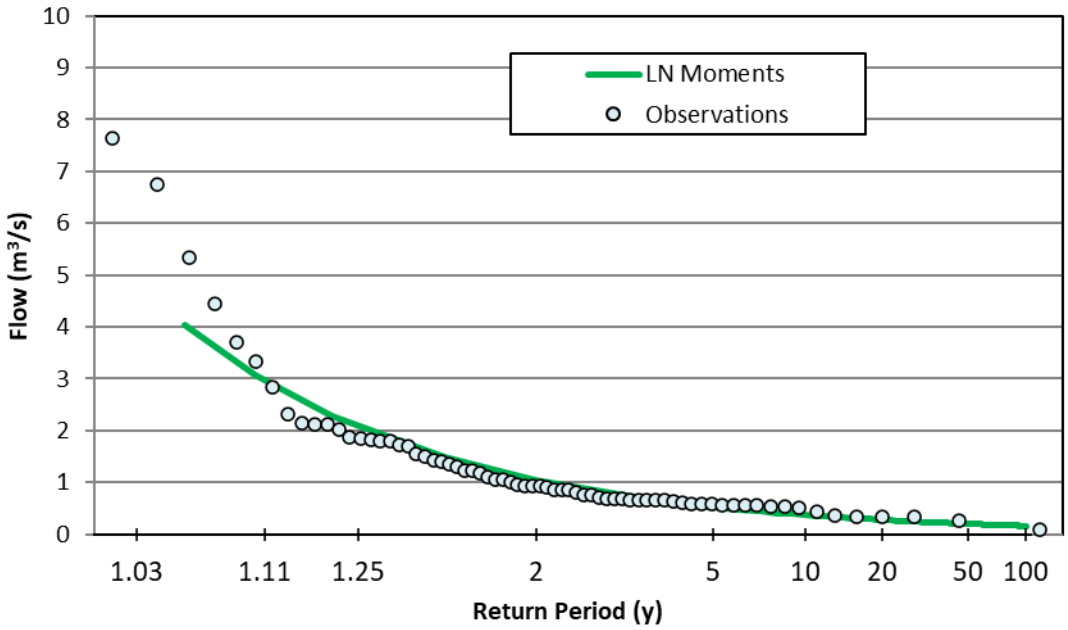


Figure A.8 August Low Flow Frequency Plot

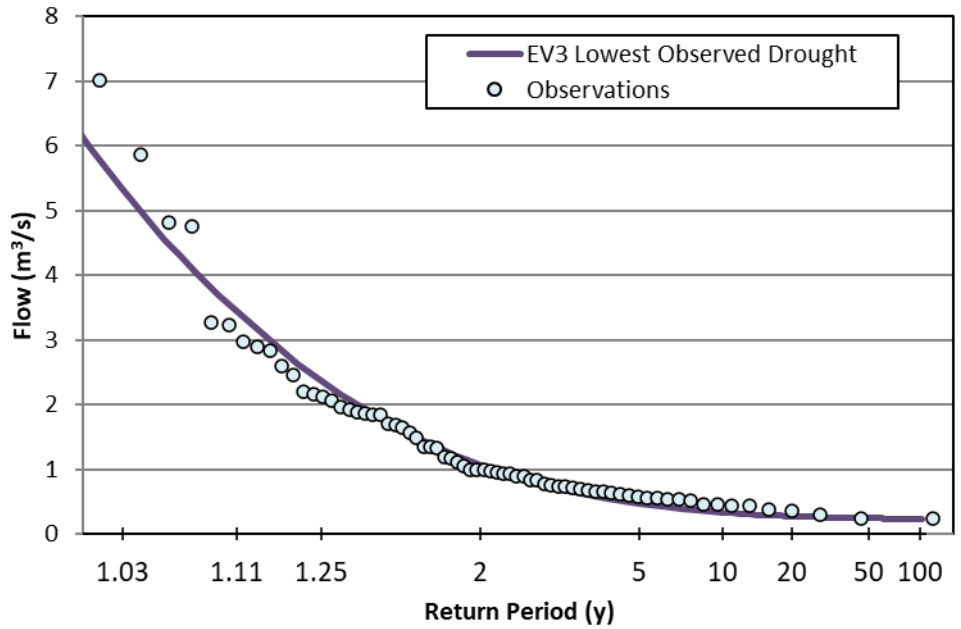


Figure A.9 September Low Flow Frequency Plot

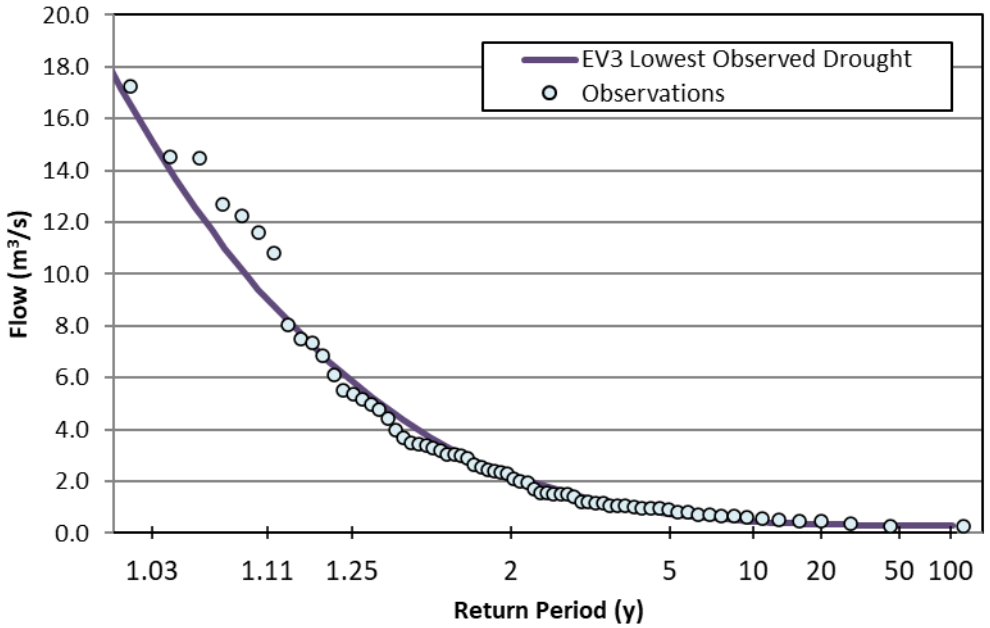


Figure A.10 October Low Flow Frequency Plot

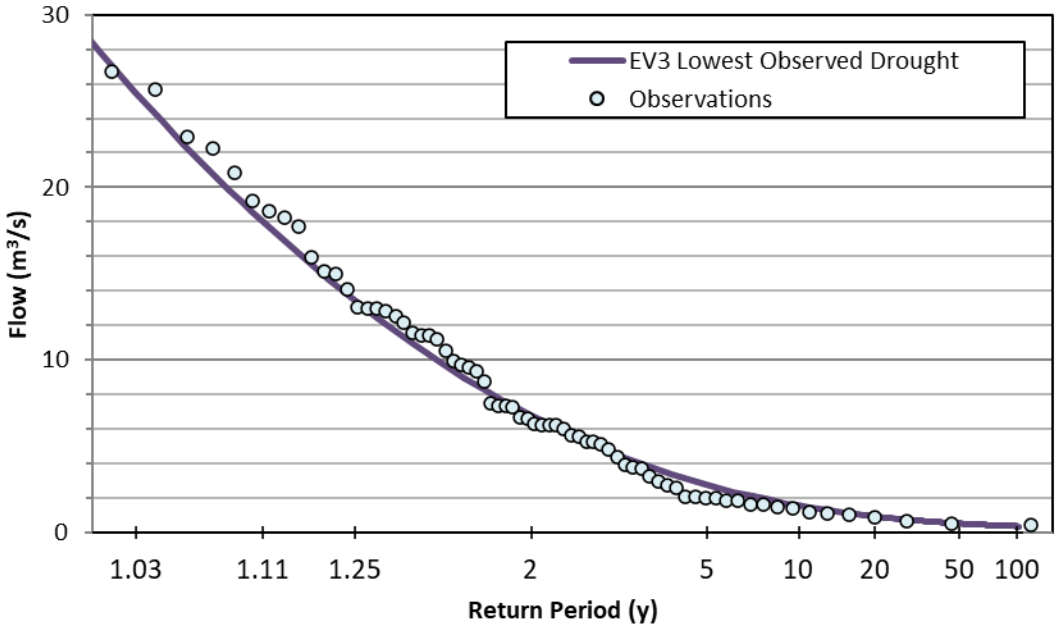


Figure A.11 November Low Flow Frequency Plot

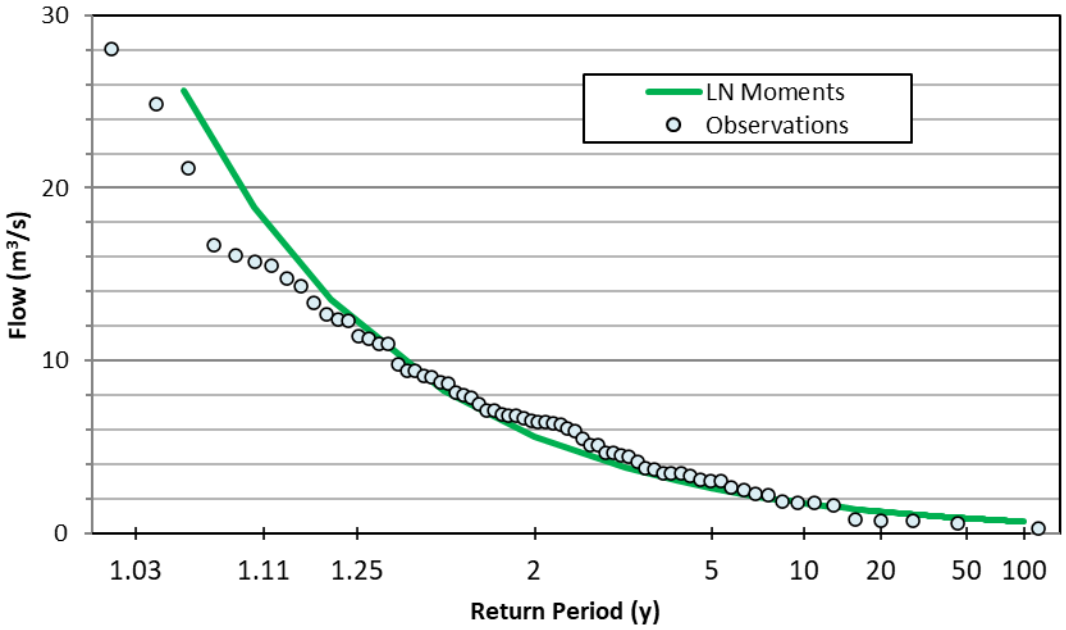


Figure A.12 December Low Flow Frequency Plot

Appendix B
CORMIX Modelling Details

B.1. January

- 7Q20 flow = 0.826 m^3/s, Effluent flow = 5,600 m^3/d (0.0648 m^3/s).
- Assumed channel depth = 1 m, and width = 20m.
- Assumed neutrally buoyant plume.
- CORMIX addresses multi-port diffusers with 3 or more ports, or submerged single port discharges. In this assessment, the two discharge pipes were replaced with three ports of equivalent total area.
- There is a significant difference between the effluent discharge velocity (~0.17 m/s) and the ambient stream velocity (0.03 m/s) resulting in potentially unreliable near-field CORMIX results. Replacing the three-port discharge approximation with an equivalent single port yielded similar results.
- Typical mixing results for January provided below. Completely mixed conditions achieved within the first 100 m.

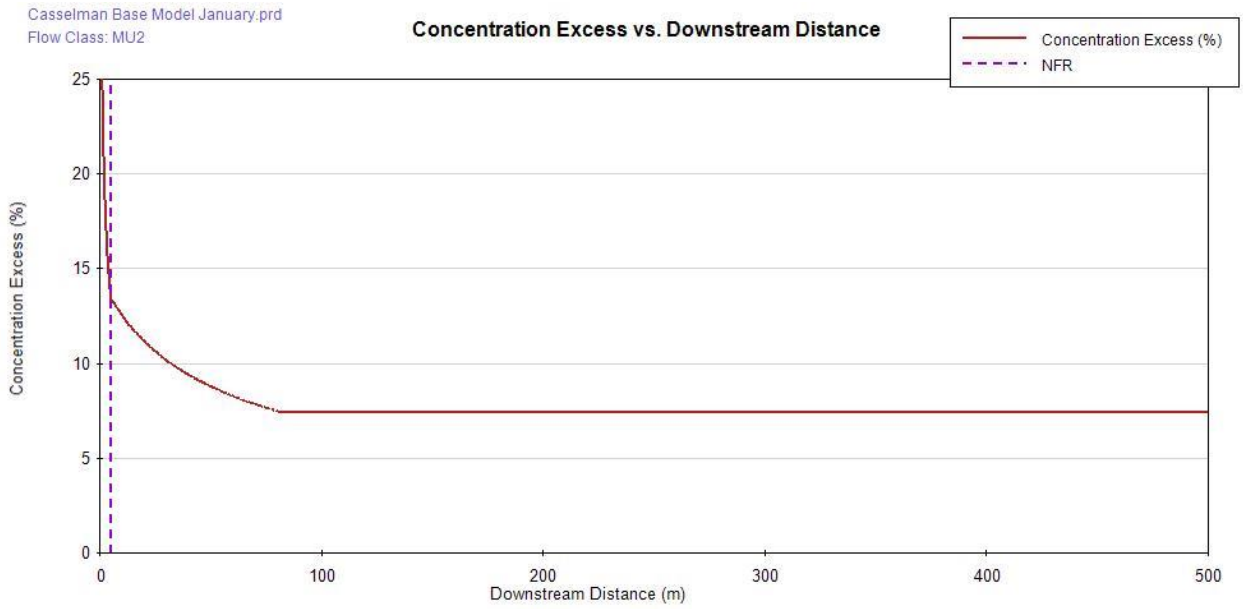


Figure B.1 – CORMIX Results for January

B.2. February

- 7Q20 flow = 0.802 m^3/s, Effluent flow = 5,750 m^3/d (0.0665 m^3/s).
- Assumed channel depth = 1 m, and width = 20m.
- Assumed neutrally buoyant plume.
- In this assessment, the two discharge pipes were replaced with three ports of equivalent total area.
- As with January results, near-field predictions are potentially unreliable, however, far-field predictions acceptable.
- Typical mixing results for February provided below. Completely mixed conditions achieved within the first 100 m.

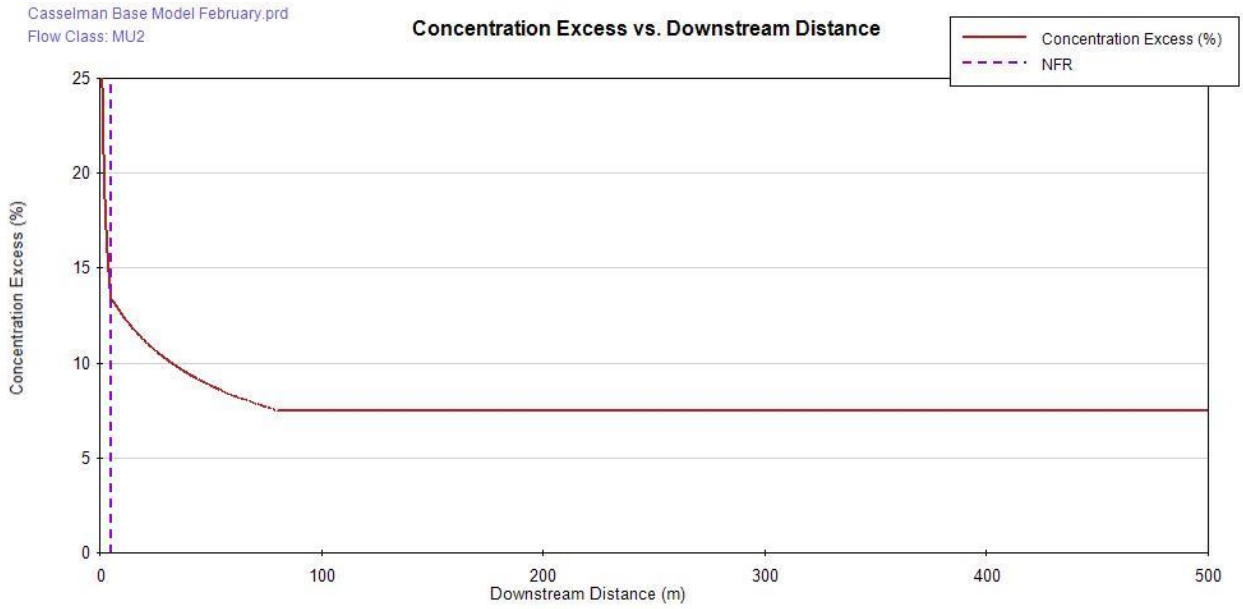


Figure B.1 – CORMIX Results for February

B.3. March

- 7Q20 flow = 1.035 m3/s, Effluent flow = 7,250 m3/d (0.0839 m3/s).
- Assumed channel depth = 1.2 m, and width = 25 m.
- Assumed neutrally buoyant plume.
- In this assessment, the two discharge pipes were replaced with three ports of equivalent total area.
- As with January results, near-field predictions are potentially unreliable, however, far-field predictions acceptable.
- Typical mixing results for March provided below. Completely mixed conditions achieved within the first 130 m.

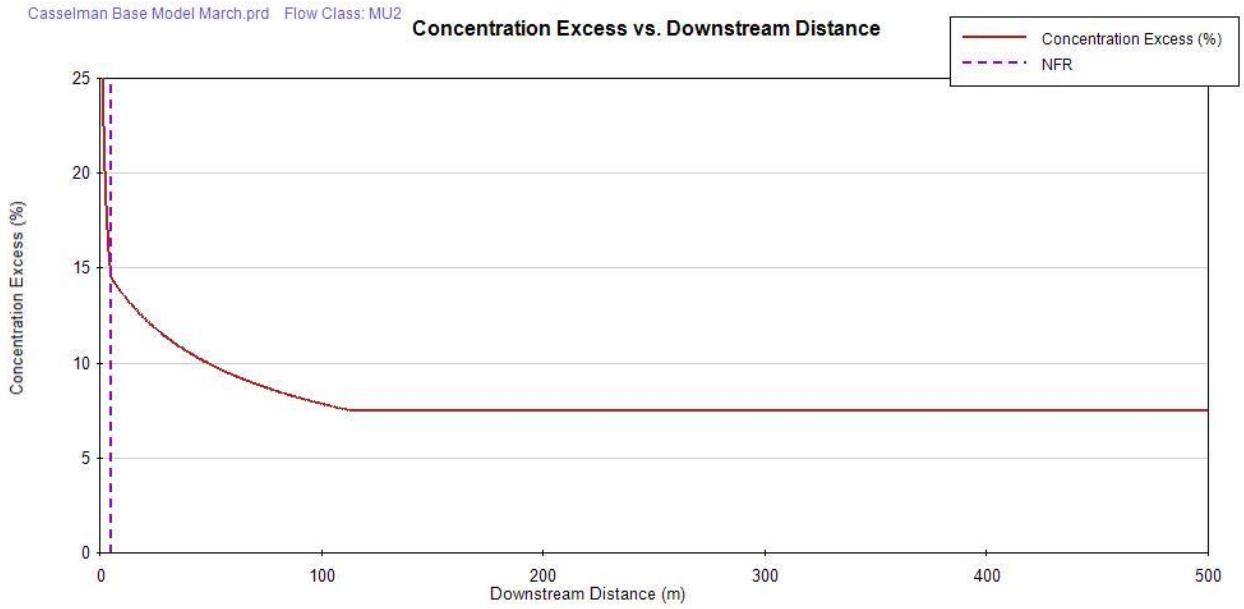


Figure B.3 – CORMIX Results for March

B.4. April

- 7Q20 flow = 8.442 m^3/s, Effluent flow = 10,000 m^3/d (0.116 m^3/s).
- Assumed channel depth = 2 m, and width = 60m.
- Assumed neutrally buoyant plume.
- Typical mixing results for April provided below. Completely mixed conditions achieved within the first 375 m.

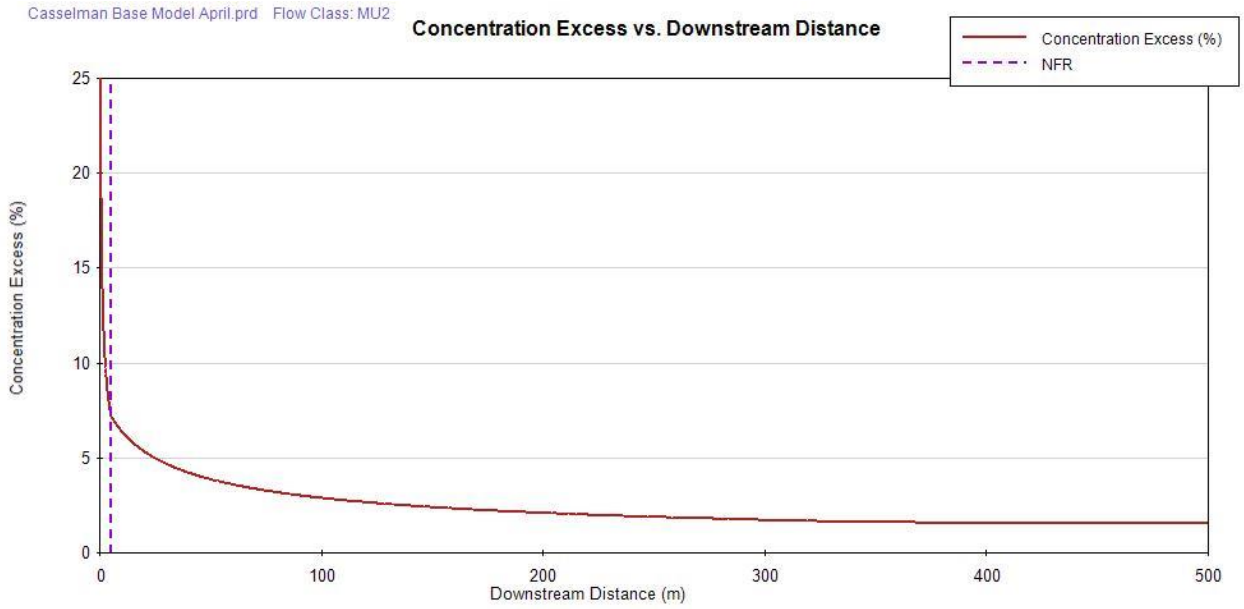


Figure B.4 – CORMIX Results for April

B.5. May

- 7Q20 flow = 2.108 m3/s, Effluent flow = 4,500 m3/d (0.0521 m3/s).
- Assumed channel depth = 1.8 m, and width = 35m.
- Assumed neutrally buoyant plume.
- In this assessment, the two discharge pipes were replaced with three ports of equivalent total area.
- As with January results, near-field predictions are potentially unreliable, however, far-field predictions acceptable.
- Typical mixing results for May provided below. Completely mixed conditions achieved within the first 175 m.

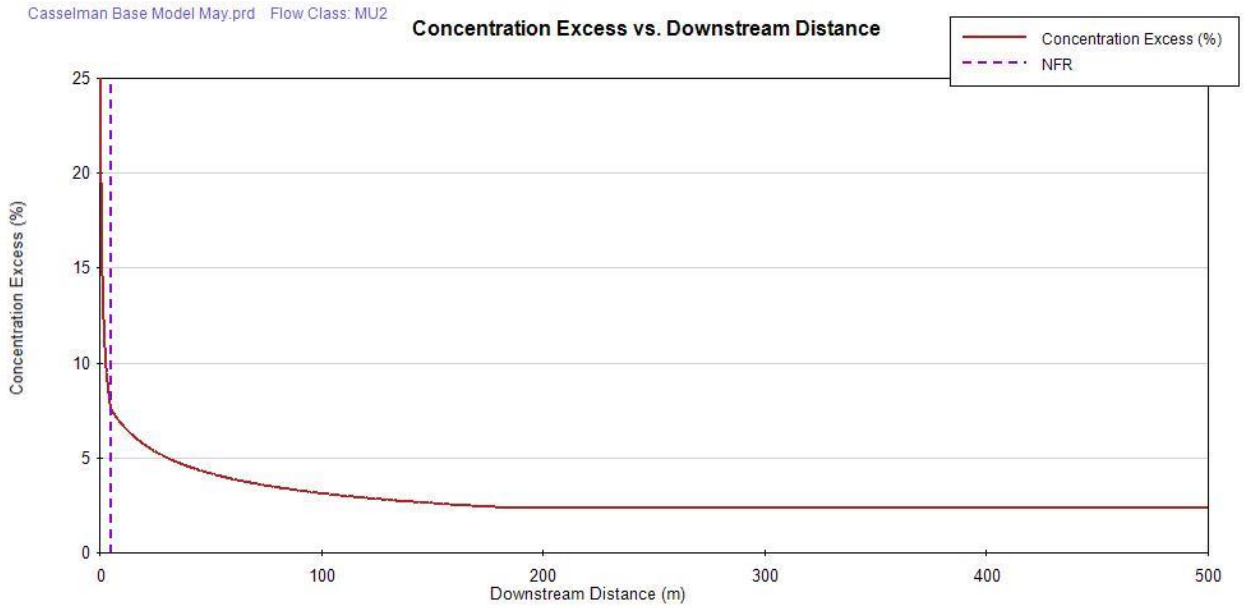


Figure B.5 – CORMIX Results for May

B.6. June

- 7Q20 flow = 0.652 m^3/s, Effluent flow = 2,150 m^3/d (0.0249 m^3/s).
- Assumed channel depth = 1.0 m, and width = 20 m.
- Assumed neutrally buoyant plume.
- In this assessment, the two discharge pipes were replaced with three ports of equivalent total area.
- As with January results, near-field predictions are potentially unreliable, however, far-field predictions acceptable.
- Typical mixing results for June provided below. Completely mixed conditions achieved within the first 80 m.

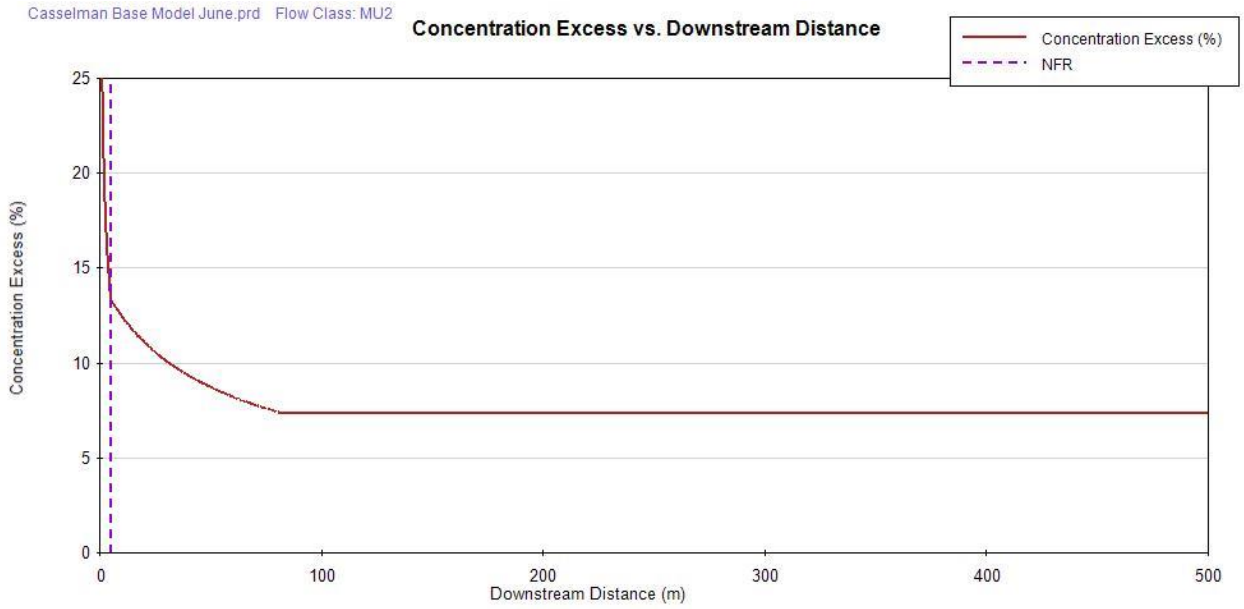


Figure B.6 – CORMIX Results for June

B.7. July

- 7Q20 flow = 0.319 m^3/s, Effluent flow = 1,050 m^3/d (0.0122 m^3/s).
- Assumed channel depth = 1.0 m, and width = 20 m.
- Assumed neutrally buoyant plume.
- In this assessment, the two discharge pipes were replaced with three ports of equivalent total area.
- As with January results, near-field predictions are potentially unreliable, however, far-field predictions acceptable.
- Typical mixing results for July provided below. Completely mixed conditions achieved within the first 75 m.

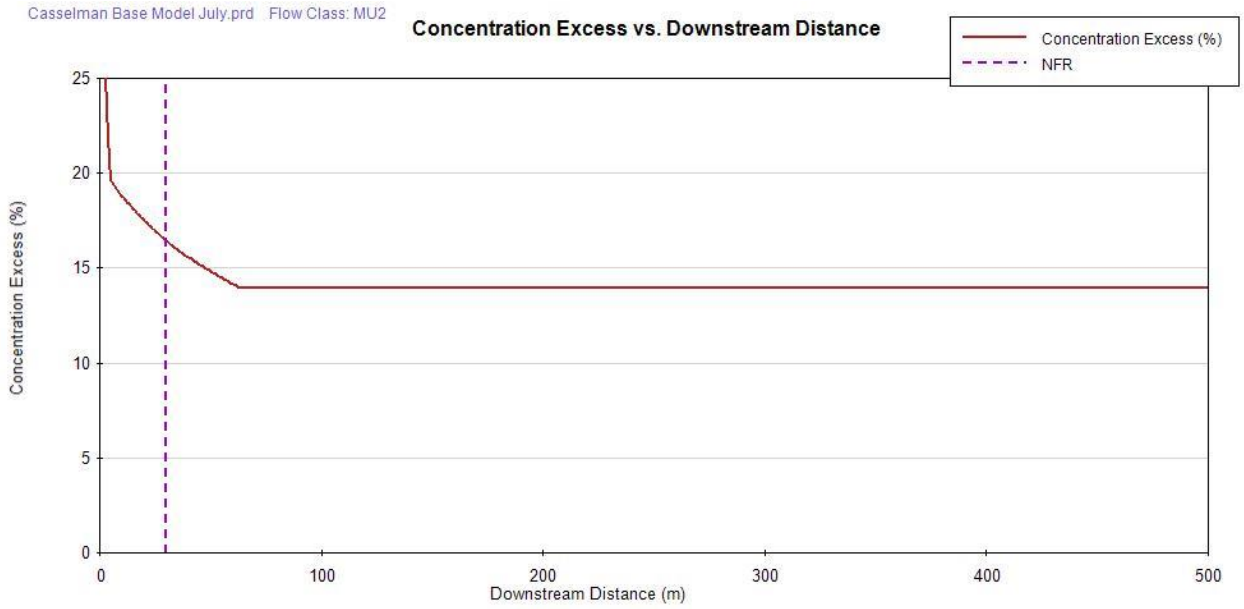


Figure B.7 – CORMIX Results for July

B.8. August

- 7Q20 flow = 0.274 m^3/s, Effluent flow = 900 m^3/d (0.0104 m^3/s).
- Assumed channel depth = 1.0 m, and width = 20 m.
- Assumed neutrally buoyant plume.
- In this assessment, the two discharge pipes were replaced with three ports of equivalent total area.
- As with January results, near-field predictions are potentially unreliable, however, far-field predictions acceptable.
- Typical mixing results for August provided below. Completely mixed conditions achieved within the first 80 m.

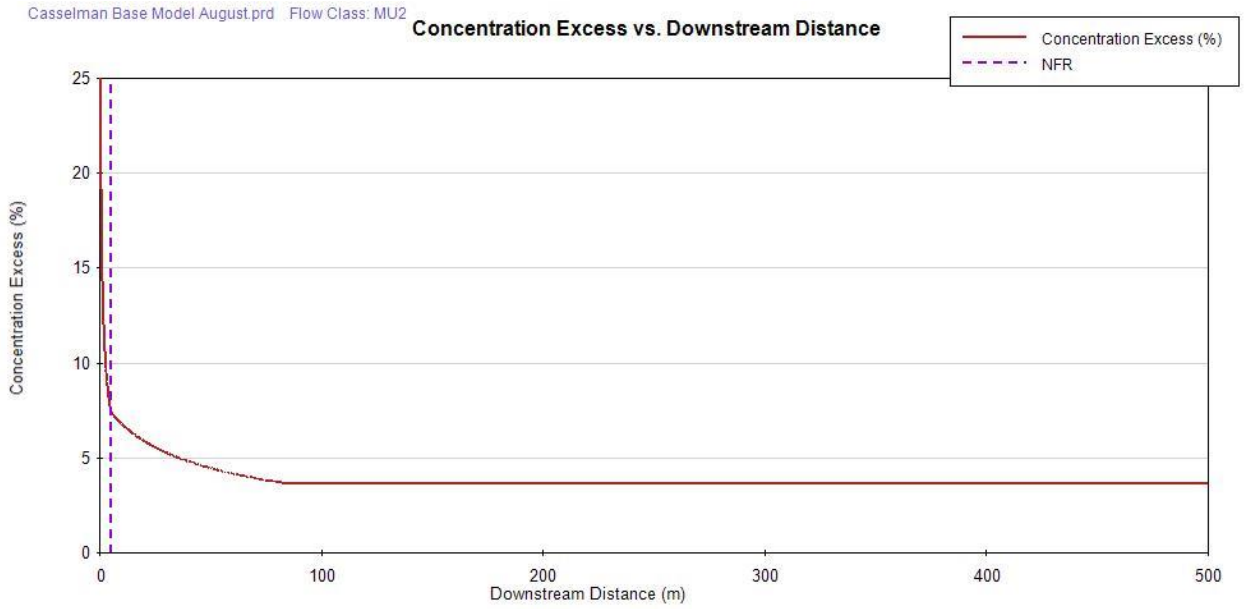


Figure B.8 – CORMIX Results for August

B.9. September

- 7Q20 flow = 0.276 m^3/s, Effluent flow = 910 m^3/d (0.0105 m^3/s).
- Assumed channel depth = 1.0 m, and width = 20 m.
- Assumed neutrally buoyant plume.
- In this assessment, the two discharge pipes were replaced with three ports of equivalent total area.
- As with January results, near-field predictions are potentially unreliable, however, far-field predictions acceptable.
- Typical mixing results for September provided below. Completely mixed conditions achieved within the first 80 m.

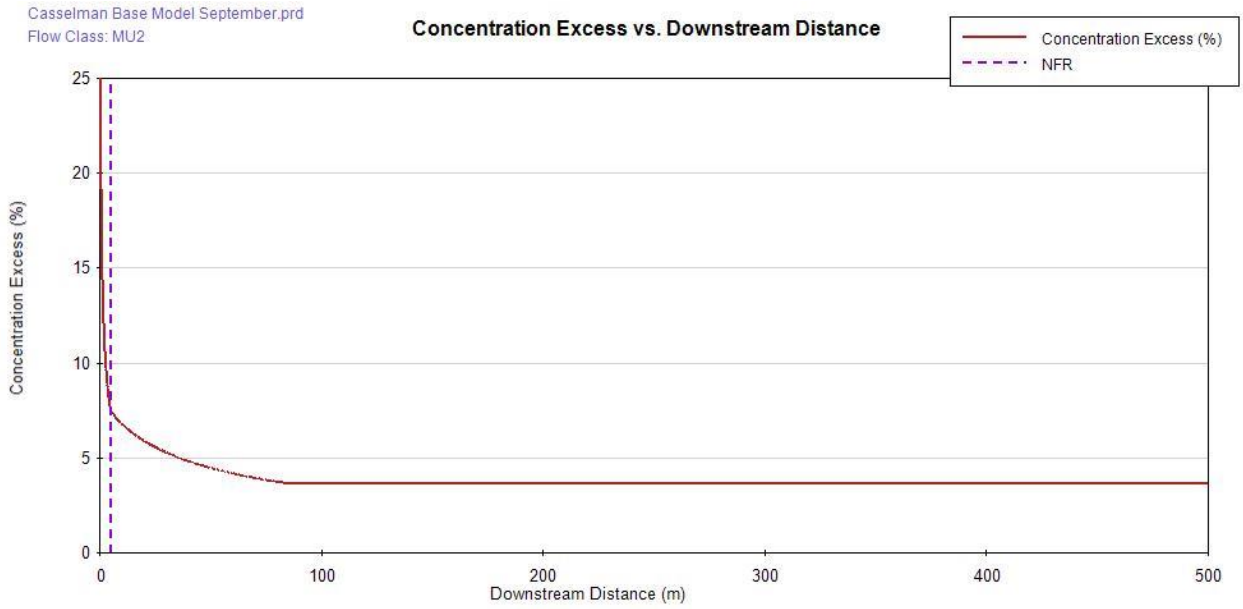


Figure B.9 – CORMIX Results for September

B.10. October

- 7Q20 flow = 0.340 m^3/s, Effluent flow = 2,250 m^3/d (0.0260 m^3/s).
- Assumed channel depth = 1.0 m, and width = 20 m.
- Assumed neutrally buoyant plume.
- In this assessment, the two discharge pipes were replaced with three ports of equivalent total area.
- As with January results, near-field predictions are potentially unreliable, however, far-field predictions acceptable.
- Typical mixing results for October provided below. Completely mixed conditions achieved within the first 80 m.

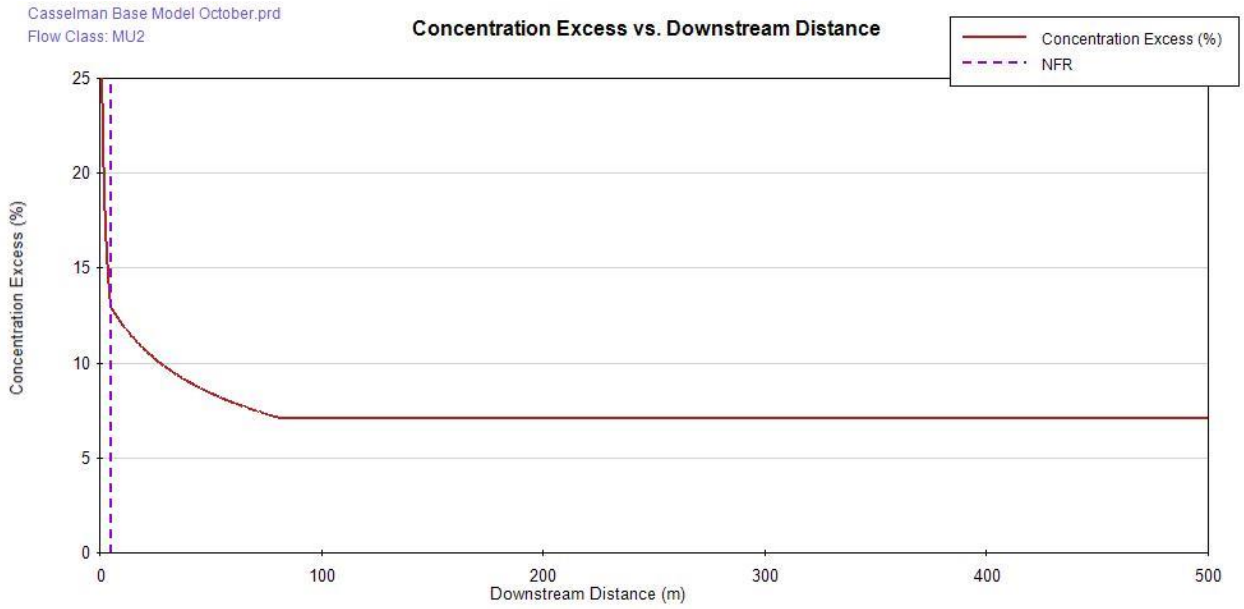


Figure B.10 – CORMIX Results for October

B.11. November

- 7Q20 flow = 0.918 m^3/s, Effluent flow = 6,050 m^3/d (0.0700 m^3/s).
- Assumed channel depth = 1.2 m, and width = 25 m.
- Assumed neutrally buoyant plume.
- In this assessment, the two discharge pipes were replaced with three ports of equivalent total area.
- As with January results, near-field predictions are potentially unreliable, however, far-field predictions acceptable.
- Typical mixing results for October provided below. Completely mixed conditions achieved within the first 125 m.

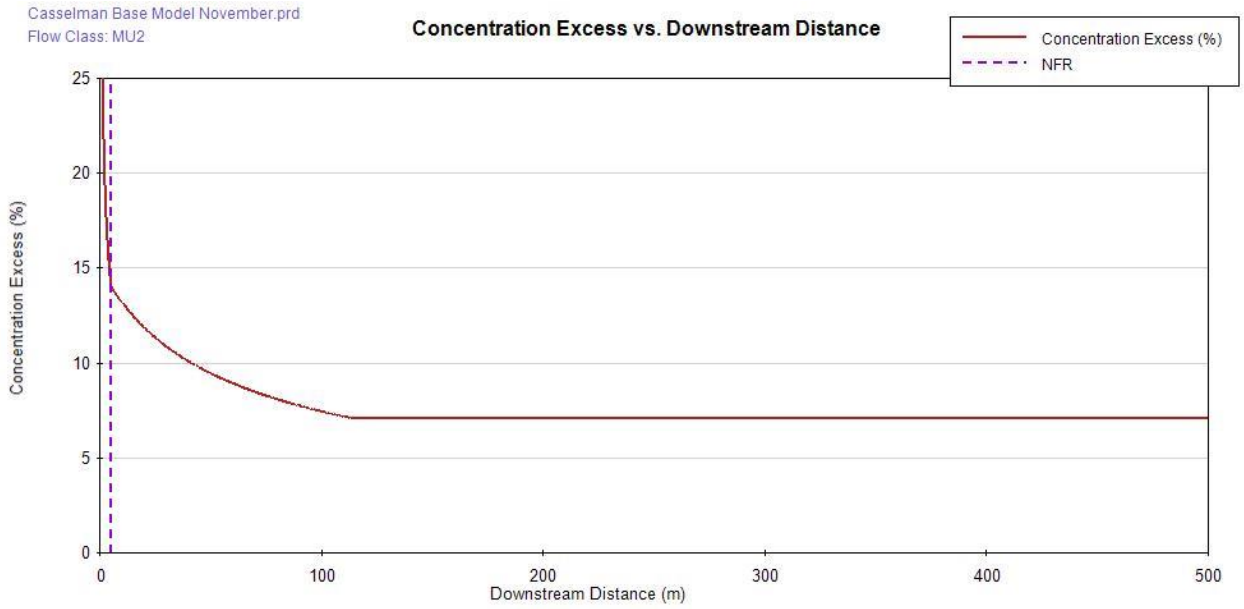


Figure B.11 – CORMIX Results for November

B.12. December

- 7Q20 flow = 1.251 m^3/s, Effluent flow = 8,750 m^3/d (0.101 m^3/s).
- Assumed channel depth = 1.2 m, and width = 25 m.
- Assumed neutrally buoyant plume.
- In this assessment, the two discharge pipes were replaced with three ports of equivalent total area.
- As with January results, near-field predictions are potentially unreliable, however, far-field predictions acceptable.
- Typical mixing results for October provided below. Completely mixed conditions achieved within the first 125 m.

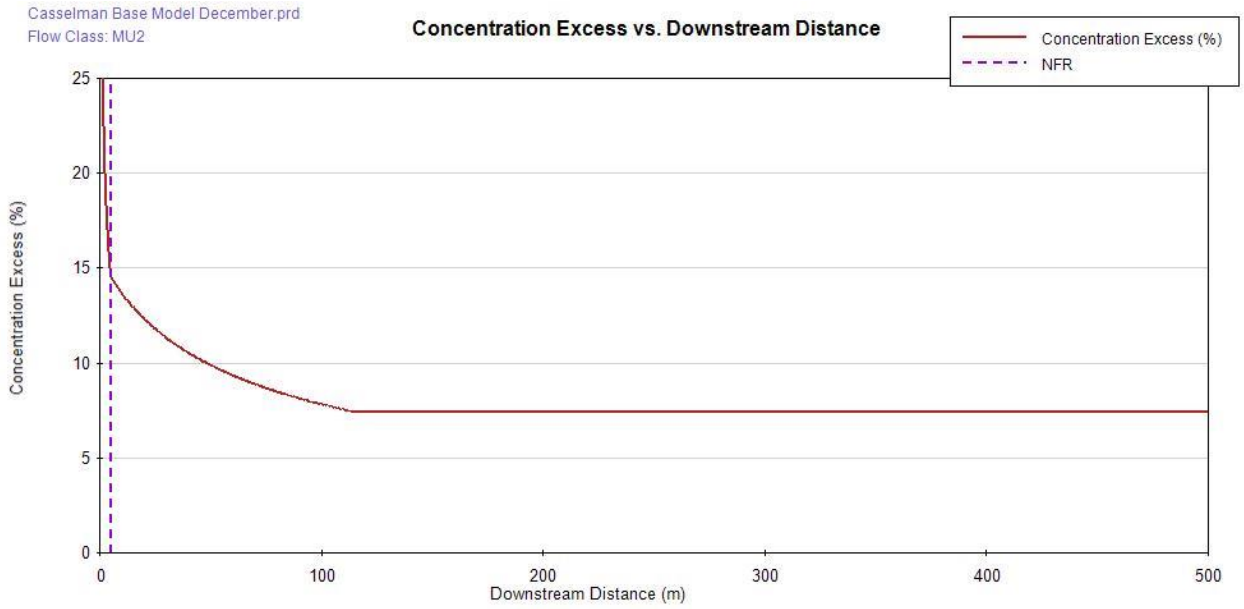


Figure B.12 – CORMIX Results for December

Appendix C

Correspondence Meeting Notes, Meeting Minutes and Presentation Materials from Consultation with MECP and SNC

Melody Johnson

From: Baxter, Sarah (She/Her) (MECP) <Sarah.Baxter@ontario.ca>
Sent: October 10, 2023 1:15 PM
To: Melody Johnson; Castro, Victor (MECP)
Cc: Carolyn Chan; Michael Hulley
Subject: RE: Casselman ACS - Notes from Conversation held Oct 5/23

Hey Melody,

Just wanted to confirm that your notes below accurately reflect our discussion last week.

I look forward to hearing about the ACS results on November 2.

Sarah Baxter
Surface Water Specialist
Technical Support Section – Eastern Region
Ministry of the Environment, Conservation and Parks
1259 Gardiners Road, Unit 3, Kingston ON, K7P 3J6
E: sarah.baxter@ontario.ca

From: Melody Johnson <melody@bskyeng.com>
Sent: October 6, 2023 1:02 PM
To: Baxter, Sarah (She/Her) (MECP) <Sarah.Baxter@ontario.ca>; Castro, Victor (MECP) <Victor.Castro@ontario.ca>
Cc: Carolyn Chan <cchan@jlrichards.ca>; Michael Hulley <Michael.Hulley@bskyeng.com>
Subject: Casselman ACS - Notes from Conversation held Oct 5/23

CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Hi Sarah / Victor,

Thank you for taking the time to speak with me yesterday regarding the ongoing Casselman ACS. I think it was a productive discussion and will help guide us in our subsequent analyses.

I've put together a summary of our conversation below, and attached a copy of the two high-level slides I presented during our call. Please let me know if you have any comments / changes / additions you'd like to make to the summary.

- Blue Sky presented a high-level overview of a proposed approach, which includes:
    - Extending the discharge period from the current Fall/Winter/Spring (Oct 1-May 15) period to year-round
    - Maintaining a minimum dilution ratio of 10:1 for all months (7Q20 : max discharge rate)
    - Ensure UIA PWQO is met at downstream, fully-mixed conditions
    - Ensure UIA non-toxicity at end-of-pipe (using an approach consistent with that used for Winchester)
    - Allow for the discharge of accumulated precipitation in lagoon cells
- Blue Sky also presented an initial low flow analysis (by calendar month) for the SNR in the vicinity of Casselman
- Victor noted that MECP is open to discussions re: extending the discharge period to year-round, however there are concerns related to Summer effluent discharges:
    - Nutrients, particularly phosphorus, are a significant concern in the SNR during the Summer months

    - Upstream agricultural impacts, low flows and elevated temperatures contribute to limited assimilative capacity
    - Current seasonal discharge facilities to this watershed can take advantage of a "trade off": less stringent nutrient limits by avoiding discharge during the critical Summer period
    - Extending the discharge period for the Casselman facility to the Summer months would require higher level treatment and more stringent effluent limits for P (and N)
- Melody noted that a recent ACS completed by Blue Sky for a constrained receiver in the Nottawasaga Valley watershed utilized an innovative approach to setting discharge flow rates
    - Effluent flows are a function of actual receiver flow, making it possible to discharge effluent during more critical seasonal periods (Summer) while minimizing impact on the receiver
    - Victor and Sarah noted that MECP could be open to considering an approach such as this for the SNR, but that details and supporting analyses would be required
    - Victor also noted that the expectation for stringent effluent requirements over the Summer period would remain
- MECP would like to see the following during the planned November 2, 2023 meeting:
    - An option that maintains the current discharge period (Oct 1-May 15) to determine the impact on effluent storage requirements and overall feasibility
    - That any options that incorporate extending discharge to the Summer period (May 16-Sep 30) take into consideration the receiver's seasonal sensitivity to nutrient loadings

Thanks, and have a lovely long weekend!

Melody Johnson, PhD, P.Eng., Senior Consultant
melody@bskyeng.com | www.bskyeng.com | M. 647.721.7644

BLUE SKY Energy Engineering & Consulting Inc.
EXPERTISE | BEST PRACTICES | CREATIVE THINKING

Casselman WWTS – ACS of the South Nation River

Current ECA Rated Capacity: 2,110 m^3/d (770,150 m^3/year)

Future Design Rated Capacity: 4,050 m^3/d (1,478,250 m^3/year)

Schedule B (cont.)

Spring - Final Effluent Compliance Limits

Winter/Spring (January 1 to May 15) - Seasonal Flow Volume = 502,500 m^3

Concentration Limits of Works (upon completion of construction of all Proposed Works)

Final Effluent Parameter	Averaging Calculator	Limit (maximum unless otherwise indicated)
CBOD5	Monthly Average Effluent Concentration	25
Total Suspended Solids	Monthly Average Effluent Concentration	25
Total Phosphorus	Monthly Average Effluent Concentration	1.0
Total Ammonia Nitrogen January 1 to March 31 April 1 to May 15	Monthly Average Effluent Concentration	 12.0 mg/L 6.0 mg/L
E. coli	Monthly Geometric Mean Density	*200 CFU/100 mL
Hydrogen Sulphide	Monthly Average Effluent Concentration	0.1 mg/L
pH of the effluent maintained between 6.0 to 8.0, inclusive, at all times		

*If the MPN method is utilized for *E. coli* analysis the objective shall be 200 MPN/100 mL.

Schedule B (cont.)

Fall - Final Effluent Compliance Limits

Fall (October 1 to December 31) - Seasonal Flow Volume = 267,650 m^3

oncentration Limits of Works (upon completion of construction of all Proposed Works)

luent Parameter	Averaging Calculator	Limit (maximum unless otherwise indicated)
	Monthly Average Effluent Concentration	15
pended Solids	Monthly Average Effluent Concentration	25
sphorus	Monthly Average Effluent Concentration	1.0
mmonia Nitrogen October 1 to November 30 December 1 to December 31	Monthly Average Effluent Concentration	 5.0 mg/L 12.0 mg/L
E. coli	Monthly Geometric Mean Density	*200 CFU/100 mL
Hydrogen Sulphide	Monthly Average Effluent Concentration	Not Detected
pH of the effluent maintained between 6.0 to 8.0, inclusive, at all times		

*If the MPN method is utilized for *E. coli* analysis the objective shall be 200 MPN/100 mL.

October 5, 2023

Casselman WWTS – ACS of the South Nation River

Schedule B (cont.)

Maximum Monthly Effluent Discharge Rates

Discharge Period	Maximum Discharge Rate	Maximum Discharge Rate Based on Dilution Ratio
January 1 - 31	5,000 m^3/d	SNR Flow/10
February 1 - 28/29	5,000 m^3/d	SNR Flow/10
March 1 - 31	5,000 m^3/d	SNR Flow/40
April 1 -30	7,000 m^3/d	SNR Flow/60
May 1 -15	7,000 m^3/d	SNR Flow/60
October 1 -31	4,000 m^3/d	SNR Flow/15
November 1 - 30	4,000 m^3/d	SNR Flow/10
December 1 - 31	5,000 m^3/d	SNR Flow/15

Low Flow Analysis Results – South Nation River in the Vicinity of Casselman

Month	7Q20 Flow (m^3/s)
January	0.826
February	0.802
March	1.035
April	8.442
May	2.108
June	0.652
July	0.319
August	0.274
September	0.276
October	0.340
November	0.918
December	1.251

Proposed Approach:

- Extend discharge period from Oct 1 – May 15 to year-round
- Maintain minimum dilution ratio of 10:1 for all months (7Q20 : max discharge rate)
- Ensure UIA PWQO met at fully-mixed conditions
- Ensure UIA non-toxicity at end-of-pipe (consistent with Winchester)
- Allow for discharge of accumulated precipitation in lagoon cells

October 5, 2023

J.L.Richards
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Casselman Lagoon Assimilative Capacity Study

MECP Pre-Consultation Meeting 1
Minutes of Meeting No. 1

Attendance:	Name	Company	Email
	Pierre-Paul Beauchamp (PB)	Village of Casselman (Casselman)	ppbeauchamp@casselman.ca
	Yves Morrissette (YM)	Casselman	ymorrissette@casselman.ca
	Dawn Crump (DC)	Ontario Clean Water Agency (OCWA)	dcrump@ocwa.com
	Victor Castro (VC)	Ministry of the Environment, Conservation and Parks (MECP)	victor.castro@ontario.ca
	Sarah Baxter (SB)	MECP	sarah.baxter@ontario.ca
	Jon Orpana (JO)	MECP	jon.orpana@ontario.ca
	Melody Johnson (MJ)	Blue Sky Energy Engineering and Consulting Inc. (Blue Sky)	melody@bskyeng.com
	Jordan Morrissette (JM)	J.L. Richards & Associates Limited (JLR)	jmorrissette@jlrichards.ca
	Carolyn Chan (CC)	JLR	cchan@jlrichards.ca
	Kevin Cortez (KC)	JLR	kcortez@jlrichards.ca

The meeting commenced at 10:00 a.m. on Thursday, November 2, 2023 at Microsoft Teams.

The following summary of the discussions of this meeting has been prepared to record decisions reached and actions required for the project. Please advise the undersigned of any errors or omissions within the next three business days.

ITEM		**ACTION BY**	**DUE BY**

1.1 INTRODUCTION

- JLR introduced the project and the team members.
- The Assimilative Capacity Study is being performed during the ongoing Master Plan Update project, prior to the commencement of a dedicated Environmental Assessment (EA) for the Casselman Lagoon system; results from the study will form a key input in the EA process.
- Blue Sky brought in as sub-consultant to perform the capacity assessment of the South Nation River.

1.2 OVERVIEW OF EXISTING SYSTEM

- The existing system consists of 3-Cell lagoon system with LagoonGuard MBBR and Disk Filter with a rated capacity of 2,110 m^3/d.
- Casselman Master Plan identified future facility rated capacity at 4,050m^3/d.
- Under existing ECA No. 8160-BAHPRF dated April 29, 2019, discharge to the South Nation River is permitted Seasonally (Spring and Fall).
- There are different maximum discharge values and effluent criteria for the different time periods; refer to attached slides.

1.3 ASSIMILATIVE CAPACITY OF SOUTH NATION RIVER

- All calculations are based on 7Q20 flows from the South Nation River.

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Casselman Lagoon Assimilative Capacity Study

MECP Pre-Consultation Meeting 1
Minutes of Meeting No. 1

ITEM	ACTION BY	DUE BY

- MJ noted that for the month of May, 7Q20 flows can be increased if considering the first half of May as Summer flow conditions occur in the later half of May.

- Proposed approach looked at two different scenarios:
  - Scenario 1 - Maintain the current effluent discharge window
  - Scenario 2 – Increase to year-round effluent discharge
- Approach maintained minimum dilution ratio of 10:1 for all months and did not exceed annual total phosphorus loading of 770 kg/year outlined in the existing ECA.
- SCENARIO 1 (refer to attached slides)
  - Updated maximum discharge rate is increased except for October.
  - MJ is proposing a reduced TP monthly limit of 0.45 mg/L, which results in annual TP loading of 770 kg/year.
  - TAN limit is reduced during the Fall and Winter to 4.5 mg/L and 10.0 mg/L, respectively, and maintained at 6.0 mg/L during the Spring
  - Estimated maximum effluent storage volume of 460,000m^3 (end of October). Given the storage requirement exceeds the existing storage capacity of 330,000m^3, new lagoon cells would be required.
  - Mixing calculations showed that TAN in fully mixed condition was below Provincial Water Quality Objective (PWQO) value for all months
  - TP percent increase above ambient conditions range between 4.0% in April and 19.6% in November
  - SB asked whether CORMIX modelling of the mixing zone had been performed. MJ noted that this was planned but not yet completed and confirmed that the fully mixed values presented were based on mass loading approach.
  - VC inquired about space availability and if the municipality would be required to purchase land for the construction of the additional lagoon cells. YM stated that all the surrounding land is owned by The Nation, purchasing additional land would be very difficult and expensive
- SCENARIO 2 (refer to attached slides)
  - For the new summer discharge, considered over 25:1 dilution ratio.
  - Proposed TP monthly limit of 0.3 mg/L results in TP total annual loading reduced to 476 kg/year, with 45.7 kg occurring during the summer
  - TAN monthly limit of 11.5 mg/L during the winter (Dec 1 – Mar 31), 6.0 mg/L during Spring (Apr 1 – May 31), 1.3 mg/L during Summer (June 1 – Sep 30), and 5.0 mg/L during Fall (Oct. 1 – Nov 30).
  - Total storage requirements of 310,000 m^3, no new lagoon cells necessary
  - Approximately 5% increase in TP concentration from the ambient concentration in the summer months
  - MECP inquired if the existing treatment system could consistently achieve the proposed effluent criteria. JLR noted that this would be investigated during the EA process; planning to discuss with Veolia regarding MBBR and disk filter capacity. Reviewing historical performance, warm weather TAN values look promising, TP to be further explored. JLR noted that the — JLR

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Casselman Lagoon Assimilative Capacity Study

MECP Pre-Consultation Meeting 1
Minutes of Meeting No. 1

ITEM		ACTION BY	DUE BY
	EA could include stress testing to demonstrate feasibility of meeting the proposed compliance limits. - MECP inquired if the plant currently monitors for effluent E.coli. OCWA confirmed that monitoring occurs, noting that the current ECA erroneously provides a limit for E.coli despite lack of disinfection. Reviewing recent results, DC reported a range of 2,700 cfu in January 2023 and 2 cfu in May 2023. A similar trend was observed for the year 2022. - MECP requested that ACS include review of E.coli criteria, especially if effluent is discharged during the summer months. - MJ commented that the purpose of the discussion is to determine if the MECP generally agrees with the approach and proposed limits presented, or whether they have initial concerns or see any red flags that must be addressed. - MECP commented that the approach was generally acceptable. Although new summer discharge into the SNR is a concern, and although the approach presents a 0.3 mg/L TP effluent limit which is not considered equivalent to “Best Available Technology” (i.e. as achieved by mechanical plants with advanced filtration), VC noted that there is recognition that the existing facility is not a new point source. SB commented that the overall reduction in total annual TP loading was favourable. - VC inquired if there were any additional scenarios considered, such as a mechanical plant. YM noted Casselman’s concerns as to cost. JM commented that the future EA would consider all options, but a mechanical plant is likely to be screened out given the availability of storage and the relative costs. - MECP would like project team to contact SNCA to discuss converting to year-round discharge, and incorporate SNCA’s comments into draft ACS report. JLR to initiate discussion with SNCA. - YM stated that Casselman is a small municipality whose borders are bounded by The Nation giving a cap to ultimate population. Given that the municipality has recently invested in the MBBR treatment system, YM considers that upgrading to a mechanical plant would be too expensive and have minimal benefit.	JLR/ Blue Sky JLR	
1.4	NEXT STEPS AND FINAL COMMENTS • SB expressed interest in CORMIX modelling results regarding mixing zone length. Blue Sky to complete for inclusion in Draft ACS report. • MECP inquired if there had been odour complaints. OCWA stated that no complaints were received except for foaming from the MBBR. • MECP inquired about the closest neighbouring property. JLR stated that the closest neighbour was a residential property approximately 150 m north. • JO requested to be copied in all future correspondence regarding the ACS for tracking purposes.	Blue Sky JLR	

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Casselman Lagoon Assimilative Capacity Study

MECP Pre-Consultation Meeting 1
Minutes of Meeting No. 1

ITEM	ACTION BY	DUE BY

Meeting adjourned at 10:52 a.m.

Prepared by:



Kevin Cortez, M.Eng., EIT
Environmental Engineering Intern

Issued on: November 9, 2023

Reviewed by:



Carolyn Chan, M.A.Sc., P.Eng.
Environmental Engineer

Distribution: All attendees

Project No. 16953-133

November 2, 2023

Casselman Lagoons - Assimilative Capacity Review of South Nation River



Agenda

- Project Contacts
- Overview of Existing System
- Assimilative Capacity of South Nation River
- Approach
- Preliminary Results
- Next Steps/Comments

Project Contacts

Village of Casselman (Owner)

- Pierre-Paul Beauchamp, Director of Public Works – ppbeauchamp@casselman.ca
- Yves Morrissette, Chief Administrative Office – ymorrissette@casselman.ca

Ontario Clean Water Agency (OCWA)

- Dawn Crump, Process & Compliance – dcrump@ocwa.com

Project Contacts

J.L. Richards and Associates Limited

- Jordan Morrissette, M.Eng., P.Eng., Senior Environmental Engineer – jmorrissette@jlrichards.ca
- Carolyn Chan, M.A.sc. P.Eng., Environmental Engineer – cchan@jlrichards.ca
- Kevin Cortez, Intern Environmental Engineer – kcortez@jlrichards.ca

Blue Sky Energy Engineering and Consulting Inc. (Assimilative Capacity Assessment)

- Melody Johnson, M.A.Sc., PhD, P.Eng., Senior Consultant – melody@bskyeng.com

Overview of Existing System



- ECA No. 8160-BAHPRF dated April 29, 2019
- Existing Rated Capacity = 2,110 m^3/d
- 3-Cell Lagoon System with LagoonGuard MBBR and Disk Filter
- Seasonal Discharge to South Nation River
- Future Rated Capacity = 4,050 m^3/d

Existing ECA

Schedule B (cont.)

Spring - Final Effluent Compliance Limits

Winter/Spring (January 1 to May 15) - Seasonal Flow Volume = 502,500 m^3

Concentration Limits of Works (upon completion of construction of all Proposed Works)

Final Effluent Parameter	Averaging Calculator	Limit (maximum unless otherwise indicated)
CBOD5	Monthly Average Effluent Concentration	25
Total Suspended Solids	Monthly Average Effluent Concentration	25
Total Phosphorus	Monthly Average Effluent Concentration	1.0
Total Ammonia Nitrogen January 1 to March 31 April 1 to May 15	Monthly Average Effluent Concentration	 12.0 mg/L 6.0 mg/L
E. coli	Monthly Geometric Mean Density	*200 CFU/100 mL
Hydrogen Sulphide	Monthly Average Effluent Concentration	0.1 mg/L
pH of the effluent maintained between 6.0 to 8.0, inclusive, at all times		

*If the MPN method is utilized for *E. coli* analysis the objective shall be 200 MPN/100 mL.

Schedule B (cont.)

Maximum Monthly Effluent Discharge Rates

Discharge Period	Maximum Discharge Rate	Maximum Discharge Rate Based on Dilution Ratio
January 1 - 31	5,000 m^3/d	SNR Flow/10
February 1 - 28/29	5,000 m^3/d	SNR Flow/10
March 1 - 31	5,000 m^3/d	SNR Flow/40
April 1 -30	7,000 m^3/d	SNR Flow/60
May 1 -15	7,000 m^3/d	SNR Flow/60
October 1 -31	4,000 m^3/d	SNR Flow/15
November 1 - 30	4,000 m^3/d	SNR Flow/10
December 1 - 31	5,000 m^3/d	SNR Flow/15

Schedule B (cont.)

Fall - Final Effluent Compliance Limits

Fall (October 1 to December 31) - Seasonal Flow Volume = 267,650 m^3

Concentration Limits of Works (upon completion of construction of all Proposed Works)

Final Effluent Parameter	Averaging Calculator	Limit (maximum unless otherwise indicated)
CBOD5	Monthly Average Effluent Concentration	15
Total Suspended Solids	Monthly Average Effluent Concentration	25
Total Phosphorus	Monthly Average Effluent Concentration	1.0
Total Ammonia Nitrogen October 1 to November 30 December 1 to December 31	Monthly Average Effluent Concentration	 5.0 mg/L 12.0 mg/L
E. coli	Monthly Geometric Mean Density	*200 CFU/100 mL
Hydrogen Sulphide	Monthly Average Effluent Concentration	Not Detected
pH of the effluent maintained between 6.0 to 8.0, inclusive, at all times		

*If the MPN method is utilized for *E. coli* analysis the objective shall be 200 MPN/100 mL.



Assimilative Capacity of South Nation River



Preliminary Analysis

Low Flow Analysis Results – South Nation River in the Vicinity of Casselman

Month	7Q20 Flow (m^3/s)
January	0.826
February	0.802
March	1.035
April	8.442
May	2.108
June	0.652
July	0.319
August	0.274
September	0.276
October	0.340
November	0.918
December	1.251

Ambient Water Quality:

- Policy 2 for TP
- Policy 1 for UIA

Proposed Approach

Schedule B (cont.)

Maximum Monthly Effluent Discharge Rates

Discharge Period	Maximum Discharge Rate	Maximum Discharge Rate Based on Dilution Ratio
January 1 - 31	5,000 m^3/d	SNR Flow/10
February 1 - 28/29	5,000 m^3/d	SNR Flow/10
March 1 - 31	5,000 m^3/d	SNR Flow/40
April 1 -30	7,000 m^3/d	SNR Flow/60
May 1 -15	7,000 m^3/d	SNR Flow/60
October 1 -31	4,000 m^3/d	SNR Flow/15
November 1 - 30	4,000 m^3/d	SNR Flow/10
December 1 - 31	5,000 m^3/d	SNR Flow/15

- Two scenarios:
  - Seasonal (maintain current discharge period of Oct 1 – May 15)
  - Year-round (extend discharge period from)
- Maintain minimum dilution ratio of 10:1 for all months (7Q20 : max discharge rate)
- The maximum annual TP loading to the SNR will not exceed the current equivalent ECA limit of 770 kg/year
- Ensure UIA PWQO met at fully-mixed conditions
- Ensure UIA non-toxicity at end-of-pipe (consistent with Winchester)
- Allow for discharge of accumulated precipitation in lagoon cells

Scenarios

1. Seasonal: Maintain current discharge window (Oct 1 to May 15)
2. Year-round: Extend discharge window

1. Seasonal Discharge

Discharge Period	Maximum Discharge Rate	Minimum Dilution Ratio Acheived [1]
Jan 1 – 31	6,750 m^3/d	10.6 : 1
Feb 1 – 28/29	6,550 m^3/d	10.6 : 1
Mar 1 – 31	8,450 m^3/d	10.6 : 1
Apr 1 – 30	10,000 m^3/d	72.9 : 1
May 1 – 15	9,000 m^3/d	39.4 : 1
May 16 – 31	-	-
Jun 1 – 30	-	-
July 1 – 31	-	-
Aug 1 – 31	-	-
Sep 1 – 30	-	-
Oct 1 – 31	2,500 m^3/d	11.8 : 1
Nov 1 – 30	6,800 m^3/d	11.7 : 1
Dec 1 – 31	10,200 m^3/d	10.6 : 1

Notes:

1. SNR 7Q20 flow : Effluent Flow

1. Seasonal Discharge

Parameter	Objective		Limit	
TP	Monthly	0.36 mg/L	Monthly	0.45 mg/L
TAN				
Winter (Dec 1 to Mar 31)	Monthly	8.0 mg/L	Monthly	10.0 mg/L
Spring (Apr 1 to May 15)	Monthly	4.8 mg/L	Monthly	6.0 mg/L
Fall (Oct 1 to Nov 30)	Monthly	3.6 mg/L	Monthly	4.5 mg/L

Excess Discharge Capacity: **0 to 6%** (depends on new storage lagoon area requirements)

Estimated Maximum Effluent Storage Volume Requirement: **460,000 m^3** (end of October) > 330,000 m^3

Maximum Summer TP Loading: **0 kg** (no summer discharge)

Maximum Annual TP Loading: **770 kg/year**

1. Seasonal Discharge

Discharge Period	Fully-Mixed UIA (ug/L as NH3)	Fully-Mixed TP (mg/L)	% Increase Above Ambient TP
Jan 1 – 31	19.4	0.208	11.0
Feb 1 – 28/29	19.4	0.208	11.0
Mar 1 – 31	19.4	0.208	11.0
Apr 1 – 30	13.4	0.115	4.0
May 1 – 15	19.7	0.118	7.1
May 16 – 31	-	-	-
Jun 1 – 30	-	-	-
July 1 – 31	-	-	-
Aug 1 – 31	-	-	-
Sep 1 – 30	-	-	-
Oct 1 – 31	19.2	0.137	19.5
Nov 1 – 30	19.3	0.137	19.6
Dec 1 – 31	19.3	0.208	11.0
PWQO	**20 ug/L as NH3**	**0.030 mg/L**	**n/a**

2. Year-Round Discharge

Discharge Period	Maximum Discharge Rate	Minimum Dilution Ratio Acheived [1]
Jan 1 – 31	5,750 m^3/d	12.4 : 1
Feb 1 – 28/29	5,600 m^3/d	12.4 : 1
Mar 1 – 31	7,250 m^3/d	12.3 : 1
Apr 1 – 30	10,000 m^3/d	72.9 : 1
May 1 – 31	4,500 m^3/d	40.5 : 1
Jun 1 – 30	2,150 m^3/d	26.2 : 1
July 1 – 31	1,050 m^3/d	26.2 : 1
Aug 1 – 31	900 m^3/d	26.3 : 1
Sep 1 – 30	910 m^3/d	26.2 : 1
Oct 1 – 31	2,250 m^3/d	13.1 : 1
Nov 1 – 30	6,050 m^3/d	13.1 : 1
Dec 1 – 31	8,750 m^3/d	12.4 : 1
Notes: 1. SNR 7Q20 flow : Effluent Flow		

2. Year-Round Discharge

Parameter	Objective		Limit	
TP	Monthly	0.20 mg/L	Monthly	0.30 mg/L
TAN				
Winter (Dec 1 to Mar 31)	Monthly	9.2 mg/L	Monthly	11.5 mg/L
Spring (Apr 1 to May 31)	Monthly	4.8 mg/L	Monthly	6.0 mg/L
Summer (June 1 to Sep 30)	Monthly	1.0 mg/L	Monthly	1.3 mg/L
Fall (Oct 1 to Nov 30)	Monthly	4.0 mg/L	Monthly	5.0 mg/L

Excess Discharge Capacity: **5.5%** (assumes no new lagoons required)

Estimated Maximum Effluent Storage Volume Requirement: **315,000 m^3** (end of October) < 330,000 m^3

Maximum Summer TP Loading: **45.7 kg** (average of 0.37 kg/d over the Summer)

Maximum Annual TP Loading: **476 kg/year**

2. Year-Round Discharge

Discharge Period	Fully-Mixed UIA (ug/L as NH3)	Fully-Mixed TP (mg/L)	% Increase Above Ambient TP
Jan 1 – 31	19.2	0.194	4.4
Feb 1 – 28/29	19.3	0.194	4.4
Mar 1 – 31	19.4	0.194	4.5
Apr 1 – 30	13.4	0.113	2.3
May 1 – 31	19.4	0.115	4.0
Jun 1 – 30	19.4	0.127	5.2
July 1 – 31	19.4	0.127	5.2
Aug 1 – 31	19.3	0.127	5.2
Sep 1 – 30	19.4	0.127	5.2
Oct 1 – 31	19.3	0.124	10.9
Nov 1 – 30	19.3	0.123	10.9
Dec 1 – 31	19.3	0.194	4.4
PWQO	**20 ug/L as NH3**	**0.030 mg/L**	**n/a**



Next Steps and Final Comments

- Maintaining seasonal discharge:
  - Expansion to effluent storage volume required
  - Project impacts (site, schedule, cost)
- Expanding discharge to year-round:
  - Minimum summer dilution ratio (~25 : 1)?
  - Summer TP concentration limit (0.30 mg/L)?
  - New TP loading to SNR over the summer (45.7 kg over June – Sep)?
- Next steps:
  - Update discharge alternatives (as required)
  - Evaluate and select preferred discharge alternative
  - Document in ACS report

Thank you!

J.L.Richards
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Melody Johnson

From: Melody Johnson
Sent: November 30, 2023 11:10 AM
To: Melody Johnson
Subject: FW: 16953-133 Casselman Lagoon ACS

From: Claire Lemay <clemay@nation.on.ca>
Sent: Wednesday, November 29, 2023 3:27 PM
To: Carolyn Chan <cchan@jlrichards.ca>
Cc: Kevin Cortez <kcortez@jlrichards.ca>
Subject: Re: 16953-133 Casselman Lagoon ACS

Hi Carolyn,

SNC has no concerns with the proposal to extend the discharge period from seasonal to year-round as long as the proposal remains to maintain the total phosphorus loading to the South Nation River within the allowable limits of the existing ECA.

Thank you,
Claire Lemay

From: Carolyn Chan <cchan@jlrichards.ca>
Sent: Wednesday, November 29, 2023 10:07 AM
To: Claire Lemay <clemay@nation.on.ca>
Cc: Kevin Cortez <kcortez@jlrichards.ca>
Subject: RE: 16953-133 Casselman Lagoon ACS

Hi Claire,

Can you provide an update? Happy to schedule a meeting if that's quicker.

Best,
Carolyn

Carolyn Chan, P.Eng., M.A.Sc.
Environmental Engineer

J.L. Richards & Associates Limited
107 - 450 Speedvale Ave. West, Guelph, ON N1H 7Y6
Direct: 226-780-7367





From: Claire Lemay <clemay@nation.on.ca>
Sent: Tuesday, November 21, 2023 12:06 PM
To: Carolyn Chan <cchan@jlrichards.ca>

Cc: Info Mailbox <info@nation.on.ca>
Subject: RE: 16953-133 Casselman Lagoon ACS

Hi Carolyn,
Thank you for your inquiry. I'll get back to you within the next few days.
Regards,
Claire

From: Carolyn Chan <cchan@jlrichards.ca>
Sent: Monday, November 20, 2023 8:14 AM
To: Claire Lemay <clemay@nation.on.ca>
Cc: Info Mailbox <info@nation.on.ca>
Subject: RE: 16953-133 Casselman Lagoon ACS

Hi Claire,

Just following up on my previous email – did you get a chance to look at the attached?

Copying the general email inbox in case Claire is not the correct contact.

Thank you,
Carolyn

Carolyn Chan, P.Eng., M.A.Sc.
Environmental Engineer

J.L. Richards & Associates Limited
107 - 450 Speedvale Ave. West, Guelph, ON N1H 7Y6
Direct: 226-780-7367

J.L. Richards & Associates Limited
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CANADA BEST MANAGED COMPANIES Platinum member

From: Carolyn Chan
Sent: Thursday, November 9, 2023 3:05 PM
To: clemay@nation.on.ca
Cc: Melody Johnson <melody@bskyeng.com>; Jordan Morrissette <jmorrissette@jlrichards.ca>; Kevin Cortez <kcortez@jlrichards.ca>
Subject: 16953-133 Casselman Lagoon ACS

Hi Claire,

We're completing an Assimilative Capacity Study to support the ongoing Master Plan Update for the Municipality of Casselman, to plan for growth in the community. One of the scenarios under consideration is expanding the discharge window of the plant. See attached slides recently presented to the MECP showing proposed quantity and effluent quality on a monthly basis; with year-round discharge, there is an increase in TP loading to the river during summer months, but an overall reduction in approved TP loading on an annual basis.

We are interested in hearing the SNCA's opinion of this scenario and incorporating any comments into our draft ACS report. Could you take a look, or pass this to the appropriate contact? Happy to set up a virtual meeting to discuss.

Best,

Carolyn

SOUTH NATION CONSERVATION
DE LA NATION SUD

Claire Lemay | RPP, Senior Planner
38 Victoria Street, Box 29, Finch, ON K0C 1K0
Tel: 613-984-2948 or 1-877-984-2948 | Fax: 613-984-2872
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Appendix B

MECP Correspondence

Memorandum

To:	Sarah Baxter, Surface Water Specialist, Eastern Region, MECP
CC:	Jon Orpana, Environmental Assessment Coordinator, MECP Carolyn Chan, P.Eng., J.L. Richards & Associates Limited
From:	Melody Johnson, PhD, P.Eng.
Date:	February 16, 2024
Subject:	Casselman WWTS Assimilative Capacity Study – Response to MECP Comments

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"Final Report – Assimilative Capacity Study to Support the Expansion of the Casselman WWTS" dated January 11, 2024 was prepared by Blue Sky Energy Engineering & Consulting Inc. (Blue Sky) and submitted to the Ministry of the Environment, Conservation and Parks (MECP) for review. Comments were provided by Sarah Baxter, Surface Water Specialist, in a memorandum dated February 1, 2024 (see Attachment A).

MECP have agreed to both the maximum effluent discharge rates and proposed effluent objectives and limits as presented in the Assimilative Capacity Study report, with the following exceptions:

> "a. If disinfection equipment is to be installed it should be operated all year and E. Coli limits should be in place for all months; and,
>
> b. There should also be effluent loading limits established for $cBOD_5$, TSS, TAN, and TP."

Our responses to these two comments are provided below.

Comment: "a. If disinfection equipment is to be installed it should be operated all year and E. Coli limits should be in place for all months."

Response: We propose to update the E. coli effluent objectives and limits to apply year-round, rather than the previously proposed seasonal discharge period of May 1 to October 31.

Comment: "b. There should also be effluent loading limits established for $cBOD_5$, TSS, TAN, and TP."

Response: Due to the variable nature of permitted effluent discharge rates, and the fact that the proposed effluent objectives and limits for $cBOD_5$, TSS and TP remain constant year-round, we are proposing annual effluent limits for these parameters calculated as follows:

Average total annual discharge rate (4,374 m^3/d) * Effluent concentration limit

This results in proposed effluent $cBOD_5$, TSS and TP loading limits of 52.5 kg/d, 52.5 kg/d and 1.31 kg/d, respectively, calculated on an annual average basis.

Because effluent TAN limits vary seasonally, and effluent discharge rates vary monthly, we are proposing monthly TAN loading limits calculated as follows:

Maximum monthly discharge rate (m^3/d) * Seasonal TAN concentration limit

This results in monthly effluent TAN loading limits. These have been calculated and are presented in Table 3 below.

Given the above, the proposed effluent requirements have been updated and are presented below in Table 1 (discharge rate), Table 2 (concentration targets) and Table 3 (loading limits). Items in **bold font** represent new and/or modified values.

Table 1 – Maximum Monthly Effluent Discharge Rates

Month	Discharge Rate (m^3/d)	Minimum Dilution Ratio
January	5,750 m^3/d	12.4
February	5,600 m^3/d	12.4
March	7,250 m^3/d	12.3
April	10,000 m^3/d	72.9
May	4,500 m^3/d	40.5
June	2,150 m^3/d	26.2
July	1,050 m^3/d	26.2
August	900 m^3/d	26.3
September	910 m^3/d	26.2
October	2,250 m^3/d	13.1
November	6,050 m^3/d	13.1
December	8,750 m^3/d	12.4

Table 2 – Proposed Effluent Objectives and Limits

Parameter	Averaging Period	Objective (mg/L unless noted otherwise)	Limit (mg/L unless noted otherwise)
$cBOD_5$	Monthly	10	12
TSS	Monthly	10	12
TP	Monthly	0.20	0.30
TAN			
Dec 1 to Mar 31	Monthly	9.2	11.5
Apr 1 to May 31	Monthly	4.8	6.0
Jun 1 to Sep 30	Monthly	1.0	1.3
Oct 1 to Nov 30	Monthly	4.0	5.0
E. coli	**Monthly**	**150 CFU/100 mL**	**200 CFU/100 mL**
pH	Single Grab	6.8 to 7.8	6.0 to 8.0

Table 3 – Proposed Effluent Loading Limits

Parameter	Averaging Period	Limit (kg/d)
cBOD5	**Annual**	**52.5**
TSS	**Annual**	**52.5**
TP	**Annual**	**1.31**
TAN		
January	**Monthly**	**66.1**
February	**Monthly**	**64.4**
March	**Monthly**	**83.4**
April	**Monthly**	**60.0**
May	**Monthly**	**27.0**
June	**Monthly**	**2.80**
July	**Monthly**	**1.37**
August	**Monthly**	**1.17**
September	**Monthly**	**1.18**
October	**Monthly**	**11.3**
November	**Monthly**	**30.3**
December	**Monthly**	**100.6**

We trust that the above adequately addresses your comments and provides you with the information you require at this time. Should you have any questions or concerns, please do not hesitate to contact Melody Johnson at melody@bskyeng.com or 647-721-7644.

Attachment A

MECP Memorandum dated February 1, 2024

Ministry of the Environment, Conservation and Parks
Eastern Region
1259 Gardiners Road, Unit 3
Kingston ON K7P 3J6
Phone: 613.549.4000
or 1.800.267.0974

Ministère de l'Environnement, de la Protection de la nature et des Parcs
Région de l'Est
1259, rue Gardiners, unité 3
Kingston (Ontario) K7P 3J6
Tél: 613 549-4000
ou 1 800 267-0974

Ontario

M E M O R A N D U M

February 1, 2024

TO: Jon Orpana
Environmental Assessment Coordinator
Environmental Assessment and Permissions Division
Eastern Region

FROM: Sarah Baxter
Surface Water Specialist
Technical Support Section
Eastern Region

RE: Casselman Wastewater Treatment System
Assimilative Capacity Study
Municipality of Casselman; United Counties of Prescott and Russell
Environmental Compliance Approval #8160-BAHPRF
ECHO #1-278240452

I have reviewed the "*Final Report, Assimilative Capacity Study to Support the Expansion of the Casselman WWTS*" dated January 11, 2024 and prepared by Blue Sky Energy Engineering & Consulting Inc. The following comments, relative to surface water impact concerns, are provided for your consideration.

Background

The Casselman Wastewater Treatment System (WWTS) is a municipal facultative lagoon system that services the Village of Casselman. The system has a rated capacity of 2,110 m^3/day and is regulated by Environmental Compliance Approval (ECA) #8160-BAHPRF. The system includes 3 facultative lagoon cells (A, B, C), an aeration system, a phosphorus removal system, and a flow measurement system. Effluent is discharged to the South Nation River via an outfall sewer equipped with two diffuser ports.

Effluent discharge is permitted between October 1 to May 15 each year. Schedule B of the ECA lists the monthly maximum effluent discharge rate. The Village is permitted to release a total of 502,500 m^3 of effluent during the winter/spring discharge period (January 1 to May 15) and 267,650 m^3 of effluent during the fall discharge period (October 1 to December 31).

The effluent objectives and limits for carbonaceous biochemical oxygen demand ($CBOD_5$), total suspended solids (TSS), total phosphorous (TP), total ammonia nitrogen (TAN), E. Coli, hydrogen sulphide (H_2S), and pH are presented in **Table 1** and **Table 2**.

Table 1: Effluent Objectives and Limits for the Spring/Winter Discharge Period

Parameter	Timeframe	Concentration Objective	Concentration Limit	Loading Limit
$CBOD_5$	Jan 1 – May 15	15 mg/L	25 mg/L	93.06 kg/d
TSS	Jan 1 – May 15	15 mg/L	25 mg/L	93.06 kg/d
TP	Jan 1 – May 15	0.8 mg/L	1 mg/L	3.73 kg/d
TAN	Jan 1 – Mar 31	12 mg/L	12 mg/L	44.67 kg/d
	Apr 1 – May 15	6 mg/L	6 mg/L	22.34 kg/d
E.Coli	Jan 1 – May 15	100 CFU/100 mL	200 CFU/100 mL	
H_2S	Jan 1 – May 15	0.1 mg/L	0.1 mg/L	0.37 kg/d
pH		6.8 – 7.8	6.0 – 8.0	

Table 2: Effluent Objectives and Limits for the Fall Discharge Period

Parameter	Timeframe	Concentration Objective	Concentration Limit	Loading Limit
$CBOD_5$	Oct 1 – Dec 31	10 mg/L	15 mg/L	43.64 kg/d
TSS	Oct 1 – Dec 31	10 mg/L	25 mg/L	72.73 kg/d
TP	Oct 1 – Dec 31	0.8 mg/L	1 mg/L	2.91 kg/d
TAN	Oct 1 – Nov 30	5 mg/L	5 mg/L	14.55 kg/d
	Dec 1 – Dec 31	12 mg/L	12 mg/L	34.89 kg/d
E.Coli	Oct 1 – Dec 31	100 CFU/100 mL	200 CFU/100 mL	
H_2S	Oct 1 – Dec 31	Non-detect	Non-detect	
pH	Oct 1 – Dec 31	6.8 – 7.8	6.0 – 8.0	

The Village is completing a Class Environmental Assessment (EA) to increase wastewater servicing capacity to meet the needs of future growth projections. An increase in wastewater volume to 4,050 m^3/day is proposed. Completion of an Assimilative Capacity Study (ACS) serves the EA by determining the site-specific effluent criteria so appropriate upgrades and technology can be explored. The reviewed document has been provided as a result.

Assimilative Capacity Study

Blue Sky have completed the ACS on the basis that the effluent discharge window will be extended to a year-round discharge. In previous pre-submission consultation (PSC) meetings, consideration was given to maintaining the existing discharge window. However, maintaining the existing discharge period would require the construction of another lagoon and it is my understanding that there is no property available to do so.

Background flow data was obtained from Water Survey of Canada (WSC) gauge #02LB013, which is located approximately 1 kilometer upstream of the WWTS. Data was available for 1950-2021. Background water quality data for BOD_5, dissolved oxygen (DO), TAN, temperature, pH, TP, TSS, nitrate, and E. Coli was obtained from Provincial Water Quality Monitoring Network (PWQMN) station #18207010002. This station is also approximately 1 kilometer upstream of the sewage system with data available from 1950-2020.

The ACS approach also:

- Assumed that the lagoon system would receive 297 m^3/d of precipitation, so the discharge capacity was increased to 4,347 m^3/d;
- Maintained a minimum dilution ratio of 10:1;
- Limited future TP loadings to 770 kg/yr (the current ECA limit);
- Used a mass-balance approach to ensure downstream un-ionized ammonia (UIA) concentrations were below the PWQO;
- Proposed TAN effluent limits that would be non-toxic at end-of-pipe;
- Suggested effluent limits for pH and E.Coli based on those approved for other similar WWTS; and,
- Assessed the proposed effluent limits using CORMIX.

Flows

Blue Sky developed maximum effluent discharge rates for each month, using monthly average 7Q20 flows in the South Nation River and a minimum dilution ratio of 10:1. The proposed rates are provided in Table 3 below.

Table 3: Proposed Maximum Monthly Effluent Discharge Rates

Month	Discharge Rate (m3/d)	Minimum Dilution Ratio
January	5,750	12.4
February	5,600	12.4
March	7,250	12.3
April	10,000	72.9
May	4,500	40.5
June	2,150	26.2
July	1,050	26.2
August	900	26.3
September	910	26.2
October	2,250	13.1
November	6,050	13.1
December	8,750	12.4

The proposed maximum discharge rates would permit an annual discharge volume of 1,674,050 m^3 or an average daily flow of 4,586 m^3. Blue Sky notes this volume will provide some flexibility in discharging the design flow plus the anticipated precipitation.

Total Phosphorus

The South Nation River is a Policy 2 receiver with respect to total phosphorus, so the existing discharge load of 770 kg/yr must be maintained or reduced. The South Nation Conservation Authority were contacted regarding the proposed effluent discharge during the summer months and there were no objections provided that the annual phosphorus loading be maintained or reduced.

Blue Sky has proposed an effluent design objective of 0.2 mg/L, a compliance limit of 0.3 mg/L, and a loading limit of 446 mg/L (**Table 4**). This loading limit is 57% less than the value currently approved. Blue Sky indicates that phosphorus concentrations downstream of the discharge are not anticipated to increase more than 5.2% above ambient during the summer months.

Carbonaceous Biochemical Oxygen Demand

The South Nation River is a Policy 1 receiver with respect to dissolved oxygen. The long-term annual 75th percentile for BOD is 4 mg/L, indicating background concentrations are low.

Blue Sky has proposed a design objective of 10 mg/L and a compliance limit of 12 mg/L (**Table 4**). At these values, $CBOD_5$ concentrations in the mixing zone could increase from 0.29 mg/L (June-September) to 0.59 mg/L (winter). Blue Sky suggests these minor concentration increases would not have a significant impact on dissolved oxygen concentrations.

Total Suspended Solids

South Nation River background TSS concentrations are elevated compared to many receiving streams of a similar size, having a long-term annual 75th percentile of 14.5 mg/L. Since there is no Provincial Water Quality Objective (PWQO) for TSS, Blue Sky recommends not exceeding the long-term Canadian Water Quality Guideline (CWQG) of a 5 mg/L increase above ambient.

Blue Sky has proposed a design objective of 10 mg/L and a compliance limit of 12 mg/L (**Table 4**). The proposed limit is significantly less than that currently approved (25 mg/L). Blue Sky indicates that downstream concentrations should not increase more than 0.13 mg/L, which meets the long-term CWQG.

Total Ammonia Nitrogen

Ambient TAN concentrations in the South Nation River are relatively low. However, the receiver has a naturally elevated pH (long-term annual 75th percentile of 8.19) and water temperatures are elevated in the summer months, so there is limited assimilative capacity available for UIA in June, July, and August.

When developing monthly TAN limits, Blue Sky used conservative effluent and/or receiver pH and temperature values to ensure the un-ionized ammonia concentration did not exceed 0.2 mg/L at the end-of-pipe. They also ensured that the downstream UIA concentrations met the PWQO of 0.02 mg/L.

The proposed TAN limits are 11.5 mg/L (December to March), 6 mg/L (April to May), 1.3 mg/L (June to September), and 5 mg/L (October to November) (**Table 4**). Blue Sky notes that these values are consistent with, or more stringent, than existing TAN limits.

pH

Blue Sky has proposed a pH design objective of 6.8-7.8 and a compliance limit of 6.0-8.0 (**Table 4**). These values are consistent with those approved by the existing ECA.

E. Coli

Blue Sky has proposed an E.Coli design objective of 150 CFU/100 mL and a compliance limit of 200 CFU/100 mL during the warm weather discharge period of May to October (**Table 4**). They suggest these values are consistent with the current ECA and other municipal WWTS discharging to the South Nation River.

Table 4: Proposed Effluent Design Objectives and Compliance Limits

Parameter	Timeframe	Objective	Limit
$CBOD_5$	All months	10 mg/L	12 mg/L
TSS	All months	10 mg/L	12 mg/L
TP	All months	0.2 mg/L	0.3 mg/L
TAN	Dec 1 – Mar 31	9.2 mg/L	11.5 mg/L
	Apr 1 – May 31	4.8 mg/L	6.0 mg/L
	Jun 1 – Sep 30	1.0 mg/L	1.3 mg/L
	Oct 1 – Nov 30	4.0 mg/L	5.0 mg/L
E. Coli	May 1 – Oct 31	150 CFU/100 mL	200 CFU/100 mL
pH	All months	6.8 – 7.8	6.0 – 8.0

CORMIX Modelling

Blue Sky completed CORMIX modelling using the monthly 7Q20 flows and the maximum monthly discharge rates. With the exception of April, fully mixed conditions are achieved within 175 meters of the diffuser. In the critical summer months, the mixing zone is only 80 meters in length.

In April, the estimated mixing zone size is 375 meters. Blue Sky acknowledges that this value is considerably larger than the other months, but notes there should be limited impact on downstream water quality because of the high dilution ratio in April (72.9:1). They also indicate that the concentration excess in the plume should reach 5% by 20 meters downstream of the diffuser.

Conclusions and Recommendations

1. The Village of Casselman are completing a Class EA to increase wastewater servicing capacity. The reviewed ACS has been completed to develop appropriate site-specific effluent criteria and aid in selection of appropriate sewage works upgrades/treatment options.

2. I have no objections to the proposed maximum effluent discharge rates listed in **Table 3** as all dilution ratios are greater than 10:1 and additional dilution capacity was allocated in the more critical summer months.

3. I have no objections to the proposed effluent objectives and limits outlined in **Table 4** except that:

    a. If disinfection equipment is to be installed it should be operated all year and E.Coli limits should be in place for all months; and,

    b. There should also be effluent loading limits established for $CBOD_5$, TSS, TAN, and TP.

If you have any questions regarding the above comments, I would be pleased to discuss them with you.



Sarah Baxter, B.Sc.H.

ec: V. Castro
C. Klein

c: File SW PR CA 03 07 (Casselman WWTS)

Appendix C

Veolia Technical Proposal

JL Richards

Attention: Carolyn Chan, P.Eng.

Environmental Engineer

CASSELMAN WWTP

COLD WEATHER SPECIALIZED TREATMENT SYSTEM

LAGOONGUARD™ - NIT MBBR + DISCFILTER

CONTINUOUS DISCHARGE

January 26th, 2024

Proposal Number: TM-123502

Prepared By:

Robert Lafond, P. Eng., Senior Process Engineer

Jason Boomhour, Municipal Business Development ON & MB

VEOLIA Water Technologies Canada
ISO 9001: 2008
4105 Sartelon, St-Laurent (QC) H4S 2B3
Tél: 514 334-7230 ● Fax: 514 334-5070
www.VEOLIAwatertechnologies.ca

PROPRIETARY NOTICE
This proposal is confidential and contains proprietary information.
It is not to be disclosed to a third party without the written consent of VEOLIA Canada.

January 26th, 2024

J.L. Richards & Associates Limited

Attention: **Carolyn Chan**, P.Eng., Environmental Engineer
Re: **Casselman WWTP**
LAGOONGUARD™ - NIT using MBBR™ Media + DISCFILTER
CONTINUOUS DISCHARGE ALL YEAR LONG
Our Project No: TM-123502

Carolyn,

Please find here our Proposal with technical information for the increasing of capacity of the **VEOLIA** LAGOONGUARD - NIT system and DISCFILTER processes in operation at Casselman WWTP.

The objective of this proposal is to present a scenario to respond to the increasing the capacity of the Casselman WWTP in the near future. VEOLIA proposes to upgrade the existing installations by adding some equipment to achieve the new effluent requirement more stringent mainly for TSS and phosphorus.

The existing MBBR reactor will not have to be modified and will not require any upgrade because the capacity of the MBBR or LagoonGuard-NIT have enough capacity to process the wastewater mainly during winter time.

The adder of the existing installation will be mainly on the filtration process and also on the increasing of the blowers' capacity.

We appreciate the opportunity to provide you with this proposal. We look forward to a meeting to further discuss the project with you. We believe there is still some room for design optimization, and would be happy to discuss them with you at your earliest convenience.

Best Regards,

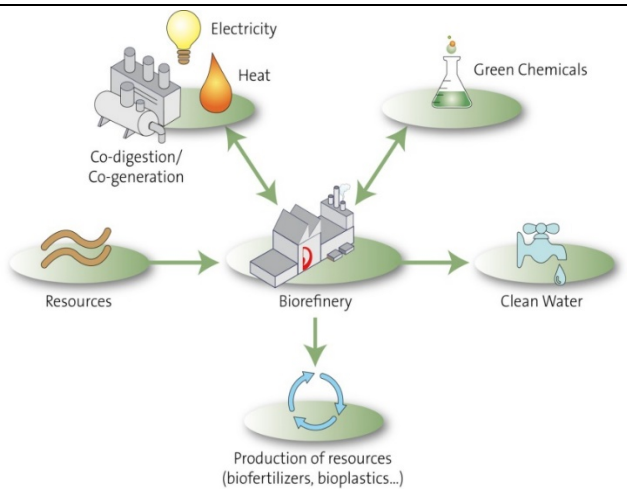
Jason Boomhour
Municipal Business Development ON & MB
Direct: 519.274.3416
jason.boomhour@veolia.com

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   - 3.3. HYDROTECH DISCFILTER Filtration
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5. **Scope of Supply**
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6. **Budget Price and Terms of Payment**

1. INTRODUCTION

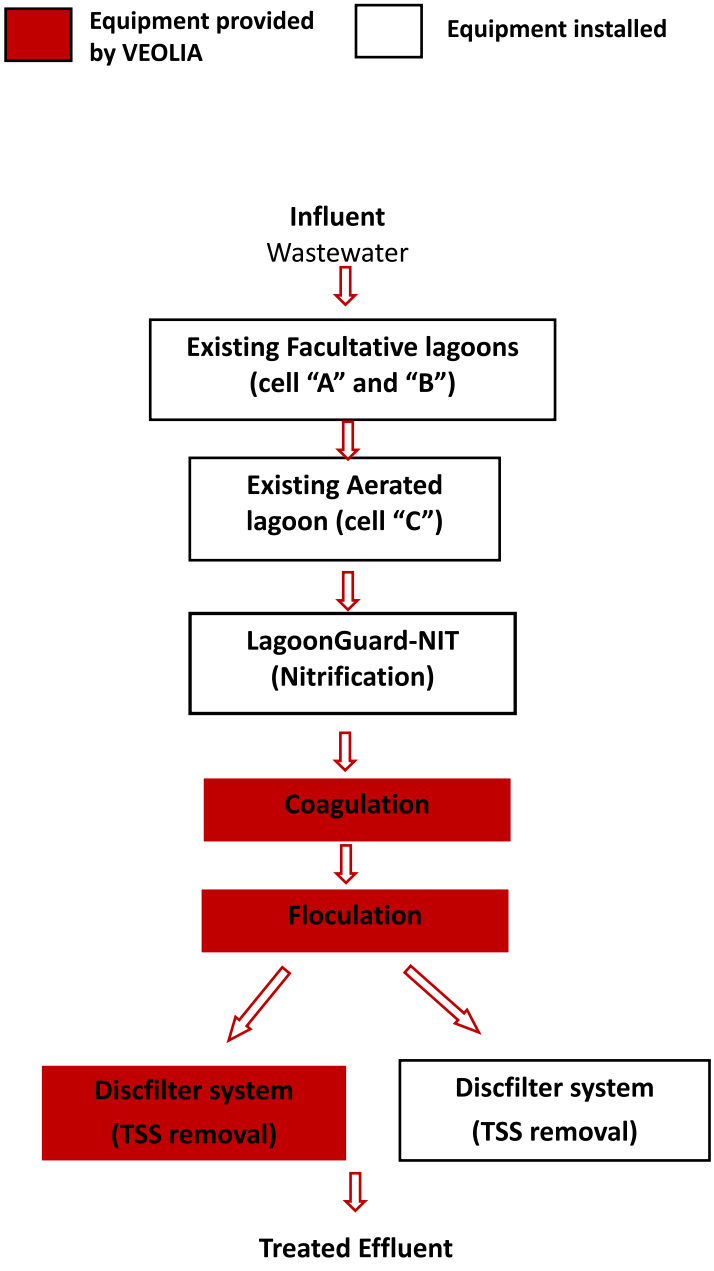
VEOLIA provides unique water and wastewater solutions to both industrial and municipal clients. VEOLIA draws upon more than 500 technologies and over 3,000 patents to find the best solution for each specific application. These resources, combined with VEOLIA's experience gained over the last 160 years in the water treatment industry, ensure that treatment needs are met through cost-effective, environmentally sound solutions implemented through projects focused on safety, quality and customer satisfaction.



VEOLIA is a trustful partner that will help to develop sustainable projects. More and more, when municipalities and industries have the opportunities to work with VEOLIA, wastewater treatment plants are not only considered as treatment stations, but as an opportunity to valorise resources. This change is now possible thanks to VEOLIA's expertise.

VEOLIA has been contacted to offer a solution for the upgrade of the existing LagoonGuard-NIT lagoon-based Casselman WWTP for a continuous discharge all year long with stringent effluent requirements. VEOLIA's proposed solution must therefore allow it to address these issues, while keeping the existing lagoon system and LagoonGuard-NIT.

VEOLIA's proposed solution is relatively simple, and consists in adding to the existing LagoonGuard-NIT an additional DISCFILTER cloth filtration system and a common coagulation and flocculation tank to achieve the low TSS and phosphorus effluent all year long. The following figure shows schematically the proposed Block flow Diagram.


Equipment provided by VEOLIA
Equipment installed
Influent
Wastewater
Existing Facultative lagoons (cell "A" and "B")
Existing Aerated lagoon (cell "C")
LagoonGuard-NIT (Nitrification)
Coagulation
Floculation
Discfilter system (TSS removal)
Discfilter system (TSS removal)
Treated Effluent

2. DATA AND ASSUMPTIONS

The new design flow per month for a continuous discharge was determined by JLRichards.

Discharge Period	Maximum Discharge Rate	Minimum Dilution Ratio Acheived [1]
Jan 1 – 31	5,750 m^3/d	12.4 : 1
Feb 1 – 28/29	5,600 m^3/d	12.4 : 1
Mar 1 – 31	7,250 m^3/d	12.3 : 1
Apr 1 – 30	10,000 m^3/d	72.9 : 1
May 1 – 31	4,500 m^3/d	40.5 : 1
Jun 1 – 30	2,150 m^3/d	26.2 : 1
July 1 – 31	1,050 m^3/d	26.2 : 1
Aug 1 – 31	900 m^3/d	26.3 : 1
Sep 1 – 30	910 m^3/d	26.2 : 1
Oct 1 – 31	2,250 m^3/d	13.1 : 1
Nov 1 – 30	6,050 m^3/d	13.1 : 1
Dec 1 – 31	8,750 m^3/d	12.4 : 1
Notes: 1. SNR 7Q20 flow : Effluent Flow		

Without more information on the effluent produced by the existing storage lagoons in the future we took the same value of the initial design. If more accurate value are available we will be able to update our design

Parameter	Raw Wastewater	Treated Effluent (Post-Aeration Cell)
CBOD5	160 mg/L[1]	Up to 60 mg/L[4]
Total Suspended Solids	210 mg/L[1]	Up to 60 mg/L[4]
Total Ammonium Nitrogen	32 mg/L[3]	Up to 23 mg/L
Total Phosphorus	7.0 mg/L[1]	0.420
Hydrogen Sulphide	-	Not detected
Temperature	0.5 – 25 °C	0.5 – 25 °C
pH	-	7.8 – 9.1
Alkalinity	350 mg/L[2]	-

The new effluent requirement would be:

Parameter	Objective		Limit	
TP	Monthly	0.20 mg/L	Monthly	0.30 mg/L
TAN				
Winter (Dec 1 to Mar 31)	Monthly	9.2 mg/L	Monthly	11.5 mg/L
Spring (Apr 1 to May 31)	Monthly	4.8 mg/L	Monthly	6.0 mg/L
Summer (June 1 to Sep 30)	Monthly	1.0 mg/L	Monthly	1.3 mg/L
Fall (Oct 1 to Nov 30)	Monthly	4.0 mg/L	Monthly	5.0 mg/L

3. BIOLOGICAL TREATMENT AND FILTRATION

3.1.Screening pre-treatment (not included)

No pre-treatment is required because the lagoons will remove the small and dense particles.

3.2.LAGOONGUARD™ Reactors

The proposed biological treatment is composed of LAGOONGUARD™ MOVING BED™ Biofilm Reactors (MBBR) reactors with ANOXKALDNES™ MBBR media. The process design is based on over 20 years of experience in developing the ANOXKALDNES™ Moving Bed™ Biofilm Technology. It is supported by pilot scale and full scale data from existing municipal treatment facilities using the ANOXKALDNES™ MOVING BED™ Biofilm Technology for organic removal and nitrification. Over 600 ANOXKALDNES™ installations are in operation worldwide.

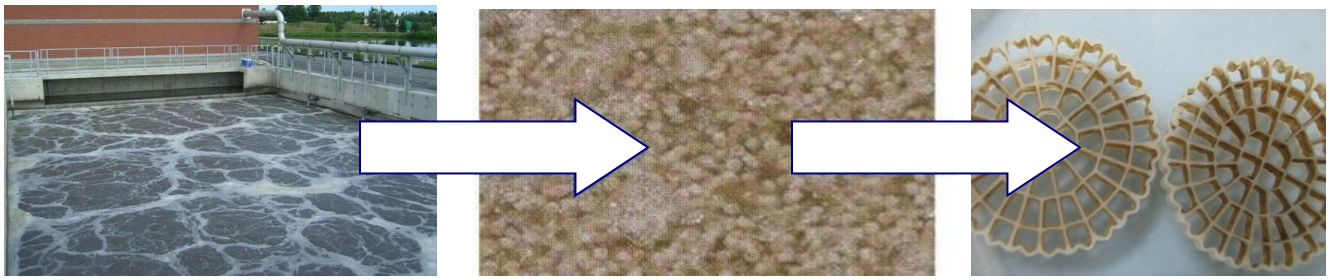
The flexibility of this patented technology allows the design of very compact and efficient stand-alone MBBR solutions as well as optimal upgrades of other, existing, biological processes, often without the need for new basins.

The microorganisms treating the wastewater grow on the surfaces of the ANOXKALDNES™ Media (or carrier) in the treatment reactor. The MOVING BED™ Biofilm Reactors (MBBR) process utilizes a cylindrical plastic carrier about 25 mm in diameter, as seen in Figure , to provide an environment in which bacterial populations and protozoa can grow very effectively.



Media K5

- Effective protected area = 800 m^2/m^3
- Diameter = 25 mm
- Thickness = 4 mm



The carriers are retained in the tanks by sieves which allow the treated water to pass to downstream units for further processing. Stainless steel laterals and diffusers provided oxygen to the system for bacterial growth but also mixing energy.

One of the important features of the process is that biofilm thickness is controlled by the movement of the media so that oxygen diffusion through the biofilm is encouraged. Detached biofilm is suspended within the reactor and leaves the reactor with the treated wastewater. The sloughed biofilm will be captured in a separation device downstream.

It is important to note that the Moving Bed Biofilm Reactor is a stand-alone biological treatment system with no need for backwashing of the media. The wastewater treatment plant will operate as a fixed-film process with no return activated sludge being pumped back from the clarification unit to the bioreactor. In a suspended sludge based treatment system, the sludge has to continuously be separated from the treated water and returned to the treatment basin

LagoonGuard : Existing system

The most stringent condition (which is then the design condition) is the spring season, where water temperature is low (around 2 to 5°C), along with maximum flow condition up to 10 000 m3/day. The slight difference in effluent discharge requirement has a minimal influence on reactor sizing, between spring and fall conditions.
Summer conditions with potential treatment in the existing storage cell due to warmer wastewater temperature will not be in issue for the TAN, even if more stringent in terms of effluent requirement.

The existing MBBR reactor will be able to perform considering the new inlet flow condition compared to the initial one for the design of the plant.
It could be possible that the future April influent flow of 10 000 m3/d would reduce depending of the influent water temperature of the MBBR process during April.
If it's the case it will be possible to increase the flow during May, June and July.
We will need more information on the flow limit and wastewater temperature for those months.
Ideally readings of 2024 during those months would be helpful for the future design.

Blowers: Increase of capacity
The existing blowers of 25 HP would have to be upgraded to supply more air. We are in communication with the blower manufacturer to verify if we have residual capacity of the existing bowers to do it.
Another option would be to add one more blower to increase the capacity of aeration for both MBBR reactors.

No more modification or adhering to the MBBR process will be required.

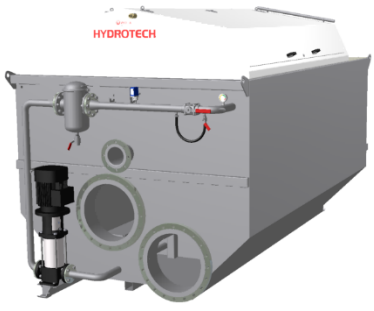
3.3.HYDROTECH DISCFILTER Filtration

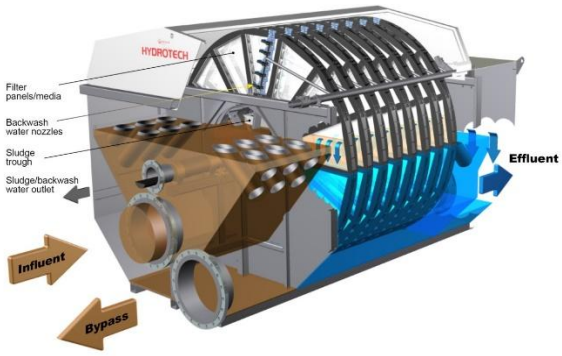
Downstream FROM THE LAGOONGUARD™, a filtration unit is required for TSS removal. The proposed HYDROTECH DISCFILTER uses a mesh filter cloth mounted on filter panels. These panels stem from a central drum where inlet water is admitted into the unit for treatment. Water is filtered in inside-out mode, flowing from the centre tube to the open base of the filter discs, through the polyester cloth before reaching the filtered water collection tank integral to the packaged unit. Solids and particles present in the inlet water are retained by the filter media on the inside of the filter panels, eventually leading to a build-up of captured solids on the filter media. Consequently, headloss across the HYDROTECH DISCFILTER increases, resulting in increased water level at the inlet of the unit.



At a predetermined water level, the high level switch initiates a backwash cycle, which rotates the filter discs in order to expose clean filter media to the water flow path, while subjecting the dirty filter media to the cleaning action of the backwash spray tips. Filtered water stored in the tank is pumped to feed the series of spray tips strategically installed on the moving arms of the backwash system. This serves to clean the entire surface of the filter media while limiting the use of filtered water in the process. An outlet weir integral to the filtered water collection tank is used to maintain the water level according to the volume of filtered water needed to carry out the backwash cycle. Filtered water flows over the weir of the tank and out of the unit.

Schematic of HYDROTECH DISCFILTER – Tank Version





Discfilter: Additional unit

The new effluent requirement for TSS and phosphorus, plus the increasing of the flow and the nature of the wastewater during summer season discharge will require an additional discfilter system.

The second unit will be most of the time a backup of the first one but during high flow and/or algae event (mainly in summer) this additional unit could be in operation at the same time or in operation one at a time during event of high solids content at low flow in the effluent depending of the duration.

The second unit of discfilter will be the same as the existing one, simplifying the spare parts and maintenance operation. The final positioning of the second unit should be close to the first one, ideally side by side to facilitate the operator's operation between the two units.

Flocculation and coagulation mixers tanks:

Due to low phosphorus objective and to assure low TSS all year, a coagulation tank and flocculation tank will have to be added to the existing installation.

Both tanks (probably in concrete pour in place) will be downstream of the MBBR effluent and upstream of the two discfilter. These two mixing tanks should be in the same extension of the existing mechanical building for the second discfilter. The volume of both tanks should be around 15 m3 (to be validated). Mixers and supports for both tanks will be supplied by VEOLIA.

Chemical skids

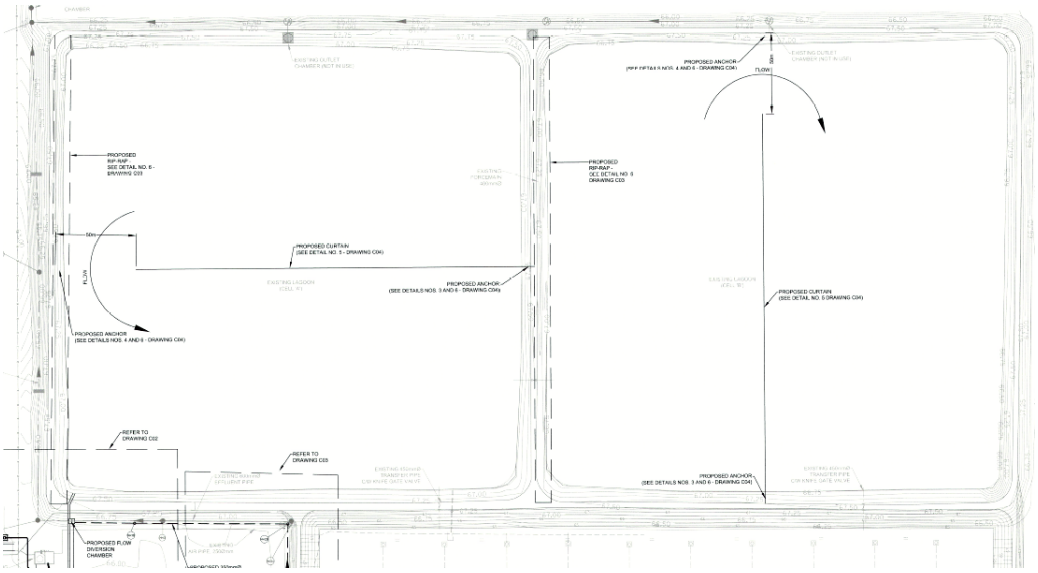
The coagulant and polymer system preparation will be supplied by VEOLIA .

Coagulant system: The coagulant skids will include two (2) metering pumps (1+1) and all the valves and accessories for the operation of the skids.

Polymer system: The polymer system will include an automatic polymer preparation system HYDRAPOL from dry polymer . Two metering pumps (1+1) will complete the polymer dosing system.

3.4.Modification of CELL A

The Cell A configuration is not optimal for the future operation and also for the actual operation.
The influent flow of Cell A has a preferential flow pattern to go to Cell B.
This configuration will not allow the use of the complete retention volume of the Cell A mainly during summer time.
Initially it was proposed on drawings of JLR to install a floating baffle on Cell A and Cell B to use the total volume of the lagoons and at the same time increase the retention time of both lagoons.

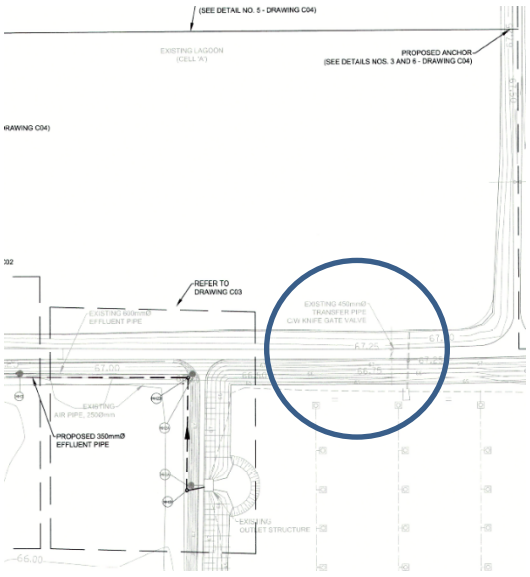


Those floating baffles or curtains will be required to the "***Continuous Discharge***" especially for Cell A.

During summertime the ammonia content is partially or completely nitrified naturally in the three cells.

With curtain and the existing connection between Cell A and Cell C (*Existing 450 mm diam. Transfer pipe with a knife gate valve*) it will be possible to feed the MBBR system and maintain the biomass active with ammonia and BOD concentration of Cell A.

At the end of the summer, gradually the flow coming from Cell A will be reduced to finally feed the MBBR only with the Cell C.



3.5.Control Panel

The LAGOONGUARD™ , DISCFILTER and dosing system processes will be controlled by the same single control panel.



4. Scope of Supply

HYDROTECH DISCFILTER

- **One (1) HYDROTECH DISCFILTERs, model HSF2222/21-1F, including:**
  - 304 SS Filter frame
  - Filtration discs with woven polyester filter media (10 µm openings)
  - 304 SS centre drum
  - ABS plastic disc segment
  - Filter panel frames
  - One (1) motor and gearbox
  - One (1) backwash pump
  - Aluminium covers
  - Instrumentation, lot of level floats
  - Factory pre-assembled

Coagulation Tank

- Pendulum mixer with supports
- Coagulant skid with two metering pumps,
  (one in operation + 1 in standby

Flocculation Tank

- Pendulum mixer with supports
- Flocculant skid with two metering pumps,
  one in operation + 1 in standby
- HYDRAPOL Automatic polymer preparation from dry polymer.

Panel Control (existing one)

- Adder to control chemical dosing system , mixers and additional discfilter
-

These elements are included in the proposal:

- Process engineering and drawings showing outline tank requirements and equipment location
- Operation & Maintenance manuals.

These elements are not included in this proposal and will be addressed by the client:

- Permits, including certificate of authorization, necessary construction permits and licences.
- Equipment installation in the mechanical building.
- Unloading, storage, maintenance preservation and protection of all equipment and materials on-site.
- All site preparation, grading, finding foundation placement and excavation for foundation, underground piping, conduits and drains.
- Foundations, buildings, sumps, trenches and similar concrete works, site interferences, fencing and landscaping (including asphalt or paving).
- Supply and installation of interconnecting piping between the client's installations and the treatment system, and between the various skids that are part of the treatment system.
- All labor, material and utilities required to install the supplied equipment.
- Supply and installation of all electrical power and conduit to the treatment system main control panel plus interconnection between the treatment system main control panel and ancillary equipment as required, including wire, cable, junction boxes, fittings, conduit, etc.
- Start-up, Commissioning, performance testing
- Motor starters and/or VFDs
- SCADA
- Equipment freight to site

5. Budget Price and Terms of Payment

Estimated cost

Estimated budget price for the items described in section 4 above is: **$CDN**

This budget is non-binding and is presented for project planning and evaluation purposes only and is not a firm offer.

Terms of payment

Typical terms of payment are:

- 10% on receipt of PO
- 25% on submittal of shop drawings
- 50% on equipment ready to ship
- 5% after commissioning
- All payment terms are 100% net 30 days from the date of invoice.

Suggested schedule

A projected schedule typical for this type of project is presented in the following table:

Table 5 Schedule

ITEM	TIMELINE	CONDITIONS
Shop drawings	6-8 weeks	Submission within designated timeline following receipt of a contract accepted by all parties
Complete Equipment Delivery	14-18 weeks	After receipt of written approval of shop drawings

This schedule is indicative and open for discussion.

Carolyn Chan

From: Boomhour, Jason <jason.boomhour@veolia.com>
Sent: February 13, 2024 12:13 PM
To: Carolyn Chan
Cc: Kevin Cortez
Subject: Re: 16953-133 - Casselman Lagoon MBBR & Disk Filter optimization

[CAUTION] This email originated from outside JLR. Do not click links or open attachments unless you recognize the sender and know the content is safe. Do not forward suspicious emails, if you are unsure, please send a separate message to Helpdesk.

Carolyn,

We have finally completed the budget price for the phase upgrades at Casselman.

If we want to phase the upgrade , it will depend on the requirement of the city (flow increasing for the next years: gradually or rapidly) and also effluent requirements of the ministry considering the new permit of discharge all year long. Please see below the identified phases and budget price for equipment supply within Veolia's scope.

First phase:
Put the floating curtain will be required to optimise the nitrification all year long mainly during a 12 months discharge objective - **provided by others**.

Second phase:
*Upgrade to 30 HP blower new unit **$55,000.00 est.***
*Upgrade existing blower to 30 HP **$????? pending***
- more information pending on blowers, rough price on the new unit, we will confirm more accurately when possible

If the new Pt requirement of < 0,3 is requested rapidly and the influent flow is not increasing, the coagulation tank and flocculation tank will be required immediately.
- mixers, supports, instrumentation and dosing pumps for coagulation and flocculation. **$235,000.00**
- adder to include CRX tanks for coagulation and flocculation **$90,000.00**

Third phase:
- discfilter HSF-2221 with all the options of the first one + pressure cleaning system **$600,000.00**

Jason Boomhour
Municipal Business Development ON & MB
VEOLIA WATER TECHNOLOGIES

Office.: +1 905.286.4846 *2102/ **Cell: +1 519.274.3416**
2000 Argentia Rd, Plaza IV, Suite 430
Mississauga, Ontario, L5N 1W1 Canada
www.veoliawatertech.com

ISO 9001:2015

#Veolia on Social Media

On Thu, Nov 2, 2023 at 1:46 PM Carolyn Chan <cchan@jlrichards.ca> wrote:

Hi Jason,

JLR is currently completing a Master Plan Update for the Village of Casselman's sewage system and I'm leading the Assimilative Capacity Study component. Due to recent growth pressures, the future rated capacity is now 4,050 m3/d and we have been pre-consulting with the MECP regarding two scenarios, one keeping the seasonal discharge (adding additional storage) and the other introducing year-round discharge.

Both scenarios involve increased average flow through the system and some level of tightening of discharge criteria; focus so far has been on Total Ammonia-N and Total Phosphorus.

A key question at this point is to what extent the existing MBBR and Disk Filter could be optimized to meet the new criteria and new loading. The attached presentation includes proposed monthly discharge values and effluent criteria. For now let's assume the incoming sewage from Cell C has the same quality as the original MBBR design basis.

Do you think we could meet sometime next week for a preliminary discussion? Do you have any initial questions or concerns we should look into prior to the discussion?

Thanks,

Carolyn

Carolyn Chan, P.Eng., M.A.Sc.
Environmental Engineer

J.L. Richards & Associates Limited
107 - 450 Speedvale Ave. West, Guelph, ON N1H 7Y6
Direct: 226-780-7367

J.L. Richards & Associates Limited
ENGINEERS · ARCHITECTS · PLANNERS

CANADA BEST MANAGED COMPANIES Platinum member

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Appendix B2

Public Consultation Documents

STAKEHOLDER REVIEW AGENCY LIST
VILLAGE OF CASSELMAN WATER AND WASTEWATER INFRASTRUCTURE MASTER PLAN

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

Agency	Name	Title	Email	Address	Delivery Preference
Algonquins of Ontario – Consultation Office			algonquins@tanakiwin.com	31 Riverside Drive, Suite 101	Email
Canton/Township of Alfred and Plantagenet	Roch Hébert	Public Works Superintendant		205 Old Highway 17 P.O. Box 350, Plantagenet ON K0B 1L0	Hard copy
City of Clarence-Rockland	Philippe Cormier		pcormier@clarence-rockland.com		Email
City of Clarence-Rockland (Clarence-Rockland)	Jean-Luc Jubinville		jjubinville@clarence-rockland.com		Email
Eastern Ontario Health Unit	Rami Basha	Program Manager, Safe Water, Food Safety and Rabies Control	rbasha@eohu.ca	1000 Pitt Street Cornwall ON K6J 5T1	Email
Eastern Ontario Health Unit	Caroline Kuate		ckuate@eohu.ca	1000 Pitt Street Cornwall ON K6J 5T1	Email
Environment and Climate Change Canada	Wesley Plant	Manager, Environmental Assessment Section, Environmental Protection Branch (Ontario Region)	wesley.plant@ec.gc.ca	4905 Dufferin St. Downsview ON M3H 5T4	Email
Fire Services	Alain Ménard	Fire Chief	amenard@casselman.ca	751 St-Jean St. P.O. Box 710 Casselman, ON K0A 1M0	Email
Fisheries and Oceans Canada – Communication Branch			FisheriesProtection@dfo-mpo.gc.ca	200 Kent Street, 13th Floor, Station 13E228, Ottawa ON K1A 0E6	Email
HydroOne			SecondaryLandUse@HydroOne.com		Email
Infrastructure Ontario		Manager, Land Use Planning		1 Dundas St. West, Suite 2000, Toronto ON M5G 2L5	Hard copy
Jacobs	Edouard Bahout		edouard.bahout@jacobs.com		Email
Ministry of Agriculture, Food and Rural Affairs	David Marriott	Rural Planner, Western Ontario Land Use Policy & Stewardship Food Safety and Environmental Policy Branch	david.marriott@ontario.ca	1 Stone Road West, Guelph ON N1G 4Y2	Email
Ministry of Economic Development, Job Creation and Trade	Shireen Mohammed	Manager(A) Corporate Policy Coordination Unit Policy	shireen.mohammed@ontario.ca	56 Wellesley St. W, 11th Flr Toronto ON M5S 2S3	Email
Ministry of Economic Development, Job Creation and Trade	Nathan Hammill	Senior Policy Advisor Corporate Policy Coordination Unit Policy	nathan.hammill@ontario.ca	56 Wellesley St. W, 11th Flr Toronto ON M5S 2S3	Email
Ministry of Citizenship and Multiculturalism	Karla Barboza	Team Lead - Heritage(A), Heritage Planning Unit, Programs and Services Branch	karla.barboza@ontario.ca	400 University Ave, 5th Floor Toronto ON M7A 2R9	Email
Ministry of Citizenship and Multiculturalism	Joseph Harvey	Heritage Planner, Heritage Planning Unit, Programs and Services Branch	Joseph.Harvey@ontario.ca	400 University Ave, 5th Floor Toronto ON M7A 2R9	Email
Ministry of Heritage, Sport, Tourism and Culture Industries - Tourism Policy and Research Branch	James (Jim) Antler	Policy Advisor, Tourism Policy Unit	james.antler@ontario.ca	447 McKeown Avenue, Suite 203 North Bay ON P1B 9S9	Email
Ministry of Indigenous Affairs				160 Bloor St E, 9th Floor Toronto ON M7A 2E6	Contact MECP to determine if the Ministry of Indigenous Affairs should be notified
Ministry of Municipal Affairs and Housing	Michael Elms	Manager, Community Planning and Development, Eastern Ontario Services Office	michael.elms@ontario.ca	8 Estate Lane (Rockwood House) Kingston ON K7M 9A8	1 hard copy
Ministry of Natural Resources and Forestry	Tracy Adams	District Manager, Kemptville, Southern Region, Regional Operations Division	Tracy.Adams2@ontario.ca	Unit 1, 10 Campus Dr, Kemptville, ON K0G 1J0	Email
Ministry of Natural Resources and Forestry		*Contact the local District office to obtain information regarding permits or authorizations that may be required for the master plan:	Kemptville.Inforequest@ontario.ca		Email
Ministry of Northern Development, Mines, Natural Resources and Forestry	Keith Johnston	Environmental Planning Team Lead(A) Strategic and Indigenous Policy Branch	keith.johnston@ontario.ca	99 Wellesley St W Toronto ON M7A 1W3	Email
Ministry of Northern Development, Mines, Natural Resources and Forestry - Northern Development and Mines	Mary Perry	Manager(A) Strategic Support Unit	mary.perry@ontario.ca	10 Campus Drive, Unit 1 Kemptville ON K0G 1J0	Email
Ministry of Northern Development, Mines, Natural Resources and Forestry - Northern Development and Mines	Omerdin Omer	Initiatives Coordinator Strategic Support Unit	omerdin.omer@ontario.ca	10 Campus Drive, Unit 1 Kemptville ON K0G 1J0	Email
Ministry of Northern Development, Mines, Natural Resources and Forestry - Northern Development and Mines	Jennifer Paetz	Initiatives Coordinator Strategic Support Unit	jennifer.paetz@ontario.ca	10 Campus Drive, Unit 1 Kemptville ON K0G 1J0	Email
Ministry of the Environment, Conservation and Parks	Jon K. Orpana	Regional Environmental Planner, Environmental Assessment Branch	Jon.Orpana@ontario.ca	1259 Gardiners Road PO Box 22032 Kingston ON K7M 8S5	Email
Ministry of the Environment, Conservation and Parks	Shannon Hamilton-Browne	Drinking Water and Compliance Supervisor, Ottawa District	Shannon.HamiltonBrowne@ontario.ca		Email
Ministry of the Environment, Conservation and Parks		*Notices to be sent to the following email addresses:	eanotification.eregion@ontario.ca MEANoticesEAAB@ontario.ca		Email both
Ministry of Transportation	Tarique Kamal	Senior Project Manager, Corridor Management, East Operations	Tarique.Kamal@ontario.ca		Email
Ministry of Transportation	Kartik Suresh		Kartik.Suresh@ontario.ca		Email
Mohawk Council of Akwesasne	Kayla Sunday	Environmental Science Officer	kayla.sunday@akwesasne.ca	101 Tewesateni Road, Akwesasne Ontario, K6H 5R7	Email
Mohawk Council of Akwesasne	Leslie Papineau	Director of DIHE, MCA	leslie.papineau@akwesasne.ca	101 Tewesateni Road, Akwesasne Ontario, K6H 5R7	Email
Ottawa Region Métis Council	Erik Gjos	President	president.ormc@gmail.com	214 Montreal Rd, Suite 400. Ottawa, ON, K1T 5H1	Email and Hard Copy
Raisin Region Conservation Authority	Jason Symington	Water Resources Speacialist, Engineering	jason.symington@rrca.on.ca	18045 County Rd. 2, Cornwall, ON K6H 5T2	Email
South Nation Conservation	Sandra Mancini		SMancini@nation.on.ca	38 Victoria Street PO Box 29 Finch ON K0C 1K0	Email
South Nation Conservation	Shahin Zand		szand@nation.on.ca		Email
The Nation Municipality	Pierre Leroux	Chief Administrative Officer	pleroux@nationmun.ca	958 Route 500 West, Casselman ON K0A 1M0	Email

STAKEHOLDER REVIEW AGENCY LIST
VILLAGE OF CASSELMAN WATER AND WASTEWATER INFRASTRUCTURE MASTER PLAN

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

The Nation Municipality	Sébastien Mainville		smainville@nationmun.ca	958 Route 500 West, Casselman ON K0A 1M0	Email
The Nation Municipality	Marc Legault		mlegault@nationmun.ca	958 Route 500 West, Casselman ON K0A 1M0	Email
The Nation Municipality	Nadia Knebel		nknebel@nationmun.ca	958 Route 500 West, Casselman ON K0A 1M0	Email
The Nation Municipality	Marc-Olivier Gratton		mogratton@nationmun.ca	958 Route 500 West, Casselman ON K0A 1M0	Email
The Nation Municipality	Nicholas Pigeon		npigeon@nationmun.ca	958 Route 500 West, Casselman ON K0A 1M0	Email
United Counties of Prescott-Russell - Planning and Forestry Department	Louis Prévost	Director of Planning and Forestry	louisprevost@prescott-russell.on.ca	59 Court Street, PO Box 304, L'Original ON K0B 1K0	Email
United Counties of Prescott-Russell - Planning and Forestry Department	Pier-Luc Mainville	Engineer of Planning and Forestry	plmainville@prescott-russell.on.ca	59 Court Street, PO Box 304, L'Original ON K0B 1K0	Email
[redacted]	[redacted]		[redacted]		[redacted]
[redacted]	[redacted]		[redacted]		[redacted]

Notice of Study Commencement

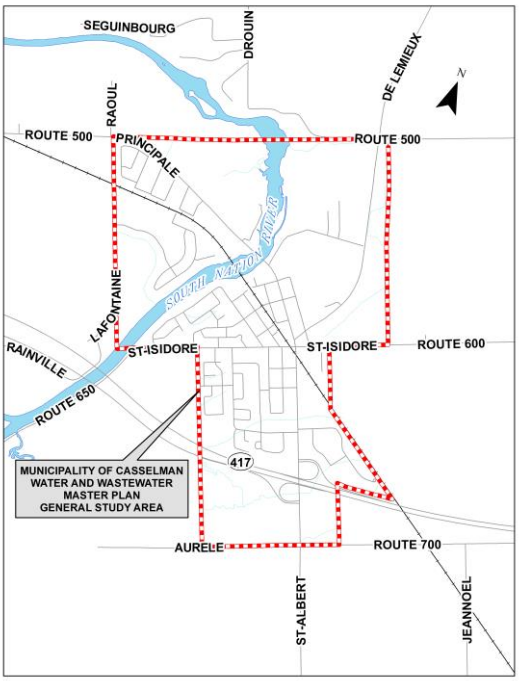
The Municipality of Casselman
Water and Wastewater Infrastructure Master Plan

The Municipality of Casselman (the Municipality) has initiated a Master Planning process in accordance with Approach 1 of the Municipal Engineers Association (MEA) Class Environmental Assessment (Class EA) to develop a Water and Wastewater Infrastructure Master Plan.

How Will This Affect Me?

The Master Plan study is assessing various options to improve the performance and reliability of the water and wastewater treatment and sewage collection systems to ensure they can be relied upon to accommodate current and future flows generated within the Municipality.

Public and agency consultation is a key part of the Master Planning process. Based on your input, the Master Plan study will identify preferred solution(s) that will benefit the community over the short, mid, and long terms.



How Do I Get More Information?

A Public Information Centre will be held in late 2022 prior to confirming the preferred solution(s). In the meantime, the study team will be reviewing background information and determining alternative solutions. You can contact a member of the study team listed below with any questions or to provide input on the Master Plan study. Updates will also be provided throughout the Master Plan study on the Municipality's website.

Susan Jingmiao Shi, P.Eng., M.Eng.
Senior Environmental Engineer
J.L. Richards & Associates Limited
203-863 Princess Street
Kingston, ON K7L 5N4
sshi@jlrichards.ca

Pierre-Paul Beauchamp
Director of Public Works
Municipality of Casselman
751 St-Jean Street
Casselman, ON K0A 1M0
ppbeauchamp@casselman.ca

This study is being conducted according to the requirements of Approach 1 of a Master Plan under the Ontario Municipal Class Environmental Assessment process (October 2000, as amended in 2015).

This Notice was issued on June 9, 2022.

Municipality of Casselman
Municipal Class Environmental Assessment
Water and Wastewater Infrastructure Master Plan

AGENCY / STAKEHOLDER RESPONSE FORM

DATE:

Name:

Agency:

1) Is your agency interested in being involved in this project? YES ☐ NO ☐

2) If you are interested in being involved in this project, please identify a contact person:

Name and Title:

Address:

Telephone: (_____) _____ Fax: (_____)_____

E-mail:

3) If you presently have any comments or questions about this project please outline them below or attach on a separate sheet of paper.

4) Do you have any information regarding the Study Area that will assist us in our planning process? If so, please outline below or attach on a separate sheet of paper.

Please submit to:

Susan Shi, P.Eng.
Assistant Project Manager
J.L. Richards & Associates Limited
203-863 Princess Street
Kingston, ON K7L 5N4
343-302-5425
sshi@jlrichards.ca

Note: If you wish to respond via email, please write directly on the form and scan a copy before emailing it to the address above. Comments and information regarding this Study are being collected to assist the Ministry in meeting the requirements of the EA Act. This material will be maintained on file for use during the Study and may be included in project documentation. With the exception of personal information, all comments will become part of the public record.

Avis de Début D'Étude

À VOUS LA PAROLE

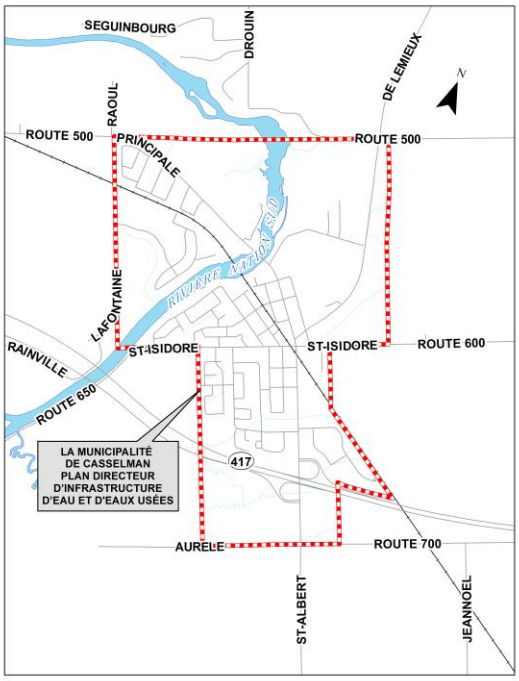
La Municipalité de Casselman
Plan Directeur D'Infrastructure d'Eau et d'Eaux Usées

La Municipalité de Casselman (la Municipalité) entreprend un processus de plan directeur selon l'Approche 1 de plan directeur dans le cadre du processus d'étude environnementale de portée générale de l'association « Municipal Engineers Association (MEA) », afin de développer un Plan Directeur d'Infrastructure d'Eau et D'Eaux Usées.

En quoi cela vous concerne?

L'étude évaluera plusieurs options pour améliorer la performance et la fiabilité des systèmes approvisionnement d'eau potable et d'assainissement d'eaux usées, afin de satisfaire les besoins actuels et futurs de la Municipalité.

La consultation des partis prenants (public et agence) fait partie intégrante du processus de plan directeur. Vos commentaires aideront à identifier et évaluer les impacts communautaires, environnementaux et économiques des options proposées, et développer les solutions préférées qui profiteront la communauté aux court, moyen et long terme.



Vous voulez plus d'information?

Une séance d'information publique aura lieu fin 2022, avant de finaliser la solutions privilégiée. Entre temps, l'équipe d'étude examinera les données de fonds et identifiera les alternatives possibles. Vous êtes invités à contacter les membres de l'équipe d'étude identifier ci-dessous avec vos questions, commentaires ou demande de renseignements. Des mises à jour seront également fournit tout au long de l'étude sur le site Web de la Municipalité.

Susan Jingmiao Shi, P.Eng., M.Eng.
Ingénieure sénior en environment
J.L. Richards & Associates Limited
203-863 rue Princess
Kingston, ON K7L 5N4
sshi@jlrichards.ca

Pierre-Paul Beauchamp
Directeur
Services environnementaux
Municipalité de Casselman
751 rue St-Jean
Casselman, ON K0A 1M0
ppbeauchamp@casselman.ca

Cette étude conforme aux conditions de l'approche 1 de plan directeur dans le cadre du processus d'étude environnementale de portée générale des municipalités de l'Ontario (octobre 2000, tel que modifié en 2015).

Cet avis publié le 9 juin 2022.

Municipalité de Casselman
Évaluation environnementale de portée municipale
Plan directeur de l'infrastructure d'approvisionnement en eau et de traitement des eaux usées

FORMULAIRE DE RÉPONSE DE L'AGENCE ET DES INTERVENANTS

DATE:

NOM:

Agence:

1) Votre agence est-elle intéressée à participer à ce projet ?? OUI ☐ NON ☐

2) Si vous souhaitez participer à ce projet, veuillez désigner une personne-ressource:

Nom et titre:

Adresse:

Téléphone: (_____) _____Télécopieur: (_____) _____

Courriel:

3) Si vous avez actuellement des commentaires ou des questions au sujet de ce projet, veuillez les décrire ci-dessous ou les joindre sur une feuille de papier séparée.

4) Avez-vous des renseignements sur la zone d'étude qui nous aideront dans notre processus de planification? Si c'est le cas, veuillez décrire ci-dessous ou joindre sur une feuille de papier séparée.

S'il vous plaît soumettre à:

Susan Jingmiao Shi, P.Eng., M.Eng.
Ingénieure sénior en environment
J.L. Richards & Associates Limited
203-863 rue Princess
Kingston, ON K7L 5N4
Téléphone: 343-302-5425
sshi@jlrichards.ca

Remarque : Si vous souhaitez répondre par courriel, veuillez écrire directement sur le formulaire et numériser une copie avant de l'envoyer par courriel à l'adresse ci-dessus. Des commentaires et des renseignements concernant cette étude sont recueillis pour aider le ministère à satisfaire aux exigences de la Loi sur l'EE. Ce matériel sera conservé au dossier pour être utilisé pendant l'étude et pourrait être inclus dans la documentation du projet. À l'exception des renseignements personnels, tous les commentaires feront partie du dossier public.

From: Algonquins of Ontario Consultation Office <algonquins@tanakiwin.com>
Sent: June 9, 2022 8:59 AM
To: Meaghan Keon
Subject: Automatic reply: [16953-118] The Municipality of Casselman - Water and Wastewater Infrastructure Master Plan

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Thank you for contacting the Algonquins of Ontario Consultation Office. This automated response is your assurance that your message has been received by this office and will be reviewed as soon as resources permit. Due to the high volume of correspondence received by this office, we are not able to respond personally to every inquiry.

Please do not hesitate to contact our office at the coordinates below should you have any questions regarding the status of your query.

This automated message may not be relied upon to fulfil, in whole or part, any duty to consult the Algonquins of Ontario.

****Important Notice****

Thank you for your email message.

In light of the ongoing developments resulting from the novel Coronavirus (COVID-19), the Algonquins of Ontario are taking proactive steps to keep our employees and workplace safe and secure.

Effective Monday, March 16, 2020 the AOO Consultation Office will be closed until further notice.

During this time, to maintain our business continuity, we will be monitoring emails and will respond when possible. If you require immediate assistance or have any pressing inquiries, please contact our general inbox at algonquins@tanakiwin.com or visit our website at www.tanakiwin.com.

Thank you for your patience, understanding and support.

Ashley (Bernard) Keller
Consultation Administrator
Algonquins of Ontario Consultation Office

From: Plant,Wesley (ECCC) <Wesley.Plant@ec.gc.ca>
Sent: June 9, 2022 8:56 AM
To: Meaghan Keon
Subject: Automatic reply: [16953-118] The Municipality of Casselman - Water and Wastewater Infrastructure Master Plan

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I am currently out of the office, returning on Tuesday June 14th.

I will respond to your e-mail upon my return. For urgent matters please contact Rob Clavering at robert.clavering@ec.gc.ca

From: Susan Jingmiao Shi
Sent: June 16, 2022 11:41 AM
To: Meaghan Keon
Subject: FW: The Municipality of Casselman....
Attachments: doc07095320220615164043.pdf

For file.

From: Rami Basha <rbasha@eohu.ca>
Sent: Thursday, June 16, 2022 11:23 AM
To: Susan Jingmiao Shi <sshi@jlrichards.ca>; Pierre Paul Beauchamp <ppbeauchamp@casselman.ca>
Cc: Caroline Kuate <ckuate@eohu.ca>
Subject: The Municipality of Casselman....

[CAUTION] This email originated from outside JLR. Do not click links or open attachments unless you recognize the sender and know the content is safe. If in doubt, please forward suspicious emails to Helpdesk.

Hello Susan and Pierre,

Thank you, for sending us the Notice of Study Commencement. Could you please, share with us updates as the study/project progress?

Regards,

Rami Basha, MPH, CPHI(C)
Program Manager, Safe Water, Food Safety and Rabies Control
Gestionnaire de programme, salubrité de l'eau, des aliments et contrôle de la rage

1000 rue Pitt Street, Cornwall, ON, K6J 5T1
Tel/tél. : 613-933-1375 ext.1269
Fax/télécopieur : 613-933-7930

Eastern Ontario Health Unit
www.EOHU.ca | Twitter | Facebook | YouTube | Instagram

Bureau de santé de l'est de l'Ontario
www.BSEO.ca | Twitter | Facebook | YouTube | Instagram

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From: Susan Jingmiao Shi
Sent: June 27, 2022 10:17 AM
To: Meaghan Keon
Subject: FW: Hydro One Response: 20220623-NoticeOfCommence-Water and Wastewater Infrastructure Master Plan
Attachments: 20220623-NoticeOfCommence-Water and Wastewater Infrastructure Master Plan.pdf

For file.

Thanks!
Susan

-----Original Message-----
From: SUN Hongxia <Susan.SUN@HydroOne.com> On Behalf Of SECONDARY LAND USE Department
Sent: Thursday, June 23, 2022 9:54 AM
To: Susan Jingmiao Shi <sshi@jlrichards.ca>
Cc: SECONDARY LAND USE Department <Department.SecondaryLandUse@hydroone.com>; ppbeauchamp@casselman.ca
Subject: Hydro One Response: 20220623-NoticeOfCommence-Water and Wastewater Infrastructure Master Plan

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Please see the attached for Hydro One's Response.

Hydro One Networks Inc
SecondaryLandUse@HydroOne.com

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Hydro One Networks Inc.

483 Bay Street
8th Floor South Tower
Toronto, Ontario M5G 2P5

HydroOne.com

June 23, 2022

Re: Water and Wastewater Infrastructure Master Plan

Attention:
Susan Jingmiao Shi, P.Eng., M.Eng.
Senior Environmental Engineer
J.L. Richards & Associates Limited

Thank you for sending us notification regarding (Water and Wastewater Infrastructure Master Plan). In our preliminary assessment, we have confirmed that Hydro One has existing distribution assets within your study area.

At this time, we do not have sufficient information to comment on the potential resulting impacts that your project may have on our infrastructure. As such, we must stay informed as more information becomes available so that we can advise if any of the alternative solutions present actual conflicts with our assets, and if so; what resulting measures and costs could be incurred by the proponent. Note that this response does not constitute approval for your plans and is being sent to you as a courtesy to inform you that we must continue to be consulted on your project.

Hydro One must be consulted during all stages of your project. Please ensure that all future communications about this and future project(s) are sent to us electronically to secondarylanduse@hydroone.com

Sent on behalf of,

Secondary Land Use
Asset Optimization
Strategy & Integrated Planning
Hydro One Networks Inc.

From: Meaghan Keon
Sent: June 10, 2022 3:20 PM
To: Orpana, Jon (MECP)
Cc: Susan Jingmiao Shi
Subject: RE: [16953-118] The Municipality of Casselman - Water and Wastewater Infrastructure Master Plan
Attachments: 2022-06-09 Copy of streamlined_ea_project_information_form.xlsx

Hi Jon,

Please find completed form attached.

Thanks,
Meaghan

From: Orpana, Jon (MECP) <Jon.Orpana@ontario.ca>
Sent: June 9, 2022 9:43 AM
To: Meaghan Keon <mkeon@jlrichards.ca>
Subject: RE: [16953-118] The Municipality of Casselman - Water and Wastewater Infrastructure Master Plan

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Hello Meaghan,

Thanks for this. MECP also requires a Project Information form to be filled out in EXCEL format. This has been part of the Notice of Commencement process since May of 2018.

Form is attached for your reference.

Thanks in advance.

Jon

Jon K. Orpana
Regional Environmental Planner
Environmental Assessment Branch
Ministry of the Environment, Conservation and Parks
Kingston Regional Office
PO Box 22032, 1259 Gardiners Road
Kingston, Ontario

K7M 8S5
Phone: (613) 548-6918
Fax: (613) 548-6908
Email: jon.orpana@ontario.ca

From: Meaghan Keon <mkeon@jlrichards.ca>
Sent: June 9, 2022 8:58 AM
To: Orpana, Jon (MECP) <Jon.Orpana@ontario.ca>
Cc: Susan Jingmiao Shi <sshi@jlrichards.ca>
Subject: [16953-118] The Municipality of Casselman - Water and Wastewater Infrastructure Master Plan

CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Greetings,

The Municipality of Casselman has initiated a Water and Wastewater Infrastructure Master Planning process in accordance with Approach 1 of the Municipal Engineers Association (MEA) Class Environmental Assessment (Class EA). The purpose of the study is to evaluate alternatives to expand and/or upgrade and access the feasibility of improving water and wastewater infrastructure for future development in Casselman.

A Notice of Commencement is being mailed/emailed to residents in the study area and to agencies and organizations that may have an interest in the Master Plan. A copy of the Notice is attached for your information. You are invited to join our mailing list and/or provide comments as the study progresses.

Comments on this study can be emailed or mailed to the address provided in the Notice of Commencement. If you have any questions or concerns, please contact the undersigned.

Meaghan

You are receiving this Notice as you have been identified as a potential stakeholder. If you wish to be removed from the mailing list, please reply with subject line "unsubscribe".

Meaghan Keon
Environmental Engineering Intern

J.L. Richards & Associates Limited
700 - 1565 Carling Avenue, Ottawa, ON K1Z 8R1
Direct: 343-804-5350

J.L. Richards & Associates Limited
ENGINEERS · ARCHITECTS · PLANNERS

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From: Susan Jingmiao Shi
Sent: June 27, 2022 9:57 AM
To: Meaghan Keon
Subject: FW: Municipality of Casselman - Water and Wastewater Infrastructure Master Plan NOC Response
Attachments: We found suspicious links; Supporting Attachment - Proponent's Intro to Delegation of Procedural Aspects of Consultation with Aboriginal Communities.docx; Supporting Attachment - Species at Risk Proponents Guide to Preliminary Screening (Draft May 2019).pdf

For file.

Please review the attached documents, update the consultation list if necessary.

Susan

From: Orpana, Jon (MECP) <Jon.Orpana@ontario.ca>
Sent: Tuesday, June 21, 2022 1:55 PM
To: ppbeauchamp@casselman.ca; Susan Jingmiao Shi <sshi@jlrichards.ca>
Cc: Primeau, Charlie (MECP) <Charlie.Primeau@ontario.ca>
Subject: Municipality of Casselman - Water and Wastewater Infrastructure Master Plan NOC Response

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Hello Pierre-Paul Beauchamp,

Please find MECP's preliminary comments on the above mentioned file. Included is the minimum list for Indigenous Community consultation.

There are also a number of attachments and imbedded links which you may find helpful.

Regards,

Jon

Jon K. Orpana
Regional Environmental Planner
Environmental Assessment Branch
Ministry of the Environment, Conservation and Parks
Kingston Regional Office
PO Box 22032, 1259 Gardiners Road
Kingston, Ontario
K7M 8S5

Phone: (613) 548-6918
Fax: (613) 548-6908
Email: jon.orpana@ontario.ca

Ministry of the Environment, Conservation and Parks

Environmental Assessment Branch

1st Floor
135 St. Clair Avenue W
Toronto ON M4V 1P5
Tel.: 416 314-8001
Fax.: 416 314-8452

Ministère de l'Environnement, de la Protection de la nature et des Parcs

Direction des évaluations environnementales

Rez-de-chaussée
135, avenue St. Clair Ouest
Toronto ON M4V 1P5
Tél. : 416 314-8001
Téléc. : 416 314-8452

By email only

June 21, 2022

Municipality of Casselman
Director of Public Works
751 St-Jean Street
Casselman, ON K0A 1M0

Attention: Pierre-Paul Beauchamp, Director of Public Works
ppbeauchamp@casselman.ca

Dear Pierre-Paul Beauchamp,

Re: Water and Wastewater Infrastructure Master Plan – Notice of Commencement Class Environmental Assessment – Municipality of Casselman

Thank you for the Notice of Study Commencement provided by email on June 9th 2022. The notice indicates that the Municipality of Casselman is undertaking a Water and Wastewater Master Servicing Infrastructure Master Plan addressing Phases 1 and 2 of the Municipal Class Environmental Assessment (Class EA), June 2000, as amended in 2015.

As highlighted in the Notice of Commencement the Master Plan is intended to follow "Approach 1" of the Class EA, a process that will be done at a broad level of assessment to identify a conceptual plan for water and wastewater servicing in the Municipality. The project is intended to address municipal improvement and growth opportunities.

Here are MECP preliminary comments on the project. Please consider these comments as you proceed through the Class EA process. The comments are grouped under these headings:

- Class EA process,
- MECP technical review issues,
- Aboriginal consultation

Class Environmental Assessment Process

Notification

As the Regional EA Coordinator for this project, I will be responsible for circulating project notices and information to MECP reviewers and coordinating the MECP response during the Class EA process. I am the mandatory contact for all notices issued for the project.

- Please provide copies of all notices by email (pdf) to the regional Email address at eanotification.eregion@ontario.ca. Notices of Completion must be sent to the ministry in accordance with section 15.1 (1) of the amended *Environmental Assessment Act.*
- Please provide scanned copies of the notices as they appear in newspapers and confirm the dates of publication.

Please contact:

Jon Orpana, Environmental Assessment Coordinator
Ministry of the Environment, Conservation and Parks
1259 Gardiners Road
P.O. Box 22032
Kingston, Ontario
K7M 8S5
email: jon.orpana@ontario.ca

Notice of Completion

It is acknowledged that the Proponent is following approach #1 for Master Plans. Approach #1 involves the Master Plan being done at a broad level of assessment thereby requiring more detailed investigations at the project-specific level in order to fulfil the Municipal Class EA documentation requirements for the specific Schedule B and C projects identified within the Master Plan. The Master Plan would therefore

become the basis for, and be used in support of, future investigations for the specific Schedule B and C projects identified within it. Schedule B projects would require the filing of the Project file for public review while Schedule C projects would have to fulfil Phases 3 and 4 prior to filing an Environmental Study Report for public review.

Once the Master Plan report is finalized, the proponent must issue a Notice of Completion providing a minimum 30-day period during which documentation may be reviewed and comment and input can be submitted to the Proponent, prior to being approved by the municipality. As the Section 16 Order provisions only apply to specific projects completing the Class EA process and not the Master Plan document itself, there are no Section 16 Order provisions at the time of completion of the Master Plan for approach #1. Projects identified in the Master Plan will be subject to Section 16 Order provisions at the time of filing of a Project File (Schedule B) or Environmental Study Report (Schedule C).

Master Plan Process

The Master Plan process is discussed in section A.2.7 and Appendix 4 of the Class EA. Appendix 4 of the Class EA sets out different approaches that could be followed, and includes sample notices. Again we note that approach 1 is being followed.

The proponent should be aware that copies of notices must be provided to the Director of this ministry's Environmental Approvals Branch, with a brief summary of how the Master Plan followed the Class EA requirements. This information is required to be sent to EAB for tracking purposes, to monitor the effectiveness of the Master Plan approach at MEANoticesEAAB@ontario.ca.

The Master Plan document should clearly define the projects which will be carried out under the Master Plan, the appropriate schedule for each project, future documentation or studies that will be needed, and future public consultation opportunities for each project or class of projects. The Master Plan should also explain the appeal mechanisms for the projects in the plan (for example, opportunities to request a Section 16 Order at a later date, appeal to OLT if integration with a Planning Act approval is proposed). We recommend that the Master Plan include a chart which summarizes the above information.

As the Master Plan is intended to satisfy Phases 1 and 2 of the Municipal Class EA process, the Master Plan should evaluate alternatives and identify impacts to the environment. The description and evaluation of alternatives should be completed in sufficient detail to allow any reviewer to understand the advantages and disadvantages of each alternative and the rationale for selecting the preferred alternative. The Master

Plan may also identify technical studies that will be carried out in future as the individual projects within the Master Plan are further developed.

Consultation with Review Agencies

In addition to public consultation, consultation with review agencies is an important component of the Class EA process. Please ensure that you contact review agencies directly to determine their interest in the project at the Notice of Commencement stage.

The MECP Regional office is a mandatory contact for all notices. In addition, other ministries and agencies that may have an interest in the project are listed in section A.3.6 and Appendices 3 and 7. The provincial ministries that are most often involved in Class EA project review include the Ministry of Municipal Affairs (for example, expansion of settlement boundaries, consistency with Growth Plan), Ministry of Natural Resources and Forestry (for example, significant wetlands), and Ministry of Tourism, Culture and Sport (for example, cultural heritage or archaeological resources).

The Master Plan should consider any impacts to servicing policies for the area. For example, the Province does not support growth on partial services. In addition, expansion of settlement boundaries may have implications for the Official Plan. We recommend that the local Ministry of Municipal Affairs Municipal Services Office be included in the government review agency consultation list for this project.

The final report should include information on correspondence with review agencies, issues raised by reviewers, and how these issues will be addressed. This could include technical studies or other information, and commitments to obtain specific approvals or permits.

We normally recommend that intermediate reports or Technical Memoranda, be prepared and circulated for comment before the final Report is prepared. This is not a requirement of the Municipal Class Environmental Assessment (Class EA) process; however, it can ensure that consultation with review agencies is carried out in an effective way and that technical comments are received from agencies before the report is finalized.

<u>MECP Technical Review</u>

This Ministry's technical review of infrastructure projects could consider:

- problems identified during MECP inspections of the existing facilities,
- impacts to the receiving water body due to increased volumes of sewage treatment plant effluent,
- impacts to source protection areas,
- quality of the drinking water source,

- potential to impact wells during operation of an expanded municipal water supply,
- impacts to groundwater and surface water due to construction (i.e. dewatering of trenches during installation of sewers and watermains, control of erosion and sedimentation, construction and/or dredging at outfall or intake locations),
- potential for encountering landfill sites, contaminated soil, contaminated sediment or groundwater during construction,
- management of excess materials, waste, contaminated soil and groundwater during construction,
- noise and air quality impacts to nearby residents or planned subdivisions,
- information on inflow and infiltration to the sewage collection system and remedial measures under consideration,
- information on the available capacity at sewage or water treatment plants to service design population,
- proposed water and sewage service areas.
- consideration of Species at Risk,
- consideration of Climate Change,

These environmental issues, and appropriate mitigation measures, should be addressed during the Class EA process. Further information on the forging list can be found in the areas of interest attachment.

We recommend that you contact this office as soon as possible during the environmental assessment process if you become aware of:

- contaminated sites in the study area or influence area of the project,
- a source water protection vulnerable area in the vicinity of the project, or
- issues that are contentious to the general public.

Consultation with First Nation and Métis Communities

The Crown has a legal duty to consult Aboriginal communities when it has knowledge, real or constructive, of the existence or potential existence of an Aboriginal or treaty right and contemplates conduct that may adversely impact that right. Before authorizing this project, the Crown must ensure that its duty to consult has been fulfilled, where such a duty is triggered. Although the duty to consult with Aboriginal peoples is a duty of the Crown, the Crown may delegate procedural aspects of this duty to project proponents while retaining oversight of the consultation process.

The proposed project may have the potential to affect Aboriginal or treaty rights protected under Section 35 of Canada's *Constitution Act* 1982. Where the Crown's duty to consult is triggered in relation to the proposed project**, the MECP is delegating the**

procedural aspects of rights-based consultation to the proponent through this letter. The Crown intends to rely on the delegated consultation process in discharging its duty to consult and maintains the right to participate in the consultation process as it sees fit.

Based on information provided to date and the Crown`s preliminary assessment the proponent is required to consult with the following communities who have been identified as potentially affected by the proposed project:

- **Algonquins of Ontario (AOO)**

Steps that the proponent may need to take in relation to Aboriginal consultation for the proposed project are outlined in the "Code of Practice for Consultation in Ontario's Environmental Assessment Process". Additional information related to Ontario's Environmental Assessment Act is available online at: www.ontario.ca/environmentalassessments.

Please also refer to the attached document "A Proponent's Introduction to the Delegation of Procedural Aspects of consultation with Aboriginal Communities" for further information, including the MECP's expectations for EA report documentation related to consultation with communities.

The proponent must contact the Director of Environmental Assessment Branch (EABDirector@ontario.ca) under the following circumstances subsequent to initial discussions with the communities identified by the MECP:

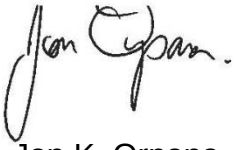
- Aboriginal or treaty rights impacts are identified to you by the communities;
- You have reason to believe that your proposed project may adversely affect an Aboriginal or treaty right;
- Consultation with Indigenous communities or other stakeholders has reached an impasse; or
- A Section 16 Order request is expected on the basis of impacts to Aboriginal or treaty rights

The MECP will then assess the extent of any Crown duty to consult for the circumstances and will consider whether additional steps should be taken, including what role you will be asked to play should additional steps and activities be required.

Thank you for your notification regarding this project and your ongoing care of the environment.

If you have questions or concerns about the above comments, please contact this office. I have appended some resources which you may find useful in consideration of some subject areas which are of interest to this ministry.

Regards,



Jon K. Orpana
Environmental Planner & Environmental Assessment Coordinator
Ministry of the Environment, Conservation and Parks
Kingston Regional Office
PO Box 22032, 1259 Gardiners Road
Kingston, Ontario
K7M 8S5

Phone: (613) 548-6918
Fax: (613) 548-6908
Email: jon.orpana@ontario.ca

EC.

Susan Jingmiao Shi, P. Eng., M. Eng.,
Senior Environmental Engineer
J.L. Richards and Associates Limited
sshi@jlrichards.ca

Mr. Charlie Primeau, Drinking Water and Compliance Supervisor
Peterborough District
Ministry of Environment Conservation and Parks
Charlie Primeau@ontario.ca

Encl. Areas of Interest

AREAS OF INTEREST (v. February 2021)

It is suggested that you check off each section after you have considered / addressed it.

☐ **Planning and Policy**

- Projects located in MECP Eastern Region may be subject to the Oak Ridges Moraine Conservation Plan (2017), Greenbelt Plan (2017) or Lake Simcoe Protection Plan (2014). Applicable plans and the applicable policies should be identified in the report, and the proponent should describe how the proposed project adheres to the relevant policies in these plans.

- The **Provincial Policy Statement (2020)** contains policies that protect Ontario's natural heritage and water resources. Applicable policies should be referenced in the report, and the proponent should describe how the proposed project is consistent with these policies.

- In addition to the provincial planning and policy level, the report should also discuss the planning context at the municipal and federal levels, as appropriate.

☐ **Source Water Protection**

The *Clean Water Act*, 2006 (CWA) aims to protect existing and future sources of drinking water. To achieve this, several types of vulnerable areas have been delineated around surface water intakes and wellheads for every municipal residential drinking water system that is located in a source protection area. These vulnerable areas are known as a Wellhead Protection Areas (WHPAs) and surface water Intake Protection Zones (IPZs). Other vulnerable areas that have been delineated under the CWA include Highly Vulnerable Aquifers (HVAs), Significant Groundwater Recharge Areas (SGRAs), Event-based modelling areas (EBAs), and Issues Contributing Areas (ICAs). Source protection plans have been developed that include policies to address existing and future risks to sources of municipal drinking water within these vulnerable areas.

Projects that are subject to the Environmental Assessment Act that fall under a Class EA, or one of the Regulations, have the potential to impact sources of drinking water if they occur in designated vulnerable areas or in the vicinity of other at-risk drinking water systems (i.e. systems that are not municipal residential systems). MEA Class EA projects may include activities that, if located in a vulnerable area, could be a threat to sources of drinking water (i.e.

have the potential to adversely affect the quality or quantity of drinking water sources) and the activity could therefore be subject to policies in a source protection plan. Where an activity poses a risk to drinking water, policies in the local source protection plan may impact how or where that activity is undertaken. Policies may prohibit certain activities, or they may require risk management measures for these activities. Municipal Official Plans, planning decisions, Class EA projects (where the project includes an activity that is a threat to drinking water) and prescribed instruments must conform with policies that address significant risks to drinking water and must have regard for policies that address moderate or low risks.

- In October 2015, the MEA Parent Class EA document was amended to include reference to the Clean Water Act (Section A.2.10.6) and indicates that proponents undertaking a Municipal Class EA project must identify early in their process whether a project is or could potentially be occurring with a vulnerable area. **Given this requirement, please include a section in the report on source water protection.**

    - The proponent should identify the source protection area and should clearly document how the proximity of the project to sources of drinking water (municipal or other) and any delineated vulnerable areas was considered and assessed. Specifically, the report should discuss whether or not the project is located in a vulnerable area and provide applicable details about the area.

    - If located in a vulnerable area, proponents should document whether any project activities are prescribed drinking water threats and thus pose a risk to drinking water (this should be consulted on with the appropriate Source Protection Authority). Where an activity poses a risk to drinking water, the proponent must document and discuss in the report how the project adheres to or has regard to applicable policies in the local source protection plan. This section should then be used to inform and be reflected in other sections of the report, such as the identification of net positive/negative effects of alternatives, mitigation measures, evaluation of alternatives etc.

- While most source protection plans focused on including policies for significant drinking water threats in the WHPAs and IPZs it should be noted that even though source protection plan policies may not apply in HVAs, these are areas where aquifers are sensitive and at risk to impacts and within these areas, activities may impact the quality of sources of drinking water for systems other than municipal residential systems.

- In order to determine if this project is occurring within a vulnerable area, proponents can use this mapping tool: http://www.applications.ene.gov.on.ca/swp/en/index.php. Note that various layers (including WHPAs, WHPA-Q1 and WHPA-Q2, IPZs, HVAs, SGRAs, EBAs, ICAs) can be turned on through the “Map Legend” bar on the left. The mapping tool will also

provide a link to the appropriate source protection plan in order to identify what policies may be applicable in the vulnerable area.

- For further information on the maps or source protection plan policies which may relate to their project, proponents must contact the appropriate source protection authority. **Please consult with the local source protection authority to discuss potential impacts on drinking water. Please document the results of that consultation within the report and include all communication documents/correspondence.**

More Information
For more information on the *Clean Water Act*, source protection areas and plans, including specific information on the vulnerable areas and drinking water threats, please refer to Conservation Ontario's website where you will also find links to the local source protection plan/assessment report.

A list of the prescribed drinking water threats can be found in section 1.1 of Ontario Regulation 287/07 made under the *Clean Water Act*. In addition to prescribed drinking water threats, some source protection plans may include policies to address additional "local" threat activities, as approved by the MECP.

☐ **Climate Change**

The document "Considering Climate Change in the Environmental Assessment Process" (Guide) is now a part of the Environmental Assessment program's Guides and Codes of Practice. The Guide sets out the MECP's expectation for considering climate change in the preparation, execution and documentation of environmental assessment studies and processes. The guide provides examples, approaches, resources, and references to assist proponents with consideration of climate change in EA. Proponents should review this Guide in detail.

- **The MECP expects proponents of Class EA projects to:**

1. Consider during the assessment of alternative solutions and alternative designs, the following:
    a. the project's expected production of greenhouse gas emissions and impacts on carbon sinks (climate change mitigation); and
    b. resilience or vulnerability of the undertaking to changing climatic conditions (climate change adaptation).
2. Include a discrete section in the report detailing how climate change was considered in the EA.

How climate change is considered can be qualitative or quantitative in nature and should be scaled to the project's level of environmental effect. In all instances, both a project's impacts on climate change (mitigation) and impacts of climate change on a project (adaptation) should be considered.

- The MECP has also prepared another guide to support provincial land use planning direction related to the completion of energy and emission plans. The "Community Emissions Reduction Planning: A Guide for Municipalities" document is designed to educate stakeholders on the municipal opportunities to reduce energy and greenhouse gas emissions, and to provide guidance on methods and techniques to incorporate consideration of energy and greenhouse gas emissions into municipal activities of all types. We encourage you to review the Guide for information.

Air Quality, Dust and Noise

- If there are sensitive receptors in the surrounding area of this project, a quantitative air quality/odour impact assessment will be useful to evaluate alternatives, determine impacts and identify appropriate mitigation measures. The scope of the assessment can be determined based on the potential effects of the proposed alternatives, and typically includes source and receptor characterization and a quantification of local air quality impacts on the sensitive receptors and the environment in the study area. The assessment will compare to all applicable standards or guidelines for all contaminants of concern. **Please contact this office for further consultation on the level of Air Quality Impact Assessment required for this project if not already advised.**

- If a quantitative Air Quality Impact Assessment is not required for the project, the MECP expects that the report contain a qualitative assessment which includes:

    - A discussion of local air quality including existing activities/sources that significantly impact local air quality and how the project may impact existing conditions;
    - A discussion of the nearby sensitive receptors and the project's potential air quality impacts on present and future sensitive receptors;
    - A discussion of local air quality impacts that could arise from this project during both construction and operation; and
    - A discussion of potential mitigation measures.

- As a common practice, "air quality" should be used an evaluation criterion for all road projects.

- Dust and noise control measures should be addressed and included in the construction plans to ensure that nearby residential and other sensitive land uses within the study area are not adversely affected during construction activities.

- The MECP recommends that non-chloride dust-suppressants be applied. For a comprehensive list of fugitive dust prevention and control measures that could be applied, refer to *Cheminfo Services Inc. Best Practices for the Reduction of Air Emissions from Construction and Demolition Activities* report prepared for Environment Canada. March 2005.
- The report should consider the potential impacts of increased noise levels during the operation of the completed project. The proponent should explore all potential measures to mitigate significant noise impacts during the assessment of alternatives.

Ecosystem Protection and Restoration

- Any impacts to ecosystem form and function must be avoided where possible. The report should describe any proposed mitigation measures and how project planning will protect and enhance the local ecosystem.

- Natural heritage and hydrologic features should be identified and described in detail to assess potential impacts and to develop appropriate mitigation measures. The following sensitive environmental features may be located within or adjacent to the study area:
  - Key Natural Heritage Features: Habitat of endangered species and threatened species, fish habitat, wetlands, areas of natural and scientific interest (ANSIs), significant valleylands, significant woodlands; significant wildlife habitat (including habitat of special concern species); sand barrens, savannahs, and tallgrass prairies; and alvars.
  - Key Hydrologic Features: Permanent streams, intermittent streams, inland lakes and their littoral zones, seepage areas and springs, and wetlands.
  - Other natural heritage features and areas such as: vegetation communities, rare species of flora or fauna, Environmentally Sensitive Areas, Environmentally Sensitive Policy Areas, federal and provincial parks and conservation reserves, Greenland systems etc.

We recommend consulting with the Ministry of Natural Resources and Forestry (MNRF), Fisheries and Oceans Canada (DFO) and your local conservation authority to determine if special measures or additional studies will be necessary to preserve and protect these sensitive features. In addition, you may consider the provisions of the Rouge Park Management Plan if applicable.

Species at Risk

- The Ministry of the Environment, Conservation and Parks has now assumed responsibility of Ontario's Species at Risk program. Information, standards, guidelines, reference materials and technical resources to assist you are found at https://www.ontario.ca/page/species-risk.

- The Client's Guide to Preliminary Screening for Species at Risk (Draft May 2019) has been attached to the covering email for your reference and use. Please review this document for next steps.

- For any questions related to subsequent permit requirements, please contact SAROntario@ontario.ca.

Surface Water

- The report must include enough information to demonstrate that there will be no negative impacts on the natural features or ecological functions of any watercourses within the study area. Measures should be included in the planning and design process to ensure that any impacts to watercourses from construction or operational activities (e.g. spills, erosion, pollution) are mitigated as part of the proposed undertaking.

- Additional stormwater runoff from new pavement can impact receiving watercourses and flood conditions. Quality and quantity control measures to treat stormwater runoff should be considered for all new impervious areas and, where possible, existing surfaces. The ministry's Stormwater Management Planning and Design Manual (2003) should be referenced in the report and utilized when designing stormwater control methods. **A Stormwater Management Plan should be prepared as part of the Class EA process** that includes:

    - Strategies to address potential water quantity and erosion impacts related to stormwater draining into streams or other sensitive environmental features, and to ensure that adequate (enhanced) water quality is maintained
    - Watershed information, drainage conditions, and other relevant background information
    - Future drainage conditions, stormwater management options, information on erosion and sediment control during construction, and other details of the proposed works

- Information on maintenance and monitoring commitments.

- Ontario Regulation 60/08 under the *Ontario Water Resources Act* (OWRA) applies to the Lake Simcoe Basin, which encompasses Lake Simcoe and the lands from which surface water drains into Lake Simcoe. If the proposed sewage treatment plant is listed in Table 1 of the regulation, the report should describe how the proposed project and its mitigation measures are consistent with the requirements of this regulation and the OWRA.

- Any potential approval requirements for surface water taking or discharge should be identified in the report. A Permit to Take Water (PTTW) under the OWRA will be required for any water takings that exceed 50,000 L/day, except for certain water taking activities that have been prescribed by the Water Taking EASR Regulation – *O. Reg. 63/16*. These prescribed water-taking activities require registration in the EASR instead of a PTTW. Please review the Water Taking User Guide for EASR for more information. Additionally, an Environmental Compliance Approval under the OWRA is required for municipal stormwater management works.

Groundwater

- The status of, and potential impacts to any well water supplies should be addressed. If the project involves groundwater takings or changes to drainage patterns, the quantity and quality of groundwater may be affected due to drawdown effects or the redirection of existing contamination flows. In addition, project activities may infringe on existing wells such that they must be reconstructed or sealed and abandoned. Appropriate information to define existing groundwater conditions should be included in the report.

- If the potential construction or decommissioning of water wells is identified as an issue, the report should refer to Ontario Regulation 903, Wells, under the OWRA.

- Potential impacts to groundwater-dependent natural features should be addressed. Any changes to groundwater flow or quality from groundwater taking may interfere with the ecological processes of streams, wetlands or other surficial features. In addition, discharging contaminated or high volumes of groundwater to these features may have direct impacts on their function. Any potential effects should be identified, and appropriate mitigation measures should be recommended. The level of detail required will be dependent on the significance of the potential impacts.

- Any potential approval requirements for groundwater taking or discharge should be identified in the report. A Permit to Take Water (PTTW) under the OWRA will be required for any water takings that exceed 50,000 L/day, with the exception of certain water taking activities that have been prescribed by the Water Taking EASR Regulation – *O. Reg. 63/16*. These prescribed water-taking activities require registration in the EASR instead of a PTTW. Please review the Water Taking User Guide for EASR for more information.

- Consultation with the railroad authorities is necessary wherever there is a plan to use construction dewatering in the vicinity of railroad lines or where the zone of influence of the construction dewatering potentially intercepts railroad lines.

Excess Materials Management

- In December 2019, MECP released a new regulation under the Environmental Protection Act, titled "On-Site and Excess Soil Management" (O. Reg. 406/19) to support improved management of excess construction soil. This regulation is a key step to support proper management of excess soils, ensuring valuable resources don't go to waste and to provide clear rules on managing and reusing excess soil. New risk-based standards referenced by this regulation help to facilitate local beneficial reuse which in turn will reduce greenhouse gas emissions from soil transportation, while ensuring strong protection of human health and the environment. The new regulation is being phased in over time, with the first phase in effect on January 1, 2021. For more information, please visit https://www.ontario.ca/page/handling-excess-soil.

- The report should reference that activities involving the management of excess soil should be completed in accordance with O. Reg. 406/19 and the MECP's current guidance document titled "Management of Excess Soil – A Guide for Best Management Practices" (2014).

- All waste generated during construction must be disposed of in accordance with ministry requirements

Contaminated Sites

- Any current or historical waste disposal sites should be identified in the report. The status of these sites should be determined to confirm whether approval pursuant to Section 46 of

the EPA may be required for land uses on former disposal sites. We recommend referring to the MECP's D-4 guideline for land use considerations near landfills and dumps.
    - Resources available may include regional/local municipal official plans and data; provincial data on large landfill sites and small landfill sites; Environmental Compliance Approval information for waste disposal sites on Access Environment.

- Other known contaminated sites (local, provincial, federal) in the study area should also be identified in the report (Note – information on federal contaminated sites is found on the Government of Canada's website).

- The location of any underground storage tanks should be investigated in the report. Measures should be identified to ensure the integrity of these tanks and to ensure an appropriate response in the event of a spill. The ministry's Spills Action Centre must be contacted in such an event.
- Since the removal or movement of soils may be required, appropriate tests to determine contaminant levels from previous land uses or dumping should be undertaken. If the soils are contaminated, you must determine how and where they are to be disposed of, consistent with *Part XV.1 of the Environmental Protection Act* (EPA) and Ontario Regulation 153/04, Records of Site Condition, which details the new requirements related to site assessment and clean up. Please contact the appropriate MECP District Office for further consultation if contaminated sites are present.

Servicing, Utilities and Facilities

- The report should identify any above or underground utilities in the study area such as transmission lines, telephone/internet, oil/gas etc. The owners should be consulted to discuss impacts to this infrastructure, including potential spills.

- The report should identify any servicing infrastructure in the study area such as wastewater, water, stormwater that may potentially be impacted by the project.

- Any facility that releases emissions to the atmosphere, discharges contaminants to ground or surface water, provides potable water supplies, or stores, transports or disposes of waste must have an Environmental Compliance Approval (ECA) before it can operate lawfully. Please consult with MECP's Environmental Permissions Branch to determine whether a new or amended ECA will be required for any proposed infrastructure.

- We recommend referring to the ministry's environmental land use planning guides to ensure that any potential land use conflicts are considered when planning for any infrastructure or facilities related to wastewater, pipelines, landfills or industrial uses.

Mitigation and Monitoring

- Contractors must be made aware of all environmental considerations so that all environmental standards and commitments for both construction and operation are met. Mitigation measures should be clearly referenced in the report and regularly monitored during the construction stage of the project. In addition, we encourage proponents to conduct post-construction monitoring to ensure all mitigation measures have been effective and are functioning properly.

- Design and construction reports and plans should be based on a best management approach that centres on the prevention of impacts, protection of the existing environment, and opportunities for rehabilitation and enhancement of any impacted areas.

- The proponent's construction and post-construction monitoring plans must be documented in the report, as outlined in Section A.2.5 and A.4.1 of the MEA Class EA parent document.

Consultation

- The report must demonstrate how the consultation provisions of the Class EA have been fulfilled, including documentation of all stakeholder consultation efforts undertaken during the planning process. This includes a discussion in the report that identifies concerns that were raised and **describes how they have been addressed by the proponent** throughout the planning process. The report should also include copies of comments submitted on the project by interested stakeholders, and the proponent's responses to these comments (as directed by the Class EA to include full documentation).

- Please include the full stakeholder distribution/consultation list in the documentation.

Class EA Process

- If this project is a Master Plan: there are several different approaches that can be used to conduct a Master Plan, examples of which are outlined in Appendix 4 of the Class EA. **The Master Plan should clearly indicate the selected approach for conducting the plan**, by identifying whether the levels of assessment, consultation and documentation are sufficient

to fulfill the requirements for Schedule B or C projects. Please note that any Schedule B or C projects identified in the plan would be subject to Part II Order Requests under the Environmental Assessment Act, although the plan itself would not be. **Please include a description of the approach being undertaken (use Appendix 4 as a reference).**

- If this project is a Master Plan: Any identified projects should also include information on the MCEA schedule associated with the project.

- The report should provide clear and complete documentation of the planning process in order to allow for transparency in decision-making.

- The Class EA requires the consideration of the effects of each alternative on all aspects of the environment (including planning, natural, social, cultural, economic, technical). The report should include a level of detail (e.g. hydrogeological investigations, terrestrial and aquatic assessments, cultural heritage assessments) such that all potential impacts can be identified, and appropriate mitigation measures can be developed. Any supporting studies conducted during the Class EA process should be referenced and included as part of the report.

- Please include in the report a list of all subsequent permits or approvals that may be required for the implementation of the preferred alternative, including but not limited to, MECP's PTTW, EASR Registrations and ECAs, conservation authority permits, species at risk permits, MTO permits and approvals under the *Impact Assessment Act*, 2019.

- Ministry guidelines and other information related to the issues above are available at http://www.ontario.ca/environment-and-energy/environment-and-energy. We encourage you to review all the available guides and to reference any relevant information in the report.

Amendments to the EAA through the Covid-19 Economic Recovery Act, 2020
Once the EA Report is finalized, the proponent must issue a Notice of Completion providing a minimum 30-day period during which documentation may be reviewed and comment and input can be submitted to the proponent. The Notice of Completion must be sent to the appropriate MECP Regional Office email address (for projects in MECP Eastern Region, the email is eanotification.eregion@ontario.ca).

The public has the ability to request a higher level of assessment on a project if they are concerned about potential adverse impacts to constitutionally protected Aboriginal and treaty rights. In addition, the Minister may issue an order on his or her own initiative within a

specified time period. The Director (of the Environmental Assessment Branch) will issue a Notice of Proposed Order to the proponent if the Minister is considering an order for the project within 30 days after the conclusion of the comment period on the Notice of Completion. At this time, the Director may request additional information from the proponent. Once the requested information has been received, the Minister will have 30 days within which to make a decision or impose conditions on your project.

Therefore, the proponent cannot proceed with the project until at least 30 days after the end of the comment period provided for in the Notice of Completion. Further, the proponent may not proceed after this time if:

- a Section 16 Order request has been submitted to the ministry regarding potential adverse impacts to constitutionally protected Aboriginal and treaty rights, or
- the Director has issued a Notice of Proposed order regarding the project.

Please ensure that the Notice of Completion advises that outstanding concerns are to be directed to the proponent for a response, and that in the event there are outstanding concerns regarding potential adverse impacts to constitutionally protected Aboriginal and treaty rights, Section 16 Order requests on those matters should be addressed in writing to:

Minister
Ministry of Environment, Conservation and Parks
777 Bay Street, 5th Floor
Toronto ON M7A 2J3
minister.mecp@ontario.ca

and

Director, Environmental Assessment Branch
Ministry of Environment, Conservation and Parks
135 St. Clair Ave. W, 1st Floor
Toronto ON, M4V 1P5
EABDirector@ontario.ca

Client's Guide to Preliminary Screening for Species at Risk

Ministry of the Environment, Conservation and Parks

Species at Risk Branch, Permissions and Compliance

DRAFT - May 2019

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1.0 Purpose, Scope, Background and Context

1.1 Purpose of this Guide

This guide has been created to:

- help clients better understand their obligation to gather information and complete a preliminary screening for species at risk before contacting the ministry,
- outline guidance and advice clients can expect to receive from the ministry at the preliminary screening stage,
- help clients understand how they can gather information about species at risk by accessing publicly available information housed by the Government of Ontario, and
- provide a list of other potential sources of species at risk information that exist outside the Government of Ontario.

It remains the client's responsibility to:

- carry out a preliminary screening for their projects,
- obtain best available information from all applicable information sources,
- conduct any necessary field studies or inventories to identify and confirm the presence or absence of species at risk or their habitat,
- consider any potential impacts to species at risk that a proposed activity might cause, and
- comply with the *Endangered Species Act* (ESA).

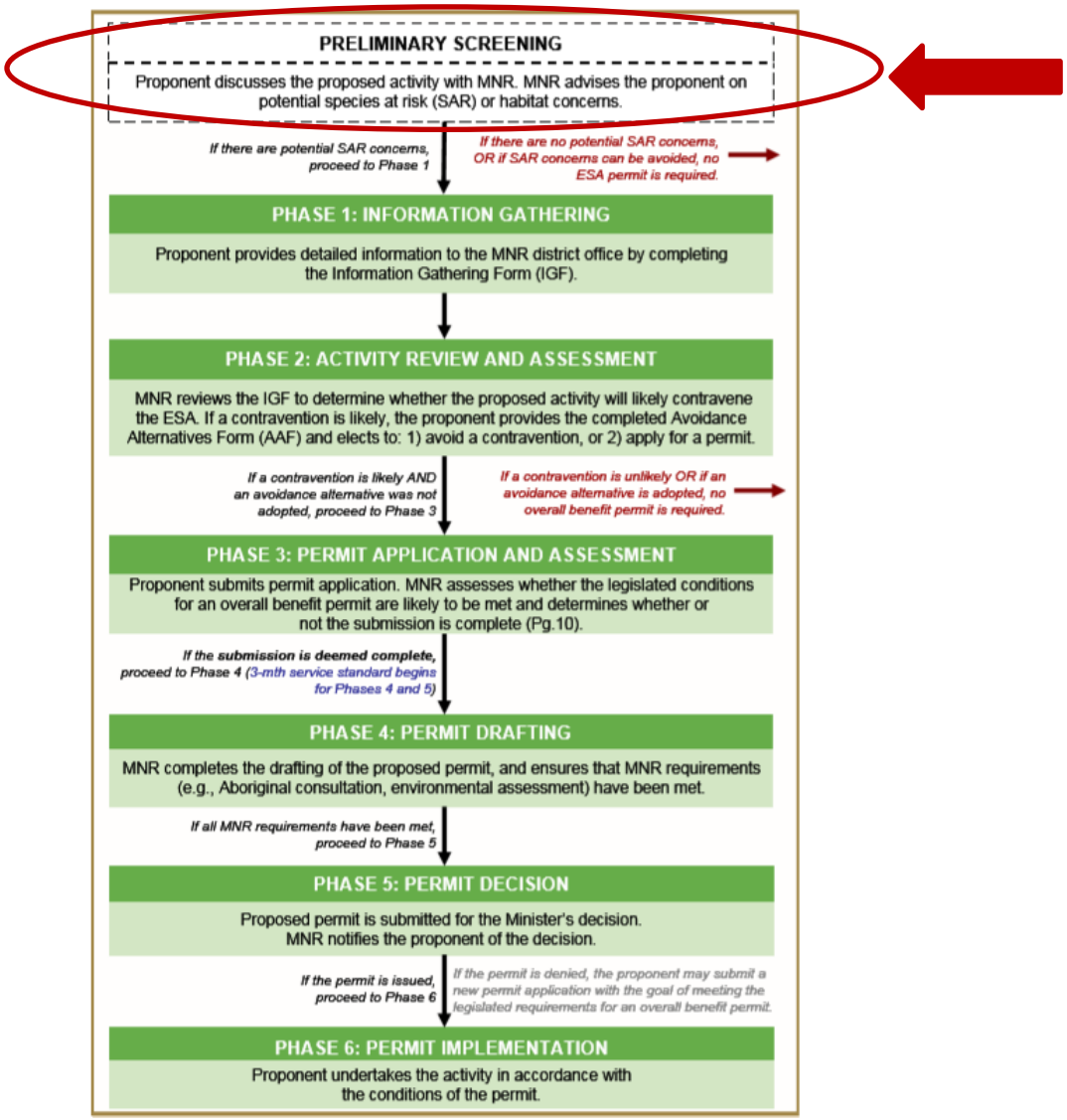
To provide the most efficient service, clients should initiate species at risk screenings and seek information from all applicable information sources identified in this guide, at a minimum, prior to contacting Government of Ontario ministry offices for further information or advice.

1.2 Scope

This guide is a resource for clients seeking to understand if their activity is likely to impact species at risk or if they are likely to trigger the need for an authorization under the ESA. It is not intended to circumvent any detailed site surveys that may be necessary to document species at risk or their habitat nor to circumvent the need to assess the impacts of a proposed activity on species at risk or their habitat. This guide is not an exhaustive list of available information sources for any given area as the availability of information on species at risk and their habitat varies across the province. This guide is intended to support projects and activities carried out on Crown and private land, by private landowners, businesses, other provincial ministries and agencies, or municipal government.

1.3 Background and Context

To receive advice on their proposed activity, clients must first determine whether any species at risk or their habitat exist or are likely to exist at or near their proposed activity, and whether their proposed activity is likely to contravene the ESA. Once this step is complete, clients may contact the ministry at SAROntario@ontario.ca to discuss the main purpose, general methods, timing and location of their proposed activity as well as information obtained about species at risk and their habitat at, or near, the site. At this stage, the ministry can provide advice and guidance to the client about potential species at risk or habitat concerns, measures that the client is considering to avoid adverse effects on species at risk or their habitat and whether additional field surveys are advisable. This is referred to as the "Preliminary Screening" stage. For more information on additional phases in the diagram below, please refer to the *Endangered Species Act Submission Standards for Activity Review and 17(2)(c) Overall Benefit Permits* policy available online at https://www.ontario.ca/page/species-risk-overall-benefit-permits



2.0 Roles and Responsibilities

To provide the most efficient service, clients should initiate species at risk screenings and seek information from all applicable information sources identified in this guide prior to contacting Government of Ontario ministry offices for further information or advice.

Step 1: Client seeks information regarding species at risk or their habitat that exist, or are likely to exist, at or near their proposed activity by referring to all applicable information sources identified in this guide.

Step 2: Client reviews and consider guidance on whether their proposed activity is likely to contravene the ESA (see section 3.4 of this guide for guidance on what to consider).

Step 3: Client gathers information identified in the checklist in section 4 of this guide.

Step 4: Client contacts the ministry at SAROntario@ontario.ca to discuss their preliminary screening. Ministry staff will ask the client questions about the main purpose, general methods, timing and location of their proposed activity as well as information obtained about species at risk and their habitat at, or near, the site. Ministry staff will also ask the client for their interpretation of the impacts of their activity on species at risk or their habitat as well as measures the client has considered to avoid any adverse impacts.

Step 5: Ministry staff will provide advice on next steps.

Option A: Ministry staff may advise the client they can proceed with their activity without an authorization under the ESA where the ministry is confident that:

- no protected species at risk or habitats are likely to be present at or near the proposed location of the activity; or
- protected species at risk or habitats are known to be present but the activity is not likely to contravene the ESA; or
- through the adoption of avoidance measures, the modified activity is not likely to contravene the ESA.

Option B: Ministry staff may advise the client to proceed to Phase 1 of the overall benefit permitting process (i.e. Information Gathering in the previous diagram), where:

- there is uncertainty as to whether any protected species at risk or habitats are present at or near the proposed location of the activity; or
- the potential impacts of the proposed activity are uncertain; or
- ministry staff anticipate the proposed activity is likely to contravene the ESA.

3.0 Information Sources

Land Information Ontario (LIO) and the Natural Heritage Information Centre (NHIC) maintain and provide information about species at risk, as well as related information about fisheries, wildlife, crown lands, protected lands and more. This information is made available to organizations, private individuals, consultants, and developers through online sources and is often considered under various pieces of legislation or as part of regulatory approvals and planning processes.

The information available from LIO or NHIC and the sources listed in this guide should not be considered as a substitute for site visits and appropriate field surveys. Generally, this information can be regarded as a starting point from which to conduct further field surveys, if needed. While this data represents best available current information, it is important to note that a lack of information for a site does not mean that species at risk or their habitat are not present. There are many areas where the Government of Ontario does not currently have information, especially in more remote parts of the province. The absence of species at risk location data at or near your site does not necessarily mean no species at risk are present at that location. On-site assessments can better verify site conditions, identify and confirm presence of species at risk and/or their habitats.

Information on the location (i.e. observations and occurrences) of species at risk is considered sensitive and therefore publicly available only on a 1km square grid as opposed to as a detailed point on a map. This generalized information can help you understand which species at risk are in the general vicinity of your proposed activity and can help inform field level studies you may want to undertake to confirm the presence, or absence of species at risk at or near your site.

Should you require specific and detailed information pertaining to species at risk observations and occurrences at or near your site on a finer geographic scale; you will be required to demonstrate your need to access this information, to complete data sensitivity training and to obtain a Sensitive Data Use License from the NHIC. Information on how to obtain a license can be found online at https://www.ontario.ca/page/get-natural-heritage-information.

Many organizations (e.g. other Ontario ministries, municipalities, conservation authorities) have ongoing licensing to access this data so be sure to check if your organization has this access and consult this data as part of your preliminary screening if your organization already has a license.

3.1 Make a Map: Natural Heritage Areas

The Make a Natural Heritage Area Map (available online at http://www.gisapplication.lrc.gov.on.ca/mamnh/Index.html?site=MNR_NHLUPS_NaturalHeritage&viewer=NaturalHeritage&locale=en-US provides public access to natural heritage information, including species at risk, without the user needing to have Geographic Information System (GIS) capability. It allows users to view and identify generalized species at risk information, mark areas of interest, and create and print a custom map directly from the web application. The tool also shows topographic information such as roads, rivers, contours and municipal boundaries.

Users are advised that sensitive information has been removed from the natural areas dataset and the occurrences of species at risk has been generalized to a 1-kilometre grid to mitigate the risks to the species (e.g. illegal harvest, habitat disturbance, poaching).

The web-based mapping tool displays natural heritage data, including:

- Generalized Species at risk occurrence data (based on a 1-km square grid),
- Natural Heritage Information Centre data.

Data cannot be downloaded directly from this web map; however, information included in this application is available digitally through Land Information Ontario (LIO) at https://www.ontario.ca/page/land-information-ontario.

3.2 Land Information Ontario (LIO)

Most natural heritage data is publicly available. This data is managed in a large provincial corporate database called the LIO Warehouse and can be accessed online through the LIO Metadata Management Tool at https://www.javacoeapp.lrc.gov.on.ca/geonetwork/srv/en/main.home. This tool provides descriptive information about the characteristics, quality and context of the data. Publicly available geospatial data can be downloaded directly from this site.

While most data are publicly available, some data may be considered highly sensitive (i.e. nursery areas for fish, species at risk observations) and as such, access to some data maybe restricted.

3.3 Additional Species at Risk Information Sources

- The Breeding Bird Atlas can be accessed online at http://www.birdsontario.org/atlas/index.jsp?lang=en
- eBird can be accessed online at https://ebird.org/home
- iNaturalist can be accessed online at https://www.inaturalist.org/
- The Ontario Reptile and Amphibian Atlas can be accessed online at https://ontarionature.org/programs/citizen-science/reptile-amphibian-atlas
- Your local Conservation Authority. Information to help you find your local Conservation Authority can be accessed online at https://conservationontario.ca/conservation-authorities/find-a-conservation-authority/

  Local naturalist groups or other similar community-based organizations
- Local Indigenous communities
- Local land trusts or other similar Environmental Non-Government Organizations
- Field level studies to identify if species at risk, or their habitat, are likely present or absent at or near the site.
- When an activity is proposed within one of the continuous caribou ranges, please be sure to consider the caribou Range Management Policy. This policy includes figures and maps of the continuous caribou range, can be found online at https://www.ontario.ca/page/range-management-policy-support-woodland-caribou-conservation-and-recovery

3.4 Information Sources to Support Impact Assessments

- Guidance to help you understand if your activity is likely to adversely impact species at risk or their habitat can be found online at https://www.ontario.ca/page/policy-guidance-harm-and-harass-under-endangered-species-act and https://www.ontario.ca/page/categorizing-and-protecting-habitat-under-endangered-species-act
- A list of species at risk in Ontario is available online at https://www.ontario.ca/page/species-risk-ontario. On this webpage, you can find out more about each species, including where is lives, what threatens it and any specific habitat protections that apply to it by clicking on the photo of the species.

4.0 Check-List

Please feel free to use the check list below to help you confirm you have explored all applicable information sources and to support your discussion with Ministry staff at the preliminary screening stage.

- ✓ Land Information Ontario (LIO)
- ✓ Natural Heritage Information Centre (NHIC)
- ✓ The Breeding Bird Atlas
- ✓ eBird
- ✓ iNaturalist
- ✓ Ontario Reptile and Amphibian Atlas
- ✓ List Conservation Authorities you contacted:_____

  _____
- ✓ List local naturalist groups you contacted:_____

  _____
- ✓ List local Indigenous communities you contacted:_____

  _____
- ✓ List any other local land trusts or Environmental Non-Government Organizations you contacted:_____

  _____
- ✓ List and field studies that were conducted to identify species at risk, or their habitat, likely to be present or absent at or near the site: _____

  _____
- ✓ List what you think the likely impacts of your activity are on species at risk and their habitat (e.g. damage or destruction of habitat, killing, harming or harassing species at risk):_____

  _____

From: Harvey, Joseph (MHSTCI) <Joseph.Harvey@ontario.ca>
Sent: June 24, 2022 4:48 PM
To: Susan Jingmiao Shi
Cc: Barboza, Karla (MHSTCI); Meaghan Keon
Subject: RE: File 0016886: The Municipality of Casselman - Water and Wastewater Infrastructure Master Plan
Attachments: We found suspicious links; 2022-06-09 Casselman Class EA NOC-Final-En.pdf

[CAUTION] This email originated from outside JLR. Do not click links or open attachments unless you recognize the sender and know the content is safe. If in doubt, please forward suspicious emails to Helpdesk.

Susan Jingmiao Shi,

Please find attached MHSTCI's initial advice on the above referenced undertaking. Do not hesitate to contact me with any questions or concerns.

Regards,

Joseph Harvey | Heritage Planner
Heritage, Tourism and Culture Division | Programs and Services Branch | Heritage Planning Unit
Ministry of Heritage, Sport, Tourism and Culture Industries
613.242.3743
Joseph.Harvey@ontario.ca

From: Meaghan Keon <mkeon@jlrichards.ca>
Sent: June-09-22 8:58 AM
To: Barboza, Karla (MHSTCI) <Karla.Barboza@ontario.ca>
Cc: Susan Jingmiao Shi <sshi@jlrichards.ca>
Subject: [16953-118] The Municipality of Casselman - Water and Wastewater Infrastructure Master Plan

CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Greetings,

The Municipality of Casselman has initiated a Water and Wastewater Infrastructure Master Planning process in accordance with Approach 1 of the Municipal Engineers Association (MEA) Class Environmental Assessment (Class EA). The purpose of the study is to evaluate alternatives to expand and/or upgrade and access the feasibility of improving water and wastewater infrastructure for future development in Casselman.

A Notice of Commencement is being mailed/emailed to residents in the study area and to agencies and organizations that may have an interest in the Master Plan. A copy of the Notice is

attached for your information. You are invited to join our mailing list and/or provide comments as the study progresses.

Comments on this study can be emailed or mailed to the address provided in the Notice of Commencement. If you have any questions or concerns, please contact the undersigned.

Meaghan

You are receiving this Notice as you have been identified as a potential stakeholder. If you wish to be removed from the mailing list, please reply with subject line "unsubscribe".

Meaghan Keon
Environmental Engineering Intern

J.L. Richards & Associates Limited
700 - 1565 Carling Avenue, Ottawa, ON K1Z 8R1
Direct: 343-804-5350





Ministry of Heritage, Sport, Tourism and Culture Industries

Programs and Services Branch
400 University Ave, 5th Flr
Toronto, ON M7A 2R9
Tel: 613242.3743

Ministère des Industries du Patrimoine, du Sport, du Tourisme et de la Culture

Direction des programmes et des services
400, av. University, 5e étage
Toronto, ON M7A 2R9
Tél: 613.242.3743

Ontario

June 24, 2022 EMAIL ONLY

Susan Jingmiao Shi, P.Eng.
Senior Environmental Engineer
J.L. Richards & Associates Limited
203-863 Princess Street
Kingston, ON K7L 5N4
sshi@jlrichards.ca

MHSTCI File	**:**	**0016886**
Proponent	**:**	**Municipality of Casselman**
Subject	**:**	**Notice of Commencement - Master Plan Approach 1**
Project	**:**	**Water and Wastewater Infrastructure Master Plan**
Location	**:**	**Municipality of Casselman**

Dear Susan Jingmiao:

Thank you for providing the Ministry of Heritage, Sport, Tourism and Culture Industries (MHSTCI) with the Notice of Commencement for this project. MHSTCI's interest in this master plan relates to it's mandate of conserving Ontario's cultural heritage, which includes archaeological resources, built heritage resources and cultural heritage landscapes.

MHSTCI understands that master plans are long range plans which integrate infrastructure requirements for existing and future land use with environmental assessment planning principles. The Municipal Class Environmental Assessment (MCEA) outlines a framework for master plan and associated studies which should recognize the planning and design Process of this Class EA, and should incorporate the key principles of successful environmental assessment planning identified in Section A.1.1. The master planning process will, at minimum, address Phases 1 and 2 of the Planning and Design Process of the MCEA.

This letter provides advice on how to incorporate consideration of cultural heritage in the above-mentioned master planning process by outlining the technical cultural heritage studies and the level of detail required to address cultural heritage in master plans. In accordance with the MCEA, cultural heritage resources should be identified early in the process in order to determine known and potential resources and potential impacts.

Master Plan Summary
The Municipality of Casselman (the Municipality) has initiated a Master Planning process in accordance with Approach 1 of the Municipal Engineers Association (MEA) Class Environmental Assessment (Class EA) to develop a Water and Wastewater Infrastructure Master Plan.

Identifying Cultural Heritage Resources
MHSTCI understands that the master plan would typically be done at a broad level of assessment thereby requiring more detailed investigations at the project-specific level. Therefore, a description of the existing conditions related to cultural heritage resources needs to be included in the master plan document.

Archaeological Resources
The existing conditions sub-section should indicate if the master plan includes areas of archaeological potential or not and acknowledge that archaeological assessments will be required for future project-specific projects. The proponents should refer to an archaeological management plan or a data sharing agreement, should they exist. In their absence, MHSTCI's screening checklists can help determine whether archaeological assessments will be needed for subsequent project undertakings: *Criteria for Evaluating Archaeological Potential* and *Criteria for Evaluating Marine Archaeological Potential*.

A statement should be included that archaeological assessments are to be undertaken by an archaeologist licensed under the Ontario Heritage Act and that archaeological assessment reports must be submitted for MHSTCI review prior to the completion of the environmental assessment and prior to any ground disturbance. Some municipalities may also elect to have a Stage 1 archaeological assessment undertaken for a master plan area.

Built Heritage Resources and Cultural Heritage Landscapes
MHSTCI recommends that an Existing Conditions Report be undertaken by a qualified person, which will include a historical summary of the study area's development, identifying all known or potential built heritage resources and cultural heritage landscapes within the study area. The findings of the existing conditions report should be included in the existing conditions subsection of the master plan document.

Community input should be sought to identify locally recognized and potential cultural heritage resources. Sources include, but are not limited to, Municipal Heritage Committees, community heritage registers, historical societies and other local heritage organizations.

Cultural heritage resources are often of critical importance to Indigenous communities. Indigenous communities may have knowledge that can contribute to the identification of cultural heritage resources, and any engagement with Indigenous communities should include a discussion about known or potential cultural heritage resources that are of value to them.

Subsequent Municipal Class EA Undertakings
The recommendations outlined above can be used in support of any future technical cultural heritage studies required for any Schedule B and C MCEA undertakings identified within the master planning area. Technical cultural heritage studies are to be undertaken by a qualified person who has expertise, recent experience, and knowledge relevant to the type of cultural heritage resources being considered and the nature of the activity being proposed. Please advise MHSTCI whether any technical cultural heritage studies will be completed for this master plan and provide them to MHSTCI before issuing a Notice of Completion.

Environmental Assessment Reporting

Thank you for consulting MHSTCI on this project. Please continue to do so through the master plan process and contact me if you have any questions or concerns.

Sincerely,

Joseph Harvey
Heritage Planner
joseph.harvey@ontario.ca

Copied to: Meaghan Keon, Environmental Engineering Intern, J.L. Richards & Associates Limited

It is the sole responsibility of proponents to ensure that any information and documentation submitted as part of their EA report or file is accurate. MHSTCI makes no representation or warranty as to the completeness, accuracy or quality of the any checklists, reports or supporting documentation submitted as part of the EA process, and in no way shall MHSTCI be liable for any harm, damages, costs, expenses, losses, claims or actions that may result if any checklists, reports or supporting documents are discovered to be inaccurate, incomplete, misleading or fraudulent.

Please notify MHSTCI (at archaeology@ontario.ca) if archaeological resources are impacted by EA project work. All activities impacting archaeological resources must cease immediately, and a licensed archaeologist is required to carry out an archaeological assessment in accordance with the Ontario Heritage Act and the Standards and Guidelines for Consultant Archaeologists.

If human remains are encountered, all activities must cease immediately, and the local police and coroner must be contacted. In situations where human remains are associated with archaeological resources, MHSTCI should also be notified (at archaeology@ontario.ca) to ensure that the site is not subject to unlicensed alterations which would be a contravention of the Ontario Heritage Act.

From: Bryant, Kathryn (MCM) <Kathryn.Bryant@ontario.ca>
Sent: January 10, 2024 4:55 PM
To: Meaghan Keon
Cc: Archaeology (MCM); Barboza, Karla (She/Her) (MCM); Harvey, Joseph (MCM)
Subject: RE: Municipality of Casselman Water & Wastewater Master Plan - Request for Archeological Information

[CAUTION] This email originated from outside JLR. Do not click links or open attachments unless you recognize the sender and know the content is safe. Do not forward suspicious emails, if you are unsure, please send a separate message to Helpdesk.

Hi Meaghan,

As you may know, the Ministry developed screening checklists to assist property owners, developers, consultants and others to identify known and potential cultural heritage resources:

- Criteria for Evaluating Archaeological Potential
- Criteria for Evaluating Marine Archaeological Potential
- Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes

I have used the document above (Criteria for Evaluating Archaeological Potential) to respond to your question:

- Question 2. Has an archaeological assessment been prepared for the property (or project area) and been accepted by MCM?
  MCM Response: At this time, we are not aware of any archaeological assessments undertaken specific to this project.

- Question 3. Are there known archaeological sites on or within 300 metres of the property (or project area)?
  MCM Response: There are two known archaeological sites within the municipality of Casselman. They are located approximately 400 and 600 metres from SPS N.6 and SPS No.1.

I hope this is of assistance. Let us know if you have any further questions.

Regards,

Kathryn Bryant
Team Lead, Archaeology Program Unit
Citizenship, Inclusion and Heritage Division| Heritage Branch
Ministry of Citizenship and Multiculturalism
Phone: 647-964-8951
Email: kathryn.bryant@ontario.ca

Ontario

From: Meaghan Keon <mkeon@jlrichards.ca>
Sent: Thursday, December 21, 2023 11:45 AM
To: Archaeology (MCM) <archaeology@ontario.ca>
Cc: Susan Jingmiao Shi <sshi@jlrichards.ca>
Subject: Municipality of Casselman Water & Wastewater Master Plan - Request for Archeological Information

CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Greetings,

We are completing a Master Plan (Approach 1) to address long-term water & wastewater issues in the Municipality of Casselman. To complete the archeological potential screening we require information about archeological potential in the vicinity of the key infrastructure and within the municipal boundary identified in the attached map.

Regards,
Meaghan

Meaghan Keon, P.Eng., MASc.
Environmental Engineer

J.L. Richards & Associates Limited
1000-343 Preston Street, Ottawa, ON K1S 1N4
Direct: 343-804-5350

J.L. Richards & Associates Limited
ENGINEERS · ARCHITECTS · PLANNERS

CANADA BEST MANAGED COMPANIES Platinum member

From: Kapusta, Stephen (MTO) <Stephen.Kapusta@ontario.ca>
Sent: June 9, 2022 10:34 AM
To: Meaghan Keon
Cc: Nadeau, Alain (MTO); Susan Jingmiao Shi
Subject: Re: [16953-118] The Municipality of Casselman - Water and Wastewater Infrastructure Master Plan
Attachments: 16953-118 Casselman Class EA NOC-Final-En.pdf

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Good Morning Meaghan,

Please include me in the mailing list for this study. Please note that the MTO has requirements for freeway crossings of services such as this that would narrow down the Highway 417 crossing location.

Thank you,

Stephen Kapusta MCIP, RPP
Senior Project Manager
Highway Corridor Management
Ministry of Transportation - Eastern Region
1355 John Counter Boulevard
Postal Bag 4000
Kingston, ON K7L 5A3
Phone (613)545-4834
Mobile (613)539-7068
Fax (613)540-5106
Toll Free 1(800)267-0295
Stephen.Kapusta@Ontario.ca

*Coronavirus Note: I will be working from home for the foreseeable future. Please contact me by mobile phone 613-539-7068.

From: Meaghan Keon <mkeon@jlrichards.ca>
Sent: June 9, 2022 8:58 AM
To: Makula, Peter (MTO) <Peter.Makula@ontario.ca>
Cc: Susan Jingmiao Shi <sshi@jlrichards.ca>
Subject: [16953-118] The Municipality of Casselman - Water and Wastewater Infrastructure Master Plan

CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Greetings,

The Municipality of Casselman has initiated a Water and Wastewater Infrastructure Master Planning process in accordance with Approach 1 of the Municipal Engineers Association (MEA) Class Environmental Assessment (Class EA). The purpose of the study is to evaluate alternatives to expand and/or upgrade and access the feasibility of improving water and wastewater infrastructure for future development in Casselman.

A Notice of Commencement is being mailed/emailed to residents in the study area and to agencies and organizations that may have an interest in the Master Plan. A copy of the Notice is attached for your information. You are invited to join our mailing list and/or provide comments as the study progresses.

Comments on this study can be emailed or mailed to the address provided in the Notice of Commencement. If you have any questions or concerns, please contact the undersigned.

Meaghan

You are receiving this Notice as you have been identified as a potential stakeholder. If you wish to be removed from the mailing list, please reply with subject line "unsubscribe".

Meaghan Keon
Environmental Engineering Intern

J.L. Richards & Associates Limited
700 - 1565 Carling Avenue, Ottawa, ON K1Z 8R1
Direct: 343-804-5350





From: Rachel Nafziger
Sent: March 13, 2024 9:37 AM
To: Meaghan Keon
Cc: Susan Jingmiao Shi
Subject: FW: [16953-118] The Municipality of Casselman - Water and Wastewater Infrastructure Master Plan- Notice of Public Information Centre
Attachments: 16953-118_Casselman MP PIC Notice_English.pdf; 16953-118_Casselman MP PIC Notice_French.pdf

Rachel Nafziger (she/her)
Project Administrator
Kingston, ON
Work: 343-302-5514

From: Kapusta, Stephen (MTO) <Stephen.Kapusta@ontario.ca>
Sent: Wednesday, March 13, 2024 9:25 AM
To: Kamal, Tarique (MTO) <Tarique.Kamal@ontario.ca>; Suresh, Kartik (MTO) <Kartik.Suresh@ontario.ca>
Cc: Rachel Nafziger <rnafziger@jlrichards.ca>
Subject: FW: [16953-118] The Municipality of Casselman - Water and Wastewater Infrastructure Master Plan- Notice of Public Information Centre

[CAUTION] This email originated from outside JLR. Do not click links or open attachments unless you recognize the sender and know the content is safe. Do not forward suspicious emails, if you are unsure, please send a separate message to Helpdesk.

Good morning Tarique and Kartik,

This is for your information. Note that in the past we have provided the municipality with options to cross Highway 417 outside of our interchange area.

Rachel: Please update your contact information to add both Tarique and Kartik and remove me as I no longer work for East Region.

Thank you,

Stephen Kapusta RPP, MCIP
Team Lead | Corridor Management Office
Highway Operations Management Branch | Operations Division
Ministry of Transportation | Ontario Public Service
613-539-7068 | stephen.kapusta@ontario.ca

Ontario

From: Rachel Nafziger <rnafziger@jlrichards.ca>
Sent: March 13, 2024 9:21 AM
To: peter.makula@ontario.ca; Kapusta, Stephen (MTO) <Stephen.Kapusta@ontario.ca>
Cc: Meaghan Keon <mkeon@jlrichards.ca>; Susan Jingmiao Shi <sshi@jlrichards.ca>
Subject: [16953-118] The Municipality of Casselman - Water and Wastewater Infrastructure Master Plan- Notice of Public Information Centre

CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Greetings,

The Municipality of Casselman is completing a Water and Wastewater Infrastructure Master Plan in accordance with Approach 1 of the Municipal Engineers Association (MEA) Class Environmental Assessment (Class EA). The purpose of the study is to evaluate alternatives to expand and/or upgrade and assess the feasibility of improving water and wastewater infrastructure for future development in Casselman.

A Notice of Public Information Centre (PIC) is being circulated to residents in the study area and to agencies and organizations that may have an interest in the Master Plan. A copy of the Notice is attached for your information.

The Public Information Centre (PIC) is scheduled as follows:

Date:	Wednesday, April 3, 2024
Time:	6:00 PM to 8:00 PM (Drop in at any time)
Location:	Casselman Community Hall
Address:	758 Brébeuf St., Casselman, ON

If you have any questions or concerns, please contact those listed in the Notice of PIC.

You are receiving this Notice as you have been identified as a potential stakeholder. If you wish to be removed from the mailing list, please reply with subject line "unsubscribe".

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

BEST MANAGED COMPANIES Platinum member

Rachel Nafziger (she/her)
Project Administrator

203 - 863 Princess Street
Kingston, ON, K7L 5N4

Work: 343-302-5514
rnafziger@jlrichards.ca

From: Rachel Nafziger
Sent: March 22, 2024 2:55 PM
To: Meaghan Keon
Cc: Susan Jingmiao Shi
Subject: FW: [16953-118] The Municipality of Casselman - Water and Wastewater Infrastructure Master Plan- Notice of Public Information Centre
Attachments: MTOComments-NoticeofWaterWastewaterInfrastructureMasterPlanPIC-The Municipality of Casselman.pdf

Rachel Nafziger (she/her)
Project Administrator
Kingston, ON
Work: 343-302-5514

From: Kamal, Tarique (MTO) <Tarique.Kamal@ontario.ca>
Sent: Friday, March 22, 2024 2:52 PM
To: Rachel Nafziger <rnafziger@jlrichards.ca>
Cc: Suresh, Kartik (MTO) <Kartik.Suresh@ontario.ca>
Subject: RE: [16953-118] The Municipality of Casselman - Water and Wastewater Infrastructure Master Plan- Notice of Public Information Centre

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Hello Rachel,

Please see the attached MTO comments for the PIC.

Thanks,

Tarique

Tarique Kamal
Senior Project Manager | Corridor Management | East Operations
Ministry of Transportation | Ontario Public Service
613-301-5425 | tarique.kamal@ontario.ca

Ontario

Taking pride in strengthening Ontario, its places and its people

Highway Corridor Management

From: Rachel Nafziger <rnafziger@jlrichards.ca>
Sent: March 13, 2024 9:21 AM
To: peter.makula@ontario.ca; Kapusta, Stephen (MTO) <Stephen.Kapusta@ontario.ca>
Cc: Meaghan Keon <mkeon@jlrichards.ca>; Susan Jingmiao Shi <sshi@jlrichards.ca>
Subject: [16953-118] The Municipality of Casselman - Water and Wastewater Infrastructure Master Plan- Notice of Public Information Centre

CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Greetings,

The Municipality of Casselman is completing a Water and Wastewater Infrastructure Master Plan in accordance with Approach 1 of the Municipal Engineers Association (MEA) Class Environmental Assessment (Class EA). The purpose of the study is to evaluate alternatives to expand and/or upgrade and assess the feasibility of improving water and wastewater infrastructure for future development in Casselman.

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Address:	758 Brébeuf St., Casselman, ON

If you have any questions or concerns, please contact those listed in the Notice of PIC.

You are receiving this Notice as you have been identified as a potential stakeholder. If you wish to be removed from the mailing list, please reply with subject line "unsubscribe".

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

Rachel Nafziger (she/her)
Project Administrator

203 - 863 Princess Street
Kingston, ON, K7L 5N4

Work: 343-302-5514
rnafziger@jlrichards.ca

BEST MANAGED COMPANIES Platinum member

Ministry of Transportation

Corridor Management Section
1355 John Counter Boulevard
Postal Bag 4000
Kingston, Ontario K7L 5A3
Tel.: 613-301-5425
Fax: 613-540-5106
Tarique.kamal@ontario.ca

Ministère des Transports

Section de gestion des couloirs routiers
1355, boulevard John Counter
CP/Service de sacs 4000
Kingston (Ontario) K7L 5A3
Tél.: 613-301-5425
Téléc.: 613-540-5106
Tarique.kamal@ontario.ca

Ontario

March 22, 2024

Rachel Nafziger (she/her)
Project Administrator
203 - 863 Princess Street
Kingston, ON, K7L 5N4
Work: 343-302-5514

Via email: rnafziger@jlrichards.ca

Dear Rachel Nafziger:

RE: [16953-118] The Municipality of Casselman - Water and Wastewater Infrastructure Master Plan- Notice of Public Information Centre

---

Thank you for circulating the notice regarding the Municipality of Casselman - Water and Wastewater Infrastructure Master Plan. The Ministry of Transportation (MTO) would like to provide important information in accordance with the Public Transportation and Highway Improvement Act (PTHIA) and the Highway Corridor Management Manual for your consideration when planning activities related to the Master Plan.

Under the PTHIA, the Ministry has authority over land use within 45 meters of the Highway 417 right-of-way and 395 meters from the center-point of the highway intersection. Any development within this area requires Ministry approvals, and proponents must obtain MTO permits before commencing any activities.

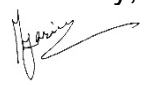
It is important to note that any watermain construction related to the Master Plan that involves crossing the highway must be planned outside of the highway interchange area and must comply with the requirements of the applicable Ontario Provincial Standard Specifications, including OPSS 701, which specifically addresses watermain construction. For guidance on the installation method of any pipeline within the MTO right-of-way and highway crossing, please refer to the Highway Corridor Management Manual (2022).

Early consultation with the MTO is highly recommended for activities within the control area. This enables stakeholders to understand the MTO review process, requirements, personnel involved, timelines, and expectations for planning, design, and construction, including qualifications for engineering consultants.

Pre-consultation requests with the MTO can be submitted online using the Highway Corridor Management Online Services at: HCMS - Highway Corridor Management System (gov.on.ca).

Please do not hesitate to contact me if you have any questions or concerns.

Sincerely,



Tarique Kamal
Senior Project Manager
MTO, Eastern Region

From: Rachel Nafziger
Sent: March 15, 2024 10:23 AM
To: Kayla Sunday
Cc: Meaghan Keon; Susan Jingmiao Shi
Subject: RE: Please resend Cassleman Consultation
Attachments: 16953-118_Casselman MP PIC Notice_English.pdf; 16953-118_Casselman MP PIC Notice_French.pdf

Good morning Kayla,

Please find attached the notice that was sent to Abraham Francis. Let us know if you have any further questions.

Warmly,
Rachel

Rachel Nafziger (she/her)
Project Administrator
Kingston, ON
Work: 343-302-5514

From: Kayla Sunday <kayla.sunday@akwesasne.ca>
Sent: Wednesday, March 13, 2024 3:59 PM
To: Rachel Nafziger <rnafziger@jlrichards.ca>
Subject: Please resend Cassleman Consultation

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Hey there,
I am unable to access the attachments sent to Abe, regarding the consultation request that came in this week. Please resend all documents.
I am in the position that Abraham Francis used to occupy, Environmental Services Manager, for the Mohawk Council of Akwesasne please direct future consults to myself or to the Director of DIHE, MCA , Leslie Papineau leslie.papineau@akwesasne.ca
Thank you,
Kayla Sunday

Environmental Services Manager
Environment Program

Department of Infrastructure, Housing, and Environment
Mohawk Council of Akwesasne
Phone: (613) 575 - 2250 Ext. 1038
Cellphone: (613) 360 – 8656
There are 5 things you can control everyday:
1: Attitude 2: Words 3: Actions 4: Manners 5: Effort

From: Susan Jingmiao Shi
Sent: June 28, 2022 8:28 AM
To: Meaghan Keon
Subject: FW: Notice of Study commencement -
Attachments: DOC062822-06282022080517.pdf

Hi Meaghan,

For file. Please update the contact list if required.

Thanks!
Susan

-----Original Message-----
From: Josée Brizard <JBrizard@nationmun.ca>
Sent: Tuesday, June 28, 2022 8:06 AM
To: Susan Jingmiao Shi <sshi@jlrichards.ca>
Cc: Pierre-Paul Beauchamp <ppbeauchamp@casselman.ca>; Yves Morrissette <ymorrissette@casselman.ca>
Subject: Notice of Study commencement -

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Hello Susan

Please find attached The Agency /Stakeholder response form from The Nation Municipality

Best regards

Josee

Josée Brizard
Directrice générale - Greffière / Chief Administrative Officer - Clerk La Municipalité de La Nation / The Nation Municipality
958 Route 500 Ouest / West
Casselman, Ontario, K0A 1M0
Phone: 613-764-5444, 235
-----Original Message-----
From: Copier
Sent: Tuesday, June 28, 2022 8:05 AM
To: Josée Brizard <JBrizard@nationmun.ca>
Subject: Scanned from Toshiba @ Nation Municipality 06/28/2022 08:05

Scanned from MFP11759466
Date:06/28/2022 08:05
Pages:1
Resolution:400x400 DPI

Êtes-vous sur la liste des électeurs? Consultez www.Voterlookup.ca!

Les bureaux de la municipalité de La Nation sont ouverts au public. Toutefois, le masque est requis. Si vous désirez rencontrer un employé en personne, veuillez communiquer avec nous au bureau de Casselman au 613-764-5444 ou au bureau de Fournier au 613-524-2932 pour prendre rendez-vous.

Ce message est confidentiel. Il peut également être privilégié ou autrement protégé par l'immunité au produit du travail ou par d'autres règles juridiques. Si vous l'avez reçu par erreur, veuillez nous en informer par courrier électronique et le supprimer de votre système. Vous ne pouvez pas copier ce message ou divulguer son contenu à qui que ce soit.

Are you registered to vote? Visit www.VoterLookup.ca!

The Nation offices are open to the public. If you wish to meet a staff member in person, you may contact us at our Casselman office at 613-764-5444 or at our Fournier office at 613-524-2932 to make an appointment.

This message is confidential. It may also be privileged or otherwise protected by work product immunity or other legal rules. If you have received it by mistake, please let us know by e-mail reply and delete it from your system; you may not copy this message or disclose its contents to anyone.

From: Johnston, Keith (NDMNRF) <Keith.Johnston@ontario.ca>
Sent: June 9, 2022 8:58 AM
To: Meaghan Keon
Subject: Automatic reply: [16953-118] The Municipality of Casselman - Water and Wastewater Infrastructure Master Plan

[CAUTION] This email originated from outside JLR. Do not click links or open attachments unless you recognize the sender and know the content is safe. If in doubt, please forward suspicious emails to Helpdesk.

Thank you for your email.

I am currently out of the office. I will not have access to email at this time and I will respond to your email when I return on June 13.

If you need immediate assistance, please contact: Jim Boothby (jim.boothby@ontario.ca) for items related to the Environmental Planning Team.

Regards,

Keith Johnston [He/Him]
A/Team Lead, Environmental Planning

Ministry of Northern Development, Mines, Natural Resources and Forestry | Policy Division | Strategic and Indigenous Policy Branch – Director's Office
Telephone: (705) 313-6960
Email: keith.johnston@ontario.ca

From: Susan Jingmiao Shi
Sent: March 13, 2024 11:53 AM
To: Pierre-Paul Beauchamp; Yves Morrissette
Cc: Meaghan Keon
Subject: Casselman Master Plan PIC Notice

Hello Pierre-Paul and Yves,

We have emailed/mailed out the PIC notice this morning for the Master Plan.

I got a call from Phil Cormier at City of Clarence-Rockland. I explained to him that the long-term solution for water supply is to switch source to their system, and that Casselman is working on interim solutions to improve water quality. He wants to receive a copy of our PIC presentation material once available which we will send after April 3.

Just want to keep you in the loop that this conversation has happened.

Cheers,
Susan

Susan Jingmiao Shi, P.Eng., M.Eng.
Associate
Senior Environmental Engineer
Practice Lead, Regional Market
Kingston, ON
Work: 343-302-5406

From: Meaghan Keon
Sent: April 4, 2024 11:40 AM
To: pcormier@clarence-rockland.com
Cc: Susan Jingmiao Shi; Pierre-Paul Beauchamp; Yves Morrissette
Subject: Casselman Water and Wastewater Infrastructure Master Plan - PIC April 3, 2024
Attachments: Casselman Master Plan PIC Boards_Final.pdf

Hi Philippe,

As requested I am sending you the PIC slides from the Casselman Water and Wastewater Infrastructure Master Plan, April 3, 2024.

Regards,
Meaghan

From: Sandra Mancini <SMancini@nation.on.ca>
Sent: June 13, 2022 1:05 PM
To: Meaghan Keon
Cc: Susan Jingmiao Shi
Subject: RE: [16953-118] The Municipality of Casselman - Water and Wastewater Infrastructure Master Plan
Attachments: 16953-118 Casselman Class EA NOC-Final-En.pdf

[CAUTION] This email originated from outside JLR. Do not click links or open attachments unless you recognize the sender and know the content is safe. If in doubt, please forward suspicious emails to Helpdesk.

Good afternoon,

Please, see attached response.

Best,

Sandra

From: Meaghan Keon <mkeon@jlrichards.ca>
Sent: June 9, 2022 9:00 AM
To: Sandra Mancini <SMancini@nation.on.ca>
Cc: Susan Jingmiao Shi <sshi@jlrichards.ca>
Subject: [16953-118] The Municipality of Casselman - Water and Wastewater Infrastructure Master Plan

External email - if you don't know or can't confirm the identity of the sender, please exercise caution and do not open links or attachments.

Greetings,

The Municipality of Casselman has initiated a Water and Wastewater Infrastructure Master Planning process in accordance with Approach 1 of the Municipal Engineers Association (MEA) Class Environmental Assessment (Class EA). The purpose of the study is to evaluate alternatives to expand and/or upgrade and access the feasibility of improving water and wastewater infrastructure for future development in Casselman.

A Notice of Commencement is being mailed/emailed to residents in the study area and to agencies and organizations that may have an interest in the Master Plan. A copy of the Notice is

attached for your information. You are invited to join our mailing list and/or provide comments as the study progresses.

Comments on this study can be emailed or mailed to the address provided in the Notice of Commencement. If you have any questions or concerns, please contact the undersigned.

Meaghan

You are receiving this Notice as you have been identified as a potential stakeholder. If you wish to be removed from the mailing list, please reply with subject line "unsubscribe".

Meaghan Keon
Environmental Engineering Intern

J.L. Richards & Associates Limited
700 - 1565 Carling Avenue, Ottawa, ON K1Z 8R1
Direct: 343-804-5350







Sandra Mancini | Team Lead, Engineering
38 Victoria Street, Box 29, Finch, ON K0C 1K0
Tel: 613-984-2948 or 1-877-984-2948 | Fax: 613-984-2872
nation.on.ca | make a donation

Our local environment, we're in it together.
Notre environnement local, protégeons-le ensemble.

COVID-19 UPDATE: Our offices are open to the public by appointment, please email info@nation.on.ca. Our Conservation Areas remain open for passive recreation. More info at: www.nation.on.ca/coronavirus.

MISE À JOUR COVID-19: Nos bureaux sont ouverts au public sur rendez-vous, veuillez envoyer un courriel à info@nation.on.ca. Nos aires de conservation restent ouvertes pour les loisirs passifs. Plus d'informations sur : www.nation.on.ca/coronavirus.

Notice of Study Commencement

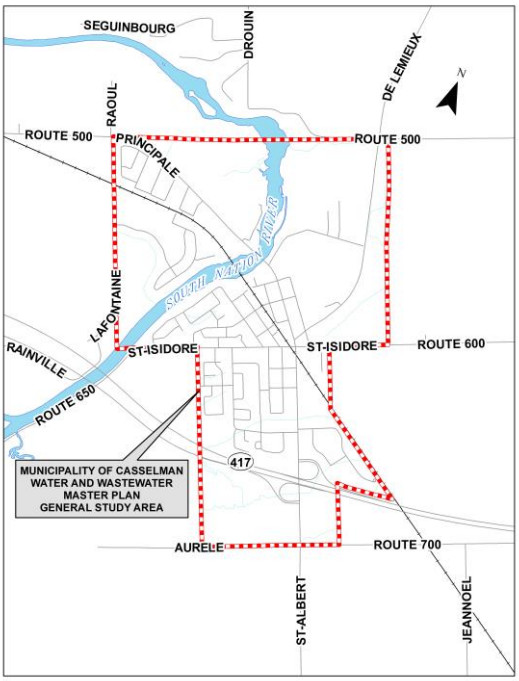
The Municipality of Casselman
Water and Wastewater Infrastructure Master Plan

The Municipality of Casselman (the Municipality) has initiated a Master Planning process in accordance with Approach 1 of the Municipal Engineers Association (MEA) Class Environmental Assessment (Class EA) to develop a Water and Wastewater Infrastructure Master Plan.

How Will This Affect Me?

The Master Plan study is assessing various options to improve the performance and reliability of the water and wastewater treatment and sewage collection systems to ensure they can be relied upon to accommodate current and future flows generated within the Municipality.

Public and agency consultation is a key part of the Master Planning process. Based on your input, the Master Plan study will identify preferred solution(s) that will benefit the community over the short, mid, and long terms.



How Do I Get More Information?

A Public Information Centre will be held in late 2022 prior to confirming the preferred solution(s). In the meantime, the study team will be reviewing background information and determining alternative solutions. You can contact a member of the study team listed below with any questions or to provide input on the Master Plan study. Updates will also be provided throughout the Master Plan study on the Municipality's website.

Susan Jingmiao Shi, P.Eng., M.Eng.
Senior Environmental Engineer
J.L. Richards & Associates Limited
203-863 Princess Street
Kingston, ON K7L 5N4
sshi@jlrichards.ca

Pierre-Paul Beauchamp
Director of Public Works
Municipality of Casselman
751 St-Jean Street
Casselman, ON K0A 1M0
ppbeauchamp@casselman.ca

This study is being conducted according to the requirements of Approach 1 of a Master Plan under the Ontario Municipal Class Environmental Assessment process (October 2000, as amended in 2015).

This Notice was issued on June 9, 2022.

Municipality of Casselman
Municipal Class Environmental Assessment
Water and Wastewater Infrastructure Master Plan

AGENCY / STAKEHOLDER RESPONSE FORM

DATE: June 13, 2022

Name: Sandra Mancini

Agency: South Nation Conservation

1) Is your agency interested in being involved in this project? YES ☑ NO ☐

2) If you are interested in being involved in this project, please identify a contact person:

Name and Title:

Jason Symington, Water Resources Specialist, Engineering

Address: 38 Victoria St Finch, Ontario K0C 1K0

Telephone: (613) 9842948 Fax: (613) 9842872

E-mail:

jsymington@nation.on.ca

3) If you presently have any comments or questions about this project please outline them below or attach on a separate sheet of paper.

4) Do you have any information regarding the Study Area that will assist us in our planning process? If so, please outline below or attach on a separate sheet of paper.

Possibly, once you identify the data needed for your project, please, email a data request to the contact. Data share agreements will be required.

Please submit to:

Susan Shi, P.Eng.
Assistant Project Manager
J.L. Richards & Associates Limited
203-863 Princess Street
Kingston, ON K7L 5N4
343-302-5425
sshi@jlrichards.ca

Note: If you wish to respond via email, please write directly on the form and scan a copy before emailing it to the address above. Comments and information regarding this Study are being collected to assist the Ministry in meeting the requirements of the EA Act. This material will be maintained on file for use during the Study and may be included in project documentation. With the exception of personal information, all comments will become part of the public record.

From: Susan Jingmiao Shi
Sent: June 27, 2022 8:20 AM
To: Meaghan Keon
Subject: FW: Municipality of Casselman - Municipal Class Environmental Assessment- Water and Wastewater Infrastructure Master Plan
Attachments: Agency Response Form - UCPR.pdf

Hi Meaghan,

Please file and update the contact list if necessary.

Thanks!
Susan

From: Prevost, Louis <LouisPrevost@prescott-russell.on.ca>
Sent: Monday, June 20, 2022 10:45 AM
To: Susan Jingmiao Shi <sshi@jlrichards.ca>
Cc: PLMainville@prescott-russell.on.ca
Subject: Municipality of Casselman - Municipal Class Environmental Assessment- Water and Wastewater Infrastructure Master Plan

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Louis

Municipality of Casselman
Municipal Class Environmental Assessment
Water and Wastewater Infrastructure Master Plan

AGENCY / STAKEHOLDER RESPONSE FORM

DATE: June 20, 2022

Name: Louis Prévost

Agency: United Counties of Prescott and Ruassell

1) Is your agency interested in being involved in this project? YES [X] NO [ ]

2) If you are interested in being involved in this project, please identify a contact person:

Name and Title: Pier-Luc Mainville, Engineer
Louis Prévost, Director

Address: 59 Court Street, L'Orignal ON K0B 1K0

Telephone: (613) 675-4661 Fax: (_____)_____

E-mail: plmainville@prescott-russell.on.ca
louisprevost@prescott-russell.on.ca

3) If you presently have any comments or questions about this project please outline them below or attach on a separate sheet of paper.

N/A

4) Do you have any information regarding the Study Area that will assist us in our planning process? If so, please outline below or attach on a separate sheet of paper.

No.

Please submit to:

Susan Shi, P.Eng.
Assistant Project Manager
J.L. Richards & Associates Limited
203-863 Princess Street
Kingston, ON K7L 5N4
343-302-5425
sshi@jlrichards.ca

Note: If you wish to respond via email, please write directly on the form and scan a copy before emailing it to the address above. Comments and information regarding this Study are being collected to assist the Ministry in meeting the requirements of the EA Act. This material will be maintained on file for use during the Study and may be included in project documentation. With the exception of personal information, all comments will become part of the public record.

Casselman Water and Wastewater Infrastructure Master Plan Update Council Presentation

May 23, 2023

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

Agenda

- Master Plan Process
- Project Background
- Future Development
- Constraints
- Future Servicing Needs



The Municipal Class Environmental Assessment Master Plan Process

Class EA Process

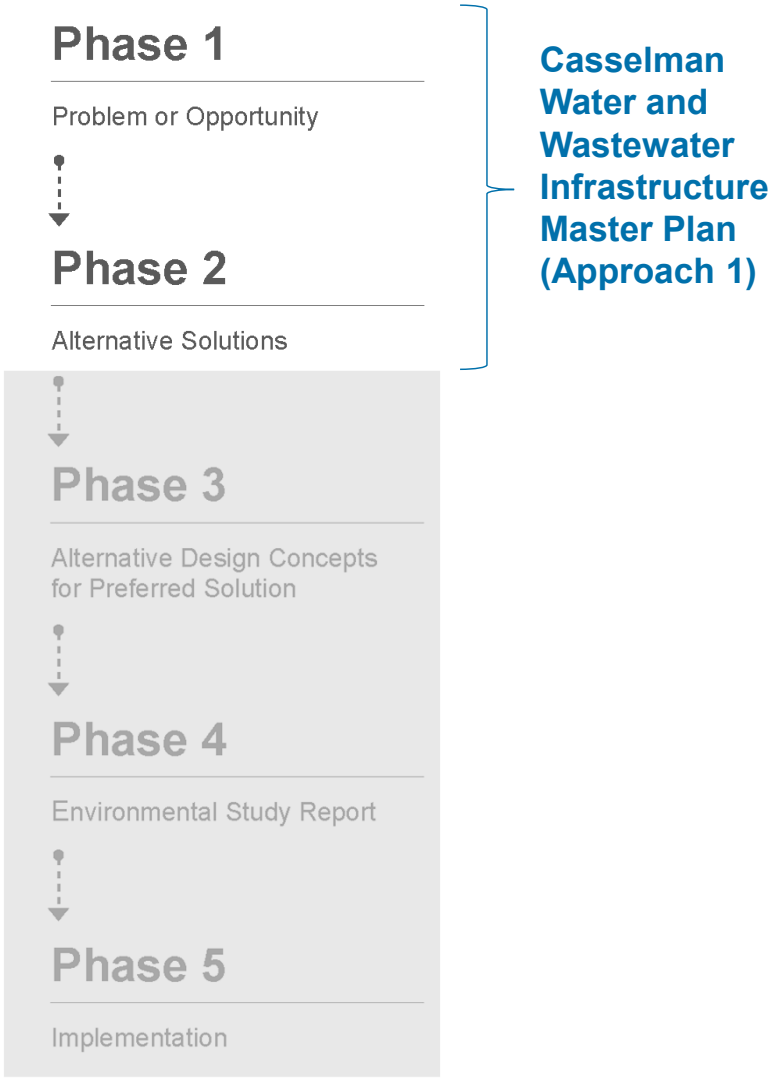
The *Ontario Environmental Assessment (EA) Act*, R.S.O., 1990 requires that projects corresponding to municipal infrastructure projects, including roads, water, and wastewater projects follow an approved planning process set out in the Municipal Class EA document prepared by the Municipal Engineers Association (MEA).

Master Plan Process

Master Plans are conducted under the framework of the MEA Class EA Process. They are a planning tool that identifies infrastructure and other requirements for the existing and future land use, through the application of environmental assessment principles. The current Master Plan is intended to satisfy Phases 1 and 2 of the Municipal Class EA process (i.e., *Approach 1*).

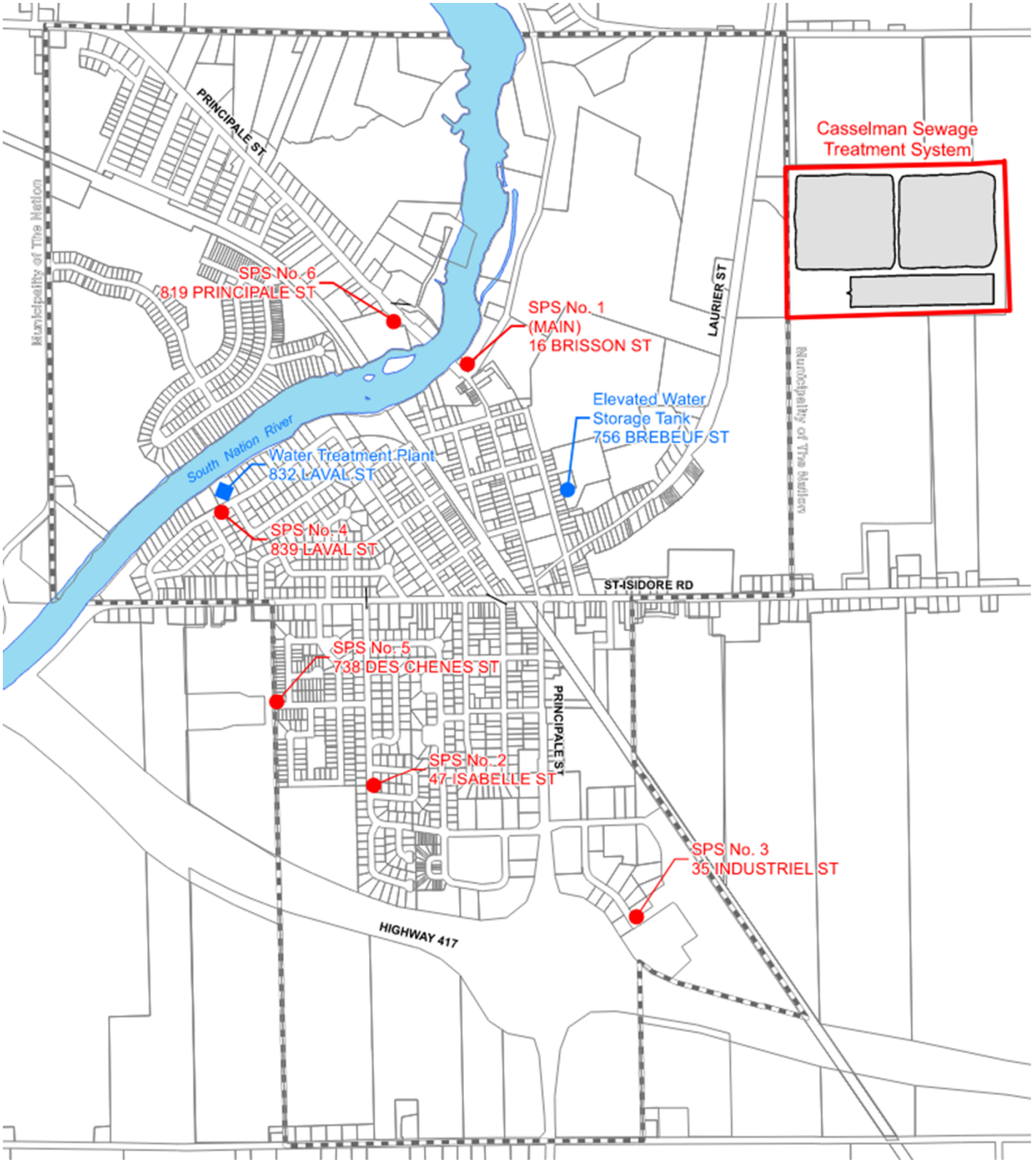
Master Plan Approach 1

This approach concludes at the end of Phases 1 and 2. With this approach, the Master Plan is being completed at a **broad level of assessment** and may require further detailed assessment at the project-specific level.



Overview of Key Infrastructure

- Water Treatment Plant
- Elevated Water Storage Tank
- Six (6) Sewage Pumping Stations
- Sewage Treatment System
- Water Distribution
- Sanitary Sewers



Purpose of the Casselman Water and Wastewater Infrastructure Master Plan

The objectives of Casselman Water and Wastewater Infrastructure Master Plan are:

- To establish 25-year future growth projections;
- To provide a description of existing conditions and constraints associated with water supply, water treatment, water storage, water distribution, wastewater collection, and wastewater treatment;
- To provide timing for when capacities of various infrastructure will be reached;
- To establish design basis for future servicing;
- To identify and evaluate alternative solutions to address existing servicing constraints and future requirements;
- To establish a project implementation plan to support future growth; and
- To consult with public and stakeholder agencies

Project Timeline and Work Completed

Notice of Commencement
- Issued May 2022

Council Presentation
- **WE ARE HERE**
- May 23, 2023

Public Information Centre
- Summer 2023

Public and Agency Consultation
- Ongoing throughout study

Notice of Completion
- Fall 2023

Phase 1 – Identify Problem or Opportunity

- Review and collect background information
- Tech Memo 1A: Water Treatment Plant and Sewage Pumping Station Condition Assessment
- Tech Memo 1B: Linear Infrastructure Condition Assessment
- Tech Memo 2: Growth Projections
- Water and Wastewater Modelling
- Casselman Sewage Treatment System Uncommitted Hydraulic Reserve Capacity
- Master Plan Phase 1 Report

Phase 2 – Identify and Evaluate Alternative Solutions (Ongoing)

- Identify future servicing needs
- Develop alternative servicing solutions
- Develop an implementation/phasing plan
- Undertake public consultation activities
- Master Plan Phase 2 Report

Future Growth Projections

Residential Development	Units	Population
Short-Term (0-5 Years; 2022-2027)	Approx. 800	2,200
Mid-Term (5-10 Years; 2027-2032)	Approx. 540	1,500
Long-Term (10-25 Years; 2032-2047)	Approx. 360	950

Industrial Development	
Short-Term (0-5 Years; 2022-2027)	None
Mid-Term (5-10 Years; 2027-2032)	None
Long-Term (10-25 Years; 2032-2047)	43.45 Hectares

Existing Constraints

Water Supply	Water Treatment	Water Distribution	Sanitary Sewers	Wastewater Treatment
• South Nation River • Quantity and quality concerns	• Currently operates at 62% Capacity • 80% Capacity Reached in the short-term • 100% Capacity Reached in the short/mid-term • Water Quality Issues	• Insufficient fire flows near elementary school on Laurier Street, Northwest area south of Principale Street and Riviere Nation North Road	• Insufficient capacity at pump stations • Insufficient sewer capacity along St. Isidore, St. Joseph, and Montcalm	• Currently operates at 65% Capacity • 80% Capacity Reached in the short-term • 100% Capacity Reached in the short-term • Landlocked site

Future Servicing Requirements

Water Supply	Water Treatment	Water Distribution	Sanitary Sewers	Wastewater Treatment
Water supply will reach • 107% in the Short-Term • 137% in the Mid-Term • 273% in the Long-Term of the existing water taking quantity	Same as water supply	• Short-Term: watermain looping • Mid-Term: Additional water storage capacity • Long-Term: none required	• Short-Term: sewers and pump stations upgrades • Mid-Term: Planning for servicing south of HWY 417 • Long-Term: Pump Station south of HWY 417	Wastewater will reach • 102% in the Short-Term • 125% in the Mid-Term • 278% in the Long-Term/ Build- Out of the existing treatment capacity.

Proposed Implementation Plan

	Short-Term (0-5 Years)	Mid-Term (5-10 Years)	Long-Term (10-25 Years)
Water Supply, Treatment and Storage	$3,200,000	$54,000,000	$15,500,000
Water Distribution	$2,100,000	0	0
Sanitary Sewers and Pumping Stations	$18,850,000	$150,000	$10,400,000
Wastewater Treatment System	$10,300,000	0	$10,000,000
TOTAL	**$34,450,000**	**$54,150,000**	**$35,900,000**

Next Steps

- Undertake Public Information Centre (Summer/Fall 2023)
- Finalize Master Plan Recommendations in the Master Plan Report
- Issue Notice of Completion (Fall 2023)
- Place Master Plan on public record for 30 days
- The Municipality may choose to proceed with further studies as recommended by the Master Plan.

Notice of Public Information Centre

The Municipality of Casselman
Water and Wastewater Infrastructure Master Plan

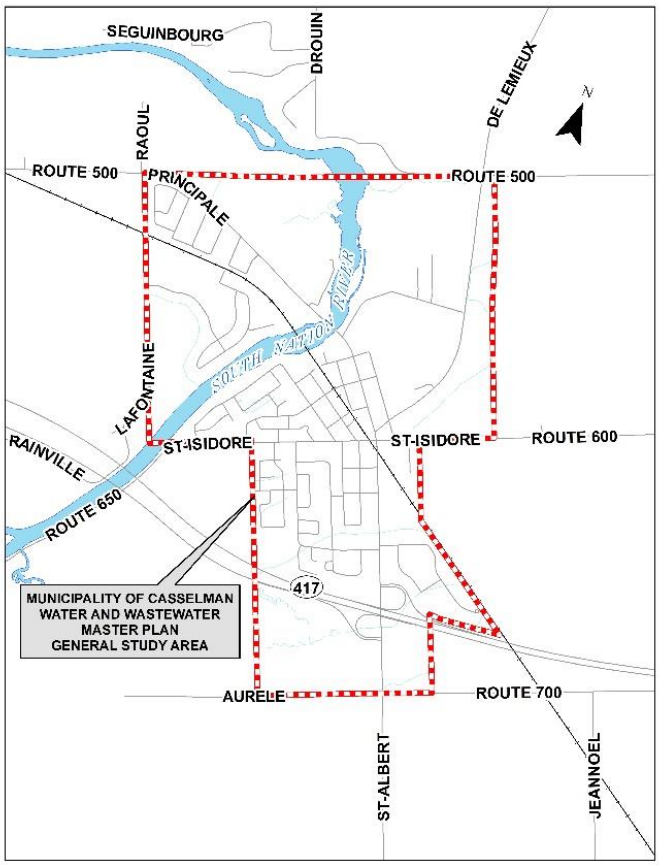
The Municipality of Casselman (the Municipality) has initiated a Master Planning process in accordance with Approach 1 of the Municipal Engineers Association Class Environmental Assessment (Class EA) to develop a Water and Wastewater Infrastructure Master Plan.

The Master Plan study is assessing various options to improve the performance and reliability of the water supply, treatment, and distribution; and wastewater treatment and sewage collection systems to ensure they can be relied upon to accommodate current and future flows generated within the Municipality.

Public and agency consultation is a key part of the Master Plan process. The Public Information Centre provides an opportunity for the public and stakeholder agencies to speak directly to the Project Team. The Public Information Centre will provide an overview of the work completed to-date, including a review of future development within the Municipality over the Master Planning timeframe, future water and wastewater servicing requirements, and the proposed alternative solutions over the short, mid, and long term.

The Public Information Centre is scheduled as follows:
Date: Wednesday, April 3, 2024
Time: 6:00 PM to 8:00 PM (Drop in at any time)
Location: Casselman Community Hall
Address: 758 Brébeuf St., Casselman, ON

Project information is being provided on the Municipality website https://en.casselman.ca/services/water_and_sewer. If you have any questions regarding the study, please contact one of the people listed below. We welcome your feedback.



Susan Jingmiao Shi, P.Eng., M.Eng.
Senior Environmental Engineer
J.L. Richards & Associates Limited
Phone: 343-302-5406
Email: sshi@jlrichards.ca

Pierre-Paul Beauchamp
Director of Public Works
Municipality of Casselman
Phone: 613-764-3139 Poste / Ext: 243
Email: ppbeauchamp@casselman.ca

This Study is being conducted according to the requirements of Approach 1 of a Master Plan under the Ontario Municipal Class Environmental Assessment process (October 2000, as amended in 2015 and 2023). The information is collected under the authority of the Environmental Assessment Act or is collected and maintained for the purpose of creating a record that is available to the general public as described in s.37 of the Freedom of Information and Protection of Privacy Act. Personal information you submit will become part of a public record that is available to the general public unless you request that your personal information remain confidential. For more information, please contact the ministry's Freedom of Information and Privacy Coordinator at 416-327-1434.

This Notice was issued on March 13, 2024.

Avis de Séance d'Information Publique

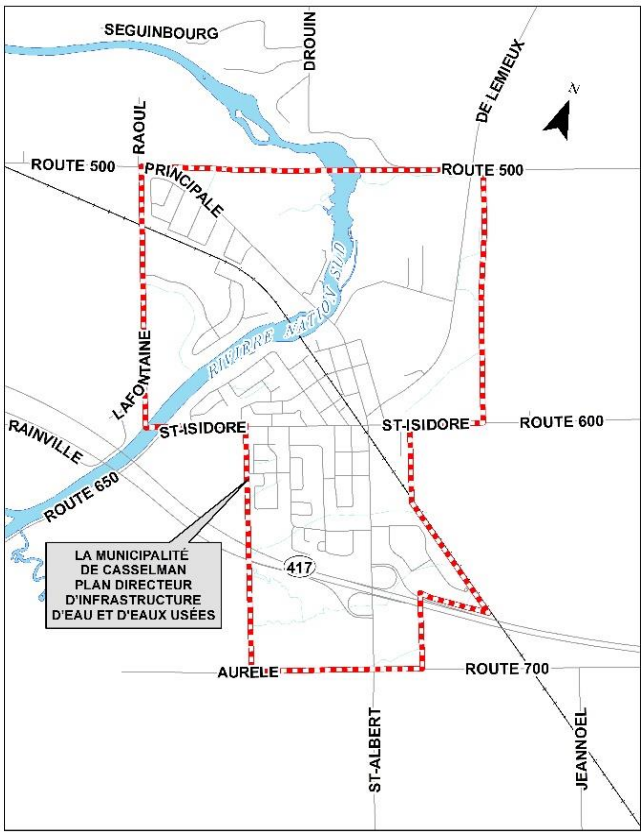
La Municipalité de Casselman

Plan Directeur D'Infrastructure d'Eau et d'Eaux Usées

La Municipalité de Casselman (la Municipalité) a entamé un processus de planification directrice conformément à l'Approche 1 de l'Évaluation environnementale de classe de l'Association des ingénieurs municipaux (Class EA) afin d'élaborer un Plan directeur des infrastructures d'eau et d'assainissement.

L'étude du plan directeur évalue différentes options pour améliorer les performances et la fiabilité de l'approvisionnement en eau, du traitement et de la distribution ; ainsi que des systèmes de traitement des eaux usées et de collecte des eaux usées pour garantir qu'ils peuvent être fiables pour accueillir les débits actuels et futurs générés au sein de la Municipalité.

La consultation publique et des organismes est un élément clé du processus du plan directeur.
Le centre d'information publique offre une occasion au public et aux organismes intervenants de s'adresser directement à l'équipe du projet.
Le centre d'information publique fournira un aperçu des travaux réalisés à ce jour, y compris un examen des développements futurs au sein de la municipalité sur la période de planification du plan directeur, des besoins futurs en matière de services d'eau et d'assainissement, et des solutions alternatives proposées à court, moyen et long terme.



Le centre d'information publique est prévu comme suit :
Date: Mercredi 3 avril 2024
Heure : De 18 h à 20 h (Venez à tout moment)
Lieu : Salle communautaire de Casselman
Adresse : 758, rue Brébeuf, Casselman, ON

Les informations sur le projet sont disponibles sur le site Web de la municipalité https://en.casselman.ca/services/water_and_sewer.
Si vous avez des questions concernant l'étude, veuillez contacter l'une des personnes listées ci-dessous.
Nous accueillons vos commentaires.

Susan Jingmiao Shi, P.Eng., M.Eng.
Ingénieur environnemental principal
J.L. Richards & Associates Limited
Téléphone: 343-302-5406
Courriel: sshi@jlrichards.ca

Pierre-Paul Beauchamp
Directeur des Travaux publics
Municipalité de Casselman
Téléphone: 613-764-3139 Poste / Ext: 243
Courriel: ppbeauchamp@casselman.ca

Cette étude est menée conformément aux exigences de l'Approche 1 d'un Plan directeur dans le cadre du processus d'évaluation environnementale de la classe municipale de l'Ontario (octobre 2000, tel que modifié en 2015 et 2023). Les informations sont collectées en vertu de la Loi sur l'évaluation environnementale ou sont collectées et conservées dans le but de créer un dossier disponible au grand public, tel que décrit à l'article 37 de la Loi sur l'accès à l'information et la protection de la vie privée. Les informations personnelles que vous soumettez feront partie d'un dossier public disponible au grand public, sauf si vous demandez que vos informations personnelles restent confidentielles. Pour plus d'informations, veuillez contacter le coordonnateur de l'accès à l'information et de la protection de la vie privée du ministère au 416-327-1434.

Cet avis a été émis le 13 mars 2024.

Casselman Water & Wastewater Infrastructure Master Plan
Public Information Centre

April 3, 2024

Sign-in Sheet

Please Print Clearly

Name	Address	Postal Code	Email	Telephone
Shahin Zand	South nation Conservation		szand@nation.on.ca	514 581 2553
[redacted]				
Jason Symington	Raisin Region		jason.symington@rrca.on.ca	613 938 3611

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

Casselman Water & Wastewater Infrastructure Master Plan
Public Information Centre

April 3, 2024

Sign-in Sheet

Please Print Clearly

Name	Address	Postal Code	Email	Telephone
[redacted]				

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS



Raisin Region
Conservation Authority

Jason Symington
Resource Specialist

P.O. Box 429
18045 County Rd. 2
Cornwall, ON K6H 5T2

jason.symington@rrca.on.ca
613-938-3611 ext. 239
www.rrca.on.ca

Casselman Water and Wastewater Infrastructure Master Plan Public Information Centre

April 3, 2024

Welcome! Please sign in.

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

The Municipal Class Environmental Assessment Master Plan Process

Class EA Process

The *Ontario Environmental Assessment (EA) Act*, R.S.O., 1990 requires that projects corresponding to municipal infrastructure projects, including roads, water, and wastewater projects follow an approved planning process set out in the Municipal Class EA document prepared by the Municipal Engineers Association (MEA).

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Master Plans are conducted under the framework of the MEA Class EA Process. They are a planning tool that identifies infrastructure and other requirements for the existing and future land use, through the application of environmental assessment principles. The current Master Plan is intended to satisfy Phases 1 and 2 of the Municipal Class EA process (i.e., *Approach 1*).

Master Plan Approach 1

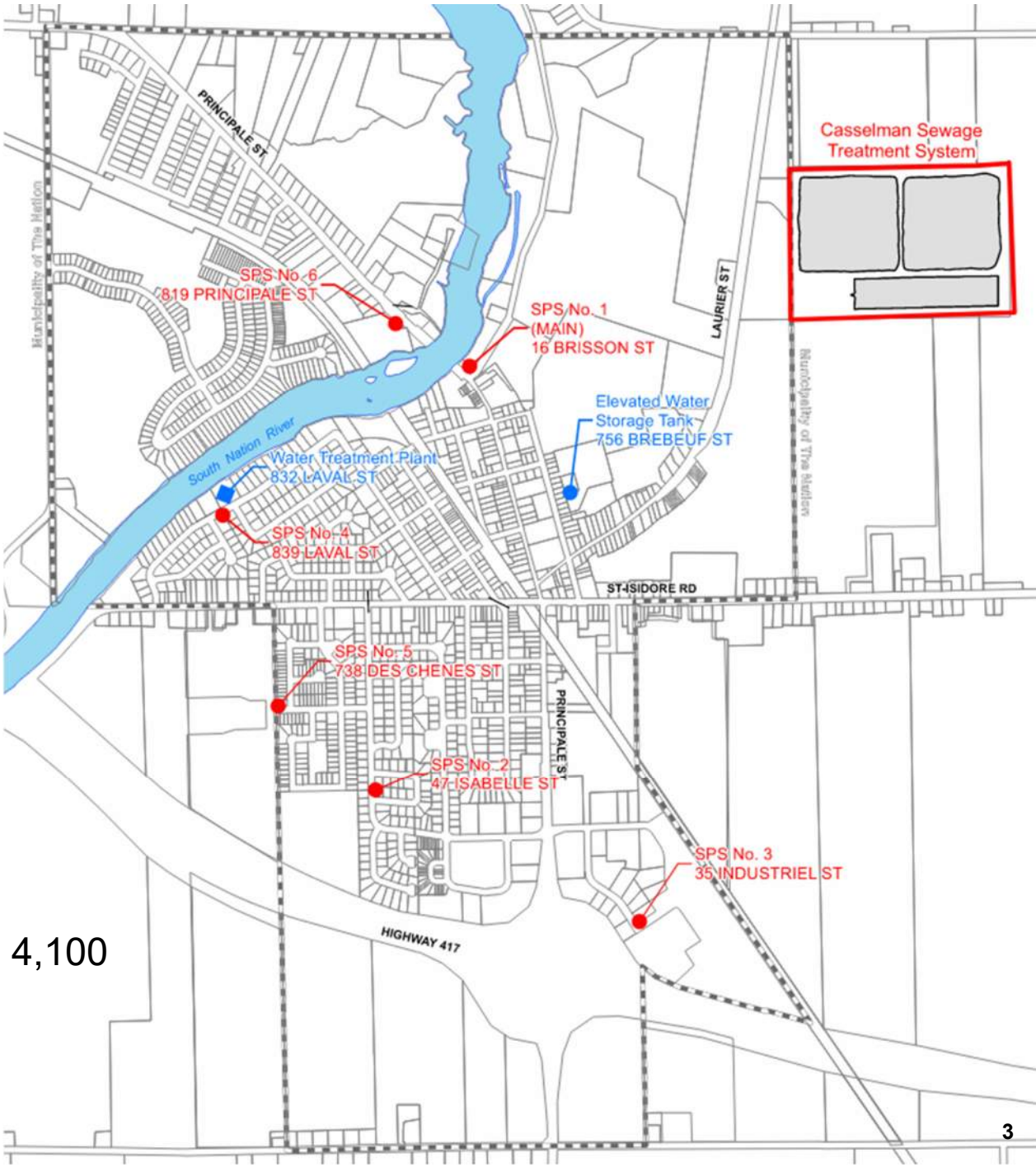
This approach concludes at the end of Phases 1 and 2. With this approach, the Master Plan is being completed at a broad level of assessment and may require further detailed assessment at the project-specific level.



Casselman Water and Wastewater Infrastructure Master Plan (Approach 1)

Existing Key Infrastructure

- Water Treatment Plant
- Elevated Water Storage Tank
- Six Sewage Pumping Stations
- Sewage Treatment System
- Water Distribution
- Sanitary Sewers
- Existing serviced population approx. 4,100



Purpose of the Casselman Water and Wastewater Infrastructure Master Plan

The objectives of Casselman Water and Wastewater Infrastructure Master Plan are:

- To establish 25-year future growth projections;
- To provide a description of existing conditions and constraints associated with water quality and supply, water treatment, water storage, water distribution, wastewater collection, and wastewater treatment;
- To provide timing for when capacities of various infrastructure will be reached;
- To establish design basis for future servicing;
- To identify and evaluate alternative solutions to address existing servicing constraints and future requirements;
- To establish a project implementation plan to support future growth; and
- To consult with public and stakeholder agencies

Project Timeline and Work Completed

Notice of Commencement
- Issued May 2022

Council Presentation
- May 23, 2023

Public Information Centre
- **WE ARE HERE**
- April 3, 2024

Public and Agency Consultation
- Ongoing throughout study

Notice of Completion
- Spring 2024

Phase 1 – Identify Problem and Opportunity

- Review and collect background information
- Technical Memorandum 1A: Water Treatment Plant and Sewage Pumping Station Condition Assessment
- Technical Memorandum 1B: Linear Infrastructure Condition Assessment
- Technical Memorandum 2: Growth Projections
- Water and Wastewater Modelling
- Casselman Sewage Treatment System Uncommitted Hydraulic Reserve Capacity
- Master Plan Phase 1 Report

Phase 2 – Identify and Evaluate Alternative Solutions

- Identify future servicing needs
- Develop alternative servicing solutions
- Develop an implementation/phasing plan
- Undertake public consultation activities
- Master Plan Phase 2 Report

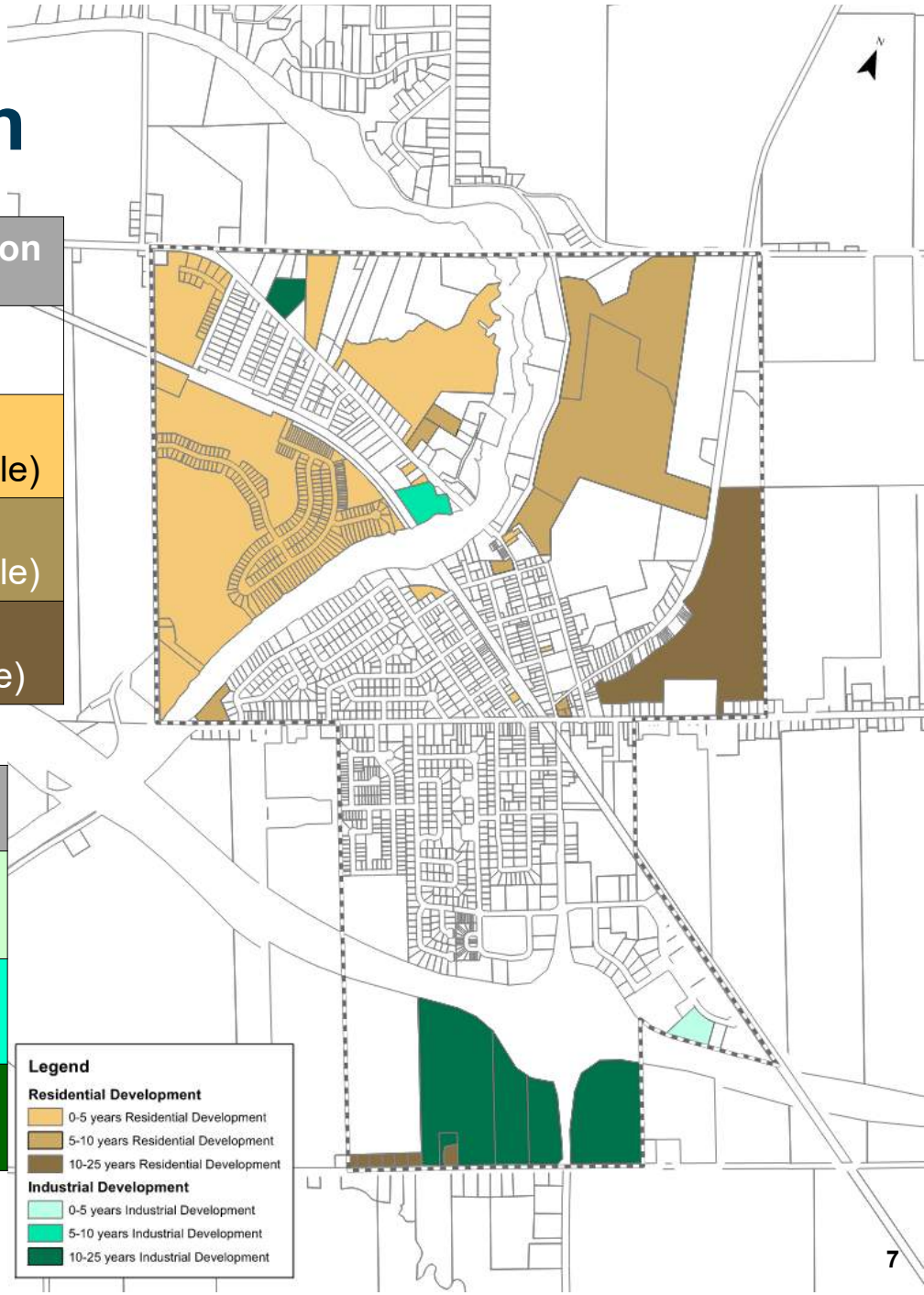
Master Plan Phase 1: Problem and Opportunity



Overview of Future Growth

Residential Development	Units	Serviced Population
Existing	-	Total 4,048
Short-Term (0-5 Years; 2022-2027)	980 units	Total 6,357 (added 2,309 people)
Mid-Term (5-10 Years; 2027-2032)	742 units	Total 8,120 (added 1,763 people)
Long-Term (10-25 Years; 2032-2047)	329 units	Total 8,902 (added 782 people)

Industrial & Commercial Development	Area
Short-Term (0-5 Years; 2022-2027)	0.25 hectares
Mid-Term (5-10 Years; 2027-2032)	2.74 hectares
Long-Term (10-25 Years; 2032-2047)	19.64 hectares



Future Servicing Requirements

Future Water Demands			
Demand Scenario	**Short-Term (2023-2027)**	**Mid-Term (2028-2032)**	**Long-Term (2033-2047)**
Future Average Day (m^3/day)	1,850	2,580	3,690
Future Maximum Day (m^3/day)	**3,552**	**4,954**	**7,085**
*Note: Existing water treatment system capacity is **3,182 m^3/day** (based on maximum day demand)*			

Future Wastewater Flows			
Demand Scenario	**Short-Term (2023-2027)**	**Mid-Term (2028-2032)**	**Long-Term (2033-2047)**
Future Average Day (m^3/day)	**2,200**	**2,930**	**4,050**
Future Maximum Day (m^3/day)	5,148	6,856	9,477
*Note: Existing wastewater treatment system capacity is **2,110 m^3/day** (based on average day demand)*			

Existing Water Infrastructure Constraints



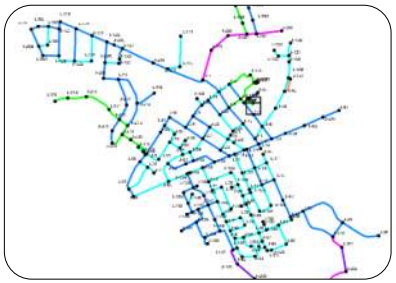
Water Supply and Treatment

- Casselman water supply is from the South Nation River which has water quantity and quality concerns.
- Casselman water treatment plant currently operates at 62% capacity.
- 100% capacity will be reached in the short-term (0-5 years).



Water Storage

- Existing elevated water tower provides water equalization storage, fire protection and emergency storage.
- Currently operates at 42% capacity.
- 100% capacity will be reached in the mid-term (5-10 years).



Water Distribution System

- Under existing conditions, all areas in Casselman meet the required system pressures; as well as the required fire flows except at the following three (3) locations: a dead end watermain on Laurier Street, northwest area south of Principale Street, Riviere Nation North Road.

Existing Wastewater Infrastructure Constraints



Wastewater Collection System

- Under existing conditions, there are 11 sewer segments within Casselman that are >90% capacity of the peak design flow.
- 8 out of 11 sewer segments are insufficient to convey peak flow.
- 6 segments in the sewer system have negative slope.



Wastewater Pumping Stations

- Casselman wastewater collection system consists of six (6) sewage pumping stations (SPSs).
- All SPSs currently receive flows below their rated capacity except for the Main SPS (feeds into the wastewater treatment system).



Wastewater Treatment

- Casselman wastewater is treated by lagoons, followed by a polishing treatment system of moving bed biofilm reactor trains and a disc filter.
- 100% capacity will be reached in the short-term (0-5 years).
- Wastewater treatment system currently operates at 65% capacity with a seasonal discharge window between October 1 and May 15 of each year.

Future Servicing Constraints

	Water Supply and Treatment	Water Storage	Wastewater Treatment	Water Distribution and Wastewater Collection Systems
Short-Term (0-5 Years)	Reach 112% of the existing capacity	Reach 64% of the existing capacity	Reach 104% of the existing capacity	Future servicing requirements were identified in Phase 2 of the Master Plan.
Mid-Term (5-10 Years)	Reach 156% of the existing capacity	Reach 101% of the capacity	Reach 139% of the existing capacity	
Long-Term (10-25 Years)	Reach 223% of the existing capacity	Reach 127% of the existing capacity	Reach 192% of the existing capacity	

Problem/Opportunity Statement

The following Problem/Opportunity Statement has been developed based on the work completed during Phase 1 of the Master Plan process:

The Municipality of Casselman is serviced by communal water and wastewater systems consisting of a water treatment plant, an elevated water storage tank, over 22 km of watermains, a sewage treatment system, six sewage pumping stations, and over 30 km of sanitary sewers. In recent years, the South Nation River, the source water for the Municipality, has presented challenges with respect to raw water quality and quantity. Moreover, the Municipality has been experiencing significant development pressures at present and within the Master Plan timeline. There is an opportunity through the Master Planning process to review the water and wastewater systems holistically and develop a strategic plan of actions that can be implemented over a logical time period and in a prioritized fashion with the intended goal of addressing future servicing needs and ensuring appropriate performance and reliability of the water and wastewater systems in short, mid and long-term planning horizons.

Master Plan Phase 2: Identification & Evaluation of Servicing Options



Identification & Evaluation of Water Supply and Treatment Options



Alternative 1: Status Quo – Maintain Water Supply from South Nation River

- Maintain existing water supply from the South Nation River at the water treatment plant.
- Rated capacity of the facility to be reached in the short-term (0-5 years).
- This alternative is NOT feasible
  - Increase in water demand from future development requires double the current maximum day water demand within the next 25 years.

Alternative 2: Increase Water Supply from South Nation River

- With support of the Casselman Weir during low flow conditions, the South Nation River can theoretically support Casselman's future average day demand.
- Low to no river flow (typically experienced during the summer) requiring use of weir-impounded, stagnant water will worse raw water quality and intensify concerns regarding manganese and organics the Municipality currently experiences.
- Effects of hotter, and dryer climate is anticipated to impact water quantity and further impacting water quality issues.
- Cost to retrofit/upgrade the water treatment plant ($30M) to support future water demands would not address the water quality issues and potential climate change impacts to low river flows.



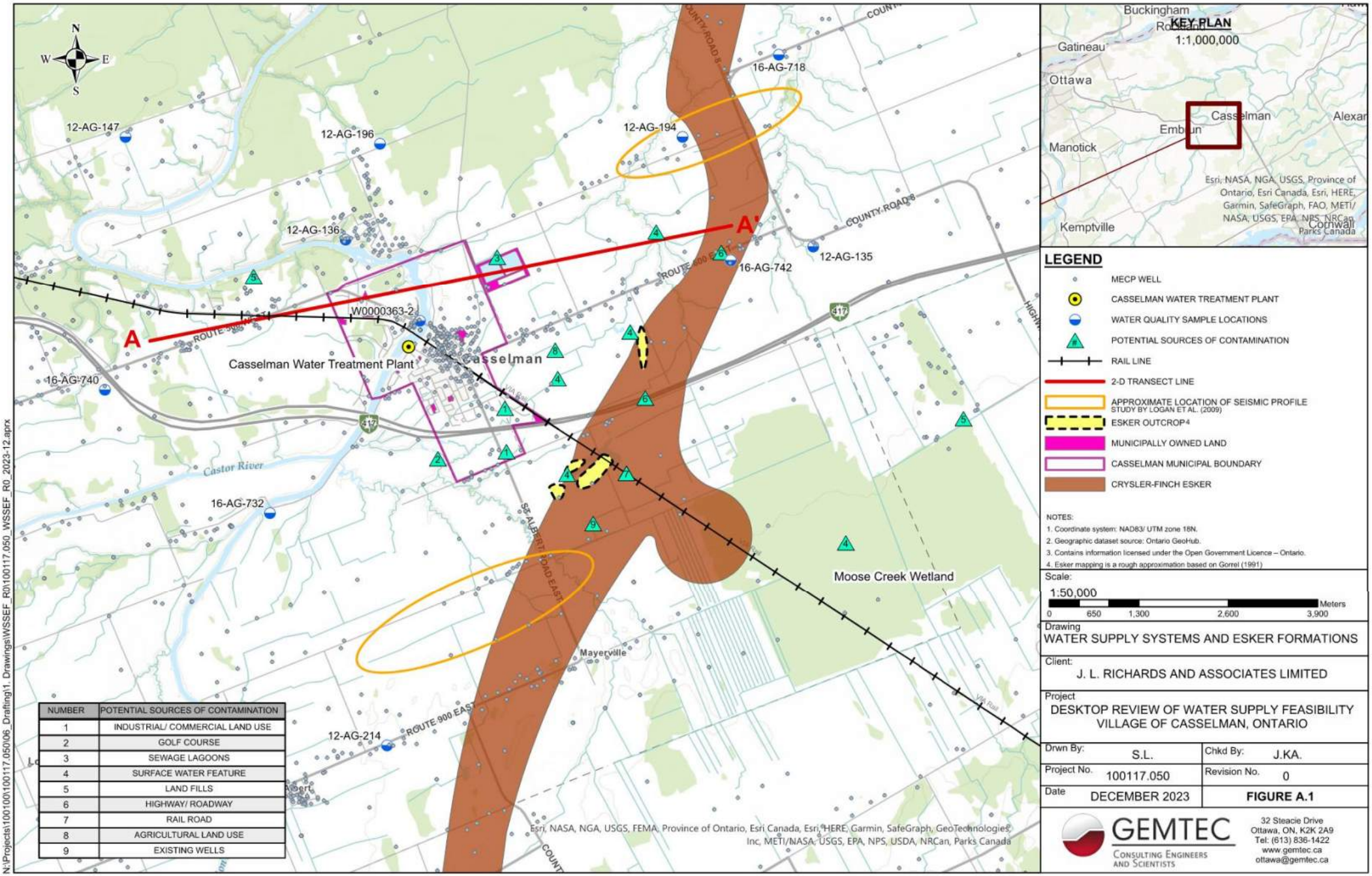


Alternative 3: Maintain Water Supply from South Nation River and Supplement from Another Source

- Supplement future demand from other sources while maintaining current water intake from the South Nation River
  - Groundwater in the vicinity of Casselman
  - Treated water from a neighboring Municipality
- This alternative involves dividing/blending treated water from a different source, some challenges associated with this:
  - Some residents receive water from one source while others from another
  - Separation of water distribution infrastructure would require additional storage, pumping, and/or treatment.
  - High capital cost ($35M) and larger operation and maintenance costs of two different water treatment systems within the Municipality.

Alternative 4a: Discontinue Water Supply from South Nation River and Obtain Water from Groundwater in the Vicinity of Casselman

- Discontinue use of the South Nation River as a water source and entirely supplement existing and future demand from groundwater.
- A study was conducted to assess the feasibility of this alternative. The Crysler-Finch esker was identified as the most likely aquifer capable of supporting Casselman.
- There is a lack of available information on the characteristics of the Crysler-Finch esker (depth, extent, water quantity, water quality, etc.). Intrusive studies would be required to determine the overall feasibility of this approach.
- Timeline for hydrogeological assessment and Class EA is a multi-year process.
- The esker is not located within municipal boundaries necessitating land-use arrangements or land procurement of a potential well field.
- Changing water chemistry of the source water would need to be assessed with respect to possible effects on the distribution system.
- High capital costs to complete the required studies and construct a new well water treatment system ($50M).



NUMBER	POTENTIAL SOURCES OF CONTAMINATION
1	INDUSTRIAL/ COMMERCIAL LAND USE
2	GOLF COURSE
3	SEWAGE LAGOONS
4	SURFACE WATER FEATURE
5	LAND FILLS
6	HIGHWAY/ ROADWAY
7	RAIL ROAD
8	AGRICULTURAL LAND USE
9	EXISTING WELLS

LEGEND

- MECP WELL
- CASSELMAN WATER TREATMENT PLANT
- WATER QUALITY SAMPLE LOCATIONS
- POTENTIAL SOURCES OF CONTAMINATION
- RAIL LINE
- 2-D TRANSECT LINE
- APPROXIMATE LOCATION OF SEISMIC PROFILE STUDY BY LOGAN ET AL. (2009)
- ESKER OUTCROP4
- MUNICIPALLY OWNED LAND
- CASSELMAN MUNICIPAL BOUNDARY
- CRYSLER-FINCH ESKER

NOTES:
1. Coordinate system: NAD83/ UTM zone 18N.
2. Geographic dataset source: Ontario GeoHub.
3. Contains information licensed under the Open Government Licence – Ontario.
4. Esker mapping is a rough approximation based on Gorrel (1991)

Scale: 1:50,000

0 650 1,300 2,600 3,900 Meters

Drawing: WATER SUPPLY SYSTEMS AND ESKER FORMATIONS

Client: J. L. RICHARDS AND ASSOCIATES LIMITED

Project: DESKTOP REVIEW OF WATER SUPPLY FEASIBILITY VILLAGE OF CASSELMAN, ONTARIO

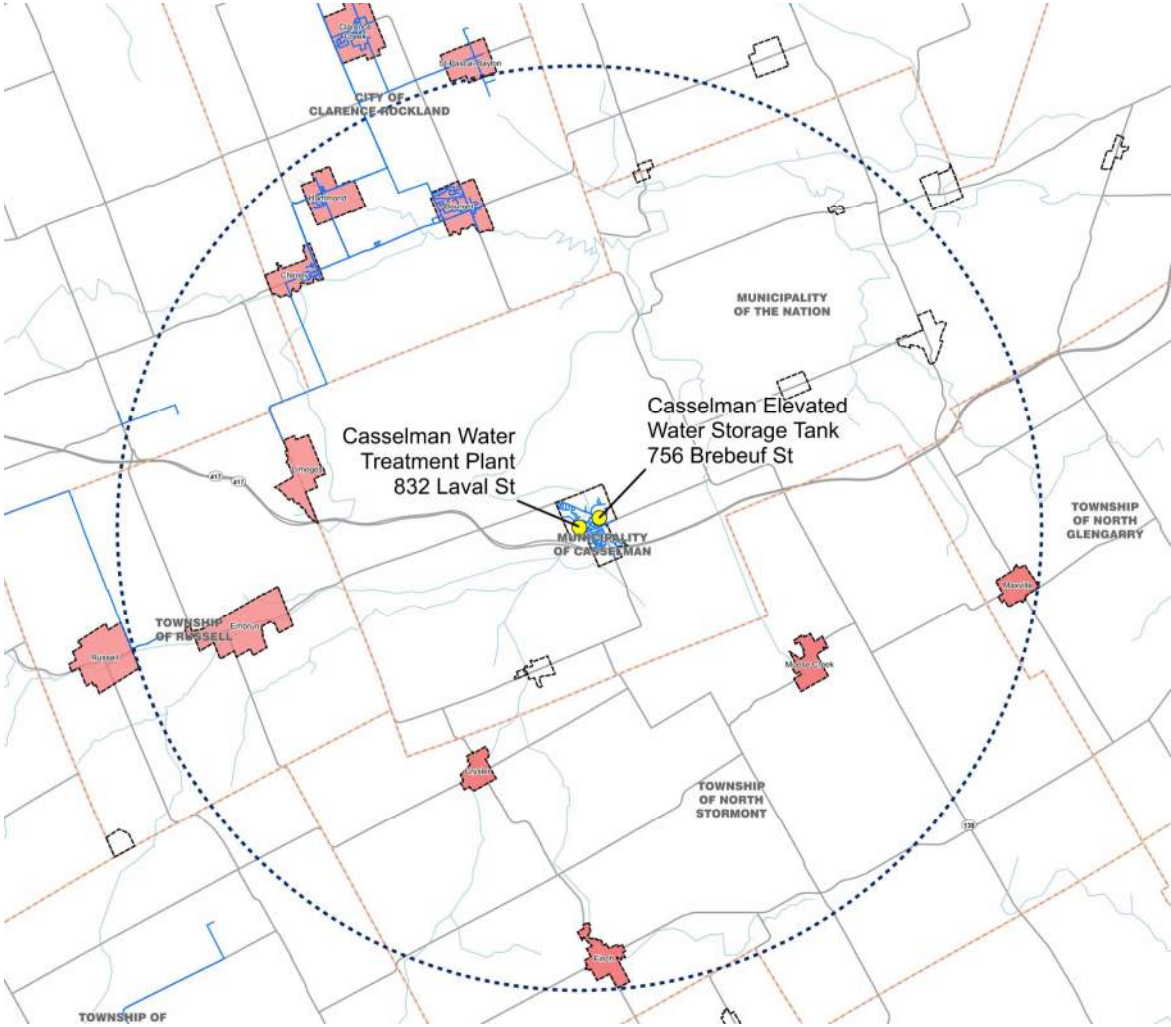
Drwn By:	S.L.	Chkd By:	J.KA.
Project No.	100117.050	Revision No.	0
Date	DECEMBER 2023		**FIGURE A.1**

GEMTEC
Consulting Engineers and Scientists
32 Steacie Drive
Ottawa, ON, K2K 2A9
Tel: (613) 836-1422
www.gemtec.ca
ottawa@gemtec.ca

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Alternative 4b: Obtain Treated Water from the City of Clarence-Rockland

- A study was conducted to determine the feasibility of receiving treated water from a nearby Municipality.
- The Township of Russell and the City of Ottawa, the Township of North Stormont, and the City of Clarence-Rockland were identified as nearby Municipalities with existing drinking water infrastructure systems.
- Given the existing capacity, long distances, and connectivity restrictions, the City of Clarence-Rockland was determined as the most feasible option to pursue.



Water Supply and Treatment Evaluation Matrix

	Alternative 2 – Increase Water Supply South Nation River	Alternative 3 – Maintain Water Supply South Nation River and Supplement from Another Water Source	Alternative 4a – Discontinue Water Supply from South Nation River and Obtain Water Supply from Groundwater in the Vicinity of the Municipality	**Alternative 4b – Discontinue Water Supply from South Nation River and Obtain Water Supply from the City of Clarence Rockland**
Natural Environment	Least Preferred	Less Preferred	Less Preferred	Preferred
Social, Cultural and Heritage Environment	Least Preferred	Least Preferred	Less Preferred	Preferred
Technical Feasibility	Least Preferred	Less Preferred	Less Preferred	Preferred
Financial Considerations	Less Preferred	Preferred	Less Preferred	Least Preferred
Overall Evaluation	**Least Preferred**	**Less Preferred**	**Less Preferred**	**Preferred**

Main Drivers of Evaluation



Reliability of drinking water source; public health and safety



Ability to support long-term growth



Impacts from and ease of construction



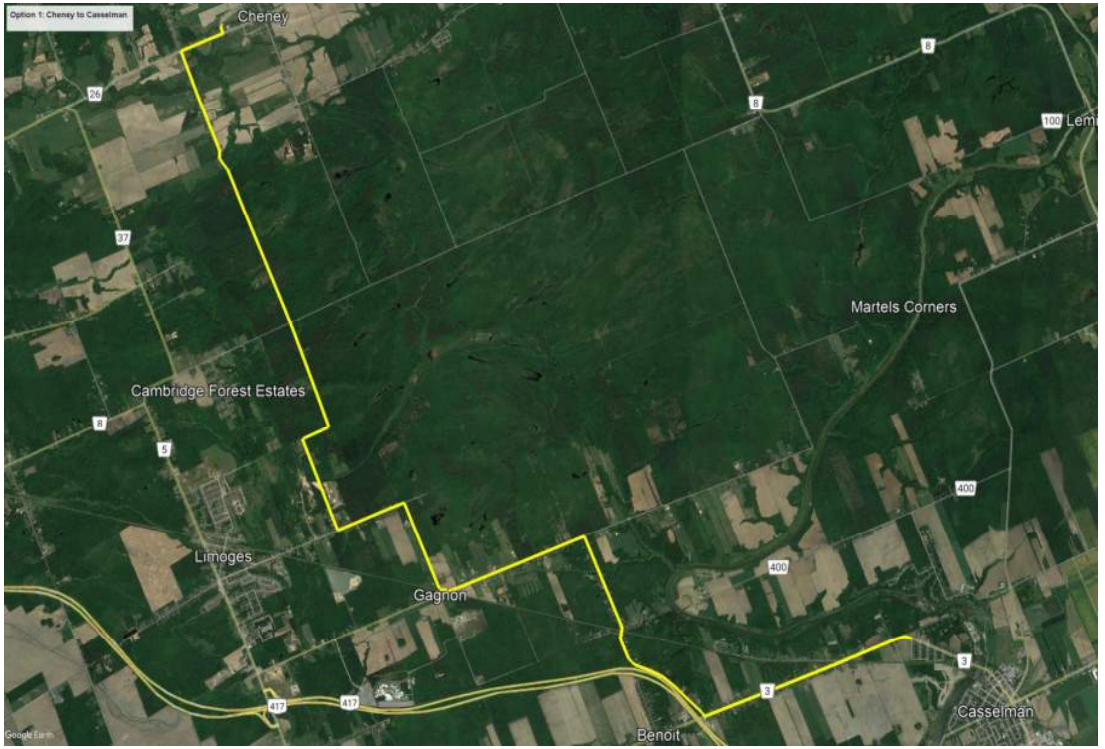
Complexity and requirement for level of treatment



Capital, operation and maintenance costs

Alternative 4b: Obtain Water from the City of Clarence-Rockland *(*Preferred Alternative)*

- Consultation meetings were held with City of Clarence-Rockland and the Nation in 2023. Clarence-Rockland water treatment plant and distribution system can support Casselman's future water demand.
- Connection to Casselman would take approximately 6-7 years.
- A direct connection is required.
- A 22 km transmission main from the Cheney Water Tower to Casselman will support Casselman's future demand (approximate route shown on Figure).



Phase 1 implemented in 5-10 years ($74.2M)

Phase 2 implemented in 10-25 years ($12.1M)

Potential Interim Solutions

Obtaining treated water from Clearance-Rockland is a long-term solution for Casselman. Until Casselman is connected to the Clarence-Rockland system (6-7 years from now), the Municipality may consider implementing the following interim solutions:

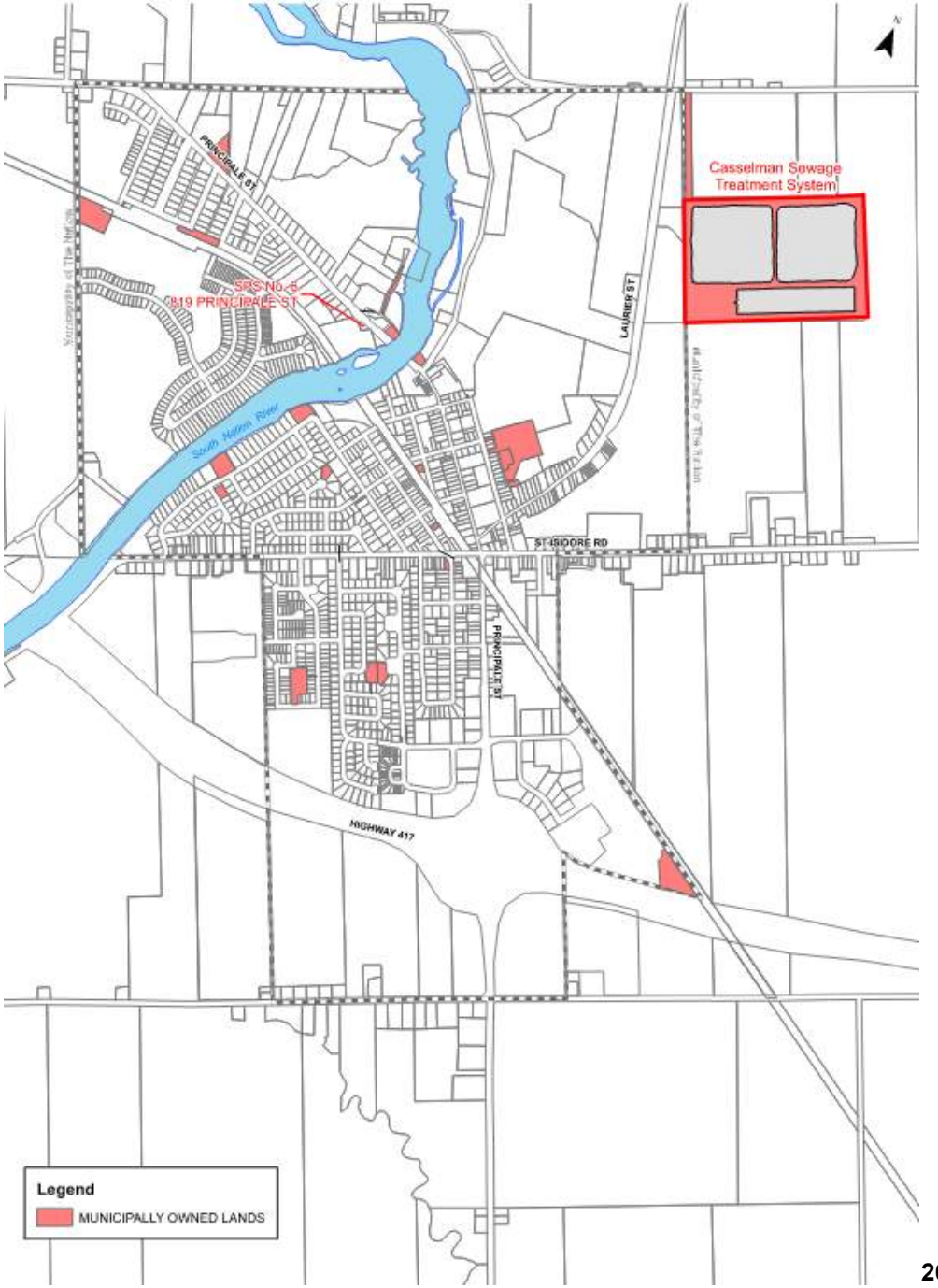
- Improve treated water quality and condition upgrades at the water treatment plant ($3M)
- Managing growth within the Municipality, until treated water becomes available from Clarence-Rockland.
- Undertake follow up studies to investigate the feasibility of increasing water supply from the South Nation River (Alternative 2) and supplementing water from groundwater source (Alternative 3). At present the Municipality is conducting a water quality testing study at the treatment plant to determine strategies to optimize the removal of manganese and organics to meet water quality objectives.
- Promotion of water conservation and efficiency measures to reduce residential, industrial, commercial, and institutional water demand.

Identification of Water Storage Options



Water Storage

- Water storage deficiency is expected in mid-term (2028-2032).
- The preferred type and location for water storage will be identified in a Schedule B Water Supply Class Environmental Assessment Study.
- The Figure identifies Municipally owned lands which may be available as potential locations for new storage.



Water Storage Options



Below Grade Reservoir and Pumping Station

- A typical below-grade reservoir is constructed of reinforced concrete and covered with earth and vegetation.
- A pumping station is required to boost the pressure.
- Highest capital and life cycle costs among the four configurations.



At-Grade Reservoir and Pumping Station

- A typical at-grade reservoir is constructed of glass-fused-to-steel.
- Slightly lower capital and life cycle costs compared to a below-grade reservoir and pumping station; more complex pumping system infrastructure compared to a below-grade reservoir resulting in increased operating and maintenance costs.



Composite Elevated Tank

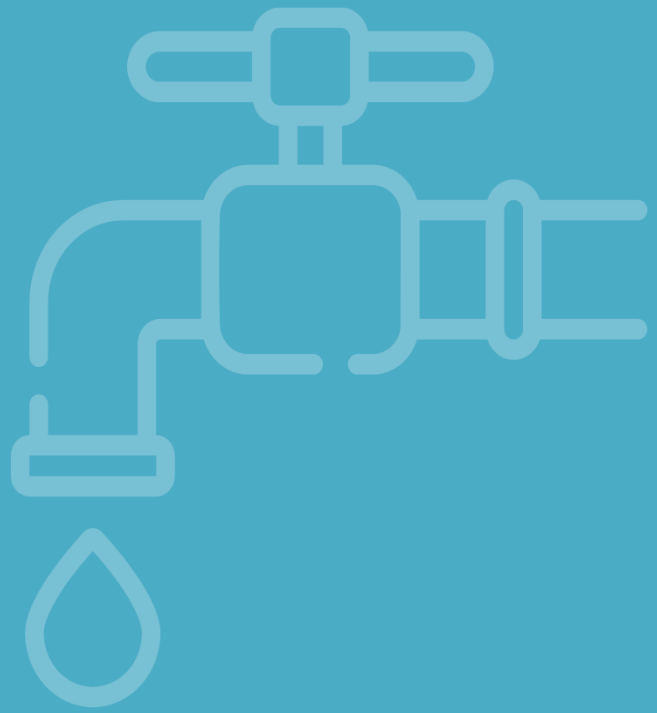
- Typically, coated steel tanks located at the top of a pedestal.
- The water level in the elevated tank sets the pressure in the water distribution system.
- The elevated composite tank will have significant lower cost than a below- or at-grade reservoir and pumping station. However, the cost of a composite elevated tank is typically higher than a standpipe.



Standpipe

- Ground storage tanks typically constructed of glass-fused-to-steel to a height that will provide adequate system pressure in the operating range.
- Standpipes are often used in small systems where less volume is needed, or in situations where the site has a high ground elevation relative to the system pressure.

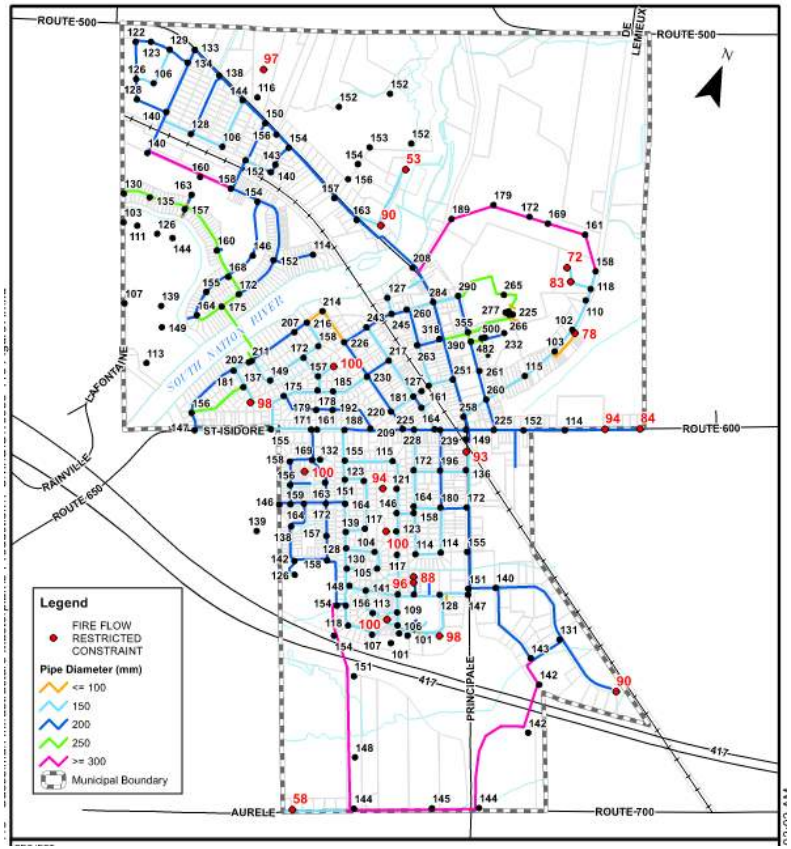
Identification of Water Distribution Servicing Requirements



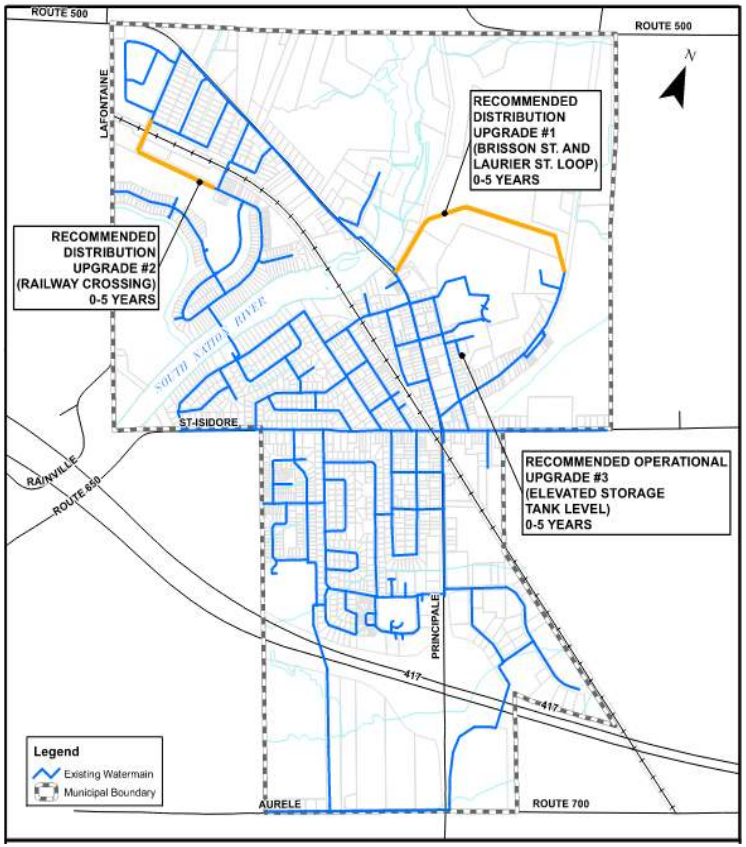
Future Water Distribution System

Water Distribution WaterCAD ® Modelling Results:

- The short-term scenario is the only future scenario for which water distribution system upgrades are recommended.
- Once the future water supply is confirmed, the mid-term and long-term scenarios will be evaluated for the supply conditions.



Water Distribution Flows under Future Maximum Day Demand + Fire Flow (with future projects)



Water Distribution System Future Projects

Recommendations:

- Upgrade #1 (Brisson to Laurier Loop): $1.5M
- Upgrade #2 (Railway Crossing): $1.6M
- Recommend operational adjustment on the elevated water storage to improve pressure and fire flow

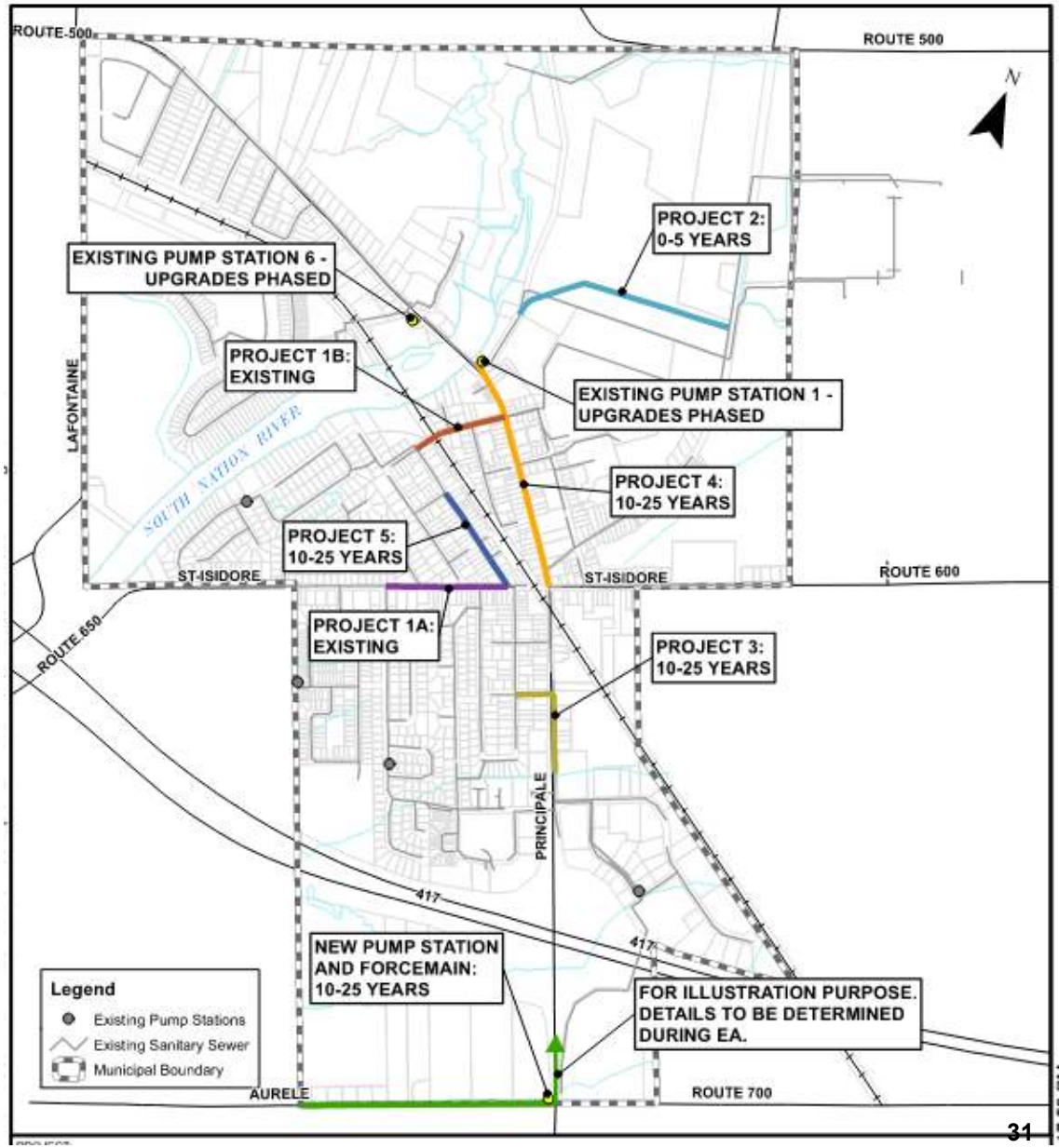
Identification of Wastewater Collection Servicing Requirements



Future Wastewater Collection System

Recommendations:

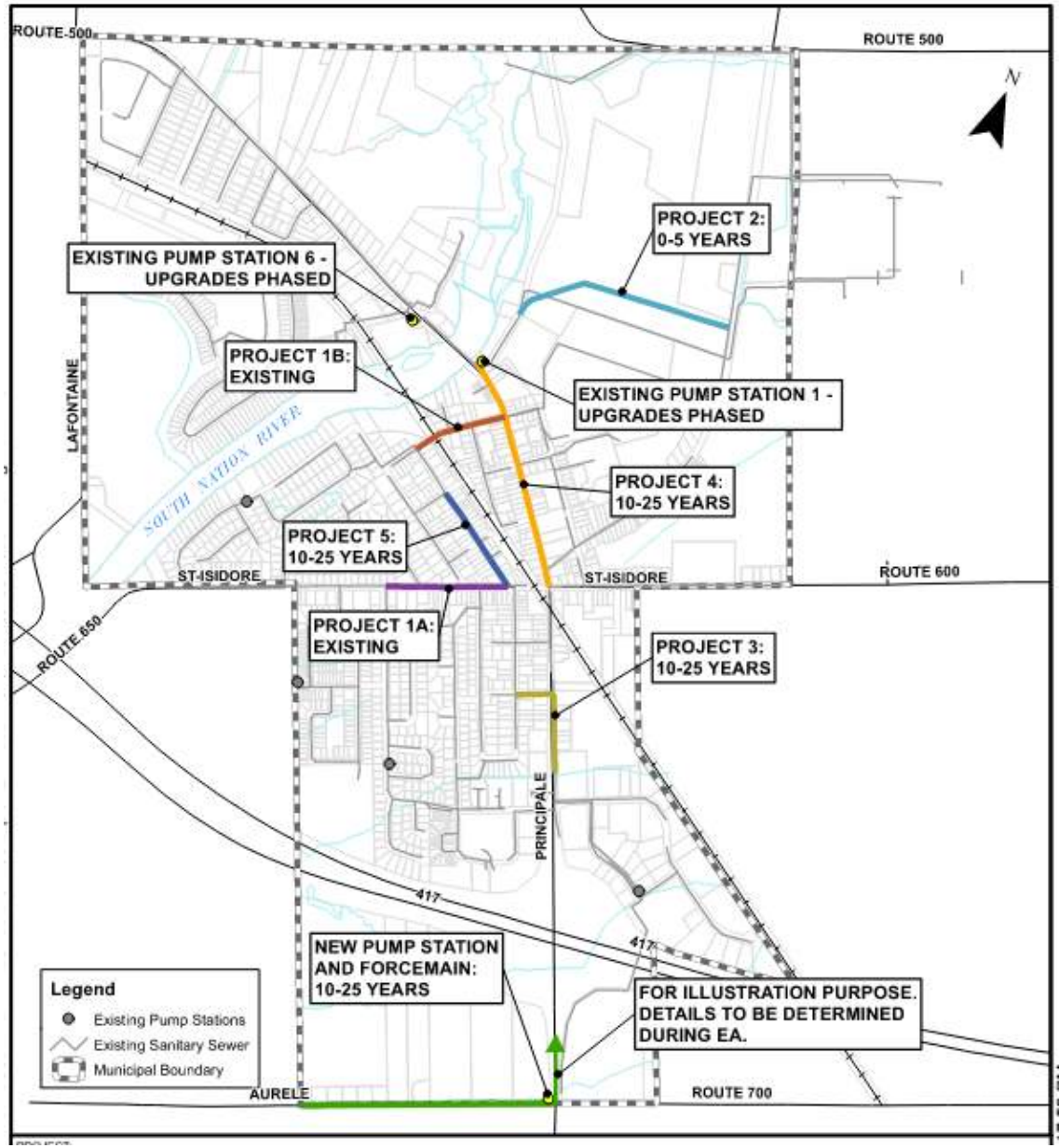
- Project 1A: Upgrade existing sanitary sewer sections along St. Isidore St., west of Principale St. ($1.9M)
- Project 1B: Upgrade existing sanitary sewer sections along Montcalm St., including a railway crossing ($1.3M)
- Project 2: New sewer to connect Brisson St. to Laurier St., for the proposed Nationview Development ($3.4M)
- Project 3: Upgrade existing sanitary sewer sections along Principale St. and Jeanne Mance St. ($1.9M)
- Project 4: Upgrade existing sanitary sewer sections along Principale St. between St-Isidore St. and Montcalm St. ($3.2M)
- Project 5: Upgrade existing sanitary sewer sections along St. Joesph St. ($1.5M)



Future Sewage Pumping Station (SPS) Upgrades

Recommendations:

- <u>SPS No.1 Expansion:</u> SPS No.1 is at capacity under existing conditions and will be upgraded in a phased approach: Phase 1 to meet 10-year flow demand ($7.4M) and Phase 2 to meet 25-year flow demand ($1.2M).
- <u>SPS No.6 Expansion:</u> Upgrade existing pumps to increase rated capacity ($1.5M).
- <u>Servicing South of Hwy. 417:</u> Complete the required Environmental Assessment, design and new construction of sanitary sewer, pumping station and forcemain to service industrial and residential properties south of the HWY 417 ($11.07M).



Identification & Evaluation of Wastewater Treatment Options



Alternative 1: Status Quo

- Maintain existing conditions at the sewage treatment plant.
- This alternative is NOT feasible given the growth anticipated by the Municipality cannot be accommodated by the existing facility.
  - The future rated capacity required would be nearly double of the existing capacity.

Alternative 2a: Maintain Current Lagoon Discharge Window and Provide Additional Lagoon Storage

- Under existing Environmental Compliance Approval, wastewater can be discharged between October 1 and May 15 of each year.
- Requires additional 130,000 m^3 of storage volume.
- Requires additional treatment train to support future sewage flows.
- Given the limited space, the Municipality would have to purchase additional land to construct the additional lagoon cell.



Alternative 2b: Expand Lagoon Discharge to Year-Round

- An Assimilative Capacity Assessment of the South Nation River was completed and approved by the Ministry of the Environment, Conservation and Parks.
- This alternative proposes to maintain existing lagoon storage capacity by increasing the allowable discharge window from seasonal to year-round.
- Expansion of the existing sewage treatment system is required, including: a new disinfection system, disc filter, coagulation chamber and other site-wide upgrades.
- An Environmental Compliance Approval amendment will also have to be completed to support year-round discharge

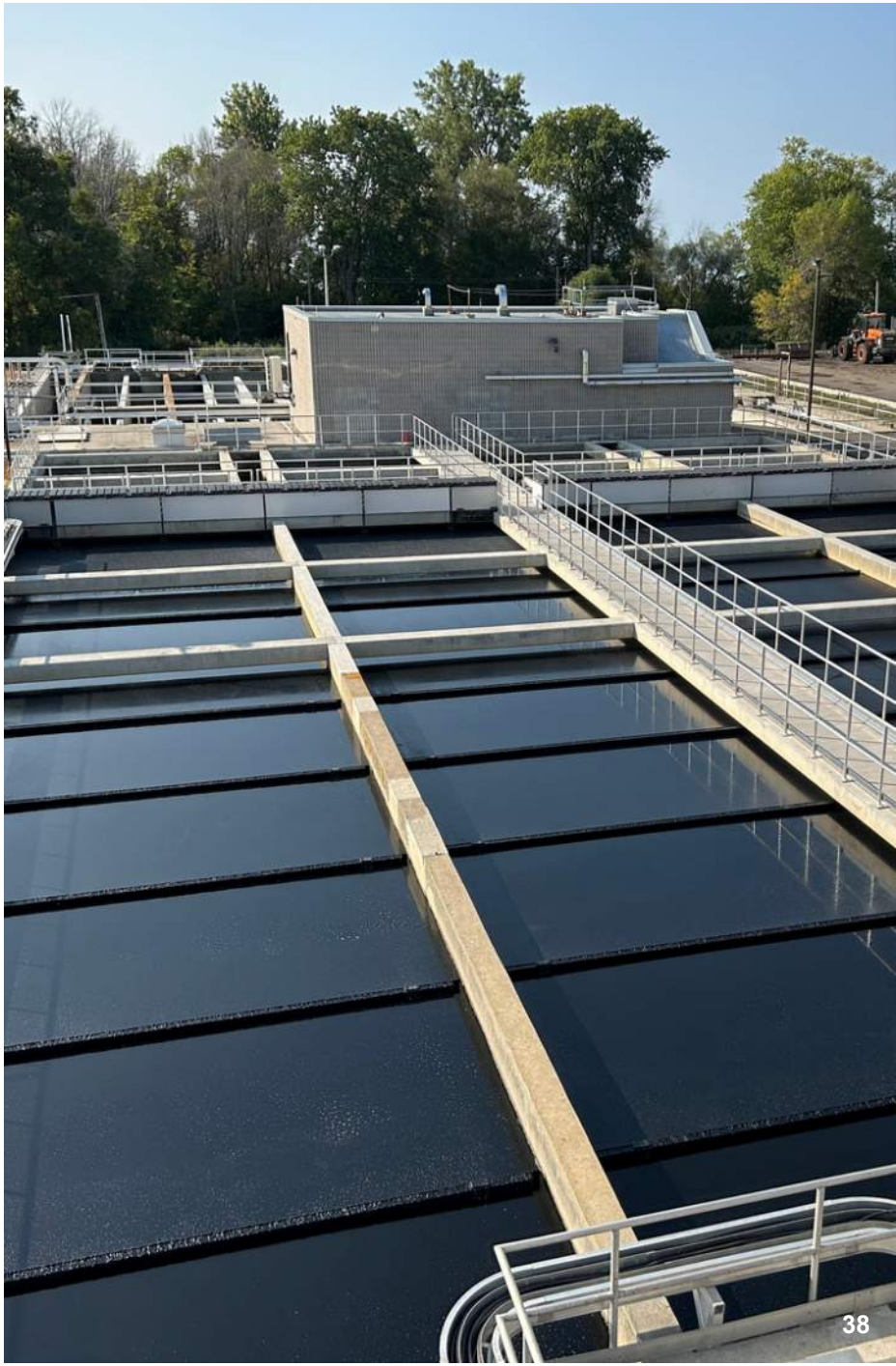


Proposed Future Effluent Quality

PARAMETER	AVERAGING PERIOD	OBJECTIVE	LIMIT
Carbonaceous Biochemical Oxygen Demand ($cBOD_5$)	Monthly	10 mg/L	12 mg/L
Total Suspended Solids (TSS)	Monthly	10 mg/L	12 mg/L
Total Phosphorus (TP)	Monthly	0.20 mg/L	0.30 mg/L
Total Ammonia Nitrogen (TAN) Dec 1 to Mar 31 Apr 1 to May 31 Jun 1 to Sep 30 Oct 1 to Nov 30	 Monthly Monthly Monthly Monthly	 9.2 mg/L 4.8 mg/L 1.0 mg/L 4.0 mg/L	 11.5 mg/L 6.0 mg/L 1.3 mg/L 5.0 mg/L
E.coli May 1 to Oct 31	Monthly	150 CFU/100 mL	200 CFU/100 mL
pH	Single Grab	6.8 to 7.8	6.0 to 8.0

Alternative 3: Abandon Lagoon Treatment

- This alternative proposes to convert the existing lagoon treatment facility to a mechanical treatment plant and expand the discharge window to year-round.
- A mechanical treatment plant could provide more effective treatment than the existing facility with a much smaller footprint.
- Requires an Environmental Compliance Approval amendment to operate year-round.
- Requires significant capital investment.



Wastewater Treatment Alternatives Evaluation Matrix

	Alternative 2a – Maintain Current Lagoon Discharge Window and Provide Additional Lagoon Storage	**Alternative 2b – Expand Lagoon Discharge Window to Year-Round**	Alternative 3 – Abandon Lagoon Treatment, Convert to a Mechanical Plant on Existing Site and Expand Discharge Window to Year-Round
Natural Environment	Least Preferred	Preferred	Preferred
Social, Cultural and Heritage Environment	Least Preferred	Preferred	Preferred
Technical Feasibility	Less Preferred	Preferred	Less Preferred
Financial Considerations	Less Preferred	Preferred	Least Preferred
Overall Evaluation	**Less Preferred**	**Preferred**	**Least Preferred**

Main Drivers of Evaluation



South Nation River receiving capacity



Ability to support long-term growth



Landlocked site



Maximize use of lagoon-based treatment and existing infrastructure



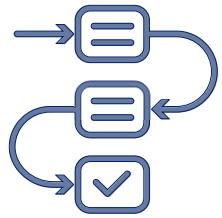
Capital, operation and maintenance costs

Proposed Implementation Plan

Proposed Projects	Short-Term (Initiate 0-5 Years)	Mid- and Long-Term (Initiate 5-25 Years)
Water Supply, Treatment and Storage	$77,200,000	$12,100,000
Water Distribution	$3,100,000	0
Wastewater Collection	$15,500,000	$18,870,000
Wastewater Treatment System	$9,000,000	0

Next Steps

- Collect and address public comments from the Public Information Centre
- Finalize Master Plan Recommendations in the Master Plan Report
- Issue Notice of Completion (April 2024)
- Place Master Plan on public record for 30 days
- The Municipality may choose to proceed with further studies as recommended by the Master Plan.



How to Participate

- Send written comments to the project contacts at the Municipality and J.L. Richards listed below by **April 17, 2024**.

Pierre-Paul Beauchamp

Director of Public Works
Municipality of Casselman
Phone: 613-764-3139 ext. 243
Email: ppbeauchamp@casselman.ca

Susan Jingmiao Shi, P.Eng., M.Eng.

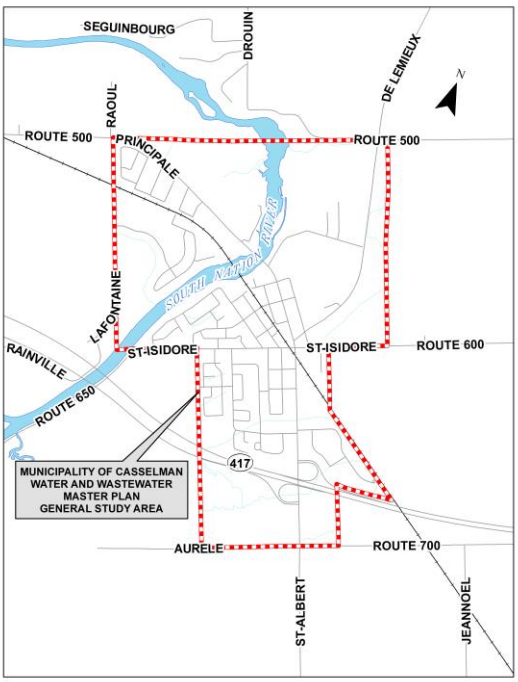
Associate, Senior Environmental Engineer
J.L. Richards & Associates Limited
Phone: 343-302-5406
Email: sshi@jlrichards.ca

- Visit the Municipality website at https://en.casselman.ca/services/water_and_sewer for more updates.

Notice of Master Plan

The Municipality of Casselman
Water and Wastewater Infrastructure Master Plan

The Municipality of Casselman has completed a Master Planning process in accordance with Approach 1 of the Municipal Engineers Association (MEA) Class Environmental Assessment (Class EA) to develop a Water and Wastewater Infrastructure Master Plan. The Master Plan study assessed various options to improve the performance and reliability of the water and wastewater treatment and sewage collection systems to ensure they can be relied upon to accommodate current and future flows generated within the Municipality.



Based on the study findings, input from technical agencies and the public, the Master Plan is now complete. The preferred alternatives include a new water supply from Clarence-Rockland, watermain and sanitary sewer upgrades, expansion and upgrades to the Casselman lagoon, and sewage pumping station upgrades. The recommended projects are presented in Section 3 of the Master Plan report which is available for review at the Municipality's website: https://en.casselman.ca/services/water_and_sewer

By this notice, the Master Plan is being placed on public record for a 30-day review period in accordance with the requirements of the Municipal Class EA. Interested persons may provide written comments to the project team by **June 12, 2024**. All comments and concerns should be sent directly to:

Susan Shi, P.Eng.
Senior Environmental Engineer
J.L. Richards & Associates Limited
203-863 Princess Street
Kingston, ON K7L 5N4
sshi@jlrichards.ca

Pierre-Paul Beauchamp
Director of Public Works
Municipality of Casselman
751 St-Jean Street
Casselman, ON K0A 1M0
ppbeauchamp@casselman.ca

All personal information included in your request – such as name, address, telephone number and property location – is collected, under the authority of section 30 of the Environmental Assessment Act and is collected and maintained for the purpose of creating a record that is available to the general public. As this information is collected for the purpose of a public record, the protection of personal information provided in the Freedom of Information and Protection of Privacy Act (FIPPA) does not apply (s.37). Personal information you submit will become part of a public record that is available to the general public unless you request that your personal information remain confidential.

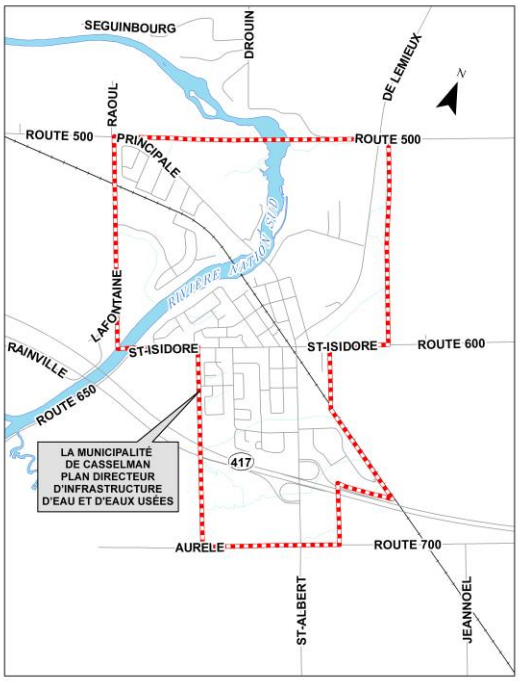
If there is no request received by **June 12, 2024**, the Master Plan is deemed complete, and the Municipality may then proceed with implementing the recommendations.

This Notice was originally issued on May 10, 2024 and revised on May 13, 2024.

Avis de Plan directeur

La municipalité de Casselman
Plan directeur des infrastructures d'eau et d'assainissement

La municipalité de Casselman a achevé un processus de planification principale conformément à l'Approche 1 de l'association des ingénieurs municipaux (AIM) en matière d'évaluation environnementale de catégorie (Classe EE) pour élaborer un plan directeur des infrastructures d'eau et d'assainissement. L'étude du plan directeur a évalué diverses options pour améliorer les performances et la fiabilité des systèmes de traitement de l'eau et des eaux usées, ainsi que des réseaux de collecte des eaux usées, afin de garantir qu'ils puissent répondre aux débits actuels et futurs générés dans la municipalité.



Sur la base des conclusions de l'étude, des contributions des organismes techniques et du public, le plan directeur est maintenant complet. Les alternatives préférées comprennent un nouvel approvisionnement en eau en provenance de Clarence-Rockland, des mises à niveau des conduites d'eau et des égouts sanitaires, l'expansion et la modernisation de la lagune de Casselman, ainsi que des mises à niveau des stations de pompage des eaux usées. Les projets recommandés sont présentés dans la section 3 du Plan directeur qui est disponible pour examen sur le site web de la Municipalité : https://en.casselman.ca/services/water_and_sewer

Par le présent avis, le plan directeur est mis à la disposition du public pour une période de révision de 30 jours conformément aux exigences de la Classe EE municipale. Les personnes intéressées peuvent soumettre leurs commentaires écrits à l'équipe de projet d'ici le **12 juin, 2024**. Tous les commentaires et préoccupations doivent être envoyés directement à :

Susan Shi, P.Eng.
Ingénieur principal en environnement
J.L. Richards & Associates Limited
203-863 Princess Street
Kingston, ON K7L 5N4
sshi@jlrichards.ca

Pierre-Paul Beauchamp
Directeur des Travaux publics
Municipalité de Casselman
751, rue St-Jean
Casselman, ON K0A 1M0
ppbeauchamp@casselman.ca

Toutes les informations personnelles incluses dans votre demande, telles que le nom, l'adresse, le numéro de téléphone et l'emplacement de la propriété, sont collectées sous l'autorité de l'article 30 de la Loi sur l'évaluation environnementale et sont recueillies et conservées dans le but de créer un enregistrement qui est disponible au grand public. Comme ces informations sont recueillies dans le but d'un enregistrement public, la protection des informations personnelles fournies dans la Loi sur l'accès à l'information et la protection de la vie privée (FIPPA) ne s'applique pas (art. 37). Les informations personnelles que vous soumettez deviendront une partie d'un dossier public disponible au grand public, sauf si vous demandez que vos informations personnelles restent confidentielles.

Si aucune demande n'est reçue d'ici le **12 juin, 2024**, le plan directeur est réputé complet, et la Municipalité peut alors procéder à la mise en œuvre des recommandations.

Cette notice a été émise le 10 mai 2024 et révisé le 13 mai 2024.

From: Orpana, Jon (MECP) <Jon.Orpana@ontario.ca>
Sent: June 21, 2024 4:23 PM
To: Meaghan Keon
Cc: Susan Jingmiao Shi
Subject: RE: [16953-118] The Municipality of Casselman - Water and Wastewater Infrastructure Master Plan

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Hello there Meaghan,

I ran the WWIMP by our District office and the WCO appreciated the heads up on what may potentially coming down the pipe for potential water and waste water projects in the municipality. He however did not have much to add in the way of comments.

I have taken a cursory look at the MP and have checked the consultation associated with the project and it looks complete.

I have no real other comments to offer as this project followed Approach 1 the study was conducted at a fairly high level and more complete work will be required for the completion of perceived Schedule B and C projects in the future.

Regards,

Jon

Jon K. Orpana hear name
Regional Environmental Planner
Environmental Assessment Branch
Ministry of the Environment, Conservation and Parks
Kingston Regional Office
PO Box 22032, 1259 Gardiners Road
Kingston, Ontario
K7M 8S5

Phone: (613) 548-6918
Fax: (613) 548-6908
Email: jon.orpana@ontario.ca

From: Meaghan Keon <mkeon@jlrichards.ca>
Sent: Monday, June 17, 2024 9:42 AM
To: Orpana, Jon (MECP) <Jon.Orpana@ontario.ca>
Cc: Susan Jingmiao Shi <sshi@jlrichards.ca>
Subject: [16953-118] The Municipality of Casselman - Water and Wastewater Infrastructure Master Plan

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Hi Jon,

I am following up for MECP comments on the Casselman Master Plan for the 30-day review period (which ended June 12, 2024); do you have a time we can expect these comments, so we can update the Municipality?

Thanks,
Meaghan

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

Meaghan Keon, P.Eng., MASc.
Environmental Engineer

1000-343 Preston Street
Ottawa, ON, K1S 1N4

Work: 343-804-5350
mkeon@jlrichards.ca

BEST MANAGED COMPANIES
Platinum member

From: Kamal, Tarique (MTO) <Tarique.Kamal@ontario.ca>
Sent: May 10, 2024 10:13 AM
To: Rachel Nafziger
Cc: Meaghan Keon; Susan Jingmiao Shi; Monga, Manan (MTO)
Subject: RE: [16953-118] The Municipality of Casselman - Water and Wastewater Infrastructure Master Plan
Attachments: RE: [16953-118] The Municipality of Casselman - Water and Wastewater Infrastructure Master Plan- Notice of Public Information Centre

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Hello Meaghan,

MTO provided the attached comments for PIC 1. Our comments remain the same.

Thanks,

Tarique

Tarique Kamal
Senior Project Manager | Corridor Management | East Operations
Ministry of Transportation | Ontario Public Service
613-301-5425 | tarique.kamal@ontario.ca

Ontario

Taking pride in strengthening Ontario, its places and its people

Highway Corridor Management

From: Rachel Nafziger <rnafziger@jlrichards.ca>
Sent: May 10, 2024 8:55 AM
Cc: Meaghan Keon <mkeon@jlrichards.ca>; Susan Jingmiao Shi <sshi@jlrichards.ca>
Subject: [16953-118] The Municipality of Casselman - Water and Wastewater Infrastructure Master Plan

From: Smythe, Liam (He/Him) (MCM) <Liam.Smythe@ontario.ca>
Sent: July 4, 2024 2:53 PM
To: Meaghan Keon
Cc: ppbeauchamp@casselman.ca; Barboza, Karla (She/Her) (MCM); Leclerc, Erika (MCM); EA Notices to ERegion (MECP); Susan Jingmiao Shi
Subject: RE: MCM Response - The Municipality of Casselman - Water and Wastewater Infrastructure Master Plan [MCM File #0016886]

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Good afternoon Meaghan,

Thank you very much for taking the time to respond to MCM's comments, and for providing the updated Phase 2 report.

I have reviewed the updated report and can confirm that MCM's comments have been addressed. We have no additional comments or questions at this time.

Best regards,

Liam Smythe
Heritage Planner | Citizenship, Inclusion and Heritage Division
Ministry of Citizenship and Multiculturalism | Ontario Public Service
416-301-4797 | Liam.Smythe@ontario.ca

Ontario

Taking pride in strengthening Ontario, its places and its people

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From: Meaghan Keon <mkeon@jlrichards.ca>
Sent: Tuesday, July 2, 2024 11:31 AM
To: Smythe, Liam (He/Him) (MCM) <Liam.Smythe@ontario.ca>
Cc: ppbeauchamp@casselman.ca; Barboza, Karla (She/Her) (MCM) <Karla.Barboza@ontario.ca>; Leclerc, Erika (MCM) <erika.leclerc@ontario.ca>; EA Notices to ERegion (MECP) <eanotification.eregion@ontario.ca>; Susan Jingmiao Shi <sshi@jlrichards.ca>
Subject: RE: MCM Response - The Municipality of Casselman - Water and Wastewater Infrastructure Master Plan [MCM File #0016886]

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Hi Liam,

We have reviewed your (7) comments in the letter you provided dated June 11, 2024 . Please see our responses below and updated report attached.

- Comment 1: Recommended text has been revised on page 8.

- Comment 2 and 3: Added a comment for each alternative presented in Table 4 (Water Supply and Treatment Evaluation Matrix) and Table 21 (Sewage Treatment Evaluation Matrix) indicating potential impacts to cultural heritage resources within the Social and Environmental Considerations section. Also, refer to our response to Comment 5.

- Comment 4: Table 23 is intended to flag at a high-level potential environmental, construction, and cultural heritage resources. This table has been revised and organized by these sub headings and recommended text has been added for cultural heritage resources.

- Comment 5: Included some of the recommended wording. An overarching comment is that screening for archaeological resources, built heritage resources and cultural heritage landscapes has not yet been undertaken for this Master Plan. For all proposed projects the potential for disruption to cultural heritage resources is dependent on the preferred alternatives. Section 5 of this Master Plan has been updated detailing which preferred alternatives may require screening based on their Class EA, see below:

  "For the recommended water distribution projects (see Section 2.4.2.2 and Figure 6), the two linear infrastructure upgrades are recommended within existing infrastructure corridors and are therefore not anticipated to impact cultural heritage resources. Upgrades to the elevated storage tank involve increasing the tank water level, therefore no cultural heritage resources impact assessment is required as this is an operational upgrade.

  For the WTP, the preferred alternative is completing short-term upgrades within the existing plant and in the long-term building a transmission pipe from the Clarence-Rockland WTP to supply to Casselman (see Section 2.2.4.2). A water transmission main route is proposed within existing rights-of-way based on an initial feasibility study; therefore, no cultural heritage resources will likely be impacted. However, the exact piping route would need to be determined through completion of a Schedule B MECA for switching the water supply to Clarence-Rockland at which time cultural heritage resources screening shall be completed.

  Similarly for wastewater, sanitary pipe upgrades are recommended within existing infrastructure corridors and are therefore not anticipated to impact cultural heritage resources (see Section 2.5.3.5 and Figure 8). SPS No. 1 and No. 6 upgrades will be contained within the existing sites (see Section 2.5.2.5 and Figure 8), therefore no impact to cultural heritage resources is anticipated but screening will be completed upon initiation of these Schedule B MECA projects. A new SPS is proposed to service development areas south of the Highway 417 (see Section 2.5.4 and Figure 8). A preferred location for this new SPS has not been defined as part of this Master Plan as it is dependent on future development areas which are anticipated in 10-25 years. The location of the new SPS would be determined during a Schedule B MECA, at which time cultural heritage resources screening should be completed to inform the preferred location.

  The preferred wastewater treatment project is contained within the existing site boundary therefore no impact to cultural heritage resources is anticipated but screening will be completed as part of the recommended Schedule C MCEA for the Casselman STS."

  Furthermore, as the Master Plan provides high level solutions for water and wastewater infrastructure needs within Casselman, in many instances, as described above, an exact location for project implementation has not been defined as part of this Master Plan. Upon initiation of the

project specific Class EAs identified above cultural heritage resources screenings would be completed to determine if further assessments are to be undertaken. Therefore, at this time cultural heritage resources screening and a Cultural Heritage Report (Existing Conditions) are not being completed as part of this Master Plan.

- Comment 6: Added wording “Section 1.3 of Phase 1”.
- Comment 7: Project Schedules have been added in Table 22 for each proposed alternative.

Please respond by July 9, 2024 if our responses to your comments are satisfactory, and we will finalize the Master Plan.

We are open to a meeting to discuss our responses if anything requires clarification.

Regards,
Meaghan



Meaghan Keon, P.Eng., MASc.
Environmental Engineer

1000-343 Preston Street
Ottawa, ON, K1S 1N4

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From: Smythe, Liam (He/Him) (MCM) <Liam.Smythe@ontario.ca>
Sent: Tuesday, June 11, 2024 10:58 AM
To: Susan Jingmiao Shi <sshi@jlrichards.ca>
Cc: ppbeauchamp@casselman.ca; Rachel Nafziger <rnafziger@jlrichards.ca>; Meaghan Keon <mkeon@jlrichards.ca>; Barboza, Karla (She/Her) (MCM) <Karla.Barboza@ontario.ca>; Leclerc, Erika (MCM) <erika.leclerc@ontario.ca>; EA Notices to ERegion (MECP) <eanotification.eregion@ontario.ca>
Subject: MCM Response - The Municipality of Casselman - Water and Wastewater Infrastructure Master Plan [MCM File #0016886]

[CAUTION] This email originated from outside JLR. Do not click links or open attachments unless you recognize the sender and know the content is safe. Do not forward suspicious emails, if you are unsure, please send a separate message to Helpdesk.

Good morning,

Thank you for providing the Ministry of Citizenship and Multiculturalism (MCM) with the updated Notice of Completion for the Municipality of Casselman's Water and Wastewater Infrastructure Master Plan.

MCM's comments on this Master Plan are included in the attached letter. Please do not hesitate to contact us if you have any questions or require further information.

Best regards,

Liam Smythe
Heritage Planner | Citizenship, Inclusion and Heritage Division
Ministry of Citizenship and Multiculturalism | Ontario Public Service
416-301-4797 | Liam.Smythe@ontario.ca

Ontario

Taking pride in strengthening Ontario, its places and its people

---

From: Rachel Nafziger <rnafziger@jlrichards.ca>
Sent: May 13, 2024 1:39 PM
Cc: Meaghan Keon <mkeon@jlrichards.ca>; Susan Jingmiao Shi <sshi@jlrichards.ca>
Subject: [16953-118] The Municipality of Casselman - Water and Wastewater Infrastructure Master Plan

CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Greetings,

A Notice of Completion was originally issued on May 10, 2024. The attached Notice of Master Plan is to superseded the Notice of Completion previously circulated. The Notice has been updated based on the latest MEA Class EA Manual formatting; **the Master Plan recommendations have not changed.**

By this Notice, the Master Plan is being placed on public record for a 30-day review period in accordance with the requirements of the Municipal Class EA and the comment period has been extended to **June 12, 2024.** Comments on this study can be emailed or mailed to the address provided in the Notice of Master Plan. If you have any questions or concerns, please contact the undersigned.

Meaghan

You are receiving this Notice as you have been identified as a potential stakeholder. If you wish to be removed from the mailing list, please reply with subject line "unsubscribe".

Meaghan Keon, P.Eng., MASc.
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Ministry of Citizenship and Multiculturalism

Heritage Planning Unit
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Ontario

June 11, 2024 EMAIL ONLY

Susan Shi
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203-863 Princess Street
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MCM File	**:**	**0016886**
Proponent	**:**	**Municipality of Casselman**
Subject	**:**	**Municipal Class Environmental Assessment – Master Plan – Approach #1 – Notice of Completion**
Project	**:**	**Water and Wastewater Infrastructure Master Plan**
Location	**:**	**Municipality of Casselman, United Counties of Prescott and Russell**

Dear Susan Shi:

Thank you for providing the Ministry of Citizenship and Multiculturalism (MCM) with the Notice of Completion for the above-referenced project, and for making the Phase 1 and Phase 2 Master Plan reports available for review on the project website.

MCM's interest in this Environmental Assessment (EA) project relates to its mandate of conserving Ontario's cultural heritage.

Project Summary
The Municipality of Casselman has completed a Master Planning process in accordance with Approach 1 of the Municipal Engineers Association (MEA) Class Environmental Assessment (Class EA) to develop a Water and Wastewater Infrastructure Master Plan (WWIMP). The Master Plan study assessed various options to improve the performance and reliability of the water and wastewater treatment and sewage collection systems to ensure they can be relied upon to accommodate current and future flows generated within the Municipality.

Comments
We have reviewed the following documents:

- *Phase 1 Report (Final) – Casselman Water and Wastewater Infrastructure Master Plan* prepared by J.L. Richards, dated September 25, 2023
- *Phase 2 Report (Final) – Casselman Water and Wastewater Infrastructure Master Plan* prepared by J.L. Richards, dated May 10, 2024

We have the following comments and observations:

- MCM understands that the master plan would typically be done at a broad level of assessment thereby requiring more detailed investigations at the project-specific level. Therefore, a description of the existing conditions related to cultural heritage resources needs to be included in the master plan document.
- The term 'Cultural Heritage Resources' include archaeological resources, built heritage resources and cultural heritage landscapes.
- Neither the Phase 1, nor the Phase 2 report provide information on how built heritage resources and cultural heritage landscapes were (or will be) considered in the development of this Master Plan.

To help support due-diligence documentation related to cultural heritage resources, we have provided detailed comments on the Phase 2 report in the attached table.

Thank you for the opportunity to review the master plan for this project. If you have any questions or require clarification, please do not hesitate to contact me. We are also available to meet with you and your consultants should it be required.

Sincerely,

Liam Smythe
Heritage Planner
Liam.Smythe@Ontario.ca

Copied to: Paul-Pierre Beauchamp, Municipality of Casselman
Rachel Nafziger, J.L. Richards
Meaghan Keon, J.L. Richards
Karla Barboza, MCM
Erika Leclerc, MCM
EA Notices to East Region, MECP

It is the sole responsibility of proponents to ensure that any information and documentation submitted as part of their EA report or file is accurate. The Ministry of Citizenship and Multiculturalism (MCM) makes no representation or warranty as to the completeness, accuracy or quality of the any checklists, reports or supporting documentation submitted as part of the EA process, and in no way shall MCM be liable for any harm, damages, costs, expenses, losses, claims or actions that may result if any checklists, reports or supporting documents are discovered to be inaccurate, incomplete, misleading or fraudulent.

Should previously undocumented archaeological resources be discovered, they may be a new archaeological site and therefore subject to Section 48(1) of the *Ontario Heritage Act*. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licensed consultant archaeologist to carry out an archaeological assessment, in compliance with Section 48(1) of the *Ontario Heritage Act*.

The *Funeral, Burial and Cremation Services Act, 2002, S.O. 2002, c.33* requires that any person discovering human remains must cease all activities immediately and notify the police or coroner. If the coroner does not suspect foul play in the disposition of the remains, in accordance with *Ontario Regulation 30/11* the coroner shall notify the Registrar, Ontario Ministry of Public and Business Service Delivery, which administers provisions of that Act related to burial sites. In situations where human remains are associated with archaeological resources, the Ministry of Citizenship and Multiculturalism should also be notified (at archaeology@ontario.ca) to ensure that the archaeological site is not subject to unlicensed alterations which would be a contravention of the *Ontario Heritage Act*.

Comment #	Reference to Phase 2 Master Plan Report	Comment	Proposed Action/Solution
1.	Table 2 – *Summary of Evaluation Criteria* p. 8	The terminology used in this section should be revised to be consistent with current legislation.	Revise text as follows: …arch**a**eological resources **and areas of archaeological potential**, **known and potential built heritage resources and cultural heritage landscapes** ~~and cultural features, designated heritage Features~~…
2.	Table 4 – *Water Supply and Treatment Evaluation Matrix* Row: *Social and Environmental Considerations* p. 16-17	Although cultural heritage resources are identified in Table 2 as one of the *Social and Environmental Considerations* of this master plan, Table 4 provides no information on how impacts to cultural heritage resources were considered in the selection of alternatives.	The *Social and Environmental Considerations* section of this table should be revised to indicate how impacts to cultural heritage resources were considered in the selection of alternatives. Please see comment #5 for more detail on how the exiting conditions for cultural heritage resources can be presented.
3.	Table 21 – *Sewage Treatment System Evaluation Matrix* p. 45	This table indicates that for Alternatives 2b and 3, there are no impacts anticipated to archaeological resources, and 'cultural heritage'. This information is contradictory to the information presented in Section 5.0 (see comment #5 below). Based on the information provided in that section, it appears that screening for archaeological resources, built heritage resources and cultural heritage landscapes has not yet been undertaken for this master plan. It is therefore unclear how it was determined that cultural heritage resources would not be impacted by this project, as the existing conditions related to cultural heritage resources have yet to be established.	In order to support the information presented in this table, the Ministry's screening checklists *Criteria for Evaluating Archaeological Potential* and *Criteria for Evaluating Marine Archaeological Potential* should be completed to help determine whether the area has archaeological potential and archaeological assessments will be need for subsequent project undertakings. Likewise, the Ministry's screening checklist *Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes* should be completed to help determine whether the area has known or potential BHR/CHL. If there is potential for BHR/CHL within the project area, then a *Cultural Heritage Report: Existing Conditions* be undertaken to support subsequent project undertakings. The Existing Conditions will include a historical summary of the study area's development, identifying all known or potential built heritage resources and cultural heritage landscapes within the study area. The findings/results of this screening should be clearly articulated in this document.
4.	Table 23 – *Summary of Environmental Impacts and Mitigation Measures* p. 48	It appears that the potential impacts presented in this table only relate to MECP's mandate. It is unclear why this information is included as further studies have yet to be completed for the projects described in Table 22.	Add a row titled **'Cultural Heritage Resources'** including the following suggested text: **Potential Impact:** • **Disturbance or destruction of archaeological resources** • **Displacement of known and/or potential built heritage**

		A row on 'Cultural Heritage Resources' would need to be included to describe the potential impacts and potential mitigation measures. Furthermore, it is unclear as to why 'Mitigation and Monitoring' and 'Permits and Approvals' are identified in this table as environmental impacts.	**<u>resources and/or cultural heritage landscapes by removal and/or demolition and/or disruption</u>** **Potential Mitigation Measures** • **<u>Undertake archaeological assessment(s) to identify and evaluate resources. All archaeological assessment work must be carried out by licensed archaeologists</u>** • **<u>Identify and evaluate Built Heritage Resources and Cultural Heritage Landscapes</u>** • **<u>Avoidance, through alternative route selection</u>** • **<u>Demolition shall be considered a last resort</u>** We also suggest that 'Mitigation and Monitoring' and 'Permits and Approvals' be moved out of the table and discussed in a sperate section.
5.	Section 5.0 – *Cultural Heritage and Archaeological Conditions* p. 52	As outlined in the cover letter, this Phase 2 report provides no information on existing conditions as they relate to cultural heritage resources and includes no commitments related to future undertakings. It is also stated elsewhere in the report that there are no anticipated impacts to cultural heritage resources (see comment #3 above). It is not clear how this conclusion could be determined as the existing conditions have not yet been established. The existing conditions sub-section should indicate if the master plan study area includes areas of archaeological potential, and acknowledge that archaeological assessments will be required for future project-specific projects. MCM also recommends that the report(s) be revised to indicate if there are known (previously recognized) and potential built heritage resources and/or cultural heritage landscapes within the study area, and if these have the potential to be impacted by future undertakings. We recommend that a *Cultural Heritage Existing Conditions Report* be undertaken by a qualified person, which will include a historical summary of the study area's development,	This section should be revised to clearly articulate the existing conditions of the study area, as the relate to cultural heritage, and the studies that have been undertaken. It is suggested that section be revised as follows: 5.0 – Cultural Heritage ~~and Archaeological~~ Conditions **<u>Cultural heritage resources, which includes archaeological resources, built heritage resources and cultural heritage landscapes, is an important aspect of the cultural environment and may be impact by the proposed undertaking.</u>** **5.1 – Archaeology** The Ministry of Citizenship and Multiculturalism (MCM) provides screening checklists to determine ~~whether archaeological assessments will be required for projects~~ **<u>if the study area has archaeological potential</u>**. Upon initiation of the Class EA projects identified in Table 22, archaeological screening should be completed to determine if an archaeological assessment is to be undertaken. When applicable, the assessment should be completed by an archaeologist licensed under the Ontario Heritage Act and the archaeological assessment report must be submitted for MCM review prior to the completion of the Class EA and prior to any ground disturbance.

		identifying all known or potential built heritage resources and cultural heritage landscapes within the master plan study area.	~~The MCM noted that there are no known archaeological assessments completed for this specific to this project to date. They noted two known archaeological sites within the Municipality of Casselman: located approximately 400 m and 600 m from SPS No.6 and SPS No.~~1 **5.2 – Built Heritage Resources and Cultural Heritage Landscapes** **A Cultural Heritage Report- Existing Conditions was undertaken on [date] by [heritage consultant] for [name of project or study area]. The assessment for this report consisted of data collection, background historic research, review of secondary source material and field review. A total of # (known and potential) cultural heritage landscapes and built heritage resources were identified within the study area as listed below.**
6.	Section 6.2 – *Future Consultation Requirements* p. 56	This section indicates that '*consultation will be undertaken for the projects in Table 22 in accordance with the consultation requirements of their identified project Schedule, as detailed in the Phase 1 Report'* Please clarify which section and/or page of the Phase 1 report contains the project schedules.	Add reference to section and/or page number of Phase 1 report outlining project schedule.
7.	Section 7 – *Next Steps* p. 56	Similar to Comment #6 above, this section reads: *'Projects that have been identified as Class EA Schedule A can be implemented without further public notification. Projects that have been identified as Class EA Schedule A+ will be advertised by the Municipality prior to project implementation. Projects that have been identified as Class EA Schedule B or C will proceed into a project-specific Class EA studies during which the public will be consulted for their input.'* Please clarify where the project schedules are identified in this report.	Add reference to section outlining project schedules.

Appendix C

Natural Environment Studies

Appendix C1

Species at Risk Screening Assessment,
Casselman Main Sewage Pumping
Station (GEMTEC 2024)

GEMTEC
www.gemtec.ca

Species at Risk Screening Assessment
Casselman Main Sewage Pumping Station Upgrades
Various Streets
Casselman, Ontario

GEMTEC Project: 100117.051

GEMTEC
www.gemtec.ca

Submitted to:

J.L. Richards & Associates Limited
1000-343 Preston Street
Ottawa, Ontario
K1S 1N4

Species at Risk Screening Assessment
Casselman Main Sewage Pumping Station Upgrades
Various Streets
Casselman, Ontario

May 23, 2024
GEMTEC Project: 100117.051

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1.0 INTRODUCTION

GEMTEC Consulting Engineers and Scientists Limited (GEMTEC) was retained by J.L. Richards & Associates Limited (JLR) to undertake a Species at Risk (SAR) Screening Assessment in support of the proposed Casselman Main Sewage Pumping Station (SPS) upgrades along various streets in Casselman, Ontario.

It is understood that the proposed SPS upgrades will occur along an approximately 1930 m stretch of land, crossing Brisson Street, the easement between Brisson Street and Laurier Street, Laurier Street, the Lagoon Access Road, and the berm between the Lagoon Cells.

In accordance with the requirements of a Municipal Class Environmental Assessment (Class A+), the Village of Casselman has identified the need to complete a SAR Screening Assessment for the proposed project area.

1.1 Project Description

The general project area is illustrated on Figure A.1 in Appendix A. A detailed site layout is provided on Figure A.2 in Appendix A. Based on information provided to GEMTEC by JLR via a Request for Proposal document, the project will consist of the following:

- Installation of a new force main beside the existing force main. The alignment is expected to be along the same alignment as the existing force main (within road allowances and existing easements); and
- Installation of a new influent sewer within the property limits of the SPS, with a new maintenance chamber. The invert is expected to be approximately 6 to 7 metres below surface. It is understood that the details of this installation are to be confirmed.

1.2 Objective and Scope of Work

The objective of the SAR Screening Assessment presented herein is twofold: 1) to identify the presence or potential presence of any SAR and their regulated habitat within the project area, 2) to recommend established and effective avoidance and mitigation measures to ensure that the project is completed in accordance with the provincial *Endangered Species Act, 2007*, the federal *Species at Risk Act*, and the *Conservation Authorities Act.*

To meet the objectives outlined above, the following scope of work was completed:

- Task 1 – Desktop Assessment
- Task 2 – Site Investigation
- Task 3 – Assessment and Reporting

2.0 METHODOLOGY

2.1 Desktop Review

A desktop review was completed to aid in the scoping of field investigations and to gather information relating to natural heritage features that may be present within the proposed project area or within 1 km of the subject property. An additional component of the desktop review was to assess the potential presence of SAR to occur on the subject site or within the study boundary based on a review of publicly accessible occurrence records and review of SAR habitat requirements and range maps.

Information regarding the potential presence of natural heritage features and SAR within the vicinity of the site was obtained from the following sources:

- Make a Map: Natural Heritage Areas (OMNRF, 2023);
- Land Information Ontario (OMNRF, 2011);
- Ontario Geological Survey (OGS, 2019);
- Department of Fisheries and Oceans Canada Aquatic SAR Maps (DFO, 2023);
- Fish ON-Line (ONMRF, 2023);
- Breeding Bird Atlas of Ontario (Cadman, et al., 2007);
- eBird Canada Hotspots (eBird Canada, 2023);
- Atlas of Mammals of Ontario (Dobbyn, 1994);
- iNaturalist Explore Observations Map (iNaturalist, 2023);
- Ontario Reptile and Amphibian Atlas (Ontario Nature, 2020);
- Village of Casselman Official Plan (Casselman, 2008);
- United Counties of Prescott-Russell Official Plan (UCPR, 2022); and
- United Counties of Prescott-Russell À La Carte On-line Mapping (UCPR, undated).

2.2 Site Investigation

A single season field investigation was completed to describe in general, the natural and physical setting of the subject property with a focus on natural heritage features and to identify any potential SAR or their habitat that may exist at the subject property.

Field investigations completed in support of this SAR report are outlined in Table 2.1 below.

Table 2.1 Summary of Field Investigations

Date	Time	Weather	Purpose
April 15, 2024	12:30-14:30	1°C, 0% cloud cover, Beaufort 0, no precipitation.	SAR Investigation

The field investigation was completed by traversing the entire stretch of the 1930 m proposed project path of construction while documenting habitat conditions and the presence/ absence of SAR and their regulated habitat.

Photographs of relevant site features are provided in Appendix B.

3.0 RESULTS

3.1 Desktop Screening Results

Results of the desktop screening exercise are summarized in Table 3.1 below. The desktop screening exercise identified the potential for six avian, two herptile, three mammalian, and one plant SAR within the project area.

Species	ESA Status	Habitat Use	Probability of Occurrence On-Site or Within Study Area	Rationale
Avian				
Bank Swallow	Threatened	Colonial nester, burrows in eroding silt, to sand banks, sand pit walls, etc.	Moderate	Suitable nesting habitat may be present within the study area. NHIC and eBird ccurrence data for species within 1 km of site. Species not observed during field investigation. No historical nests observed within project area.
Barn Swallow	Special Concern	Nests in barns and other semi-open structures. Forages over open fields and meadows.	Moderate	Suitable nesting habitat may be present within the study area. eBird ccurrence data for species within 1 km of site. Species not observed during field investigation. No historical nests observed within project area.
Bobolink	Threatened	Nests in dense tall grass fields and meadows, low tolerance for woody vegetation.	Moderate	Agricultural fields within project area may provide suitable grassland habitat to support species presence. NHIC occurrence records confirm its presence within 1 km of site. Species not observed during field investigation.
Canada Warbler	Special Concern	Prefers wet forests with dense shrub layers	Low	Prefered wet forest habitat may be present on-site. No recent records within 1 km of proposed project area. Species not observed during field investigation.
Cerulean Warbler	Threatened	Prefers mature deciduous forest habitat.	Low	Preferred mature deciduous forest habitat is not present on-site or within study area. Species not observed during field investigation.
Chimney Swift	Threatened	Nests in traditional-style open brick chimneys.	Low	eBird indicates presence of species within 1 km of site. No suitable nesting structures within 1 km of site. Species not encountered during the field investigation.
Common Nighthawk	Special Concern	Nests in a variety of open sites: beaches, fields and grave rooftops.	Low	Suitable open habitat present in the study area. No recent occurrence records within 1 km of site. Species not observed during field investigation.
Eastern Meadowlark	Threatened	Nests and forages in dense tall grass fields and meadows, higher tolerance to woody vegetation.	Moderate	Agricultural fields within project area may provide suitable grassland habitat to support species presence. NHIC occurrence records confirm its presence within 1 km of site. Species not observed during field investigation.
Eastern Whip-poor-will	Threatened	Nests on the ground in open deciduous or mixed woodlands with little underbrush, and bedrock outcrops.	Low	Site lacks suitable open deciduous or mixed woodlands to support species presence. No recent records within 1 km of the proposed project area. Species not observed during the field investigation.
Eastern Wood-Pewee	Special Concern	Woodland species, often found near clearings and edge habitat.	Moderate	Potentially suitable wooded edge habitat is scattered throughout the project area. NHIC occurrence data for species within 1 km of site. Species not observed during the field investigation.
Evening Grosbeak	Special Concern	Nests in trees or large shrubs, preference to large coniferous forests, will use deciduous. Overwinters in Ottawa.	Low	Site lacks suitable stands of coniferous or deciduous forest to support species presence. No recent occurrence records for species within 1 km of site. Species not observed during the field investigation.
Golden Eagle	Endangered	Nests on remote, bedrock cliffs, overlooking large burns, lakes or tundras	Low	Preferred nesting habitat is not present on-site or within the study area. No occurrence records within 1 km of site. Species not observed during the field investigation.
Golden-winged Warbler	Special Concern	Ground nesting, edge species. Breeds in successional scrub habitats surrounded by forests.	Low	The study area lacks a suitable combination of successional scrub habitat adjacent to forest. No occurrence records within 1 km of site. Species not observed during the field investigation.
Grasshopper Sparrow	Special Concern	Ground-nesting grassland species. Prefers fields with low sparse vegetation on sand, alvars or poor soils.	Low	Potentially suitable habitat within the agricultural fields of the greater study area. No occurrence records within 1 km of site. Species was not observed during the field investigation.
Henslow's Sparrow	Endangered	Prefers open, moist, tallgrass fields.	Low	Preferred moist tallgrass fields not present on-site or within the study area. No occurrence records within 1 km of site. Species not observed during field investigation.
Least Bittern	Threatened	Prefers marshes, shrub swamps, usually near cattails	Low	Suitable marsh or swamp habitat not present within the study area. No recent observations within 1 km of the proposed project site. Species not observed during the field investigation.
Lesser Yellowlegs	Threatened	Ottawa Migrant. Breeding is limited to Alaska and northern Canada. During winter and migration usess coastal salt marshes, estuaries and ponds, lakes, freshwater wetlands, anthropogenic wetlands.	Moderate	Potentially suitable open aquatic habitat on-site. eBird occurrence records for species within the Caselman Lagoons. Species not observed during the field investigation.
Loggerhead Shrike	Endangered	Prefers grazed pastures with short grass and scattered shrubs, especially hawthorn.	Low	Study area lacks suitable grazed pasture habitat. Preferred shrub species not observed within study area. No occurrence records within 1 km of site. Species not observed during the field investigation.
Olive-sided Flycatcher	Special Concern	Forest edge species, forages in open areas from high vantage points in trees.	Low	Potentially suitable wooded edge habitat is scattered throughout the project area. No occurrence records for species within 1 km of site. Species not observed during the field investigation.
Peregrine Falcon	Special Concern	Nests on cliffs near water and on more anthropogenic structures such as tall buildings, bridges, and smokestacks.	Low	Preferred nesting structures not present on-site or within the study area. Recent occurrence records for species within study area are primarily associated with the South Nation River. Species not observed during field investigation.
Red-headed Woodpecker	Endangered	Prefers open deciduous woodlands, particularly those dominated by oak and beech.	Low	Site lacks suitable stands of woodland habitat. No occurrence records for species within 1 km of site. Species was not observed during the field investigation.
Red-necked Phalarope	Special Concern	Ottawa Migrant. Breeds around lakes, bogs, and marshes in the Arctic tundra or tundra-forest boundary.	Moderate	Potentially suitable open aquatic habitat on-site. eBird occurrence records for species within the Caselman Lagoons. Species not observed during the field investigation.
Rusty Blackbird	Special Concern	Wet wooded or shrubby areas (nests at edges of Boreal wetlands)	Low	No wet wooded or shrubby areas within the immediate study area. No recent occurrence records for species within 1 km of site. Species was not observed during the field investigation.
Short-eared Owl	Threatened	Ground nester, prefers open habitats, fields and marshes.	Low	Suitable open habitat present in the study area. No recent occurrence records within 1 km of site. Species not observed during field investigation.
Wood Thrush	Special Concern	Prefers deciduous or mixed woodlands.	Moderate	Potentially suitable wooded edge habitat is scattered throughout the project area. NHIC occurrence data for species within 1 km of site. Species not observed during the field investigation.
Mammalian				
Eastern small-footed Myotis	Endangered	Roosts in rock crevices, barns and sheds. Overwinters in abandoned mines. Summer habitats are poorly understood in Ontario, elsewhere prefers to roost in open, sunny rocky habitat and occasionally in buildings (Humphrey, 2017).	Moderate	Study area may contain suitable roosting habitat. No recent reports within 1 km of the proposed project site. Species not observed during field investigation.
Little Brown Myotis	Endangered	Maternal colonies known to use buildings, may also roost in trees during summer. Affinity towards anthropogenic structures for summer roosting habitat and exhibit high site fidelity (Environment Canada, 2015).	Moderate	Study area may contain suitable roosting habitat. Research-grade iNaturalist observations confirm its presence within 1 km of the proposed project site. Species not observed during field investigation.
Northern myotis (Northern Long-eared Bat)	Endangered	Occurs throughout eastern North America in associated with Boreal forests. Roosts mainly in trees, occasionally anthropogenic structures during summer (Environment Canada, 2015). Overwinters in caves and abandoned mines.	Low	Species affinity is for Boreal forests and species rarely roosts in anthropogenic structures. No recent observations within 1 km of the proposed project site.
Tri-colored Bat	Endangered	Roosts in trees, rock crevices and occasionally buildings during summer. Overwinters in caves and mines.	Moderate	Study area may contain suitable roosting habitat. No recent reports within 1 km of the proposed project site. Species not observed during field investigation.

Species	ESA Status	Habitat Use	Probability of Occurrence On-Site or Within Study Area	Rationale
Reptilian				
Blanding's Turtle	Threatened	Inhabits quiet lakes, streams and wetlands with abundant emergent vegetation. Frequently occurs in adjacent upland forests.	Low	Study area likely to provide suitable habitat conditions to support species activity. No occurrence records within 1 km of site. Species not observed during field investigation.
Eastern Musk Turtle	Special Concern	Wetlands. Highly aquatic habtiats.	Low	Study area lacks suitable habitat conditions to support species activity. No occurrence records within 1 km of site. Species not observed during field investigation.
Eastern Ribbonsnake	Special Concern	Marshy edfes of wetlands and watercourses.	Low	Suitable habitat may be present within the study area. No occurrence records within 1 km of site. Species not observed during field investigation.
Northern Map Turtle	Special Concern	Highly aquatic species, found only in lakes and large rivers.	Moderate	Study area lacks suitable habitat conditions to support species activity. No occurrence records within 1 km of site. Species not observed during field investigation.
Snapping Turtle	Special Concern	Highly aquatic species, found in a wide variety of wetlands, water bodies and watercourses.	Low	Study area likely to provide suitable habitat conditions to support species activity. No occurrence records within 1 km of site. Species not observed during field investigation.
Spotted Turtle	Endangered	Secretive wetland species.	Low	Study area lacks suitable habitat conditions to support species activity. No occurrence records within 1 km of site. Species not observed during field investigation.
Wood Turtle	Endangered	Primarily terrestrial forest species. Associated with clear, gravelly streams.	Low	Study area lacks suitable habitat conditions to support species activity. No occurrence records within 1 km of site. Species not observed during field investigation.
Plants				
American Ginseng	Endangered	Rich, moist, relatively mature deciduous forests.	Low	Study area lacks suitable habitat to support species activity. No occurrence records within 1 km of site. Species not observed during the field investigation.
Black Ash	Endangered	Predominantly a wetland species, found in swamps, floodplains and fens.	Low	Study area lacks suitable wetland habitat to support species presence. No occurrence records within 1 km of site. Species not observed during the field investigation.
Butternut	Endangered	Inhabits a wide range of habitats including upland and lowland deciduous and mixed forests.	Low	Suitable wooded hedgrow habitat on-site to support species presence. No occurrence records within 1 km of site. Species not observed during the field investigation.
Lichens				
Pale-bellied Frost Lichen	Endangered	Grows on the bark of hardwood trees such as white ash, black walnut, American elm and ironwood. Can also be found growing on fence posts and boulders.	Low	Study area may provide suitable habitat. No recent occurrence records with 1 km of the site. Species was not observed during field investigation.
Fish				
American Eel	Endangered	Primarily nocturnal, hiding in soft substrate or submerged vegetation during the day.	Moderate	Suitable habitat present within the South Nation River to support species presence. NHIC indicates occurrence records for the species within 1 km of site. Species was not observed during the field investigation.
Bridle Shiner	Special Concern	Prefers clear water with abundant vegetation over silty or sandy vegetation	Low	The South Nation River may provide suitable habitat conditions. No occurrence records for the species within 1 km of site. Species was not observed during the field investigation.
Channel Darter	Special Concern	Prefers clear water with abundant vegetation over silty or sandy vegetation	Low	The South Nation River may provide suitable habitat conditions. No occurrence records for the species within 1 km of site. Species was not observed during the field investigation.
Lake Sturgeon	Endangered	Large lakes and rivers. Forages in cool water, 4-9m deep over soft substrates. Spawns in shallower, fast-flowing areas over rocks or gravel.	Low	The South Nation River may provide suitable habitat conditions. No occurrence records for the species within 1 km of site. Species was not observed during the field investigation.
Northern Brook Lamprey	Special Concern	Prefers shallow areas with warm water. Larvae burrows in soft substrate for up to 7 years.	Low	The South Nation River may provide suitable habitat conditions. No occurrence records for the species within 1 km of site. Species was not observed during the field investigation.
River Redhorse	Special Concern	Prefers fast-flowing, clear rivers over rocky substrate	Low	The South Nation River may provide suitable habitat conditions. No occurrence records for the species within 1 km of site. Species was not observed during the field investigation.
Silver Lamprey	Special Concern	Larvae live 4-7 years in burrows, preference to soft substrate.	Low	The South Nation River may provide suitable habitat conditions. No occurrence records for the species within 1 km of site. Species was not observed during the field investigation.
Insects				
Bogbean Buckmoth	Endangered	Preferred food plant is bog bean, present in a variety of wetlands including bogs, swamps and fens.	Low	Preferred wetland habitat not present on-site. Species nor prefered food source observed during field investigation.
Gypsy Cuckoo Bumble Bee	Endangered	Inhabits a wide range of habitats: open meadows, agricultural and urban areas, boreal forests and woodlands.	Low	Preferred habitat may be present within the study area. No recent occurrence records within 1 km of site. Species not observed during field investigation.
Monarch Butterfly	Special Concern	Caterpillars require milkweed plants confined to meadow and open areas. Adult butterflies use more diverse habitat with a variety of wildflowers	Low	Preferred habitat may be present within the study area. No recent occurrence records within 1 km of site. Species not observed during field investigation.
Mottled Duskywing	Endangered	Larval food plant (New Jersey Tea) found in sandy areas and alvars.	Low	Preferred habitat not present within the study area. Species not observed during field investigation.
Nine-spotted Lady Beetle	Endangered	Habitat generalist	Low	No recent occurrence reports in the area, thought to be locally extirpated. Species not observed during field investigation.
Rusty-patched Bumble Bee	Endangered	Habitat generalist	Low	Preferred habitat may be present within the study area. No recent occurrence records within 1 km of site. Species not observed during field investigation.
Transverse Lady Beetle	Endangered	Habitat generalist	Low	No new records of traverse lady beetle in Ontario, species thought to be absent in former habitats.
West Virginia White Butterfly	Special Concern	Requires mature moist deciduous woods with larval host plant toothwort.	Low	Necessary vegetation and toothwort plant not present on-site or within study area.
Yellow-banded Bumble Bee	Special Concern	Habitat generalist; mixed woodlands, variety of open habitat	Low	Potentially suitable foraging habitat for yellow-banded bumble bee occurs on-site. No recent observations within 1 km of the proposed project site. Species not observed during field investigation.

3.2 Vegetation Communities

Vegetation communities within the study area consisted of agricultural fields, constructed green space (schoolyard, open parks), open aquatic (lagoons), and wooded hedgerow areas.

Wooded areas on-site were associated with the successional scrub fields adjacent to the schoolyard, riparian areas, and scattered field hedgerows. Tree species included common riparian associates and species common to disturbed environments, including Manitoba maple (*Acer negundo*), alder (*Alnus* sp.), American elm (*Ulmus americana*), trembling aspen (*Populus tremuloides*), and hawthorn (*Crataegus sp.*). A stand of dead green ash (*Fraxinus pennsylvanica)* was observed between GEMTEC borehole BH23-4 and BH24-3. No black ash were observed during the field investigation.

Most of the proposed construction area is made up of constructed green space (parkspace) and agricultural fields. The field north of Laurier Street appear to be in active use for row crop agriculture. The fields south of Laurier were not in use at the time of the site investigation, being occupied by grass species from the previous growing season. Some areas of field have given way to successional scrub habitat dominated by young Manitoba maple, alternate-leaved dogwood (*Cornus alternifolia*), and red osier dogwood (*Cornus sericea*).

Aquatic vegetation at the time of the site investigation was mostly limited to green algal growths within the South Nation River and the Casselman Lagoons. Pondweed was observed within small sections of pooling associated with a drainage swale running north-south between GEMTEC boreholes BH24-5 and BH24-6.

3.3 Wildlife

During field investigations within the project area, all terrestrial wildlife, including calls and sign, were recorded. Due to the urban nature of the Study Area, it is anticipated that most wildlife species in the area are limited to those that tolerate humans and cultural landscapes. Birds recorded have been assumed to be residents/breeding. Table 3.2 lists all wildlife species identified during field investigations.

Table 3.2 – Incidental Wildlife Observations

Common Name	Scientific Name	S-Rank	ESA Status
Birds			
American goldfinch	*Carduelis tristis*	S5B	-
American wigeon	*Turdus migratorius*	S4	-
Canada goose	*Branta canadensis*	S5	-
Hooded merganser	*Lophodytes cucullatus*	S5B, S5N	-
Killdeer	*Charadrius vociferus*	S5B, S5N	-
Mallard	*Anas platyrhynchos*	S5	-
Northern flicker	*Colaptes auratus*	S4B	-
Red-winged blackbird	*Agelaius phoeniceus*	S4	-
Savannah sparrow	*Passerculus sandwichensis*	S4B	-
Song sparrow	*Melospiza melodia*	S5B	-
Tree swallow	*Tachycineta bicolor*	S4B	-
Woodcock	*Scolopax minor*	S4B	-
Herptile			
Spring peeper	*Pseudacris crucifer*	S5	-
Western chorus frog	*Pseudacris maculata pop. 1*	S3	-
Mammalian			
American beaver	*Castor canadensis*	S5	-
Eastern gray squirrel	*Sciurus carolinensis*	S5	-
Groundhog	*Marmota monax*	S5	-
Muskrat	*Ondatra zibethicus*	S5	-

Notes:
S/N* – range of uncertainty about the status of the species
S1/N1 – Critically Imperiled: At very high risk of extirpation in the jurisdiction due to very restricted range, very few populations or occurrences, very steep declines, severe threats, or other factors.
S2/N2 – Imperiled: At high risk of extirpation in the jurisdiction due to restricted range, few populations or occurrences, steep declines, severe threats, or other factors.
S3/N3 – Vulnerable: At moderate risk of extirpation in the jurisdiction due to a restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors
S4/N4 – Apparently Secure: At a fairly low risk of extirpation in the jurisdiction due to an extensive range and/or many populations or occurrences, but with possible cause for some concern because of local recent declines, threats, or other factors.
S5/N5 – Secure: At very low or no risk of extirpation in the jurisdiction due to a very extensive range, abundant populations, or occurrences, with little to no concern from declines or threats.
SE – Introduced species.

No fish were directly observed within the South Nation River and Casselman Lagoons. Fish habitat is further discussed in Section 3.4.

No other evidence of wildlife activity was observed within or immediately adjacent to the proposed path of construction.

3.4 Fish Habitat

Targeted surveys for fish were not completed as part of the project scope; however, an aquatic habitat investigation to characterize the South Nation River was completed Fish habitat within the project area consists of the South Nation River at the western limits, and the Casselman Lagoons at the eastern end. Both these features are mapped as fish habitat on the UCPR Official Plan (UCPR, 2022).

The South Nation River originates approximately 90 kilometres (km) south of the project area, where it begins as a drainage point for the wetlands north of Brockville. From the study area the South Nation River continues to flow for another 55 km northeastwards before discharging into the Ottawa River, north of Plantagenet. Within the confines of the study area, the South Nation River can be characterized as being a mostly naturalized watercourse flowing through the Village of Casselman.

The South Nation River was noted to have a constant, moderate to fast flow. The channel varied greatly in width, being mostly channelized as it occurs adjacent to the project area. Water within the confines of the study area was noted as mostly clear with some brown discoloration from suspended sediments. Water depths were not measured at the time of the field investigation. The South Nation River had an abundance of in-water structure, including fallen trees and logs, undercut banks, large cobble, and exposed roots. No barriers to fish passage were noted during the field investigation.

The Casselman Lagoons are indicated as offline ponds that provide fish habitat by the UCPR Official Plan (UCPR, 2022). Water within the confines of the study area was noted as brownish discolored due to suspended sediments and organic material. Water depths were not measured during the field investigation. The banks of the lagoons were densely vegetated with reeds and cattail. The Casselman Lagoons appear to lack in-water structure and habitat complexity.

Presently, the full scope of the work needed to complete the replacement of the Carp Culvert is unknown. Until such time the full scope of work is available, it is assumed that temporary impacts to fish habitat within the watercourse are anticipated as a result of the project,, a Department of Fisheries and Oceans (DFO) Request for Project Review (RfR) will be required to be submitted to DFO prior to any in-water work to ensure the project avoids the Hazardous Alteration, Disturbance or Destruction of fish habitat (HADD). A Letter of Advice (LoA) has not been provided by the DFO at the time of this reports writing.

3.5 Species at Risk

As outlined in the Endangered Species Act (Ontario, 2007), only species listed as threatened or endangered and their general habitat receive automatic protection. When a species-specific recovery strategy is developed, a specific habitat regulation will be established, which eventually replaces the automatic habitat protection.

As discussed in Section 3.1, the desktop screening exercise identified the following SAR as being found or potentially found within the Study Area: bank swallow (*Riparia riparia,* THR), bobolink (*Dolichonyx oryzivorus*, THR), eastern meadowlark (*Sturnella magna,* THR), lesser yellowlegs (*Tringa flavipes*, THR), eastern small-footed myotis (*Myotis leibii*, END), little brown myotis (*Myotis lucifugus*, END), and tri-colored Bat (*Perimyotis subflavus*, END).

No floral or faunal SAR were observed within the project area during the completed site investigation. Additional species of conservation concern (Special Concern and/or rare species) were identified during the background reviewing including eastern wood-pewee (*Contopus virens*), red-necked phalarope (*Phalaropus lobatus*), wood thrush (*Hylocichla mustelina*), and northern map turtle (*Graptemys geographica*). Species of Special Concern and their habitat do not receive protection under the ESA.

Potential impacts associated with the proposed project to SAR identified as having a moderate potential to occur on-site, are discussed in the subsections below.

3.5.1 Bank Swallow

Bank swallow is a small insectivorous songbird that nest in burrow colonies built into natural and human-made settings that are vertical faces of silt and sand deposits. No suitable nesting habitat was observed within the proposed project area. However, the combination of open aquatic and field habitats within the project area may provide suitable foraging opportunities. As vegetation grubbing and excavation will be required as part of the proposed works, the project is likely to result in a minor, temporary loss of suitable riparian habitat within the Casselman Lagoons.

Potential indirect impacts include temporary increased disturbances due to human presence and elevated noise levels during construction. However, given the scope of the project, impacts to bank swallow and their habitat are anticipated to be minimal and temporary. Furthermore, it is anticipated that the disturbed areas of suitable habitat within the Casselman Lagoons will return to a state that continues to support bank swallow foraging needs.

The project area does not provide regulated bank swallow habitat. Any potential impacts to individual bank swallow can be mitigated by implementing the avoidance and mitigation measures outlined in Section 4 below. If all of the avoidance and mitigation measures outlined in Section 4 below are enacted, no further permitting is required for the protection of bank swallow.

3.5.2 Bobolink and Eastern Meadowlark

Bobolink nest and forage in dense tall grass fields and have a low tolerance for woody vegetation, while eastern meadowlark nest and forage in dense tall grass fields and have a higher tolerance for woody vegetation.

Potential nesting and foraging habitats for bobolink and eastern meadowlark are limited to the nearby open agricultural fields, which may see a minor loss during construction. However, it is anticipated that direct impacts will be temporary in nature, as the areas of disturbed agricultural field will return to use as potentially suitable crop habitat.

Potential indirect impacts include temporary increased disturbances due to human presence and elevated noise levels during construction. However, overall impacts to bobolink and eastern meadowlark and their habitats are anticipated to be minimal and temporary.

Avoidance and mitigation measures to prevent harm to avian SAR and associated habitat are provided in Section 4.

3.5.3 Lesser Yellowlegs

Lesser yellowlegs is a small shorebird that migrates between its breeding grounds in northern Canada and its overwintering grounds across the southern United States, central, and south America. The species utilizes coastal salt marshes, estuaries and ponds, lakes, freshwater wetlands, and anthropogenic wetlands such as flooded rice fields and sewage lagoons as habitat.

Potential foraging habitats for migratory lesser yellowlegs are concentrated around the South Nation River and the Casselman Lagoons. As vegetation grubbing and excavation will be required as part of the proposed works, the project is likely to result in a minor loss of suitable riparian within the Casselman Lagoons.

Potential indirect impacts include temporary increased disturbances due to human presence and elevated noise levels during construction. However, given the scope of the project, impacts to lesser yellowlegs and their habitat are anticipated to be minimal and temporary. Furthermore, it is anticipated that the disturbed areas of suitable habitat within the Casselman Lagoons will return to a state that continues to support lesser yellowlegs foraging habitat needs.

Any potential impacts to individual lesser yellowlegs can be mitigated by implementing the avoidance and mitigation measures outlined in Section 4 below. As long as all of the avoidance and mitigation measures outlined in Section 4 below are enacted, no further permitting is required for the protection of lesser yellowlegs.

3.5.4 Eastern Small-Footed Myotis, Little Brown Myotis, and Tri-Colored Bat

Three mammalian SAR were identified as having a moderate potential to occur on-site or within the project area. Eastern small-footed myotis (*Myotis leibii*), little brown myotis (*Myotis lucifugus*), and tri-colored bat (*Perimyotis subflavus*) are provincially listed as Endangered under the ESA.

Potential roosting habitats for SAR Bats is limited to the wooded hedgerow treed areas and adjacent anthropogenic buildings and structures. Construction through the treed areas in the immediate vicinity of the proposed pathway are likely to require some form of vegetation clearing. None of the anthropogenic buildings and structures are within the scope of the proposed work area, nor are they anticipated to be impacted by the proposed project.

As the project is anticipated to require some vegetation clearing in the form of tree removal, direct impacts to SAR Bats may include the minor loss of wooded habitat and possible roosting trees.

Potential indirect impacts include temporary increased disturbances due to human presence and elevated noise levels during construction, and habitat encroachment. However, given the scope

of the project, impacts to eastern small-footed myotis, little brown myotis, and tri-colored bat are anticipated to be minimal and temporary.

Avoidance and mitigation measures to prevent harm to eastern small-footed myotis, little brown myotis, and tri-colored bat and associated habitat are provided in Section 4.

4.0 AVOIDANCE AND MITIGATION MEASURES

The following avoidance and mitigation measures are recommended in order to minimize or avoid, to the greatest extent possible, the potential impacts from the proposed rehabilitation on the local environment, including potential SAR and their habitat:

- Vegetation removal should occur outside of March 15 to September 30 to avoid the key breeding bird period and bat summer active season. The timing windows provides protection of migratory birds and roosting bats and avoids contravention of the Migratory Bird Convention Act and Endangered Species Act. If vegetation clearing activities must take place during the timing window, then a nest and acoustic survey shall be conducted by a qualified professional prior to any vegetation removal on-site.
- Active bird nests are protected under the ESA and the Migratory Bird Convention Act (MBCA). Active bird nests may not be disturbed, damaged or removed. Any disturbance, damage or removal of active bird nests must wait until after the active season, when they are no longer being used.
- To protect trees identified to be retained during construction, the Critical Root Zone (CRZ) should be identified and fenced. The CRZ is defined as 10 cm from the base of the tree for every centimetre in diameter of the tree trunk at breast height.
- Perform daily pre-work sweeps of the construction area to ensure no species at risk are present and to remove any wildlife from inside the construction area.
- Erosion and sediment control should be prepared by a qualified person and measures implemented prior to any construction works and be maintained until all disturbed ground has been permanently stabilized.
- During construction if any SAR are identified on-site all work should stop and a qualified professional and the MECP should be contacted for next steps.

In addition to the measures above, sediment fencing/exclusion fencing is recommended to be installed at the up gradient and downgradient edge of the construction area for the protection of wildlife SAR, protection of fish and fish habitat, and protection of water quality within the watercourse.

- To protect migrating turtles associated with the South Nation River and the Casselman Lagoons, exclusion fencing should be installed around the entire construction area prior to construction commencing to prohibit the movement of turtles into the construction area. Following installation of exclusion fencing, a qualified professional should be retained to sweep the construction area to remove any turtles which may be trapped within the exclusion fencing.
    - Exclusion fencing should follow the protocols outlined in the Species at Risk Branch: Best Practices Technical Note: Reptile and Amphibian Exclusion Fencing Version 1.1 (MNRF, July 2013).

    - The current best practices for turtle fencing provisions indicate that fencing must be up by May 1st and is to remain in place until October 15. Should fencing not be in place prior to May 1st, individual turtles have the potential occupy the project area and nest, resulting in project delays.
- To prevent turtles nesting within the construction zone, all stockpiled materials should be covered with a geotextile between May 1 and August 1 of any year.
- To protect potential travel corridors and migrating turtles, all existing riparian zone vegetation along the watercourse and lagoons should be maintained to the extent as possible to provide protection and cover, and if removed, reinstated following construction.

The following general mitigation measures are recommended for the protection of water quality, fish and fish habitat:

- If any in-water work is required as part of the culvert replacement work, or if work is unable to avoid HADD of fish habitat, a Request for Review must be submitted to the Department of Fisheries and Oceans prior to any in-water work is commenced to ensure that the project avoids death to fish and the harmful alteration, disruption and destruction of fish habitat.
- To protect warm-water fish habitat, no in-water work is permitted between May 1 to July 15.
- Light-duty sediment fencing shall be installed along the downgradient edge of the construction area with accordance to the Ontario Provincial Standard Specification and Drawing (OPSD) 219.110.
- Install straw bale flow check dams as per OPSD 219.180 at the outlet and downstream of the channel.
- Maintain as much of the natural vegetation as possible within and around the construction project. Post-construction, degraded vegetation within the disturbed areas should be replaced by planting of local or non-invasive plant species, or seeded, as to prevent further soil erosion.
- Reinstate disturbed areas with native vegetation post-construction.
- Schedule work to avoid wet, windy, and rainy periods.
- Maintain erosion and sediment control measures until all disturbed ground has been permanently stabilized, suspended sediment has resettled, and runoff water is clear.
- To protect aquatic habitat for turtle and fish species, machinery should be maintained in good working condition and all machinery should be fueled a minimum of 30 m from the high-water mark.

If applicable, the following mitigation measures are recommended for the protection of fish entrapped within the working area:

- For the protection and safe release of fish entrapped within the working area, a fish salvage effort is recommended.
- Fish salvage efforts are to be conducted only by trained professionals under the applicable permitting from the Ontario Ministry of Natural Resources and Forestry (MNRF).
- A fish salvage effort is to be conducted after the in-water working area has been satisfactorily sectioned off, but prior to any dewatering or other in-water construction activities, unless otherwise approved.

5.0 CLOSURE

This Species at Risk Assessment was completed based on our understanding of the project at the time of writing. The investigation undertaken by GEMTEC with respect to this report and any conclusions or recommendations made in this report reflect the best judgements of GEMTEC based on the site conditions observed during the investigations undertaken at the date(s) identified in the report and on the information available at the time the report was prepared.

This report has been prepared for the application noted and it is based, in part, on visual observations made at the site, all as described in the report. Unless otherwise stated, the findings contained in this report cannot be extrapolated or extended to previous or future site conditions or for portions of the site that were unavailable for direct investigation.

Should new information become available during future work or other studies, GEMTEC should be requested to review the information and, if necessary, re-assess the conclusions presented herein.

We trust this report provides sufficient information for your present purposes. If you have any questions concerning this report, please do not hesitate to contact our office.

Sincerely,



Luca Fiorindi, B.A. G.Cert.
Junior Biologist



Zachary Anderson, B.Sc.
Biologist

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APPENDIX A

Report Figures

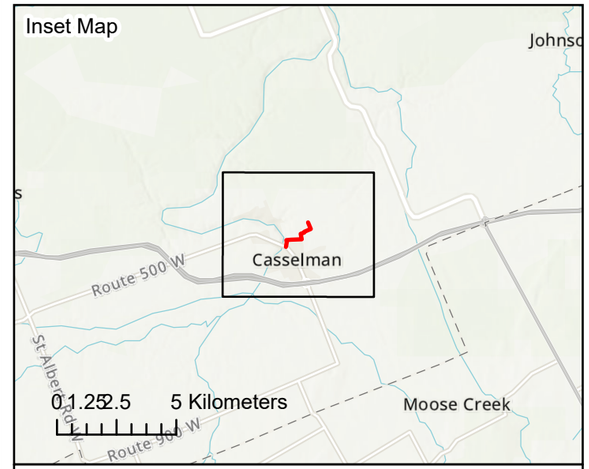
Figure A.1 – Site Location

Figure A.2 – Site Layout



Legend

- Project Area
- Study Area



Scale
1:30,000
0 200 400 800 1,200 1,600 Meters

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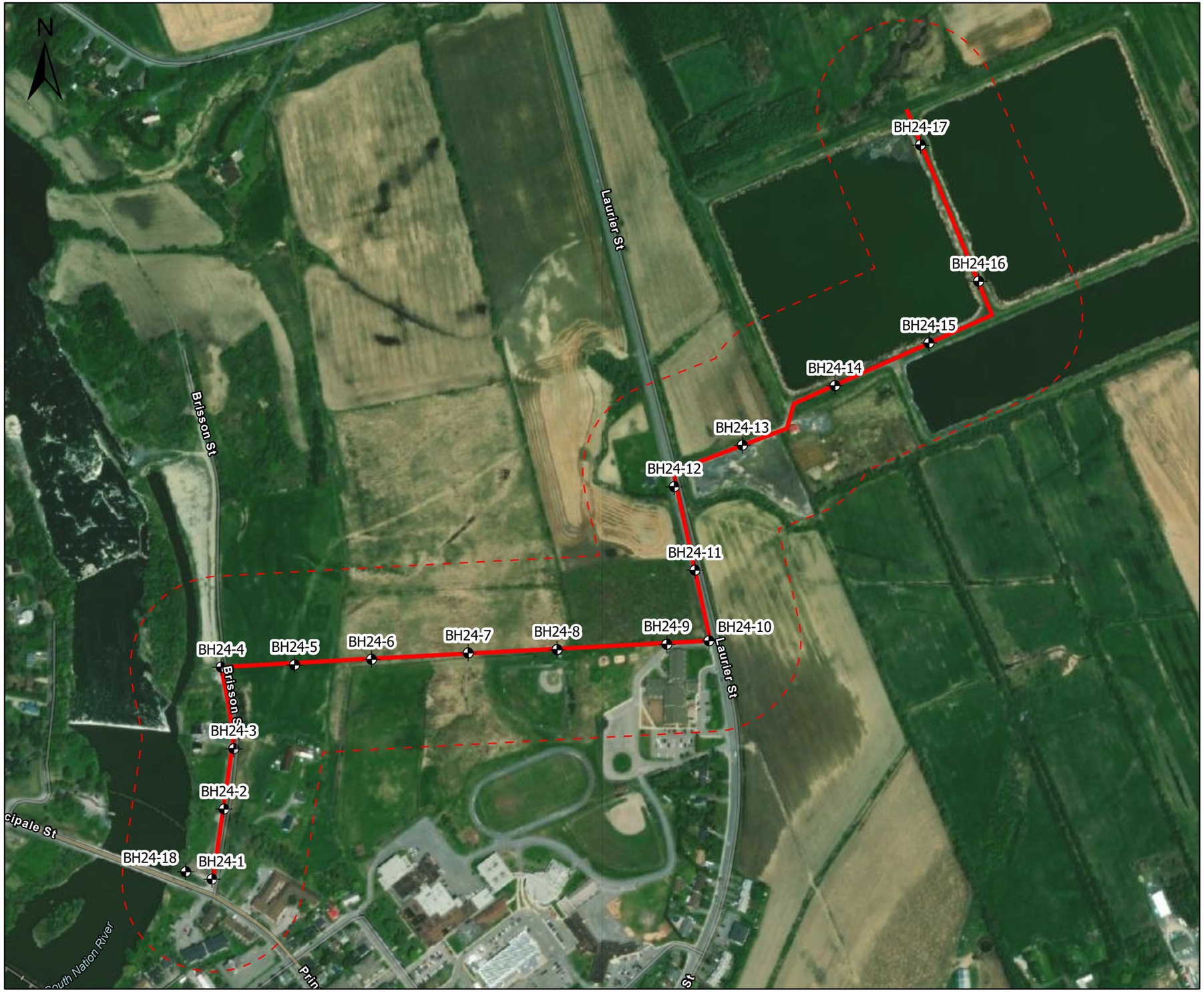
Client:	Project:
J. L. Richards & Associates Limited	100117.051

Location
Casselman Main Sewage Pumping Station (SPS)
Casselman, Ontario

Drwn By:	Chkd By:	
EP	TW	Site Location

Date: April 2024	Rev.	Figure: A.1
© Queen's Printer for Ontario	0	

Coordinate System: NAD 1983 UTM Zone 18N
Service Layer Credits: World Street Map: Province of Ontario, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, NRCan, Parks Canada
World Topographic Map: Province of Ontario, Esri Canada, Esri, TomTom, Garmin, SafeGraph, METI/NASA, USGS, EPA, NPS, USDA, NRCan, Parks Canada



Legend

- Project Area
- Study Area
- Borehole Location (GEMTEC, 2024)

Scale
1:7,500
0 75 150 300 450 Meters

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Location
Casselman Main Sewage Pumping Station (SPS)
Casselman, Ontario

Drwn By:	Chkd By:	
EP	TW	Site Location
Date: April 2024	Rev. 0	Figure: A.1

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Coordinate System: NAD 1983 UTM Zone 18N
Service Layer Credits: Hybrid Reference Layer: Esri Community Maps Contributors, Province of Ontario, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, NRCan, Parks Canada
World Imagery: SDG Counties, Maxar

APPENDIX B

Site Visit Photographs



Site Photograph 1 – Laurier Street



Site Photograph 2 – Agricultural Field North of Laurier Street



Site Photograph 3 – Lot of Casselman Lagoons



Site Photograph 4 – Muskrat Den (1 of 2)

GEMTEC Consulting Engineers and Scientists	Project SAR Screening Assessment Casselman Main Sewage Pumping Station Upgrades, Casselman, Ontario	**APPENDIX B**	**Site Photographs**
		File No. 100117.051	



Site Photograph 5 – Berm between Casselman Lagoons



Site Photograph 6 – Berm between Casselman Lagoons



Site Photograph 7 – Casselman Lagoons



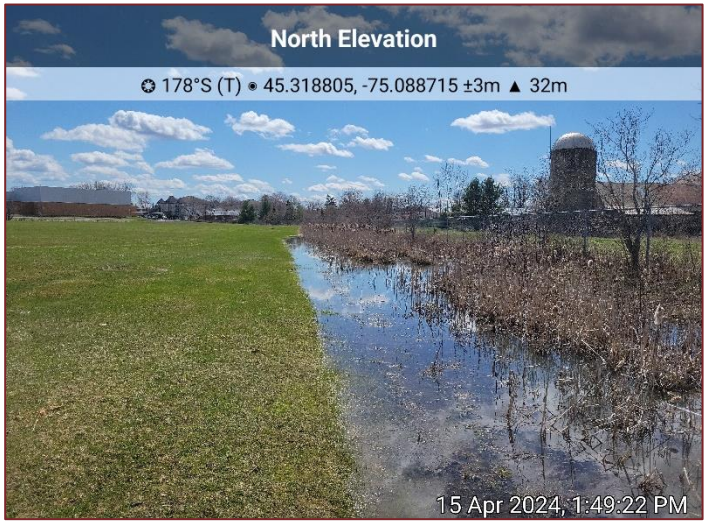
Site Photograph 8 – Muskrat Den (2 of 2)



Site Photograph 9 – Grass Field adjacent to Schoolyard



Site Photograph 10 – Grass Field adjacent to Schoolyard



Site Photograph 11 – Pooling in Swale



Site Photograph 12 – Cervid Tracks along Riparian Area



Site Photograph 13 – Stand of Green Ash – Brisson Street



Site Photograph 14 – Green Ash



Site Photograph 15 – Groundhog Den (BH24-5)



Site Photograph 16 – Parkspace – Brisson Street



Site Photograph 13 – South Nation River



Site Photograph 14 – South Nation River (ii)



Site Photograph 15 – Pumping Station



Site Photograph 16 – Pumping Station (ii)

experience • knowledge • integrity



civil	civil
geotechnical	géotechnique
environmental	environnement
structural	structures
field services	surveillance de chantier
materials testing	service de laboratoire des matériaux

expérience • connaissance • intégrité

Appendix C2

Draft Ecological Risk Assessment,
Casselman Lagoon System Upgrade
(Bowfin 2019)

DRAFT

Casselman Lagoon System Upgrade

Ecological Risk Assessment

Prepared for:

J.L. Richards & Associates Limited
700 - 1565 Carling Avenue
Ottawa, ON,
K1Z 8R1

Prepared by:
Bowfin Environmental Consulting Inc.
168 Montreal Road
Cornwall, Ontario
K6H 1B3

March 2019

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List of Acronyms and Definitions

BHA - Butternut Health Assessments
COSSARO - Committee on the Status of Species at Risk in Ontario
COSSEWIC - Committee on the Status of Endangered Wildlife in Canada
DBH - Diameter at breast height
ERA – Ecological Risk Assessment
ELC - Ecological Land Classification
ESA - *Endangered Species Act* (Provincial)
GPS – Global Positioning System
NAD 83: North American Datum 1983
UTM: Universal Transverse Mercator
NHIC – Natural Heritage Information Centre
NHRM - Natural Heritage Reference Manual
OMNR/MNRF - Ontario Ministry of Natural Resources (old name)
-Ministry of Natural Resources and Forestry (new name)
OWES - Ontario Wetland Evaluation System
PPS - Provincial Policy Statement
SAR - Species at Risk (in this report they refer to species that are provincially or federally listed as endangered or threatened and receive protection under ESA or SARA)
SARA - *Species at Risk Act* (Federal)
SARO - Species at Risk in Ontario
SWH - Significant Wildlife Habitat
SWHCS – Significant Wildlife Habitat Criteria Schedules for Ecoregion 6E
SWHTG - Significant Wildlife Habitat Technical Guide

SRANK DEFINITIONS

S1 Critically Imperiled in the nation or state/province because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state/province.

S2 Imperiled in the nation or state/province because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state/province.

S3 Vulnerable in the nation or state/province due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.

S4 Apparently Secure; uncommon but not rare; some cause for long-term concern due to declines or other factors.

S5 Secure; Common, widespread, and abundant in the nation or state/province.

? Inexact Numeric Rank—Denotes inexact numeric rank

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SNA Not Applicable, A conservation status rank is not applicable because the species is not a suitable target for conservation activities.

S#B Breeding

S#N Non-Breeding

SARA STATUS DEFINITIONS

END Endangered: a wildlife species facing imminent extirpation or extinction.

THR Threatened: a wildlife species that is likely to become endangered if nothing is done to reverse the factors leading to its extirpation or extinction.

SC Special Concern, a wildlife species that may become threatened or endangered because of a combination of biological characteristics and identified threats.

SARO STATUS DEFINITIONS

END Endangered: A species facing imminent extinction or extirpation in Ontario which is a candidate for regulation under Ontario's ESA.

THR Threatened: A species that is at risk of becoming endangered in Ontario if limiting factors are not reversed.

SC Special concern: A species with characteristics that make it sensitive to human activities or natural events.

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1.0 INTRODUCTION

J.L. Richards & Associates Limited has been retained to propose adding system upgrades to the Casselman Lagoon on part of Lot 8, Concession 6 in the Township of Cambridge, United Counties of Prescott and Russell (Figure 1). The proposed upgrades consist of work within the lagoons themselves as well as the construction of two small buildings. These buildings will serve to house blowers/disc filter and a MBBR tank. The buildings are proposed to be constructed in part of the southwest corner of the Casselman Lagoon property (Figure 2). While these proposed buildings would be built in disturbed habitat, there is a potential for species at risk (SAR) to utilize the area. The remainder of the upgrades, those in the lagoons, will occur within the constructed infrastructure which are not considered suitable for SAR.

Bowfin Environmental Consulting Inc. (Bowfin) has been retained to complete an Ecological Risk Assessment (ERA). The ERA was requested by Ministry of Natural Resources and Forestry (MNRF). ERAs typically serve to identify the potential for the presence of SAR habitat. It will not necessarily fulfill other requirements (i.e. Environmental Impact Statements).

The subject lands are situated approximately 900 m to the east of the South Nation River (Figure 1). The proposed location of the buildings is within an undeveloped portion of the lagoon lands roughly 2.7 ha in size. This area was bordered by agricultural fields to the west and south, and by lagoons to the north and east. The Coupal Municipal Drain, which follows a portion of the road ditch to the east of Laurier Street, is situated within 120 m of the surveyed area (Figure 2).

This ERA includes a background review to identify potential SAR habitats within the subject lands followed by a summary of existing conditions as observed during field investigations.

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Figure 1: General Location of Subject Lands

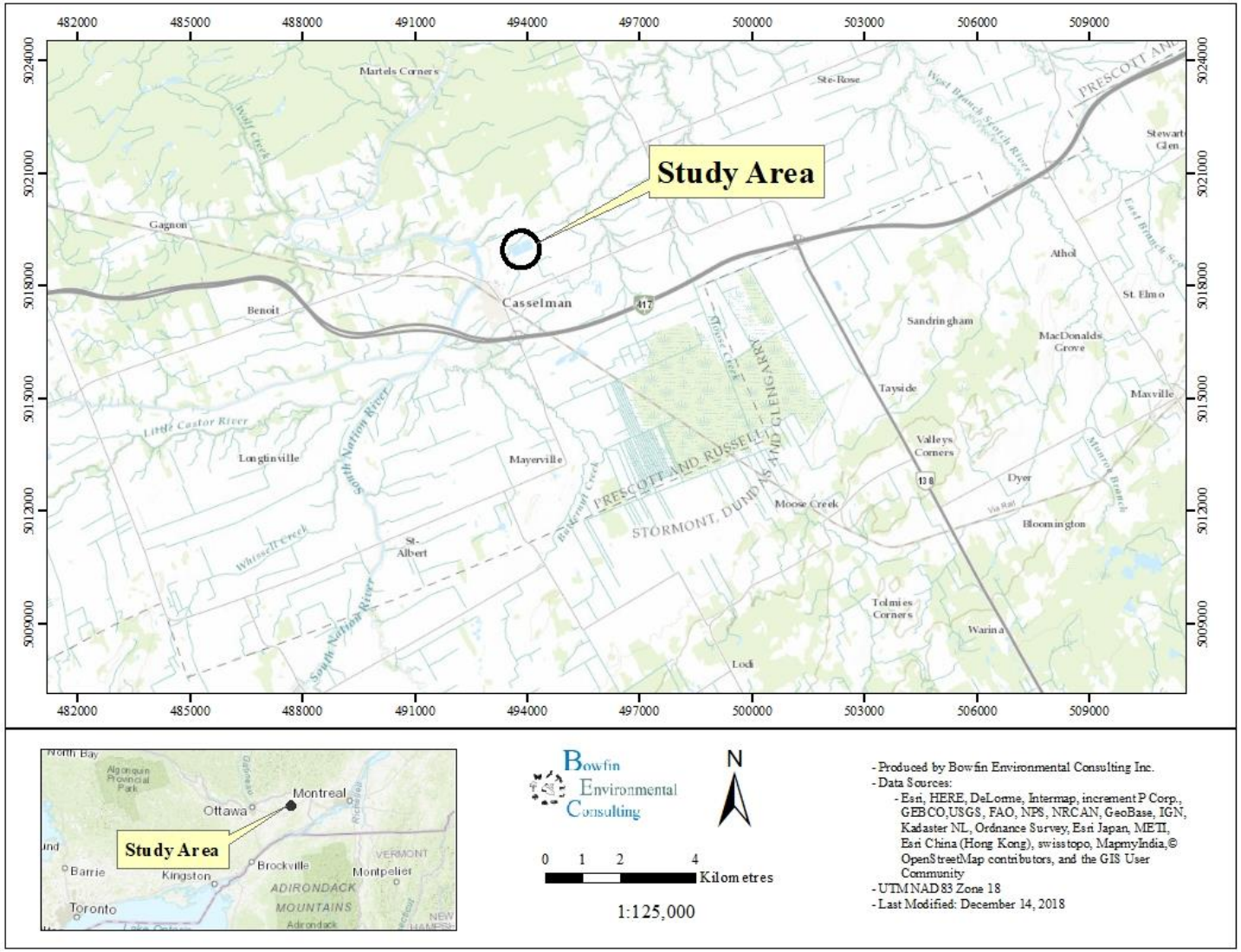
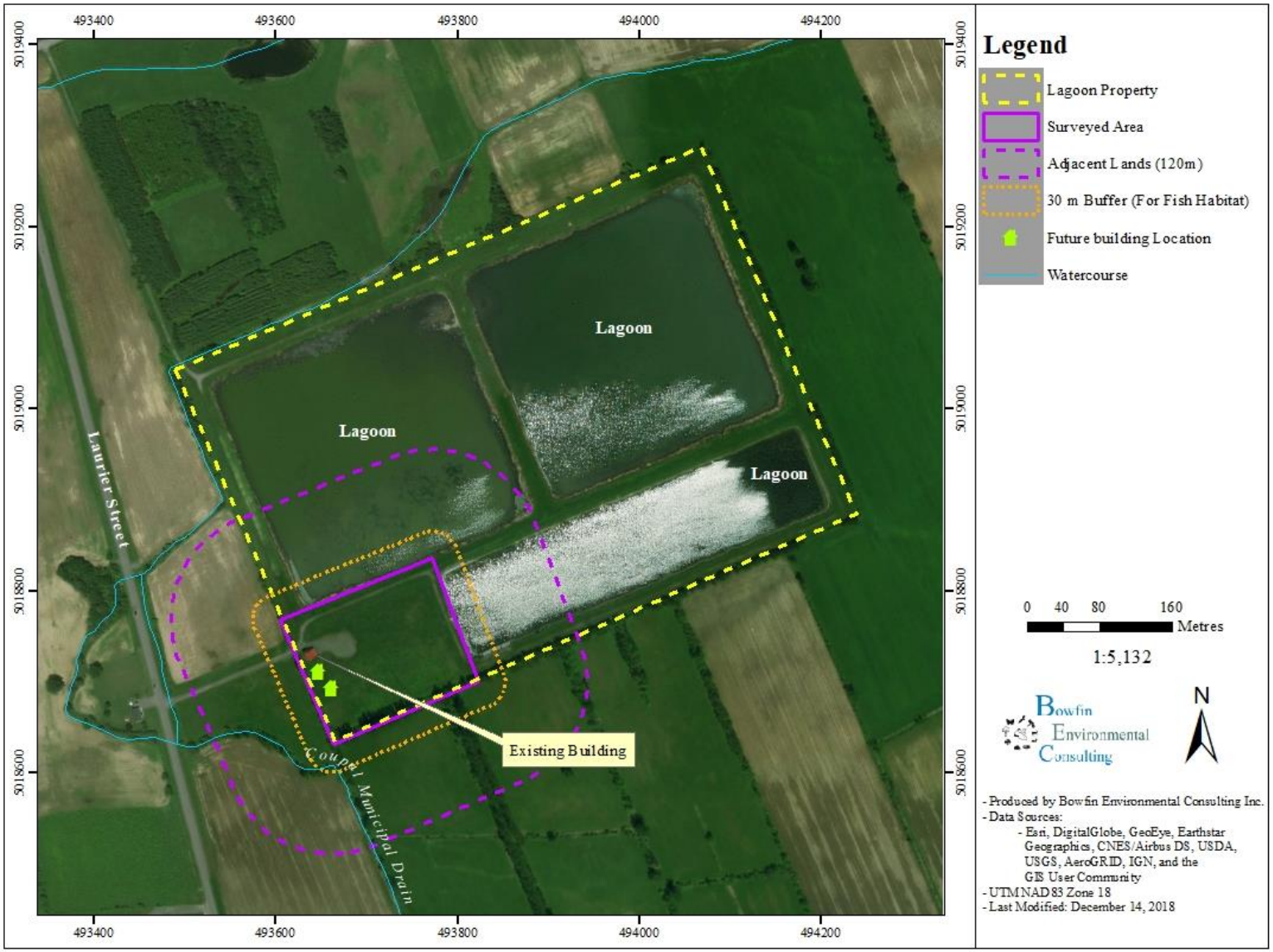


Figure 2: Location of Subject Lands



2.0 METHODS

Work undertaken for the completion of this project included a background review of existing information and field investigations.

2.1 Study Area

The study area varied with the item being surveyed. The study area for each item is described herein. The detailed field investigations and assessments were completed within the subject lands (area proposed to be developed). However, these investigations also included general observations and inventory for Butternuts within the adjacent lands. The background review and consideration for the potential for species at risk (SAR) included a larger study area (±5 km).

2.2 Background Review

The background review began with preliminary mapping of the vegetation communities in the subject lands and the adjacent 120 m, as a desktop exercise. The search of databases and available background data also included the adjacent ±5 km.

The background search of available records was made to gather information on the known and potential occurrences of SAR within the project area. An information request was sent directly to the Ministry of Natural Resources and Forestry (MNRF) Kemptville, by J. L. Richards, for any additional information. The response is included in Appendix A.

2.3 Field Studies

Information in the field was collected on December 19, 2018. A summary of the time, ambient conditions and purpose for the visit is provided in Table 1.

Table 1: Summary of Dates and Times of Site Investigations

Date	Time (h)	Staff	Air Temperature (Min-Max) °C	Cloud Cover (5) Beaufort Wind Scale [Descriptor (scale)]	Purpose
December 19, 2018	0930-1115	C. Fontaine E. Theberge	-8.0-(-6.0) (-12.3-(1.9))	Overcast, light air (1)	-Vegetation Description -Butternut Inventory -Tree Cavity Inventory (Bat Maternity Sites)

C. Fontaine - Cody Fontaine - Fisheries and Wildlife Technologist
E. Theberge – Elysabeth Theberge —M.Sc. Biology

*Min-Max Temp Taken From: Environment Canada. National Climate Data and Information Archive. Ottawa Intl Airport, Ontario. Available http://climate.weatheroffice.gc.ca/ [January 2, 2019]

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2.3.1 Description of Vegetation Communities

To assess the potential for significant wildlife habitat and SAR or their habitat, the vegetation communities within the subject lands were described. Sufficient level of detail was collected to provide general habitat descriptions and identify preferred habitats.

The field studies were completed by systematically travelling through the study area and by ground truthing the results from the preliminary mapping exercise. Due to the time of the visit (December 19, 2019), the description of the vegetation communities was limited to what could be observed in the field during the winter. However, at the time of the visit, there was little snow covering the ground, and so, any woody plants could be identified, as well as some of the remnant herbaceous vegetation. Habitat descriptions were based on *Ecological Land Classification for Southern Ontario* (ELC) 1st approximation, *Natural Heritage Reference Manual* (NHRM) and *Significant Wildlife Habitat Technical Guide* (SWHTG).

Plants that could not be identified in the field were collected for a more detailed examination in the laboratory. Nomenclature used in this report follows the Southern Ontario Plant List (Bradley, 2007) for both common and scientific names which are based on Newmaster *et al.* (1998). Authorities for scientific names are given in Newmaster *et al.* (1998). Specific attention was made to locating SAR or species of conservation value (any S1-S3 species) listed as potentially occurring within the study area. Any specimen observed was photographed and its coordinates were recorded on a GPS using NAD83.

2.3.2 Butternut Inventory

Butternuts are an endangered species protected by the *Endangered Species Act* (ESA). The MNRF have certified Butternut Health Assessors (BHA) to complete Butternut Health Assessments (BHA) as per MNRF specifications. To determine presence/absence of the butternut, an inventory was completed on December 19, 2018. This inventory consisted in searching the study area in and within 50 m of the subject lands. Any individuals noted would be marked with white spray paint and flagging tape and numbered sequentially. Their UTMs, using a GPS unit set at NAD83, would be recorded and the individual would be assessed according the BHA protocol during the leaf-on period. There were no butternuts present on site, as such, no BHA was required.

2.3.3 Bat Surveys

Currently, there are four bat species listed as SAR in Ontario. The potential to impact these species depends on the presence/absence of critical habitat: hibernation or maternity sites. There were no potential hibernacula sites present as such, no hibernacula surveys were completed. There were no woodlands within the study area. The trees in the windrows (in and within 10 m of the site) were searched for suitable cavity trees.

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3.0 SITE INVESTIGATION RESULTS

3.1 Background Information

The area for proposed upgrades is bordered by agricultural fields to the west and south, and by lagoons to the north and east. There are no natural watercourses or waterbodies present within the subject lands but a portion of Coupal Municipal Drain is situated just within 30 m of the corner of the site and the road ditches along Laurier Street are within 30 m of the site (Figure 2). It forms part of Lot 8, Concession 6 in the Township of Cambridge, United Counties of Prescott and Russell.

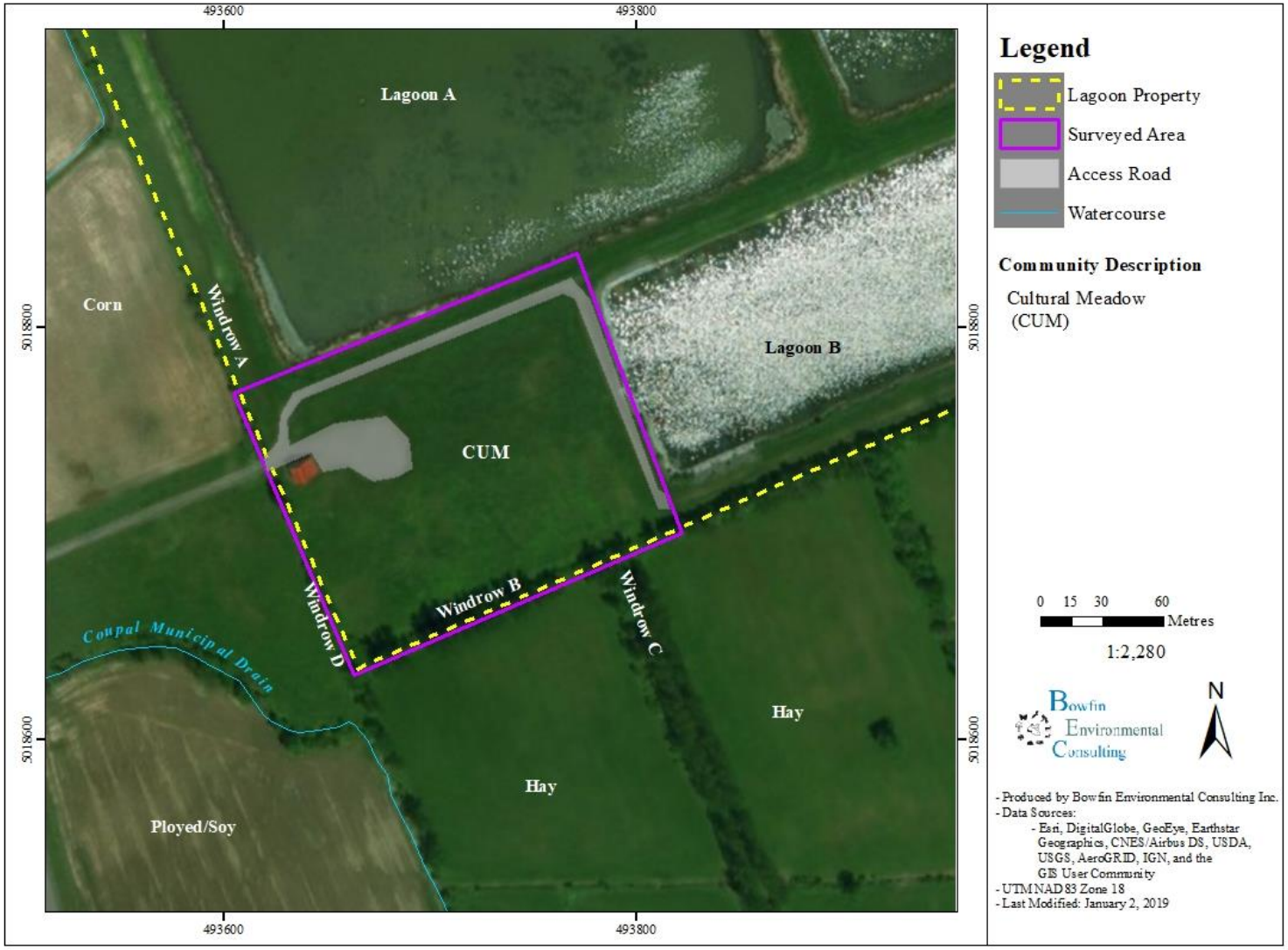
3.2 Vegetation Communities

Within the lagoon lands, the habitat consisted of a cultural meadow. The northern half contained more upland herbaceous species while the southern half contained more lowland herbaceous and shrub species. This area was bordered by treed windrows to the west and to the south. In the adjacent lands, row crops (corn and soy) were present to the west, lagoons to the north and east, and hay fields to the south (Figure 3).

Photographs of the communities are included after the descriptions. The descriptions are based on what was observed at the time of the December 19, 2018 field visit. Again, there was minimal snow covering the ground and some herbaceous plants present within the study area could be identified or collected for later identification. The community boundaries are based on satellite image interpretation (Figure 3). The vegetation descriptions begin with the field communities followed by a description of the windrows.

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Figure 3: Vegetation Communities



Cultural Meadow

The lands within the lagoon property have been described as cultural meadow. While, there was a presence of wetland species, their dominance could not be determined at this time and the site seemed to be more upland.

The northern half of the site consisted of herbaceous species: reed canary grass, common tansy, wild carrot, various goldenrod species, timothy, and other grasses. Species recorded on and next to the access road at the northern and eastern boundaries of the study area included common plantain, common chicory, red clover, common milkweed, bladder campion, common sow-thistle, cow vetch, common burdock, white sweet clover, smooth brome, purple loosestrife, and common pepper-grass.

The southern half of the site included: reed canary grass, purple loosestrife, sensitive fern, red-osier dogwood, along with various other fern species. Some goldenrod species were still present in this half of the field as well as common milkweed. Red-osier dogwood and wild red raspberry were recorded along the southernmost edge of the site.

There were some narrow bands of wetland vegetation along the edge of lagoon A (common reed, broadleaf cattail and purple loosestrife) and the edge of lagoon B a few trees (Manitoba maple and white ash; diameter-at-breast height (dbh) of <25 cm) on rock face.



Photo 1: Looking west towards the field from the east end of the site (December 19, 2018)

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Photo 2: Looking west towards the field from the east end of the site (June 2018, J.L. Richards)

Windrows

Windrow A was located at the northwestern corner of the subject lands, running parallel to the western edge. Tree species present included black cherry and white ash (max. 10 cm dbh, max 6 m tall). Shrub species included hawthorn species, Tartarian honeysuckle and wild red raspberry.

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Photo 3: Looking south at Windrow A (December 19, 2018)

Windrow B was located along the southernmost edge of the subject lands. Tree species present included gray birch, white ash, eastern cottonwoods (30-50 cm dbh), largetooth aspen, and red maple. Shrub species included slender willow, Tartarian honeysuckle, red-osier dogwood and wild red raspberry.

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Photo 4: Looking east at Windrow B (December 19, 2018)

Windrow C was located just outside of the southeastern corner of the subject lands, running perpendicular to windrow B. Tree species present included eastern cottonwoods and largetooth aspens (30-50 cm dbh), gray birch, and white ash.

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Photo 5: Looking south at Windrow C (December 19, 2018)

Windrow D was located along the southwestern edge of the subject lands. Tree species present included black cherry, and gray birch. Shrub species included a clump of staghorn sumac, slender willow, red-osier dogwood and common blackberry.

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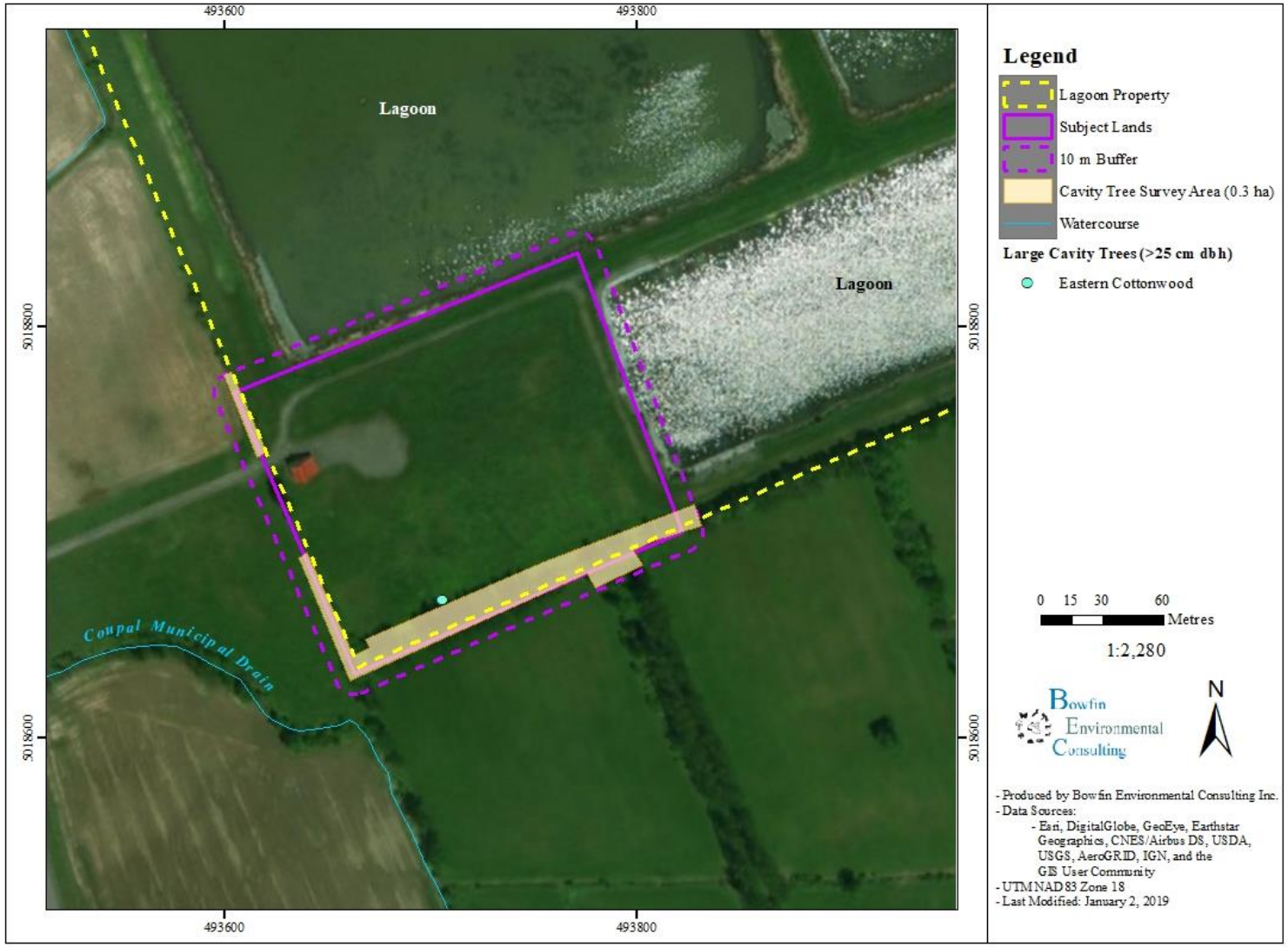
Photo 6: Looking west at Windrow D (December 19, 2018)

3.3 Bat Cavity Results

As mentioned above, the study area included the undeveloped lands on the lagoon property and the adjacent 10 m buffer (Figure 4). One cavity tree with a minimum dbh of 25 cm was found in the searched area (Figure 4). This cavity tree consisted in a healthy eastern cottonwood with a dbh of 28 cm.

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Figure 4: Location of Cavity Trees (>25 cm)



3.4. Butternut Inventory Results

The undeveloped lands in the southwestern corner of the lagoon property and the 50 m buffer contained no butternuts. The butternut inventory is valid for a period of 2-years (in this case until December 19, 2020).

4.0 EVALUATION OF POTENTIAL FOR SPECIES AT RISK

4.1 Endangered and Threatened Species Assessment

Endangered and Threatened Species at Risk (SAR) are protected under provincial *Endangered Species Act*. It should be noted that not all information for all species is available to the public. Furthermore, the absence of a recording does not necessarily indicate that the species is absent from the area. The MNRF Kemptville information request response letter (received November 28, 2016) identified a high potential for: bobolink and eastern meadowlark. A background review of the Atlas of Breeding Birds of Ontario (ABBO) for the study area lists the possible occurrence of the following SAR birds: eastern whip-poor-will, chimney swift, bank swallow, barn swallow, bobolink, and eastern meadowlark (Appendix A: MNRF Response Letter

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T l c.: 613 258-3920

Ontario

Mon. Nov 28, 2016

Sarah Gore
J.L. Richards & Associates Limited
864 Lady Ellen Place
Ottawa, Ontario
K1Z 5M2
(613) 728-6012 ext 1251
sgore@jlrichards.ca

Attention: Sarah Gore

Subject: Information Request - Infrastructure (Drain, Bridge, Culvert)
Project Name: Village of Casselman Wastewater Treatment System Class EA
Site Address:
Our File No. 2016_CAM-3826

Natural Heritage Values
The Ministry of Natural Resources and Forestry (MNRF) Kemptville District has carried out a preliminary review of the area in order to identify any potential natural resource and natural heritage values.

The following Natural Heritage values were identified for the general subject area:

- Municipal Drain
- Unevaluated Wetland (Not evaluated per OWES)
- Wintering Area, Raptor

Municipal Official Plans contain information related to natural heritage features. Please see the local municipal Official Plan for more information, such as specific policies and direction pertaining to activities which may impact natural heritage features. For planning advice or Official Plan interpretation, please contact the local municipality. Many municipalities require environmental impact studies and other supporting studies be carried out as part of the development application process to allow the municipality to make planning decisions which are consistent with the Provincial Policy Statement (PPS, 2014).

1

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The MNRF strongly encourages all proponents to contact partner agencies and appropriate municipalities early on in the planning process. This provides the proponent with early knowledge regarding agency requirements, authorizations and approval timelines; Ministry of the Environment and Climate Change (MOECC) and the local Conservation Authority may require approvals and permitting where natural values and natural hazards (e.g., floodplains) exist.

As per the Natural Heritage Reference Manual (NHRM, 2010) the MNRF strongly recommends that an ecological site assessment be carried out to determine the presence of natural heritage features and species at risk and their habitat on site. The MNRF can provide survey methodology for particular species at risk and their habitats.

The NHRM also recommends that cumulative effects of development projects on the integrity of natural heritage features and areas be given due consideration. This includes the evaluation of the past, present and possible future impacts of development in the surrounding area that may occur as a result of demand created by the presently proposed project.

In Addition, the following Fish species were identified: brook stickleback.

Water

If any in-water works are to occur, there are timing windows for which work in water should not take place (see below). Appropriate measures should be taken to minimize and mitigate impact on water quality and fish habitat, including:

- installation of sediment and erosion control measures;
- avoiding the removal, alteration, or covering of substrates used for fish spawning, feeding, over-wintering or nursery areas; and
- debris control measures to manage falling debris (e.g. spalling).

Timing windows (no in-water works) in MNRF Kemptville District*:

Warmwater and cool water	→ March 15 – June 30
St. Lawrence River & Ottawa River	→ March 15 – July 15
Coldwater	→ October 1 – May 31
Big Rideau Lake & Charleston Lake	→ October 1 – June 30

* *Please note: Additional timing restrictions may apply as they relate to endangered and threatened species for works in both water and wetland areas.*

Timing windows when in-water work is restricted – based on species presence:

FISH SPECIES	TIMING WINDOW (No in-water works)

2

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Spring:	Walleye	March 15 to May 31
	Northern Pike	March 15 to May 31
	Lake Sturgeon	May 1 to June 30
	Muskellunge	March 15 to May 31
	Largemouth/Smallmouth Bass	May 1 to July 15
	Rainbow Trout	March 15 to June 15
	Other /Unknown Spring Spawning Species**	**March 15 to July 15**

	FISH SPECIES	**TIMING WINDOW (No in-water works)**
Fall:	Lake Trout	October 1 to May 31
	Brook Trout	October 1 to May 31
	Pacific Salmon	September 15 to May 31
	Lake Whitefish	October 15 to May 31
	Lake Herring	October 15 to May 31
	Other /Unknown Fall Spawning Species	October 1 to May 31

Additional approvals and permits may be required under the Fisheries Act. Please contact Fisheries and Oceans Canada to determine requirements and next steps. There may also be approvals required by the local Conservation Authority or Transport Canada. As the MNRF is responsible for the management of provincial fish populations, we request ongoing involvement in such discussions in order to ensure population conservation.

Drainage Works

Where drainage works are proposed within wetland areas, the MNRF is concerned is the impacts to the hydrology and ecology of the wetland, which may have impacts on species and their habitats. For example, changing water levels as a result of drainage works may impact turtles or nesting birds, some of which may be protected under legislation such as the Endangered Species Act (ESA) or the Fish and Wildlife Conservation Act. Therefore a consideration for direct and indirect impacts to species and their habitats is imperative.

Where drainage works occur within the originally approved drainage footprint, as per the Drainage Act, there are no Public Lands Act requirements from the MNRF. However, other MNRF legislation may apply including, but not limited to, the ESA. Some drainage works may be eligible to proceed without a permit from MNRF provided that regulatory conditions are met. For more information please check out the following link http://www.ontario.ca/environment-and-energy/ditch-and-drainage-work-and-endangered-or-threatened-species

3

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Species at Risk

A review of the Natural Heritage Information Centre (NHIC) and internal records and aerial photograph interpretation indicate that there is a potential for the following threatened (THR) and/or endangered (END) species on the site or in proximity to it:

- Bobolink (THR)
- Eastern Meadowlark (THR)

All endangered and threatened species receive individual protection under section 9 of the ESA and receive general habitat protection under Section 10 of the ESA, 2007. Thus any potential works should consider disturbance to the individuals as well as their habitat (e.g. nesting sites). General habitat protection applies to all threatened and endangered species. Note some species in Kemptville District receive regulated habitat protection. The habitat of these listed species is protected from damage and destruction and certain activities may require authorization(s) under the ESA. For more on how species at risk and their habitat is protected, please see: https://www.ontario.ca/page/how-species-risk-are-protected.

If the proposed activity is known to have an impact on any endangered or threatened species at risk (SAR), or their habitat, an authorization under the ESA may be required. It is recommended that MNRF Kemptville be contacted prior to any activities being carried out to discuss potential survey protocols to follow during the early planning stages of a project, as well as mitigation measures to avoid contravention of the ESA. Where there is potential for species at risk or their habitat on the property, an Information Gathering Form should be submitted to Kemptville MNRF at sar.kemptville@ontario.ca.

The Information Gathering Form may be found here:
http://www.forms.ssb.gov.on.ca/mbs/ssb/forms/ssbforms.nsf/FormDetail?OpenForm&ACT=RDR&TAB=PROFILE&ENV=WWE&NO=018-0180E

For more information on the ESA authorization process, please see:
https://www.ontario.ca/page/how-get-endangered-species-act-permit-or-authorization

Habitat has been identified within the project area that appears suitable for one or more species listed by SARO as Special Concern (SC). One or more special concern species has been documented to occur either on the site or nearby. Species listed as special concern are not protected under the ESA, 2007. However, please note that some of these species may be protected under the Fish and Wildlife Conservation Act and/or Migratory Birds Convention Act.

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Again, the habitat of special concern species may be significant wildlife habitat and should be assessed accordingly. Species of special concern for consideration:

- Monarch (SC)
- Snapping Turtle (SC)

If any of these or any other species at risk are discovered throughout the course of the work, and/or should any species at risk or their habitat be potentially impacted by on site activities, MNRF should be contacted and operations be modified to avoid any negative impacts to species at risk or their habitat until further direction is provided by MNRF.

Breeding birds may be present on site. The Migratory Birds Convention Act and the ESA may be triggered if these birds are affected. Negative impacts may be avoided by clearing vegetation outside of the breeding bird season (April 15th – August 15th) or by surveys conducted by a qualified professional to ensure no breeding birds are present before clearing of vegetation.

No work should occur in turtle overwintering habitat from October 16th – March 15th in order to protect hibernating turtles. Turtles can be found travelling on land during the active season (April 1st – October 30th). If the proposed works are to occur during these times, the MNRF recommends fencing off the site prior to work being undertaken in order to prevent turtles from accessing the site.

Please note that information regarding species at risk is based largely on documented occurrences and does not necessarily include an interpretation of potential habitat within or in proximity to the site in question. Although this data represents the MNRF's best current available information, it is important to note that a lack of information for a site does not mean that additional features and values are not present. It is the responsibility of the proponent to ensure that species at risk are not killed, harmed, or harassed, and that their habitat is not damaged or destroyed through the activities carried out on the site.

The MNRF continues to strongly encourage ecological site assessments to determine the potential for SAR habitat and occurrences. When a SAR or potential habitat for a SAR does occur on a site, it is recommended that the proponent contact the MNRF for technical advice and to discuss what activities can occur without contravention of the Act. For specific questions regarding the Endangered Species Act (2007) or SAR, please contact MNRF Kemptville District at sar.kemptville@ontario.ca.

The approvals processes for a number of activities that have the potential to impact SAR or their habitat have recently changed. For information regarding regulatory exemptions and associated

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online registration of certain activities, please refer to the following website: https://www.ontario.ca/page/how-get-endangered-species-act-permit-or-authorization.

Please note: The advice in this letter may become invalid if:

- The Committee on the Status of Species at Risk in Ontario (COSSARO) re-assesses the status of the above-named species OR adds a species to the SARO List such that the section 9 and/or 10 protection provisions apply to those species; or
- Additional occurrences of species are discovered on or in proximity to the site.

This letter is valid until: Tue. Nov 28, 2017

For any questions or concerns, please do not hesitate to contact me.

Sincerely,

Joffre Côté
(FLS) Management Biologist
joff.cote@ontario.ca

Encl.\
-ESA Infosheet
-NHIC/LIO Infosheet

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Appendix B). Species that were listed as endangered or threatened since 2016 have been added as well as those that, based on personal experience, often occur within the general area.

The final list includes 11 species: 6 birds (eastern whip-poor-will, chimney swift, bank swallow, barn swallow, bobolink, and eastern meadowlark), 4 mammals (all bats – little brown myotis, northern myotis, eastern and small-footed myotis and tri-colored bat), and 1 plant (butternut) (Table 2).

Birds

There are six species of birds listed as potentially occurring: eastern whip-poor-will, chimney swift, bank swallow, barn swallow, bobolink, and eastern meadowlark.

Eastern Whip-poor-Will

The eastern whip-poor-will is protected federally as a threatened species. This well camouflaged species can be found in a multitude of forest types. Its requirements consist of areas that are semi-open forests or sites with a closed forest intermixed with other open habitats. It also needs some areas with little ground cover (COSEWIC, 2009). Its minimum habitat size requirement is 9 ha. The G*eneral Habitat Description for Eastern Whip-poor-will* (MNRF on-line document) indicates that the protected habitat for this species includes three categories:

Category 1	known nests and 20 m of the nest
Category 2	the area between 20 m and 170 m from the nest or the approximate centre of the defended territory
Category 3	the area of suitable habitat between 170 m and 500 m of the nest or approximate centre of the defended territory

The necessary habitat requirements are not fulfilled at this site or within 500 m. This species is considered absent.

Chimney Swift

The chimney swift can often be found in developed areas and prefers to utilize structures such as large (>50 cm dbh) trees or man-made structures such as chimneys for its nesting habitat. There were no man-made structures with chimneys within the subject lands or adjacent areas. Further, the trees on-site were <50 cm dbh. This species habitat is considered absent.

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Bank Swallow

Bank swallows are known to nest in vertical banks including those along riverbanks, and sand pits. There were no suitable banks for this species and no nest sites were found during the site visit. This species habitat is considered absent.

Barn Swallow

The barn swallow can often be found nesting on man-made structures. The existing building may provide nesting habitat, but it will not be impacted by the proposal to build in structures.

Bobolink and Eastern Meadowlark

This species of grassland breeding birds requires a minimum of 4 ha of uncut meadow or field. The G*eneral Habitat Description for Bobolink* (MNRF on-line document) indicates that the protected habitat for this species includes three categories:

Category 1	known nests and 10 m of the nest
Category 2	the area between 10 m and 60 m from the nest or the approximate centre of the defended territory
Category 3	the area of continuous suitable habitat between 60 m and 300 m of the nest or approximate centre of the defended territory

The field within the subject lands may provide suitable habitat for this species. This added with hay fields directly to the south of the subject lands meets the above-mentioned habitat requirement of a minimum of 4 ha of uncut field. This species has the potential to be present and to utilize the subject lands. To confirm presence and use of the site by this species, grassland breeding bird surveys would be required during the proper survey window. This will be further discussed in Section 5.0.

Eastern Meadowlark

Like the bobolink, this is a grassland breeding bird requiring a minimum of 5 ha of uncut meadow or field. The G*eneral Habitat Description for Eastern Meadowlark* (MNRF on-line document) indicates that the protected habitat for this species includes three categories:

Category 1	known nests and 10 m of the nest
Category 2	the area between 10 m and 100 m from the nest or the approximate centre of the defended territory
Category 3	the area of continuous suitable habitat between 100 m and 300 m of the nest or approximate centre of the defended territory

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The field within the subject lands may provide suitable habitat for this species. This added with hay fields directly to the south of the subject lands meets the above-mentioned habitat requirement of a minimum of 4 ha of uncut field. This species has the potential to be present and to utilize the subject lands. To confirm presence and use of the site by this species, grassland breeding bird surveys would be required during the proper survey window. This will be further discussed in Section 5.0.

Bats

The potential SAR bats within the general area are: little brown myotis, northern myotis, eastern small-footed myotis and tri-colored. There are three types of habitats required by bats: hibernation, maternity sites and day-roost sites. The latter is not considered critical habitat.

These four bats species prefer to hibernate in caves or mines. They can hibernate in buildings but that is rare for these species (COSEWIC, 2013b). No caves or mines were present. There is only one building present within the subject lands.

The recovery strategy for the eastern small-footed myotis indicates that the preferred maternity habitat of this species consists of open rock habitats and that it rarely uses old buildings as roosting/maternity sites (Humphrey, 2017). There was no rocky habitat present. Based on this information, this species' maternity sites are considered absent.

The Atlas of Mammals of Ontario (Dobbyn, 1994) suggests that the tri-coloured bat is not present within this part of Ontario, however, the NatureServe mapping in the COSSARO (COSSARO, 2015) includes all of southeastern Ontario. Based on this information, this species is considered to have a lower potential of occurring.

The northern myotis tends to prefer larger expanses of older forests (late successional or primary forests) and chose maternity sites in snags that are in the mid-stage of decay. They prefer habitat with intact interior habitat and is shown to be negatively correlated with edge habitat (Menzel et al., 2002; Broders et al., 2006; Yates et al., 2006; OMNRF, 2015). This habitat was not present and as such, this species is considered absent.

The little brown myotis is one of the few bat species that can use anthropogenic structures as maternity sites. Potential suitable structures can include buildings, bridges, barns, and bat boxes. The little brown myotis can also use tall, large cavity trees that are in the early to mid-stages of decay as maternity roosts, as well as loose/raised tree bark, and/or crevices in cliffs (ECCC, 2018). This bat species occurs in higher densities in mature deciduous and/or mixed forests due to increased opportunities for large snags. However, unlike the northern myotis, the little brown myotis does not exclusively require mature forest stands in order to find appropriate maternity roosts (COSSEWIC, 2013b). This commonly observed species has the potential to utilize the

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site. However, neither the existing buildings nor the trees in the windrows will be impacted by the project.

The SWHCS (OMNRF, 2015) indicates that consideration for maternity sites, for species that utilise tree cavities, should be made when the vegetation community consists of a mature deciduous or mixed forest with >10/ha of large trees (>25 cm DBH). MRNF guidelines for bat maternity sites require a minimum of >10 snags (with a minimum DBH of 25 cm) / ha. As documented in Section 3.3.2 above, the trees present within 10 m of the site, forming the windrows, did not meet the minimum requirement for bat maternity sites. There remains the potential for the various species to utilise the trees on-site for day-roosts.

Plants

Butternuts

As discussed above, no butternuts were identified within 50 m of the subject lands.

4.1.1 SAR Conclusions

Based on the single site visit, there were no butternuts in or within 50 m of the undeveloped section of the lagoon lands. The review of the potential species and their habitat needs suggests that the cultural meadow could be used by the two grassland species; bobolink and/or eastern meadowlark. Further study would be required to confirm whether these grassland birds use the habitat within the study area. There also remains the potential for day-roost sites for bats.

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Table 2: Summary of Potential SAR

Common Name	Scientific Name	Preferred Habitat	SRank	ESA Reg. 230/08 SARO List Status	SARA Schedule 1 List of Wildlife SAR Status	Reference
BIRDS						
Eastern Whip-poor-will	*Antrostomus vociferus*	Rock or sand barrens with scattered trees, savannahs, old burns or other disturbed sites in a state of early to mid-forest succession, or open conifer plantations.	S4B	THR	THR	COSEWIC, 2009
Chimney Swift	*Chaetura pelagica*	Cities, towns, villages, rural, and wooded areas.	S4B, S4N	THR	THR	COSEWIC, 2007
Bank Swallow	*Riparia riparia*	Variety of forest types, most common in wet, mixed deciduous-coniferous forest with a well-developed shrub layer. It is often found in shrub marshes, red maple stands, cedar stands, conifer swamps dominated by black spruce and larch and riparian woodlands along rivers and lakes. It is also associated with ravines and steep brushy slopes near these habitats	S4B	THR	THR	COSEWIC, 2013a
Barn Swallow	*Hirundo rustica*	Open or semi-open lands: farms, field, marshes.	S4B	THR	THR	COSSEWIC, 2011a; Peterson, 1980
Bobolink	*Dolichonyx oryzivorus*	Primarily in forage crops, and grassland habitat.	S4B	THR	THR	COSEWIC, 2010
Eastern Meadowlark	*Sturnella magna*	Fields, meadows and prairies.	S4B	THR	THR	COSEWIC, 2011b; Peterson, 1980

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Common Name	Scientific Name	Preferred Habitat	SRank	ESA Reg. 230/08 SARO List Status	SARA Schedule 1 List of Wildlife SAR Status	Reference
MAMMALS						
Little Brown Myotis	*Myotis lucifugus*	Buildings, attics, roof crevices and loose bark on trees or under bridges. Always roost near waterbodies.	S4	END	END	Eder, 2002
Northern Myotis/Northern Long-eared Bat	*Myotis septentrionalis*	Older (late successional or primary forests) with large interior habitat.	S3	END	END	Menzel et al., 2002; Broders et al., 2006; SWH 6E Ecoregion Criterion Schedule, 2015
Eastern Small-footed Myotis	*Myotis leibii*	Found within deciduous or coniferous forests in hilly areas.	S2S3	END	NAR	Eder, 2002
Tri-colored Bat	*Perimyotis subflavus*	Prefers shrub habitat or open woodland near water.	S3?	END	END	Eder, 2002
PLANTS						
Butternut	*Juglans cinerea*	Variety of sites, grows best on well-drained fertile soils in shallow valleys and on gradual slopes	S2?	END	END	COSEWIC, 2003

Status Updated August 1, 2018

SRANK DEFINITIONS

S2 Imperiled, Imperiled in the nation or state/province because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state/province.

S3 Vulnerable, Vulnerable in the nation or state/province due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.

S4 Apparently Secure, Uncommon but not rare; some cause for long-term concern due to declines or other factors.

S#S# Range Rank, A numeric range rank (e.g., S2S3) is used to indicate any range of uncertainty about the status of the species or community. Ranges cannot skip more than one rank (e.g., SU is used rather than S1S4).

SAB Breeding accidental.

? Inexact Numeric Rank—Denotes inexact numeric rank

S#B Breeding

S#N Non-Breeding

SARO STATUS DEFINITIONS

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END Endangered: A species facing imminent extinction or extirpation in Ontario which is a candidate for regulation under Ontario's ESA.
THR Threatened: A species that is at risk of becoming endangered in Ontario if limiting factors are not reversed.
SC Special Concern: A species with characteristics that make it sensitive to human activities or natural events.

SARA STATUS DEFINITIONS

END Endangered, a wildlife species facing imminent extirpation or extinction.
THR Threatened, a wildlife species that is likely to become endangered if nothing is done to reverse the factors leading to its extirpation or extinction.
NAR Not at Risk, a wildlife species that has been evaluated and found to be not at risk of extinction given the current circumstances.

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5.0 IMPACT ASSESSMENT

5.1 Project Summary

This ERA looked at the lands within the lagoon property that may be affected by the proposed updates to the lagoon system. The review was restricted to the impacts resulting from the proposed construction of two small buildings. These buildings would serve to house blowers/disc filter and a MBBR tank. The buildings are proposed to be constructed in part of the southwest corner of the Casselman Lagoon property. While these proposed buildings would be built in disturbed habitat, there is a potential for species at risk (SAR) to utilize the area. The remainder of the upgrades, those in the lagoons, will occur within the constructed infrastructure which are not considered suitable for SAR.

The area for proposed upgrades was bordered by agricultural fields to the west and south, and by lagoons to the north and east. Portions of the Coupla Municipal Drain and the road ditches along Laurier Street are within 30 m of the site (Figure 2).

Within the lagoon lands, the habitat consisted of a cultural meadow. A review of the available background information and the habitat on-site concluded that there was the potential for two grassland SAR bird species to utilize the habitat (bobolink and eastern meadowlark), for barn swallows to utilize the existing building and for bat SAR to use the trees in the windrow as day-roots. No butternuts were found. The potential to impact these SAR will be evaluated in this section.

Note that while not officially part of the ERA, we note that, almost all birds in Ontario are protected by the *Migratory Bird Convention Act* (MBCA) and/or *Fish and Wildlife Conservation Act* (FWCA) and care should be taken to avoid harming these during the breeding bird window provided below. Furthermore, the presence of watercourses within 30 m would trigger the need to implement appropriate erosion and sediment control measures.

5.2 Assessment Methods

The significance of the potential impacts to the species at risk or their habitats can be measured using four different criteria:

1. Area affected may be:
    a. local in extent signifying that the impacts will be localized within the project area
    b. regional signifying that the impacts may extend beyond the immediate project area.

2. Nature of Impact:

a. negative or positive
b. direct or indirect

3. Duration of the impact may be rated as:
    a. short term (construction phase, 1-2 years)
    b. medium term (2-3 years)
    c. long term (>3 years).
    d. permanent

4. Magnitude of the impact may be:
    a. negligible signifying that the impact is not noticeable
    b. minor signifying that the project's impacts are perceivable and require mitigation
    c. moderate signifying that the project's impacts are perceivable and require mitigation as well as monitoring and/or compensation
    d. major signifying that the project's impacts would destroy the environmental component within the project area.

5.3 Evaluation of Impact

SAR that are listed as endangered or threatened under the provincial *Endangered Species Act* (all species) or the federal *Species at Risk Act* (SARA) (only "fish" as defined under the *Fisheries Act* in this case fish and mussel species) are protected in this study area. Together, provincially and federally protected species are referred to as SAR. The following endangered or threatened species or their habitat were described as potentially occurring in Section 4.1 of this report:

- Bobolink and Eastern Meadowlark
- Barn swallow (Existing building could provide habitat)
- Roosting habitat potential for little brown myotis, eastern small-footed myotis, northern myotis and tri-colored bat)

5.3.1 Birds (Barn Swallow, Bobolink and Eastern Meadowlark) and Birds in General

Due to the timing of Bowfin's involvement, no breeding bird surveys could be undertaken. The potential for the existing structure to provide habitat for barn swallow and for the meadow to provide habitat for bobolink and eastern meadowlarks was identified.

Addition Data Required

- It is understood that the existing building will not be impacted by the project. If work does need to be completed on or near the existing building, then a search for barn swallow nests should be made. Note that the barn swallow nesting season begins on May 1.

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- Field surveys required to confirm whether either of the two grassland SAR are breeding in or within 300 m of the subject lands is required. These surveys require a minimum of three weeks and must be completed between June 1 and the first week in July.

Preliminary List Mitigation Measures:

- No impacts to federal SAR bird nests, or their eggs is permitted under the federal *Species at Risk Act*. If a federally-listed bird species at risk nest is encountered, then work must stop and the Environment Canada must be notified immediately for guidance.
- No impacts to provincial SAR bird nests or their eggs is permitted under the provincial *Endangered Species Act*. If a provincially-listed bird species at risk is encountered, then work must stop and the Ministry of Environment, Conservation and Parks contacted. Note that the government roles are currently under transition and at this time Ministry of Natural Resources and Forestry – Kemptville District should still be contacted with respect to provincial SAR.
- Educate staff and contractors on the potential for SAR to be in the area and their significance.
- Almost all breeding birds are protected under the MBCA and/or FWCA. The only species not protected are: American crow, brown-headed cowbird, common grackle, house sparrow, red-winged blackbird and starling. It is prohibited to destroy or disturb an active nest of other birds, or to take or handle nests, eggs, or nestlings. In this part of Ontario, the current standard nesting period is between April 12th to August 28th. Outside of this timing window, it is considered unlikely that birds would be nesting. Note, there are some birds (birds of prey, herons etc.) that do begin nesting earlier in the year. It should also be noted, that if an active nest is present before or after the above dates that it is still protected. These dates only serve as a guideline.
- There is the potential for ground nesters to occur within the subject lands once grading activities occur should bare soil be left (i.e. killdeer). Perform regular walks of the cleared areas looking for ground nesters. If any are present, the contact a biologist for guidance.
- Work during the daytime hours to prevent light disturbances.
- Ensure that all equipment have the appropriate mufflers to reduce noise disturbances.
- Should a nest be discovered, stop all work that may disturb the birds (i.e. that cause the adults to fly off the nest) and contact a biologist or MNRF or Environment Canada, as appropriate for the species.

Area	Nature	Duration	Magnitude
Local	Negative Direct	Short Term	Unknown – field investigations required (though it is noted that the footprint would be small and located at the edge of the meadow habitat)

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5.3.2 Bats

The potential SAR bats within the general area are: little brown myotis, northern myotis, eastern small-footed myotis and tri-coloured. No hibernacula were found. Based on the habitats encountered and the location of the study area, the habitat did not meet the definition for bat maternity sites. However, bats could use the trees for day-roots.

Potential Impacts and Mitigation Measures:

- Educate contractors by informing them that most bats in Ontario are protected.
- If trees need to be removed then when possible, remove them after September 30th or before May 1st. If this is not possible, conduct exit survey or shake the trees prior to cutting them down. If a bat is observed leaving the tree, then stop clearing vegetation and wait until after September 30th for any additional tree clearing (there are sufficient trees nearby for bats to quickly find alternative day-roosts).

Area	Nature	Duration	Magnitude
Local	Negative Direct	Permanent Term (removal of tree)	Minor

6.0 CONCLUSION

Based on the background review and the site investigations completed to date, there remains the potential for some SAR (bobolink, eastern meadowlark and barn swallow as well as bats) to utilize the habitat. The presence/absence of the three bird SAR should be determined by following the MNRF protocols. With respect to the bats, the mitigation measures listed above should suffice to minimize the impacts to these should they be present.

I trust that this report will meet your requirements. Should you have any questions or comments, please contact the undersigned.

Sincerely,

Michelle Lavictoire,
Biologist

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7.0 REFERENCES

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Appendix A: MNRF Response Letter

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Mon. Nov 28, 2016

Sarah Gore
J.L. Richards & Associates Limited
864 Lady Ellen Place
Ottawa, Ontario
K1Z 5M2
(613) 728-6012 ext 1251
sgore@jlrichards.ca

Attention: Sarah Gore

Subject: Information Request - Infrastructure (Drain, Bridge, Culvert)
Project Name: Village of Casselman Wastewater Treatment System Class EA
Site Address:
Our File No. 2016_CAM-3826

Natural Heritage Values
The Ministry of Natural Resources and Forestry (MNRF) Kemptville District has carried out a preliminary review of the area in order to identify any potential natural resource and natural heritage values.

The following Natural Heritage values were identified for the general subject area:

- Municipal Drain
- Unevaluated Wetland (Not evaluated per OWES)
- Wintering Area, Raptor

Municipal Official Plans contain information related to natural heritage features. Please see the local municipal Official Plan for more information, such as specific policies and direction pertaining to activities which may impact natural heritage features. For planning advice or Official Plan interpretation, please contact the local municipality. Many municipalities require environmental impact studies and other supporting studies be carried out as part of the development application process to allow the municipality to make planning decisions which are consistent with the Provincial Policy Statement (PPS, 2014).

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The MNRF strongly encourages all proponents to contact partner agencies and appropriate municipalities early on in the planning process. This provides the proponent with early knowledge regarding agency requirements, authorizations and approval timelines; Ministry of the Environment and Climate Change (MOECC) and the local Conservation Authority may require approvals and permitting where natural values and natural hazards (e.g., floodplains) exist.

As per the Natural Heritage Reference Manual (NHRM, 2010) the MNRF strongly recommends that an ecological site assessment be carried out to determine the presence of natural heritage features and species at risk and their habitat on site. The MNRF can provide survey methodology for particular species at risk and their habitats.

The NHRM also recommends that cumulative effects of development projects on the integrity of natural heritage features and areas be given due consideration. This includes the evaluation of the past, present and possible future impacts of development in the surrounding area that may occur as a result of demand created by the presently proposed project.

In Addition, the following Fish species were identified: brook stickleback.

Water

If any in-water works are to occur, there are timing windows for which work in water should not take place (see below). Appropriate measures should be taken to minimize and mitigate impact on water quality and fish habitat, including:

- installation of sediment and erosion control measures;
- avoiding the removal, alteration, or covering of substrates used for fish spawning, feeding, over-wintering or nursery areas; and
- debris control measures to manage falling debris (e.g. spalling).

Timing windows (no in-water works) in MNRF Kemptville District*:

Warmwater and cool water	→ March 15 – June 30
St. Lawrence River & Ottawa River	→ March 15 – July 15
Coldwater	→ October 1 – May 31
Big Rideau Lake & Charleston Lake	→ October 1 – June 30

* *Please note: Additional timing restrictions may apply as they relate to endangered and threatened species for works in both water and wetland areas.*

Timing windows when in-water work is restricted – based on species presence:

FISH SPECIES	TIMING WINDOW (No in-water works)

2

Ministry of Natural Resources and Forestry

Kemptville District

10 Campus Drive
Postal Box 2002
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Fax: 613 258-3920

Ministère des Richesses naturelles et des Forêts

District de Kemptville

10, promenade Campus
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Spring:	Walleye	March 15 to May 31
	Northern Pike	March 15 to May 31
	Lake Sturgeon	May 1 to June 30
	Muskellunge	March 15 to May 31
	Largemouth/Smallmouth Bass	May 1 to July 15
	Rainbow Trout	March 15 to June 15
	Other /Unknown Spring Spawning Species**	**March 15 to July 15**

	FISH SPECIES	TIMING WINDOW (No in-water works)
Fall:	Lake Trout	October 1 to May 31
	Brook Trout	October 1 to May 31
	Pacific Salmon	September 15 to May 31
	Lake Whitefish	October 15 to May 31
	Lake Herring	October 15 to May 31
	Other /Unknown Fall Spawning Species	October 1 to May 31

Additional approvals and permits may be required under the Fisheries Act. Please contact Fisheries and Oceans Canada to determine requirements and next steps. There may also be approvals required by the local Conservation Authority or Transport Canada. As the MNRF is responsible for the management of provincial fish populations, we request ongoing involvement in such discussions in order to ensure population conservation.

Drainage Works

Where drainage works are proposed within wetland areas, the MNRF is concerned is the impacts to the hydrology and ecology of the wetland, which may have impacts on species and their habitats. For example, changing water levels as a result of drainage works may impact turtles or nesting birds, some of which may be protected under legislation such as the Endangered Species Act (ESA) or the Fish and Wildlife Conservation Act. Therefore a consideration for direct and indirect impacts to species and their habitats is imperative.

Where drainage works occur within the originally approved drainage footprint, as per the Drainage Act, there are no Public Lands Act requirements from the MNRF. However, other MNRF legislation may apply including, but not limited to, the ESA. Some drainage works may be eligible to proceed without a permit from MNRF provided that regulatory conditions are met. For more information please check out the following link http://www.ontario.ca/environment-and-energy/ditch-and-drainage-work-and-endangered-or-threatened-species

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Species at Risk

A review of the Natural Heritage Information Centre (NHIC) and internal records and aerial photograph interpretation indicate that there is a potential for the following threatened (THR) and/or endangered (END) species on the site or in proximity to it:

- Bobolink (THR)
- Eastern Meadowlark (THR)

All endangered and threatened species receive individual protection under section 9 of the ESA and receive general habitat protection under Section 10 of the ESA, 2007. Thus any potential works should consider disturbance to the individuals as well as their habitat (e.g. nesting sites). General habitat protection applies to all threatened and endangered species. Note some species in Kemptville District receive regulated habitat protection. The habitat of these listed species is protected from damage and destruction and certain activities may require authorization(s) under the ESA. For more on how species at risk and their habitat is protected, please see: https://www.ontario.ca/page/how-species-risk-are-protected.

If the proposed activity is known to have an impact on any endangered or threatened species at risk (SAR), or their habitat, an authorization under the ESA may be required. It is recommended that MNRF Kemptville be contacted prior to any activities being carried out to discuss potential survey protocols to follow during the early planning stages of a project, as well as mitigation measures to avoid contravention of the ESA. Where there is potential for species at risk or their habitat on the property, an Information Gathering Form should be submitted to Kemptville MNRF at sar.kemptville@ontario.ca.

The Information Gathering Form may be found here:
http://www.forms.ssb.gov.on.ca/mbs/ssb/forms/ssbforms.nsf/FormDetail?OpenForm&ACT=RDR&TAB=PROFILE&ENV=WWE&NO=018-0180E

For more information on the ESA authorization process, please see:
https://www.ontario.ca/page/how-get-endangered-species-act-permit-or-authorization

Habitat has been identified within the project area that appears suitable for one or more species listed by SARO as Special Concern (SC). One or more special concern species has been documented to occur either on the site or nearby. Species listed as special concern are not protected under the ESA, 2007. However, please note that some of these species may be protected under the Fish and Wildlife Conservation Act and/or Migratory Birds Convention Act.

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Again, the habitat of special concern species may be significant wildlife habitat and should be assessed accordingly. Species of special concern for consideration:

- Monarch (SC)
- Snapping Turtle (SC)

If any of these or any other species at risk are discovered throughout the course of the work, and/or should any species at risk or their habitat be potentially impacted by on site activities, MNRF should be contacted and operations be modified to avoid any negative impacts to species at risk or their habitat until further direction is provided by MNRF.

Breeding birds may be present on site. The Migratory Birds Convention Act and the ESA may be triggered if these birds are affected. Negative impacts may be avoided by clearing vegetation outside of the breeding bird season (April 15th – August 15th) or by surveys conducted by a qualified professional to ensure no breeding birds are present before clearing of vegetation.

No work should occur in turtle overwintering habitat from October 16th – March 15th in order to protect hibernating turtles. Turtles can be found travelling on land during the active season (April 1st – October 30th). If the proposed works are to occur during these times, the MNRF recommends fencing off the site prior to work being undertaken in order to prevent turtles from accessing the site.

Please note that information regarding species at risk is based largely on documented occurrences and does not necessarily include an interpretation of potential habitat within or in proximity to the site in question. Although this data represents the MNRF's best current available information, it is important to note that a lack of information for a site does not mean that additional features and values are not present. It is the responsibility of the proponent to ensure that species at risk are not killed, harmed, or harassed, and that their habitat is not damaged or destroyed through the activities carried out on the site.

The MNRF continues to strongly encourage ecological site assessments to determine the potential for SAR habitat and occurrences. When a SAR or potential habitat for a SAR does occur on a site, it is recommended that the proponent contact the MNRF for technical advice and to discuss what activities can occur without contravention of the Act. For specific questions regarding the Endangered Species Act (2007) or SAR, please contact MNRF Kemptville District at sar.kemptville@ontario.ca.

The approvals processes for a number of activities that have the potential to impact SAR or their habitat have recently changed. For information regarding regulatory exemptions and associated

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online registration of certain activities, please refer to the following website: https://www.ontario.ca/page/how-get-endangered-species-act-permit-or-authorization.

Please note: The advice in this letter may become invalid if:

- The Committee on the Status of Species at Risk in Ontario (COSSARO) re-assesses the status of the above-named species OR adds a species to the SARO List such that the section 9 and/or 10 protection provisions apply to those species; or
- Additional occurrences of species are discovered on or in proximity to the site.

This letter is valid until: Tue. Nov 28, 2017

For any questions or concerns, please do not hesitate to contact me.

Sincerely,

Joffre Côté
(FLS) Management Biologist
joff.cote@ontario.ca

Encl.\
-ESA Infosheet
-NHIC/LIO Infosheet

6

Appendix B: Atlas of Breeding Birds of Ontario Results (Regions 24 squares: 18VR81, 18VR82, 18VR91, 18VR92.)

Common Name	Scientific Name	ABBO Category	SRank	ESA Reg. 230/08 SARO List Status	SARA Schedule 1 List of Wildlife SAR Status
Canada Goose	*Branta canadensis*	Confirmed	S5		
Wood Duck	*Aix sponsa*	Confirmed	S5		
Gadwall	*Anas strepera*	Confirmed	S4		
American Wigeon	*Anas americana*	Confirmed	S4		
American Black Duck	*Anas rubripes*	Probable	S4		
Mallard	*Anas platyrhynchos*	Confirmed	S5		
Blue-headed Vireo	*Vireo solitarius*	Possible	S5B		
Northern Shoveler	*Anas clypeata*	Confirmed	S4		
Northern Pintail	*Anas acuta*	Probable	S5		
Green-winged Teal	*Anas crecca*	Confirmed	S4		
Redhead	*Aythya americana*	Possible	S2B, S4N		
Lesser Scaup	*Aythya affinis*	Possible	S4		
Hooded Merganser	*Lophodytes cucullatus*	Probable	S5B, S5N		
Ruddy Duck	*Oxyura jamaicensis*	Confirmed	S4B, S4N		
Gray Partridge	*Perdix perdix*	Probable	SNA		
Ruffed Grouse	*Bonasa umbellus*	Confirmed	S4		
Wild Turkey	*Meleagris gallopava*	Probable	S5		
Pied-billed Grebe	*Podilymbus podiceps*	Confirmed	S4B, S4N		
American Bittern	*Botaurus lentiginosus*	Confirmed	S4B		
Great Blue Heron	*Ardea herodias*	Confirmed	S4		
Turkey Vulture	*Cathartes aura*	Probable	S5B		
Northern Harrier	*Circus cyaneus*	Probable	S4B		
Sharp-shinned Hawk	*Accipiter striatus*	Confirmed	S5		
Cooper's Hawk	*Accipiter cooperii*	Confirmed	S4		
Northern Goshawk	*Accipiter gentilis*	Probable	S4		
Broad-winged Hawk	*Buteo platypterus*	Confirmed	S5B		
Red-tailed Hawk	*Buteo jamaicensis*	Confirmed	S5		
American Kestrel	*Falco sparverius*	Possible	S4		
Merlin	*Falco columbarius*	Confirmed	S5B		
Virginia Rail	*Rallus limicola*	Confirmed	S5B		

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Common Name	Scientific Name	ABBO Category	SRank	ESA Reg. 230/08 SARO List Status	SARA Schedule 1 List of Wildlife SAR Status
Sora	*Porzana carolina*	Confirmed	S4B		
Common Gallinule	*Gallinula galeata*	Probable	S4B		
American Coot	*Fulica americana*	Probable	S4B		
Killdeer	*Charadrius vociferus*	Confirmed	S5B, S5N		
Spotted Sandpiper	*Actitis macularia*	Confirmed	S5		
Upland Sandpiper	*Bartramia longicauda*	Confirmed	S4B		
Common Snipe	*Gallinago delicata*	Confirmed	S5B		
American Woodcock	*Scolopax minor*	Possible	S4B		
Wilson's Phalarope	*Phalaropus tricolor*	Confirmed	S3B		
Black Tern	*Chlidonias niger*	Possible	S3B	SC	
Rock Pigeon	*Columba livia*	Confirmed	SNA		
Mourning Dove	*Zenaida macroura*	Confirmed	S5		
Black-billed Cuckoo	*Coccyzus erythropthalmus*	Possible	S5B		
Great Horned Owl	*Bubo virginianus*	Probable	S4		
Barred Owl	*Strix varia*	Possible	S5		
Short-eared Owl	*Asio flammeus*	Possible	S2N, S4B	SC	SC
Northern Saw-whet Owl	*Aegolius acadicus*	Possible	S4		
Eastern Whip-poor-will	*Antrostomus vociferus*	Probable	S4B	THR	THR
Chimney Swift	*Chaetura pelagica*	Possible	S4B, S4N	THR	THR
Ruby-throated Hummingbird	*Archilochus colubris*	Probable	S5B		
Belted Kingfisher	*Ceryle alcyon*	Confirmed	S4B		
Red-headed Woodpecker	*Melanerpes erythrocephalus*	Possible	S4B	SC	THR
Yellow-bellied Sapsucker	*Sphyrapicus varius*	Confirmed	S5B		
Downy Woodpecker	*Picoides pubescens*	Confirmed	S5		
Hairy Woodpecker	*Picoides villosus*	Confirmed	S5		
Northern Flicker	*Colaptes auratus*	Confirmed	S4B		
Pileated Woodpecker	*Dryocopus pileatus*	Probable	S5		
Eastern Wood-Pewee	*Contopus virens*	Confirmed	S4B	SC	SC
Alder Flycatcher	*Empidonax alnorum*	Confirmed	S5B		
Willow Flycatcher	*Empidonax traillii*	Probable	S5B		

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Common Name	Scientific Name	ABBO Category	SRank	ESA Reg. 230/08 SARO List Status	SARA Schedule 1 List of Wildlife SAR Status
Least Flycatcher	*Empidonax minimus*	Confirmed	S4B		
Eastern Phoebe	*Sayornis phoebe*	Confirmed	S5B		
Great Crested Flycatcher	*Myiarchus crinitus*	Confirmed	S4B		
Eastern Kingbird	*Tyrannus tyrannus*	Confirmed	S4B		
Warbling Vireo	*Vireo gilvus*	Confirmed	S5B		
Red-eyed Vireo	*Vireo olivaceus*	Confirmed	S5B		
Blue Jay	*Cyanocitta cristata*	Confirmed	S5		
American Crow	*Corvus brachyrhynchos*	Confirmed	S5B		
Common Raven	*Corvus corax*	Confirmed	S5		
Horned Lark	*Eremophila alpestris*	Confirmed	S5B		
Tree Swallow	*Tachycineta bicolor*	Confirmed	S4B		
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	Confirmed	S4B		
Bank Swallow	*Riparia riparia*	Confirmed	S4B	THR	THR
Cliff Swallow	*Petrochelidon pyrrhonota*	Confirmed	S4B		
Barn Swallow	*Hirundo rustica*	Confirmed	S4B	THR	THR
Black-capped Chickadee	*Poecile atricapilla*	Confirmed	S5		
Red-breasted Nuthatch	*Sitta canadensis*	Confirmed	S5		
White-breasted Nuthatch	*Sitta carolinensis*	Confirmed	S5		
Brown Creeper	*Certhia familiaris*	Probable	S5B		
House Wren	*Troglodytes aedon*	Confirmed	S5B		
Winter Wren	*Troglodytes troglodytes*	Possible	S5B		
Sedge Wren	*Cistothorus platensis*	Probable	S4B		
Marsh Wren	*Cistothorus palustris*	Probable	S4B		
Golden-crowned Kinglet	*Regulus satrapa*	Confirmed	S5B		
Ruby-crowned Kinglet	*Regulus calendula*	Possible	S4B		
Eastern Bluebird	*Sialia sialis*	Confirmed	S5B		
Veery	*Catharus fuscescens*	Confirmed	S4B		
Hermit Thrush	*Catharus guttatus*	Confirmed	S5B		
Wood Thrush	*Hylocichla mustelina*	Probable	S4B	SC	THR
American Robin	*Turdus migratorius*	Confirmed	S5B		
Gray Catbird	*Dumetella carolinensis*	Confirmed	S4B		

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Common Name	Scientific Name	ABBO Category	SRank	ESA Reg. 230/08 SARO List Status	SARA Schedule 1 List of Wildlife SAR Status
Brown Thrasher	*Toxostoma rufum*	Confirmed	S4B		
European Starling	*Sturnus vulgaris*	Confirmed	SNA		
Cedar Waxwing	*Bombycilla cedrorum*	Probable	S5B		
Blue-winged Teal	*Anas discors*	Confirmed	S4		
Nashville Warbler	*Vermivora ruficapilla*	Probable	S5B		
Yellow Warbler	*Dendroica petechia*	Confirmed	S5B		
Chestnut-sided Warbler	*Dendroica pensylvanica*	Confirmed	S5B		
Magnolia Warbler	*Dendroica magnolia*	Probable	S5B		
Cape May Warbler	*Dendroica tigrina*	Confirmed	S5B		
Black-throated Blue Warbler	*Dendroica caerulescens*	Possible	S5B		
Yellow-rumped Warbler	*Dendroica coronata*	Confirmed	S5B		
Black-throated Green Warbler	*Dendroica virens*	Probable	S5B		
Blackburnian Warbler	*Dendroica fusca*	Confirmed	S5B		
Pine Warbler	*Dendroica pinus*	Confirmed	S5B		
Palm Warbler	*Dendroica palmarum*	Probable	SNRB		
Black-and-white Warbler	*Mniotilta varia*	Confirmed	S5B		
American Redstart	*Setophaga ruticilla*	Probable	S5B		
Ovenbird	*Seiurus aurocapillus*	Confirmed	S4B		
Northern Waterthrush	*Seiurus noveboracensis*	Probable	S5B		
Mourning Warbler	*Oporornis philadelphia*	Confirmed	S4B		
Common Yellowthroat	*Geothlypis trichas*	Confirmed	S5B		
Canada Warbler	*Wilsonia canadensis*	Confirmed	S4B	SC	THR
Eastern Towhee	*Pipilo erythrophthalmus*	Possible	S4B		
Chipping Sparrow	*Spizella passerina*	Confirmed	S5B		
Clay-colored Sparrow	*Spizella pallida*	Confirmed	S4B		
Field Sparrow	*Spizella pusilla*	Confirmed	S4B		
Vesper Sparrow	*Pooecetes gramineus*	Confirmed	S4B		
Savannah Sparrow	*Passerculus sandwichensis*	Confirmed	S4B		
Grasshopper Sparrow	*Ammodramus savannarum*	Possible	S4B	SC	SC
Song Sparrow	*Melospiza melodia*	Confirmed	S5B		
Swamp Sparrow	*Melospiza georgiana*	Confirmed	S5B		

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Common Name	Scientific Name	ABBO Category	SRank	ESA Reg. 230/08 SARO List Status	SARA Schedule 1 List of Wildlife SAR Status
White-throated Sparrow	*Zonotrichia albicollis*	Confirmed	S5B		
Dark-eyed Junco	*Junco hyemalis*	Possible	S5B		
Scarlet Tanager	*Piranga olivacea*	Possible	S4B		
Northern Cardinal	*Cardinalis cardinalis*	Probable	S5		
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	Confirmed	S4B		
Indigo Bunting	*Passerina cyanea*	Probable	S4B		
Bobolink	*Dolichonyx oryzivorus*	Confirmed	S4B	THR	THR
Red-winged Blackbird	*Agelaius phoeniceus*	Confirmed	S4		
Eastern Meadowlark	*Sturnella magna*	Confirmed	S4B	THR	THR
Common Grackle	*Quiscalus quiscula*	Confirmed	S5B		
Brown-headed Cowbird	*Molothrus ater*	Confirmed	S4B		
Baltimore Oriole	*Icterus galbula*	Confirmed	S4B		
Purple Finch	*Carpodacus purpureus*	Confirmed	S4B		
House Finch	*Carpodacus mexicanus*	Confirmed	SNA		
Red Crossbill	*Loxia curvirostra*	Possible	S4B		
White-winged Crossbill	*Loxia leucoptera*	Probable	S5B		
Pine Siskin	*Carduelis pinus*	Probable	S4B		
American Goldfinch	*Carduelis tristis*	Probable	S5B		
Evening Grosbeak	*Coccothraustes vespertinus*	Confirmed	S4B		
House Sparrow	*Passer domesticus*	Confirmed	SNA		

Status updated March 22, 2018

SRANK DEFINITIONS

S2 Imperiled, Imperiled in the nation or state/province because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state/province.

S3 Vulnerable, Vulnerable in the nation or state/province due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.
S4 Apparently Secure, Uncommon but not rare; some cause for long-term concern due to declines or other factors.
S5 Secure, Common, widespread, and abundant in the nation or state/province.
SNA Not Applicable, A conservation status rank is not applicable because the species is not a suitable target for conservation activities.
SNR Unranked, Nation or state/province conservation status not yet assessed.
S#S# Range Rank, A numeric range rank (e.g., S2S3) is used to indicate any range of uncertainty about the status of the species or community. Ranges cannot skip more than one rank (e.g., SU is used rather than S1S4).
S#B Breeding

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S#N Non-Breeding

SARO STATUS DEFINITIONS

THR Threatened: A species that is at risk of becoming endangered in Ontario if limiting factors are not reversed.
SC Special Concern: A species with characteristics that make it sensitive to human activities or natural events.

SARA STATUS DEFINITIONS

THR Threatened, a wildlife species that is likely to become endangered if nothing is done to reverse the factors leading to its extirpation or extinction.
SC Special Concern, a wildlife species that may become threatened or endangered because of a combination of biological characteristics and identified threats.

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Appendix D

Geotechnical, Hydrogeological and Soil Screening Reports

Appendix D1

Soil Screening Report, Casselman Main Sewage Pumping Station (GEMTEC 2025)

GEMTEC
www.gemtec.ca

Soil Screening Report
Casselman Main Sewage Pumping Station Upgrades
Casselman, Ontario

GEMTEC Project: 100117.051

GEMTEC
www.gemtec.ca

Submitted to:

J.L. Richards & Associates Limited
1000 – 343 Preston Street
Ottawa, Ontario
K1S 1N4

Soil Screening Report
Casselman Main Sewage Pumping Station Upgrades
Casselman, Ontario

January 13, 2025
GEMTEC Project: 100117.051

GEMTEC Consulting Engineers and Scientists Limited
32 Steacie Drive
Ottawa, ON, Canada
K2K 2A9

January 13, 2025 File: 100117.051

J.L. Richards & Associates Limited
1000 – 343 Preston Street
Ottawa, Ontario
K1S 1N4

Attention: Mr. Matthew Marcuccio, P.Eng, Environmental Engineer

Re: Soil Screening Report
Casselman Main Sewage Pumping Station Upgrades
Casselman, Ontario

Enclosed is our Soil Screening Report for the excess soil to be generated for the Casselman Main Sewage Pumping Station Upgrades in Casselman, Ontario. This report was prepared by Mohit Bhargav, M.Sc.E., EIT, and reviewed by Daniel Elliot, P.Geo., QP_{ESA}.



Mohit Bhargav, M.Sc.E., EIT
Environmental Scientist



Daniel Elliot, P.Geo., QP_{ESA}
Senior Environmental Geoscientist

MB/DE

Enclosures
N:\Projects\100100\100117.051\05_Technical Work\Excess Soil\Soil Screening Report\100117.051_RPT_SoilScreeningReport_2025-01-13_Rev1.docx

EXECUTIVE SUMMARY

GEMTEC Consulting Engineers and Scientists Limited (GEMTEC) was retained by J.L. Richards & Associates Limited (JLR) to conduct an Environmental Excess Soil Investigation (Field Investigation) for the Casselman Main Sewage Pumping Station (SPS) Upgrades in Casselman, Ontario (herein referred to as the 'Site'). The Site location is shown in Figure A1 to Figure A3, Appendix A. GEMTEC understands that the anticipated excess soil volume to be generated from the Site is 7,000 cubic metres (m^3).

The Field Investigation was carried out in conjunction with the Geotechnical and Hydrogeological Investigation between July 18, 2024 and July 26, 2024. During that time, a total of seventeen (17) boreholes and probe holes were advanced at the Site.

The selection of applicable provincial standards for comparison to soil analytical results is based on a review of various receiving site characteristics as well as potential soil management and disposal options considered as part of the project.

Soil from samples collected at BH24-1, BH24-2, BH24-4, BH24-8, BH24-12, BH24-15, and BH24-16 met Table 1 – Background Site Condition Standards for agricultural and other land uses. Soil samples from the remaining locations met Table 2.1 – Full Depth Generic Excess Soil Quality Standards for residential/parkland/institutional land uses.

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1.0 INTRODUCTION

GEMTEC Consulting Engineers and Scientists Limited (GEMTEC) was retained by J.L. Richards & Associates Limited (JLR) to conduct an Environmental Excess Soil Investigation (Field Investigation) for the Casselman Main Sewage Pumping Station (SPS) Upgrades in Casselman, Ontario (herein referred to as the 'Site'). The Site location is shown in Figure A1 to Figure A3, Appendix A.

GEMTEC understands that the anticipated excess soil volume to be generated from the Site is 7,000 cubic metres (m^3). GEMTEC completed a preliminary soil quality screening investigation as part of this undertaking. This preliminary soil quality screening investigation will not be sufficient to satisfy the Section 8 planning document requirements under Ontario Regulation 406/19 – On-Site and Excess Soil Management (O.Reg. 406/19). However, all samples collected during the investigation can be used to satisfy the requirements.

2.0 BACKGROUND

2.1 Project Description

Based on information provided to GEMTEC by JLR the project will consist of upgrading the existing Casselman Main Sewage Pumping Station (SPS). Details of the proposed works are shown on drawings C101 to C109 inclusive, titled "Forcemain Plan & Profile" dated September 2024 and prepared by J.L. Richards. The upgrading works include:

- Installation of a new 525 millimetre diameter concrete overflow pipe and flapper type gate value. The overflow pipe will be installed from an existing manhole on the north side of the SPS, with the flapper gate outletting into the South Nation River a relatively short distance to the north of the SPS. The details of this component of the works are to be confirmed., however shallow excavations within about 3 metres depth are anticipated.
- Installation of a new 400 millimetre diameter HDPE forcemain from the existing SPS at the intersection of Brisson Street and Principale Street to the location identified as Lagoon Cell 1 East Berm. The length of forcemain to be installed is about 2,000 metres. The alignment is expected to be along the same alignment as the existing forcemain (within road allowances and existing easements). The forcemain will be constructed within Laurier Street.

It is also understood full road width reconstruction is being considered along Brisson Street, and that trench reinstatement of the roadway is being considered along Laurier Street, the Sainte-Euphémie Catholic Elementary School, and the lagoon access road.

Material and installation details related to the proposed Casselman Main SPS Upgrades are available under separate report titled 'Geotechnical and Hydrogeological Investigation,

Casselman Main Sewage Pumping Station Upgrades, Casselman, Ontario' prepared by GEMTEC in September 2024.

Based on the project information available, this project will require registration as described under Section 8 of O.Reg. 406/19 for the following reasons:

- The estimated volume of soil to become excess is greater than 2,000 m^3 and the project area includes community and industrial property uses;
- The project area includes enhanced investigation properties; and,
- The infrastructure being installed is new.

If the volume of soil expected to become excess changes the requirement for registration should be reviewed.

2.2 Environmental Records

No historical environmental reports were available for review prior to the Field Investigation. Local experience and publicly available aerial photographs were reviewed to inform the anticipated contaminants of potential concern (COPCs) to be investigated during the Field Investigation.

2.3 Scope of Work

GEMTEC performed the following tasks:

- Task 1 – Geotechnical and Hydrogeological Investigation;
- Task 2 – Environmental Excess Soil Investigation; and,
- Task 3 – Soil Screening Report.

3.0 METHODOLOGY

3.1 General

The Field Investigation (Task 2) was carried out in conjunction with the Geotechnical and Hydrogeological Investigation (Task 1) between July 18, 2024 and July 26, 2024. During that time, a total of seventeen (17) boreholes and probe holes were advanced at the Site. The details of the Field Investigation are provided in Table 3.1.

Table 3.1: Details of the Field Investigation

Borehole/ Probe Holes	Borehole Location	Ground Surface Elevation (m)	Borehole Depth (metres below ground surface (m bgs))	Purpose of Borehole/Probe Hole
24-1	Pumping Station and Brisson Street	61.9	3.8 (Refusal)	Excess Soil Investigation

Borehole/ Probe Holes	Borehole Location	Ground Surface Elevation (m)	Borehole Depth (metres below ground surface (m bgs))	Purpose of Borehole/Probe Hole
MW24-1	Pumping Station and Brisson Street	62.0	4.0 (Refusal)	Geotechnical Investigation
24-2	Pumping Station and Brisson Street	59.2	4.4	Excess Soil Investigation
24-3 (Probe)	Pumping Station and Brisson Street	58.6	1.9 (Refusal)	Geotechnical Investigation
24-4	Pumping Station and Brisson Street	58.3	4.9	Excess Soil Investigation
24-5	Removed from work program due to unlocatable sanitary forcemain.			
24-6	Field / School Yard	63.9	4.42	Excess Soil Investigation
24-7 (Probe)	Field / School Yard	64.4	4.6	Geotechnical Investigation
24-8	Field / School Yard	65.8	4.4	Excess Soil Investigation
24-9 (Probe)	Field / School Yard	66.5	4.6	Geotechnical Investigation
24-10	Field / School Yard	65.4	4.4	Excess Soil Investigation
24-11 (Probe)	Laurier Street	65.4	5.2	Geotechnical Investigation
24-12	Laurier Street	64.8	5.2	Excess Soil Investigation
24-13	Removed from work program due to unlocatable sanitary forcemain.			
24-14 (Probe)	Lagoon	67.7	4.6	Geotechnical Investigation
24-15	Lagoon	67.8	4.4	Excess Soil Investigation
24-16	Lagoon	67.6	6.7	Excess Soil Investigation
24-17	Lagoon	67.7	4.4	Excess Soil Investigation
24-18	Pumping Station and Brisson Street	61.5	8.8	Excess Soil Investigation

3.2 Soil Drilling

The boreholes were advanced using a truck and a track mounted drill rig supplied and operated by George Downing Estate Drilling Ltd. of Grenville-Sur-La-Rouge, Quebec. The boreholes (for

Excess Soil Investigation) were advanced to depths of approximately 8.8 m bgs across the proposed construction alignment.

3.3 Soil Sampling

The Field Investigation was conducted in general accordance with O.Reg. 406/19 and O.Reg. 153/04, as amended.

The Field Investigation was conducted by a member of GEMTEC's engineering staff acting under the direction of a QP_{ESA}. Soil samples were collected following the *Guidance on Sampling and Analytical Methods for Use at Contaminated Sites in Ontario (MOE, 1996)*. Soil samples were split in the field into two components. One component was placed into laboratory-prepared containers with minimal headspace as well as a pre-measured vial of methanol and stored in a cooler for laboratory analysis. The second component was placed inside a plastic bag for field screening. Soil screening included a description of the soil and noting the presence of any staining, odour and/or debris.

Clean gloves were worn and changed between each sample interval to prevent cross contamination. Soil samples were inspected in the field for visual, tactile, and olfactory evidence of impact, and, following a period of equilibration to ambient temperature, soil sample vapours were screened using a dual sensor combustible gas indicator (CGI) and photoionization detector (PID). This instrument measures a concentration of total combustible gas, calibrated to known concentrations of isobutylene and hexane. The instrument operates in the methane elimination mode. The detection limit of the instrument ranges from 0 to 11,000 ppm (i.e., 100 % LEL of hexane). The CGI has an accuracy of 25 ppm below 1,000 ppm and 5% of the lower explosive limit (LEL) between 1,000 ppm and 100% LEL.

The field investigation included the submission of eleven discrete soil samples and five leachate samples. The leachate samples included four modified Synthetic Precipitation Leaching Procedure (mSPLP) and one Toxicity Characteristic Leaching Procedure (TCLP). Soil samples were selected based on visual, tactile, and olfactory observations from the Field Investigation. Soil samples were submitted for analysis to AGAT Laboratories (AGAT) under standard chain of custody protocols, in accordance with GEMTEC Quality Assurance/Quality Control (QA/QC) procedures.

4.0 SELECTION OF REGULATORY CRITERIA

The selection of applicable provincial standards for comparison to soil analytical results is based on a review of various receiving site characteristics as well as potential soil management and disposal options considered as part of the project. It is understood that the construction project will have the potential for the excavated soils to be reused off-Site. Therefore, soil analytical results were compared to applicable provincial standards considering these requirements.

Soil Quality Standards for Reuse Off-Site in Ontario

Based on the above discussion, the following provincial standards were selected to assess the soil analytical results for potential reuse off-Site.

- MECP Table 1: Ontario Ministry of the Environment, Conservation and Parks, "Rules for Soil Management and Excess Soil Quality Standards", February 2024. Full Depth Background Site Condition Standards for Agricultural or Other Property Use.
- MECP Table 1: Ontario Ministry of the Environment, Conservation and Parks, "Rules for Soil Management and Excess Soil Quality Standards", February 2024. Leachate Screening Levels for Excess Soil Reuse for Agricultural or Other Property Use.
- MECP Table 2.1: Ontario Ministry of the Environment, Conservation and Parks, "Rules for Soil Management and Excess Soil Quality Standards", February 2024. Full Depth ESQS in a Potable Ground Water Condition for Residential / Parkland / Institutional (RPI) Property Use.
- MECP Table 2.1: Ontario Ministry of the Environment, Conservation and Parks, "Rules for Soil Management and Excess Soil Quality Standards", February 2024. Leachate Screening Levels for Full Depth Excess Soil in a Potable Ground Water Condition for RPI Property Use.
- MECP Table 3.1: Ontario Ministry of the Environment, Conservation and Parks, "Rules for Soil Management and Excess Soil Quality Standards", February 2024. Full Depth ESQS in a Non-Potable Ground Water Condition for Industrial / Commercial / Community (ICC) Property Use.
- MECP Table 3.1: Ontario Ministry of the Environment, Conservation and Parks, "Rules for Soil Management and Excess Soil Quality Standards", February 2024. Leachate Screening Levels for Full Depth Excess Soil in a Non-Potable Ground Water Condition for ICC Property Use.

The following provincial standards were considered to be applicable to the TCLP analytical results obtained during the Field Investigation:

- MECP O.Reg. 558/347 Schedule 4, Leachate Quality Criteria, to evaluate waste classification (hazardous or non-hazardous waste).

5.0 SOIL QUALITY RESULTS

5.1 Site Stratigraphy

The general soil stratigraphy based on borehole locations is provided below:

5.1.1 Pumping Station and Brisson Street (BH24-1 to BH24-4, and BH24-18)

The general soil stratigraphy at BH24-1 to BH24-3 was asphaltic concrete underlain by grey, crushed sand and gravel with trace silt followed by silty clay and glacial till. Shallow bedrock was encountered at BH24-4.

Fill material was encountered below the gravel roadway structure at BH24-2 and BH24-3, and below the topsoil at boreholes 24-18. The fill material generally consisted of brown silty sand with varying amounts of gravel, silt, and clay. Boulders were inferred in the fill material at BH24-18. The fill material at boreholes 24-3 consisted of grey gravel with some sand.

5.1.2 Field / School Yard (BH24-6 to BH24-10)

The general soil stratigraphy at BH24-6 and BH24-8 was topsoil underlain by silty clay and glacial till. Fill material underlain by a former topsoil layer was also encountered below the topsoil at BH24-8. The fill material consisted of brown silty clay with trace sand.

The general stratigraphy at BH24-10 was asphaltic concrete underlain by grey, crushed sand and gravel with trace silt (base/subbase material) followed by silty clay and glacial till.

5.1.3 Laurier Street (BH24-12)

The general stratigraphy at BH24-12 was asphaltic concrete underlain by grey, crushed sand and gravel with trace silt (base material), and brown sand and gravel with trace to some silt (subbase material). A layer of fill material was encountered below the road structure and consisted of light brown silty sand underlain by a layer of former topsoil, silty clay, glacial till and sand.

5.1.4 Lagoon (BH24-15 to BH24-17)

The general stratigraphy at BH24-15 to BH24-17 were topsoil underlain by fill material. The fill material generally consisted of grey brown silty sand to sand with some silt, trace amounts of organic material, and contained variable amounts of clay and gravel followed by silty clay. Additionally, grey sandy silt was encountered at BH24-15 below the fill material.

The detailed soil stratigraphy is provided on the Borehole Logs, Appendix B.

5.2 Soil Analytical Results

A summary of exceedances for the soil analytical results to the applicable ESQS is provided in Table 5.1. Detailed soil analytical tables are provided in Table C.1 to Table C.4, Appendix C. Analytical results are visualized in Figure A4 to Figure A6, Appendix A.

Table 5.1: Summary of Soil Analytical Results

Soil Samples	Depth of samples (m bgs)	Analysis	Exceedances compared to MECP Table 1 SCS	Exceedances compared to MECP Table 2.1 RPI ESQS	Exceedances compared to MECP Table 3.1 RPI ESQS
BH24-1 SS1	0.15 - 0.76	M&Is, PAHs, PHC F1-F4, BTEX	SAR	--	--
BH24-2 SS3	1.52 - 2.13	M&Is, PHC F1-F4, BTEX	Chromium, EC, SAR	EC	--
BH24-4 SS1	0.00 - 0.61	M&Is, PAHs, PHC F1-F4, BTEX	SAR	--	--
BH24-6 SA3	1.52 - 2.13	M&Is, PAHs, PHC F1-F4, BTEX	Barium, Chromium, Cobalt, Nickel, Vanadium	Barium, Cobalt, Vanadium	Vanadium
BH24-8 SA5	3.04 - 3.65	M&Is, PHC F1-F4, BTEX	--	--	--
BH24-10 SS3	1.52 - 2.13	M&Is, PHC F1-F4, BTEX	Barium, Chromium, Cobalt, Nickel, Vanadium, EC, SAR	Vanadium, EC	Vanadium
BH24-12 SS2	0.76 - 1.37	M&Is, PAHs, PHC F1-F4, BTEX	SAR	--	--
BH24-15 SA3	1.52 - 2.13	M&Is, PAHs, PHC F1-F4, BTEX	--	--	--
BH24-16 SS3	1.52 - 2.13	M&Is, PAHs, PHC F1-F4, BTEX	--	--	--
BH24-17 SS4	2.28 - 2.89	M&Is, PHC F1-F4, BTEX	Chromium, Cobalt, Nickel, SAR	--	--
BH24-18 SS6	3.81 - 4.42	M&Is, PHC F1-F4, VOCs	SAR	--	--

Notes:

1. m bgs – metres below ground surface
2. M&Is – Metals and Inorganics
3. VOCs – Volatile Organic Compounds
4. BTEX – Benzene, Toluene, Ethylbenzene, and Xylene
5. PHC F1-F4 – Petroleum Hydrocarbon F1-F4
6. PAHs – Polycyclic Aromatic Hydrocarbons
7. EC – Electrical Conductivity
8. SAR – Sodium Adsorption Ratio
9. MECP Table 1: Ontario Ministry of the Environment, Conservation and Parks, "Rules for Soil Management and Excess Soil

Quality Standards", February 2024. Full Depth Background Site Condition Standards for Agricultural or Other Property Use.
10. MECP Table 2.1: Ontario Ministry of the Environment, Conservation and Parks, "Rules for Soil Management and Excess Soil Quality Standards", February 2024. Full Depth ESQS in a Potable Ground Water Condition for RPI Property Use.
11. MECP Table 3.1: Ontario Ministry of the Environment, Conservation and Parks, "Rules for Soil Management and Excess Soil Quality Standards", February 2024. Full Depth ESQS in a Non-Potable Ground Water Condition for ICC Property Use.

No exceedances were identified for the leachate analysis samples for mSPLP and TCLP samples. The soils are classified as nonhazardous and can be disposed off at a MECP licensed landfill.

Based on salting activities (during winter months) in proximity of the sampling locations at the Site (along right of ways), exceedances of EC and SAR with green text should not be considered contamination for soil remaining at the Site. These exceedances should also be reviewed by a QP of the receiving site to determine suitability for reuse of salt impacted soils. Potential reuse of excess soils may be contingent on the material not being used in landscaped areas with sensitive vegetation and plant species due to the elevated EC and SAR levels. The use of the excess soil at other sites must meet the receiving site's analytical and site-specific instrument requirements, MECP ESQS for imported materials, and limitations on reuse of salt impacted soils as outlined in the Rules Document. Additional discussion about reuse of salt impacted soils is available in Section 5.3.

SAR values exceeding Table 1 at BH24-17 and BH24-18 are not expected to be attributable to road salting activities due to the depth of the samples and the soil type. There is evidence within Sterling et al. (2023) to support elevated EC and SAR levels as naturally occurring due to the Champlain Sea deposits. It is GEMTEC's opinion that SAR exceeding Table 1 at BH24-17 and BH24-18 are not a concern, however, this should be confirmed by a potential reuse site owner and/or QP operating on the reuse site's behalf.

Samples from native materials had elevated concentrations of naturally occurring metals (blue text) as reported by Sterling et al. (2023). Concentrations of barium, cobalt, chromium, and vanadium in clay samples from the Champlain Sea deposit were compared to the 2023 report "Background Metals in Champlain Sea Sediments: Updated from 2019 Drilling and Sampling Program" (Geofirma, 2023). GEMTEC referenced this document to determine if the reported concentrations exceeded MECP ESQS. Consequently, the exceedances of barium, cobalt, chromium, and vanadium in soil samples from the Site should be considered naturally occurring, as the concentrations are below the proposed geo-regional values. Additional discussion about reuse of soils with local background concentration is available in Section 5.4.

5.3 Discussion about Salt Impacts

As the Site is included as part of a roadway, salt impacts in soil were anticipated. Based on guidance provided in Section D, Part 1. (3) of the Rules Document Salt impacted excess soil may only be placed at a reuse site if one or more of the following conditions apply:

- Where it is reasonable to expect that the soil will be affected by the same chemicals as a result of continued application of a substance for the safety of vehicular or pedestrian traffic under conditions of snow or ice;
- At any industrial or commercial use property;
- At any residential, parkland, institutional, or community use property so long as:
    - The excess soil is buried at least 1.5 metres below the surface of the soil; or
    - A landscape plan as described in the Rules Document has been created by a defined person under O.Reg. 406/19.
- At any agricultural use property so long as:
    - The excess soil is buried at least 1.5 metres below the surface of the soil; or
    - An area that will not be vegetated and only where the soil is used to achieve a grade necessary for construction of buildings, such as barns or greenhouses, or the installation of a driveway or parking area.

Despite the scenarios above, salt-impacted excess soil shall not be finally placed:

- Within 30 metres of a waterbody; or,
- Within 100 metres of a potable water well or area with an intended property use that may require a potable water well; or,
- On lands that will be used for growing crops or pasturing livestock unless the excess soil is placed 1.5 metres or greater below the soil surface.

5.4 Naturally Occurring Metals

In accordance with the Rules document, beneficial reuse of soil with naturally occurring elevated metals where the concentrations of said metals are within the range typically found in the soil at the reuse site is permitted. Accordingly, as elevated metals are typical in the clays throughout eastern Ontario (Champlain Sea Clay Area), if these same soils are confirmed to be present at the intended receiving site, reuse of these soils within such areas is permissible providing there are no other exceedances of other ESQS parameters (bulk or leachate) that would preclude reuse of the soils at the intended receiving site. As such, soils may be reused at a beneficial reuse site such that stipulations on reuse of soil with 'local background concentrations' as outlined in the Rules Document is adhered to and pending confirmation of suitability for reuse and acceptance from the receiving site and their QP_{ESA}.

5.5 Quality Assurance/Quality Control

5.5.1 Analytical Laboratory QA/QC

Soil samples were submitted to AGAT during the Field Investigation. AGAT completed a variety of internal QA/QC measures on the submitted soil samples. AGAT is accredited by the Standards Council of Canada (SCC) in cooperation with the Canadian Association of Laboratory Accreditation (CALA) for specific environmental tests listed in the scope of accreditation approved

by the SCC and registered with CALA. AGAT is also accredited to the ISO/IEC 17025 standard and employ in-house quality assurance and quality control programs to govern sample analysis including the analysis of method blanks, spiked blanks, and the analysis of duplicates (10%) for each sample batch.

The AGAT report did not note any QA/QC issues in the certificates of analysis. The laboratory certificates of analysis are provided in Appendix D.

5.5.2 QA/QC Summary

Based on the measures discussed above, sample collection and handling protocols are considered acceptable and associated analytical results are considered reliable. The sample collection methods and duplicates do not suggest inconsistencies in the field collection or in the laboratory analysis methods.

6.0 CONCLUSIONS

GEMTEC makes the following conclusions based on the soil analytical results obtained during the Field Investigation:

- Excess soil from BH24-1, BH24-2, BH24-4, BH24-8, BH24-12, BH24-15, and BH25-16 meets Table 1 Agricultural or Other property uses with restrictions related to salt-impacted soils and local background conditions related to elevated metal concentrations in naturally occurring clays.
- Excess soil from BH24-6, BH24-10, bh24-17, and BH24-18 meets Table 2.1 RPI property uses with restrictions related to salt-impacted soils and local background conditions related to elevated metal concentrations in naturally occurring clays.

Based on these conclusions, GEMTEC recommends the following:

- Excess soil generated in the vicinity of BH24-1, BH24-2, BH24-4, BH24-8, BH24-12, BH24-15, and BH25-16 can be reused at any receiving site so long as salt-impacted soil restrictions and local background condition considerations are observed.
- The excess soil from BH24-6, BH24-10, BH24-17, and BH24-18 should be used at either Table 2.1 RPI/ICC receiving site or Table 3.1 ICC receiving site so long as salt-impacted soil restrictions and local background condition considerations are observed.
- Planning studies required by O.Reg. 406/19 should be undertaken prior to tendering and construction work in order to maintain compliance with the applicable environmental regulations.

The recommendation is based on discrete sampling locations and may not be representative of the conditions between sampling locations. Should indications of contamination be identified during construction, additional sampling is recommended.

7.0 LIMITATION OF LIABILITY

This report and the work referred to within it has been undertaken by GEMTEC Consulting Engineers and Scientists Limited for J.L. Richards & Associates Limited. It is intended for the exclusive use of J.L. Richards & Associates Limited. This report may not be relied upon by any other person or entity without the express written consent of GEMTEC Consulting Engineers and Scientists Limited and J.L. Richards & Associates Limited. Nothing in this report is intended to provide a legal opinion.

The investigation undertaken by GEMTEC with respect to this report and any conclusions or recommendations made in this report reflect the best judgements of GEMTEC based on the Site conditions observed during the investigations undertaken at the date(s) identified in the report and on the information available at the time the report was prepared. This report has been prepared for the application noted and it is based, in part, on visual observations made at the Site, stockpile conditions at the storage location and laboratory analyses of specific chemical parameters and material during a specific time interval, all as described in the report. Unless otherwise stated, the findings contained in this report cannot be extrapolated or extended to previous or future Site conditions, portions of the Site that were unavailable for direct investigation, subsurface locations on the Site that were not investigated directly, or chemical parameters, materials or analysis which were not addressed. Chemical parameters other than those addressed by the investigation described in this report may exist in soil and groundwater elsewhere on the Site, the chemical parameters addressed in the report may exist in soil and groundwater at other locations at the Site that were not investigated and concentrations of the chemical parameters addressed which are different than those reported may exist at other locations on the Site than those from where the samples were taken.

Should new information become available during future work, including excavations, borings, or other studies, GEMTEC should be requested to review the information and, if necessary, re-assess the conclusions presented herein.

8.0 REFERENCES

Geofirma. “Elevated Background Metals in Champlain Sea Sediments: Updated from 2019 Drilling and Sampling Program” (Geofirma, 2023).

Ontario Ministry of the Environment and Climate Change (MOECC). Guidance on sampling and analytical methods for use at contaminated sites in Ontario. Revised December 1996.

Ontario Ministry of the Environment, Conservation and Parks (MECP). Management of Excess Soil – A Guide for Best Management Practices. October 26, 2021.

Ontario Ministry of the Environment, Laboratory Services Branch (MOE). Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act and Excess Soil Quality. March 09, 2004, amended as of July 1, 2011 and as of February 19, 2021.

Ontario Ministry of the Environment, Conservation and Parks (MECP). Ontario Regulation 153/04, Made under the Environmental Protection Act, Part XV.1 – Records of Site Condition. October 31, 2011, updated January 1, 2014.

Ontario Ministry of the Environment, Conservation and Parks (MECP). Ontario Regulation 347, General Waste Management, Made under the Environmental Protection Act, R.S.O. 1990, c. E.19. 1990 updated July 1, 2021.

Ontario Ministry of the Environment, Conservation and Parks (MECP). Soil, ground water and sediment standards made under the Environmental Protection Act, Part XV.1. October 31, 2011 updated January 1, 2014.

Ontario Ministry of the Environment, Conservation and Parks (MECP). Ontario Regulation 406/19, – On-site and Excess Soil Management. December 2019, amended April 2024.

Ontario Ministry of the Environment, Conservation and Parks (MECP). Rules for Soil Management and Excess Soil Quality Standards. February 2024.

9.0 CLOSURE

We trust this letter provides sufficient information for your present purposes. If you have any questions concerning this letter, please do not hesitate to contact our office.

Sincerely,



Mohit Bhargav, M.Sc.E., EIT
Environmental Scientist



Daniel Elliot, P.Geo., QP_{ESA}
Senior Environmental Geoscientist

MB/DE

APPENDIX A

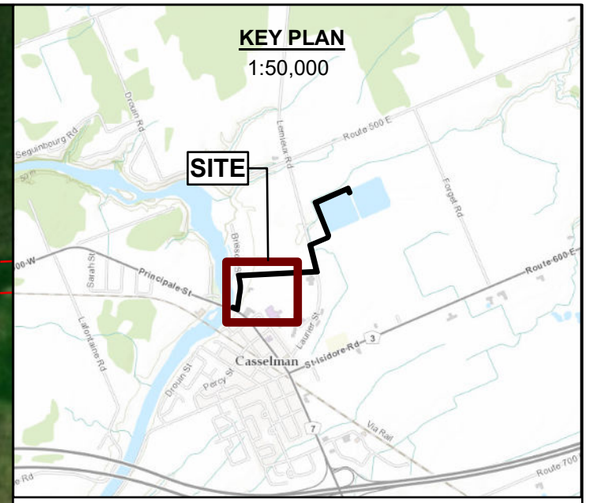
Figures



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KEY PLAN

1:50,000



LEGEND

BH # — BOREHOLE ID
XX.XX — GROUND SURFACE ELEVATIONS, IN METRES GEODETIC DATUM

BOREHOLE LOCATION

APPROXIMATE BOREHOLE LOCATION (GOLDER, 2005)

PROJECT LIMIT

GENERAL NOTES:

1. Coordinate system: NAD83(CSRS) / UTM zone 18N
2. Survey Reference based on PRS579626392983
   Easting: 476040.80m
   Northing: 5012925.07m
   Elevation: 78.42m
2. Geographic dataset source: Ontario GeoHub.
3. Contains information licensed under the Open Government Licence – Ontario.
4. Service Layer Credits: World Topographic Map: Esri Canada, Esri, HERE, Garmin, INCREMENT P, USGS, METI/NASA, EPA, USDA, AAFC, NRCan, World Imagery: SDG Counties, Maxar, Microsoft

Scale:

1:2,000 Meters

0 27.5 55 110 165

Drawing: BOREHOLE LOCATION PLAN

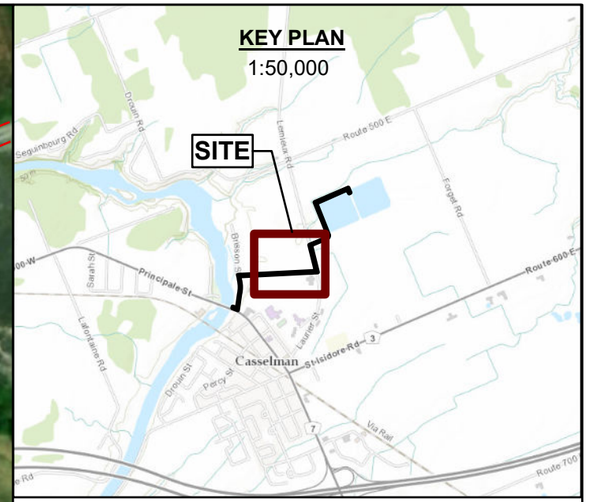
Client: J. L. RICHARDS & ASSOCIATES LIMITED

Project: CASSELMAN MAIN SEWAGE PUMPING STATION (SPS) UPGRADES
CASSELMAN, ONTARIO

Drwn By:	S.L.	Chkd By:	D.E.
Project No.	100117.051	Revision No.	0
Date	JANUARY 2025	**FIGURE A1**	

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Ottawa, ON, K2K 2A9
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www.gemtec.ca
ottawa@gemtec.ca





LEGEND

BH # — BOREHOLE ID
XX.XX — GROUND SURFACE ELEVATIONS, IN METRES GEODETIC DATUM

BOREHOLE LOCATION

APPROXIMATE BOREHOLE LOCATION (GOLDER, 2005)

PROJECT LIMIT

GENERAL NOTES:

1. Coordinate system: NAD83(CSRS) / UTM zone 18N
2. Survey Reference based on PRS579626392983
   Easting: 476040.80m
   Northing: 5012925.07m
   Elevation: 78.42m
2. Geographic dataset source: Ontario GeoHub.
3. Contains information licensed under the Open Government Licence – Ontario.
4. Service Layer Credits: World Topographic Map: Esri Canada, Esri, HERE, Garmin, INCREMENT P, USGS, METI/NASA, EPA, USDA, AAFC, NRCan, World Imagery: SDG Counties, Maxar, Microsoft

Scale:

1:2,000 Meters

0 27.5 55 110 165

Drawing

BOREHOLE LOCATION PLAN

Client:

J. L. RICHARDS & ASSOCIATES LIMITED

Project

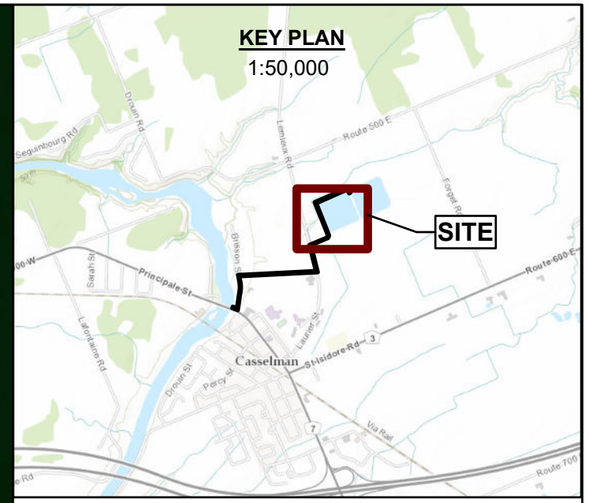
CASSELMAN MAIN SEWAGE PUMPING STATION (SPS) UPGRADES
CASSELMAN, ONTARIO

Drwn By:	S.L.	Chkd By:	D.E.
Project No.	100117.051	Revision No.	0
Date	JANUARY 2025		**FIGURE A2**

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LEGEND

BH # — BOREHOLE ID
XX.XX — GROUND SURFACE ELEVATIONS, IN METRES GEODETIC DATUM

- BOREHOLE
- APPROXIMATE BOREHOLE LOCATION (GOLDER, 2005)
- PROJECT LIMIT

GENERAL NOTES:

1. Coordinate system: NAD83(CSRS) / UTM zone 18N
2. Survey Reference based on PRS579626392983
   Easting: 476040.80m
   Northing: 5012925.07m
   Elevation: 78.42m
2. Geographic dataset source: Ontario GeoHub.
3. Contains information licensed under the Open Government Licence – Ontario.
4. Service Layer Credits: World Topographic Map: Esri Canada, Esri, HERE, Garmin, INCREMENT P, USGS, METI/NASA, EPA, USDA, AAFC, NRCan, World Imagery: SDG Counties, Maxar, Microsoft

Scale:
1:2,000
Meters
0 27.5 55 110 165

Drawing
BOREHOLE LOCATION PLAN

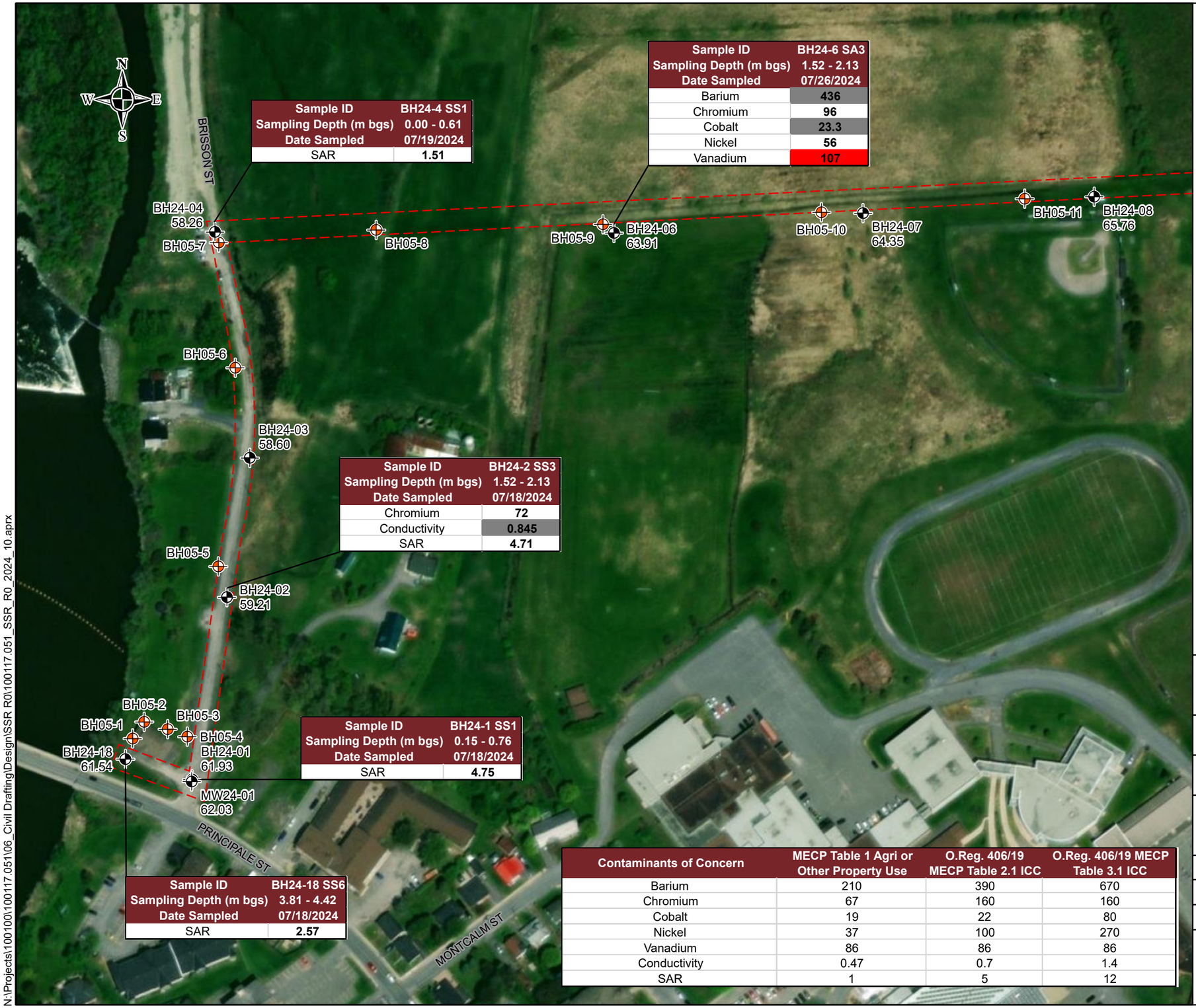
Client:
J. L. RICHARDS & ASSOCIATES LIMITED

Project
CASSELMAN MAIN SEWAGE PUMPING STATION (SPS) UPGRADES
CASSELMAN, ONTARIO

Drwn By:	S.L.	Chkd By:	D.E.
Project No.	100117.051	Revision No.	0
Date	JANUARY 2025	**FIGURE A3**	

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Sample ID	BH24-4 SS1
Sampling Depth (m bgs)	0.00 - 0.61
Date Sampled	07/19/2024
SAR	**1.51**

Sample ID	BH24-6 SA3
Sampling Depth (m bgs)	1.52 - 2.13
Date Sampled	07/26/2024
Barium	**436**
Chromium	**96**
Cobalt	**23.3**
Nickel	**56**
Vanadium	**107**

Sample ID	BH24-2 SS3
Sampling Depth (m bgs)	1.52 - 2.13
Date Sampled	07/18/2024
Chromium	**72**
Conductivity	**0.845**
SAR	**4.71**

Sample ID	BH24-1 SS1
Sampling Depth (m bgs)	0.15 - 0.76
Date Sampled	07/18/2024
SAR	**4.75**

Sample ID	BH24-18 SS6
Sampling Depth (m bgs)	3.81 - 4.42
Date Sampled	07/18/2024
SAR	**2.57**

Contaminants of Concern	MECP Table 1 Agri or Other Property Use	O.Reg. 406/19 MECP Table 2.1 ICC	O.Reg. 406/19 MECP Table 3.1 ICC
Barium	210	390	670
Chromium	67	160	160
Cobalt	19	22	80
Nickel	37	100	270
Vanadium	86	86	86
Conductivity	0.47	0.7	1.4
SAR	1	5	12

LEGEND

BH # — BOREHOLE ID
XX.XX — GROUND SURFACE ELEVATIONS, IN METRES GEODETIC DATUM

BOREHOLE LOCATION

APPROXIMATE BOREHOLE LOCATION (GOLDER, 2005)

PROJECT LIMIT

NOTES

RPI - Residential/Parkland/Institutional

ICC - Industrial/Commercial/Community

'm bgs' - Metres Below Ground Surface

MECP Table 1 Agri ESQS: Full Depth Background Site Condition Standards, Agriculture or Other Property Use.

MECP Table 2.1 Agri ESQS: Full Depth Excess Soil Quality Standards in a Potable Ground Water Condition, Agricultural or Other Property Use.

BOLD	- Exceeds MECP Table 1 Agri ESQS
BOLD	- Exceeds MECP Table 1 Agri ESQS
BOLD	- Exceeds MECP Table 3.1 ICC ESQS

GENERAL NOTES:

1. Coordinate system: NAD83(CSRS) / UTM zone 18N

2. Survey Reference based on PRS579626392983
Easting: 476040.80m
Northing: 5012925.07m
Elevation: 78.42m

2. Geographic dataset source: Ontario GeoHub.

3. Contains information licensed under the Open Government Licence – Ontario.

4. Service Layer Credits: World Topographic Map: Esri Canada, Esri, HERE, Garmin, INCREMENT P, USGS, METI/NASA, EPA, USDA, AAFC, NRCan, World Imagery: SDG Counties, Maxar, Microsoft

Scale:
1:2,000
Meters
0 27.5 55 110 165

Drawing
SOIL EXCEEDANCES

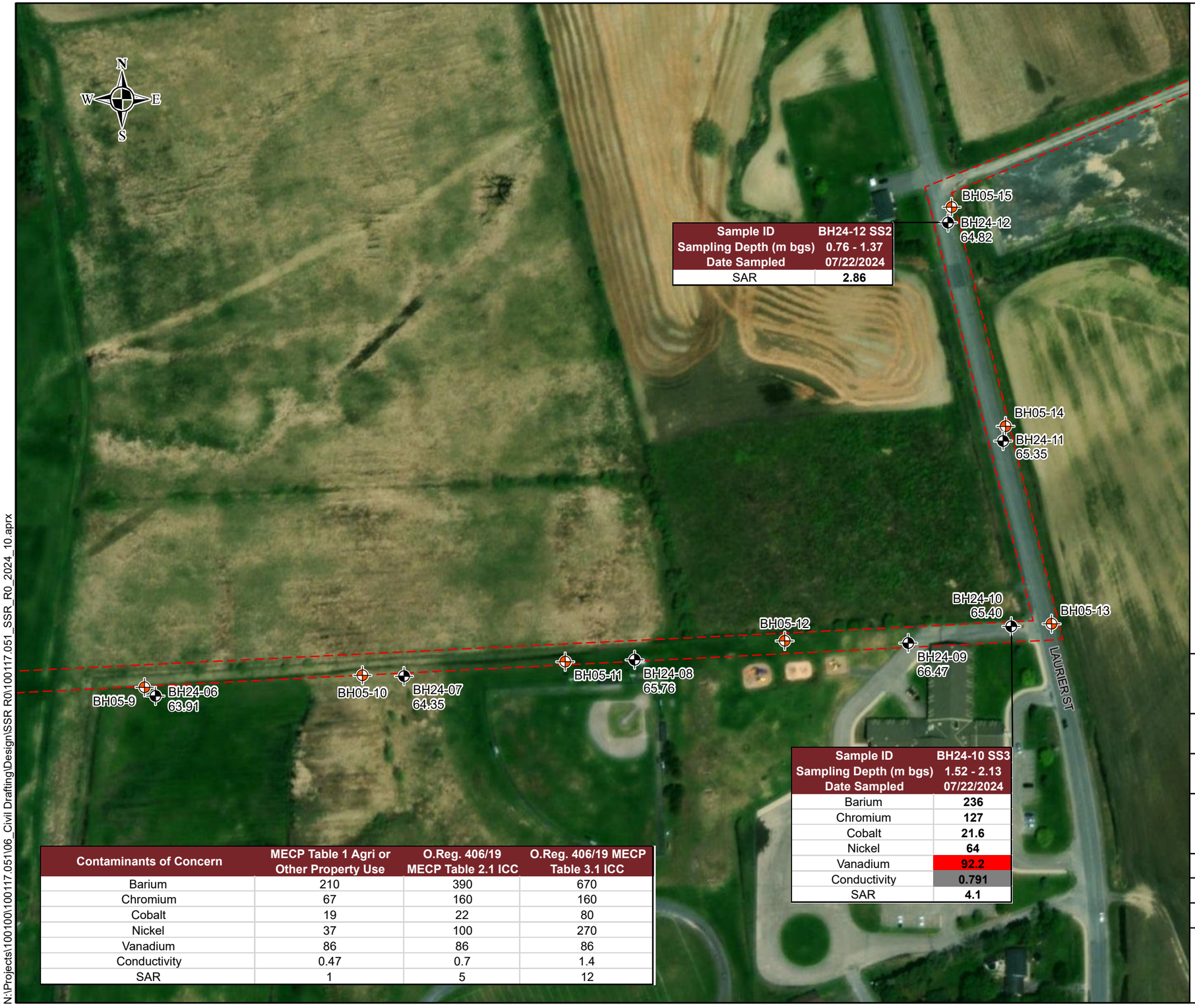
Client:
J. L. RICHARDS & ASSOCIATES LIMITED

Project
CASSELMAN MAIN SEWAGE PUMPING STATION (SPS) UPGRADES
CASSELMAN, ONTARIO

Drwn By:	S.L.	Chkd By:	D.E.
Project No.	100117.051	Revision No.	0
Date	JANUARY 2025		**FIGURE A4**

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Sample ID	BH24-12 SS2
Sampling Depth (m bgs)	0.76 - 1.37
Date Sampled	07/22/2024
SAR	**2.86**

Sample ID	BH24-10 SS3
Sampling Depth (m bgs)	1.52 - 2.13
Date Sampled	07/22/2024
Barium	**236**
Chromium	**127**
Cobalt	**21.6**
Nickel	**64**
Vanadium	**92.2**
Conductivity	**0.791**
SAR	**4.1**

Contaminants of Concern	MECP Table 1 Agri or Other Property Use	O.Reg. 406/19 MECP Table 2.1 ICC	O.Reg. 406/19 MECP Table 3.1 ICC
Barium	210	390	670
Chromium	67	160	160
Cobalt	19	22	80
Nickel	37	100	270
Vanadium	86	86	86
Conductivity	0.47	0.7	1.4
SAR	1	5	12

LEGEND

BH # — BOREHOLE ID
XX.XX — GROUND SURFACE ELEVATIONS, IN METRES GEODETIC DATUM

BOREHOLE LOCATION

APPROXIMATE BOREHOLE LOCATION (GOLDER, 2005)

PROJECT LIMIT

NOTES

RPI - Residential/Parkland/Institutional

ICC - Industrial/Commercial/Community

'm bgs' - Metres Below Ground Surface

MECP Table 1 Agri ESQS: Full Depth Background Site Condition Standards, Agriculture or Other Property Use.

MECP Table 2.1 Agri ESQS: Full Depth Excess Soil Quality Standards in a Potable Ground Water Condition, Agricultural or Other Property Use.

BOLD	- Exceeds MECP Table 1 Agri ESQS
BOLD	- Exceeds MECP Table 1 Agri ESQS
BOLD	- Exceeds MECP Table 3.1 ICC ESQS

GENERAL NOTES:

1. Coordinate system: NAD83(CSRS) / UTM zone 18N

2. Survey Reference based on PRS579626392983
Easting: 476040.80m
Northing: 5012925.07m
Elevation: 78.42m

2. Geographic dataset source: Ontario GeoHub.

3. Contains information licensed under the Open Government Licence – Ontario.

4. Service Layer Credits: World Topographic Map: Esri Canada, Esri, HERE, Garmin, INCREMENT P, USGS, METI/NASA, EPA, USDA, AAFC, NRCan, World Imagery: SDG Counties, Maxar, Microsoft

Scale:

1:2,000 Meters

0 27.5 55 110 165

Drawing: SOIL EXCEEDANCES

Client: J. L. RICHARDS & ASSOCIATES LIMITED

Project: CASSELMAN MAIN SEWAGE PUMPING STATION (SPS) UPGRADES
CASSELMAN, ONTARIO

Drwn By:	S.L.	Chkd By:	D.E.
Project No.	100117.051	Revision No.	0
Date	JANUARY 2025	**FIGURE A5**	

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Sample ID	BH24-17 SS4
Sampling Depth (m bgs)	2.28 - 2.89
Date Sampled	07/22/2024
Chromium	**97**
Cobalt	**20.2**
Nickel	**51**
SAR	**1.1**

Contaminants of Concern	MECP Table 1 Agri or Other Property Use	O.Reg. 406/19 MECP Table 2.1 ICC	O.Reg. 406/19 MECP Table 3.1 ICC
Barium	210	390	670
Chromium	67	160	160
Cobalt	19	22	80
Nickel	37	100	270
Vanadium	86	86	86
Conductivity	0.47	0.7	1.4
SAR	1	5	12

LEGEND

BH # — BOREHOLE ID
XX.XX — GROUND SURFACE ELEVATIONS, IN METRES GEODETIC DATUM

BOREHOLE

APPROXIMATE BOREHOLE LOCATION (GOLDER, 2005)

PROJECT LIMIT

NOTES

RPI - Residential/Parkland/Institutional

ICC - Industrial/Commercial/Community

'm bgs' - Metres Below Ground Surface

MECP Table 1 Agri ESQS: Full Depth Background Site Condition Standards, Agriculture or Other Property Use.

MECP Table 2.1 Agri ESQS: Full Depth Excess Soil Quality Standards in a Potable Ground Water Condition, Agricultural or Other Property Use.

BOLD	- Exceeds MECP Table 1 Agri ESQS
BOLD	- Exceeds MECP Table 1 Agri ESQS
BOLD	- Exceeds MECP Table 3.1 ICC ESQS

GENERAL NOTES:

1. Coordinate system: NAD83(CSRS) / UTM zone 18N

2. Survey Reference based on PRS579626392983
Easting: 476040.80m
Northing: 5012925.07m
Elevation: 78.42m

2. Geographic dataset source: Ontario GeoHub.

3. Contains information licensed under the Open Government Licence – Ontario.

4. Service Layer Credits: World Topographic Map: Esri Canada, Esri, HERE, Garmin, INCREMENT P, USGS, METI/NASA, EPA, USDA, AAFC, NRCan, World Imagery: SDG Counties, Maxar, Microsoft

Scale:
1:2,000
Meters
0 27.5 55 110 165

Drawing
SOIL EXCEEDANCES

Client:
J. L. RICHARDS & ASSOCIATES LIMITED

Project
CASSELMAN MAIN SEWAGE PUMPING STATION (SPS) UPGRADES
CASSELMAN, ONTARIO

Drwn By:	S.L.	Chkd By:	D.E.
Project No.	100117.051	Revision No.	0
Date	JANUARY 2025		**FIGURE A6**

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APPENDIX B

Borehole Logs

RECORD OF BOREHOLE 24-1

CLIENT: J.L. Richards & Associates Limited
PROJECT: Casselman Main Sewage Pumping Station (SPS) Upgrades
JOB#: 100117.051
LOCATION: See Figures A.1 to A.3, Appendix A

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Jul 18 2024

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY (mm)	BLOWS/0.3m	LABORATORY ANALYSES	COMBUSTIBLE VAPOUR CONCENTRATION (ppm)	ODOUR	TPH (mg/kg)	MONITORING WELL INSTALLATION AND NOTES
		Ground Surface		61.93									
0	Power Auger Hollow Stem Auger (210mm OD)	28mm ASPHALTIC CONCRETE		0.03									Asphaltic coldpatch repair
		Grey, crushed sand and gravel, trace silt (BASE/SUBBASE MATERIAL)		61.51							None		
		Stiff to very stiff, red grey brown SILTY CLAY		0.42	1	SS	250	16	M&Is, PAHs, PHC F1-F4/BTEX	Hex: 0; IBL: 0	None		
											None		
1					2	SS	400	9		Hex: 0; IBL: 1	None		
				60.41									
		Very stiff, grey brown SILTY CLAY, trace sand		1.52	3	SS	500	14		Hex: 0; IBL: 2	None		Backfilled with auger cuttings
2					4	SS	350	14		Hex: 0; IBL: 1	None		
				58.88									
3		Dense to very dense, brown silty sand, trace clay and gravel (GLACIAL TILL)		3.05	5	SS	350	34		Hex: 50; IBL: 2	None		
				58.12									
		End of Borehole Auger refusal		3.81									

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LOGGED: ML
CHECKED: LB/DE

ENV - BOREHOLE LOG 100117.051_BH_LOGS_2024-07-25.GPJ GEMTEC 2018.GDT 10/1/24

RECORD OF BOREHOLE 24-2

CLIENT: J.L. Richards & Associates Limited
PROJECT: Casselman Main Sewage Pumping Station (SPS) Upgrades
JOB#: 100117.051
LOCATION: See Figures A.1 to A.3, Appendix A

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Jul 18 2024

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLE DATA: NUMBER	TYPE	RECOVERY (mm)	BLOWS/0.3m	LABORATORY ANALYSES	COMBUSTIBLE VAPOUR CONCENTRATION (ppm)	ODOUR	TPH (mg/kg)	MONITORING WELL INSTALLATION AND NOTES
		Ground Surface		59.21									
0	Power Auger Hollow Stem Auger (210mm OD)	Grey, crushed sand and gravel, trace silt (ROADWAY MATERIAL)											Asphaltic coldpatch
				0.20									
		Brown silty sand and gravel, trace clay (FILL MATERIAL)			1	SS	300	26		Hex: 0; IBL: 2	None		
1					2	SS	200	16		Hex: 0; IBL: 2	None		Backfilled with auger cuttings
				57.99									
		Stiff to very stiff, grey brown SILTY CLAY		1.22									
					3	SS	450	7	M&Is, PHC F1-F4/BTEX	Hex: 0; IBL: 2	None		
2				56.92									
		Grey silty sand and gravel, trace clay (GLACIAL TILL)		2.29	4	SS	75	50 for 75mm		Hex: 0; IBL: 1	None		
				56.67									
	Diamond Rotary Core HQ (89mm OD)	BEDROCK		2.54	5	RC		TCR= 77%, SCR=77%, RQD= 77%					
3													Bentonite seal
					6	RC		TCR= 94%, SCR=89%, RQD= 79%					
4				54.81									
		End of Borehole		4.40									

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LOGGED: ML
CHECKED: LB/DE

ENV - BOREHOLE LOG 100117.051_BH_LOGS_2024-07-25.GPJ GEMTEC 2018.GDT 10/1/24

RECORD OF BOREHOLE 24-3

CLIENT: J.L. Richards & Associates Limited
PROJECT: Casselman Main Sewage Pumping Station (SPS) Upgrades
JOB#: 100117.051
LOCATION: See Figures A.1 to A.3, Appendix A

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Jul 19 2024

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLE DATA: NUMBER	TYPE	RECOVERY (mm)	BLOWS/0.3m	LABORATORY ANALYSES	COMBUSTIBLE VAPOUR CONCENTRATION (ppm)	ODOUR	TPH (mg/kg)	MONITORING WELL INSTALLATION AND NOTES
		Ground Surface		58.60									
0	Power Auger / Hollow Stem Auger (210mm OD)	Grey, crushed sand and gravel (ROADWAY MATERIAL)		0.20									Asphaltic coldpatch repair
		Grey gravel, some sand (FILL MATERIAL)											Backfilled with auger cuttings
1		Stiff to very stiff, grey brown SILTY CLAY		57.42 1.18									
		End of Probe Hole Auger Refusal		56.75 1.85									

GEMTEC
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LOGGED: ML
CHECKED: LB/DE

ENV - BOREHOLE LOG 100117.051_BH_LOGS_2024-07-25.GPJ GEMTEC 2018.GDT 10/1/24

RECORD OF BOREHOLE 24-4

CLIENT: J.L. Richards & Associates Limited
PROJECT: Casselman Main Sewage Pumping Station (SPS) Upgrades
JOB#: 100117.051
LOCATION: See Figures A.1 to A.3, Appendix A

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Jul 19 2024

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLE DATA: NUMBER	TYPE	RECOVERY (mm)	BLOWS/0.3m	LABORATORY ANALYSES	COMBUSTIBLE VAPOUR CONCENTRATION (ppm)	ODOUR	TPH (mg/kg)	MONITORING WELL INSTALLATION AND NOTES
		Ground Surface		58.26									
0	Power Auger / Hollow Stem Auger (210mm OD)	Grey, crushed sand and gravel (ROADWAY MATERIAL)			1	SS		41	M&Is, PAHs, PHC F1-F4/BTEX	Hex: NA; IBL: NA	None		Flush Mount Casing and sand
				57.60									
1	Diamond Rotary Core HQ (89mm OD)	BEDROCK		0.66	2	RC		TCR= 89%, SCR= 68%, RQD= 48%					Bentonite Seal
2					3	RC		TCR= 93%, SCR= 91%, RQD= 91%					
3					4	RC		TCR= 99%, SCR= 99, RQD= 92%					Filter Sand
4					5	RC		TCR= 100%, SCR= 89%, RQD= 89%					50mm diameter, 1.5m long PVC screen
				53.38									
		End of Borehole		4.88									

GROUNDWATER OBSERVATIONS

DATE	DEPTH (m)	ELEVATION (m)
Aug. 07/24	0.94 ▽	57.32

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LOGGED: ML
CHECKED: LB/DE

ENV - BOREHOLE LOG 100117.051_BH_LOGS_2024-07-25.GPJ GEMTEC 2018.GDT 10/1/24

RECORD OF BOREHOLE 24-6

CLIENT: J.L. Richards & Associates Limited
PROJECT: Casselman Main Sewage Pumping Station (SPS) Upgrades
JOB#: 100117.051
LOCATION: See Figures A.1 to A.3, Appendix A

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Jul 25 2024

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLE DATA: NUMBER	TYPE	RECOVERY (mm)	BLOWS/0.3m	LABORATORY ANALYSES	COMBUSTIBLE VAPOUR CONCENTRATION (ppm)	ODOUR	TPH (mg/kg)	MONITORING WELL INSTALLATION AND NOTES
0	Power Auger, Hollow Stem Auger (210mm OD)	Ground Surface		63.91									
		TOPSOIL		0.03									Asphaltic coldpatch repair
		Stiff to very stiff, grey brown SILTY CLAY			1	SS	450	3		Hex: 0; IBL: 18	None		
1					2	SS	500	12		Hex: 0; IBL: 25	None		
2					3	SS	610	10	M&Is, PAHs, PHC F1-F4/BTEX	Hex: 0; IBL: 27	None		Backfilled with auger cuttings
				61.32	4	SS	425	21		Hex: 0; IBL: 12	None		
3		Compact to very dense, grey brown gravelly silty sand, some clay, possible cobbles and boulders (GLACIAL TILL)		2.59	5	SS	125	50 for 75mm		Hex: 0; IBL: 9	None		
4					6	SS	350	28		Hex: 0; IBL: 30	None		
				59.49									
		End of borehole		4.42									

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Consulting Engineers and Scientists

LOGGED: ML
CHECKED: LB/DE

ENV - BOREHOLE LOG 100117.051_BH_LOGS_2024-07-25.GPJ GEMTEC 2018.GDT 10/1/24

RECORD OF BOREHOLE 24-7

CLIENT: J.L. Richards & Associates Limited
PROJECT: Casselman Main Sewage Pumping Station (SPS) Upgrades
JOB#: 100117.051
LOCATION: See Figures A.1 to A.3, Appendix A

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Jul 25 2024

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	SOIL PROFILE: STRATA PLOT	SOIL PROFILE: ELEV. / DEPTH (m)	SAMPLE DATA: NUMBER	SAMPLE DATA: TYPE	SAMPLE DATA: RECOVERY (mm)	SAMPLE DATA: BLOWS/0.3m	SAMPLE DATA: LABORATORY ANALYSES	COMBUSTIBLE VAPOUR CONCENTRATION (ppm)	ODOUR	TPH (mg/kg)	MONITORING WELL INSTALLATION AND NOTES
		Ground Surface		64.35									
0	Power Auger / Hollow Stem Auger (210mm OD)	Probe Hole - Soil not sampled											Asphaltic coldpatch repair
1													
2													Backfilled with auger cuttings
3													
4				59.77									
		End of Probe Hole		4.58									

GEMTEC
Consulting Engineers and Scientists

LOGGED: ML
CHECKED: LB/DE

ENV - BOREHOLE LOG 100117.051_BH_LOGS_2024-07-25.GPJ GEMTEC 2018.GDT 10/1/24

RECORD OF BOREHOLE 24-8

CLIENT: J.L. Richards & Associates Limited
PROJECT: Casselman Main Sewage Pumping Station (SPS) Upgrades
JOB#: 100117.051
LOCATION: See Figures A.1 to A.3, Appendix A

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Jul 25 2024

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLE DATA: NUMBER	TYPE	RECOVERY (mm)	BLOWS/0.3m	LABORATORY ANALYSES	COMBUSTIBLE VAPOUR CONCENTRATION (ppm)	ODOUR	TPH (mg/kg)	MONITORING WELL INSTALLATION AND NOTES
		Ground Surface		65.76									
0	Power Auger Hollow Stem Auger (210mm OD)	TOPSOIL Grey brown silty clay, trace sand (FILL MATERIAL)		0.05	1	SS	350	2		Hex: 0; IBL: 21	None		Asphaltic coldpatch repair
1		FORMER TOPSOIL LAYER Stiff to very stiff, grey brown SILTY CLAY		64.69 1.07 1.10	2	SS	400	3		Hex: 0; IBL: 11	None		
2					3	SS	610	8		Hex: 0; IBL: 13	None		Backfilled with auger cuttings
					4	SS	610	9		Hex: 0; IBL: 19	None		
3		Compact to very dense, grey brown silty sand, some clay and gravel, possible cobbles and boulders (GLACIAL TILL)		63.01 2.75	5	SS	400	32	M&Is, PHC F1-F4/BTEX	Hex: 0; IBL: 12	None		
4					6	SS	450	52		Hex: 0; IBL: 19	None		
		End of borehole		61.34 4.42									

GEMTEC
Consulting Engineers and Scientists

LOGGED: ML
CHECKED: LB/DE

ENV - BOREHOLE LOG 100117.051_BH_LOGS_2024-07-25.GPJ GEMTEC 2018.GDT 10/1/24

RECORD OF BOREHOLE 24-9

CLIENT: J.L. Richards & Associates Limited
PROJECT: Casselman Main Sewage Pumping Station (SPS) Upgrades
JOB#: 100117.051
LOCATION: See Figures A.1 to A.3, Appendix A

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Jul 22 2024

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	SOIL PROFILE: STRATA PLOT	SOIL PROFILE: ELEV. / DEPTH (m)	SAMPLE DATA: NUMBER	SAMPLE DATA: TYPE	SAMPLE DATA: RECOVERY (mm)	SAMPLE DATA: BLOWS/0.3m	SAMPLE DATA: LABORATORY ANALYSES	COMBUSTIBLE VAPOUR CONCENTRATION (ppm)	ODOUR	TPH (mg/kg)	MONITORING WELL INSTALLATION AND NOTES
		Ground Surface		66.47									
0	Power Auger / Hollow Stem Auger (210mm OD)	Probe Hole - Soil not sampled											Asphaltic coldpatch repair
1													
2													Backfilled with auger cuttings
3													
4				61.89									
		End of Probe Hole		4.58									

GEMTEC
Consulting Engineers and Scientists

LOGGED: ML
CHECKED: LB/DE

ENV - BOREHOLE LOG 100117.051_BH_LOGS_2024-07-25.GPJ GEMTEC 2018.GDT 10/1/24

RECORD OF BOREHOLE 24-10

CLIENT: J.L. Richards & Associates Limited
PROJECT: Casselman Main Sewage Pumping Station (SPS) Upgrades
JOB#: 100117.051
LOCATION: See Figures A.1 to A.3, Appendix A

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Jul 22 2024

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLE DATA: NUMBER	TYPE	RECOVERY (mm)	BLOWS/0.3m	LABORATORY ANALYSES	COMBUSTIBLE VAPOUR CONCENTRATION (ppm)	ODOUR	TPH (mg/kg)	MONITORING WELL INSTALLATION AND NOTES
0	Power Auger Hollow Stem Auger (210mm OD)	Ground Surface		65.40									
		100mm ASPHALTIC CONCRETE		0.10									
		Grey crushed sand and gravel, trace silt (BASE MATERIAL)		65.07	1	SS	250	10		Hex: 0; IBL: 90	None		Flushmount Casing and Bentonite
		Grey crushed sand and gravel, trace silt (SUBBASE MATERIAL)		0.33 64.75									
		Stiff to very stiff, red grey brown SILTY CLAY, trace sand		0.65									
1					2	SS	200	5		Hex: 0; IBL: 0	None		Auger Cuttings
					3	SS	610	4	M&Is, PHC F1-F4/BTEX	Hex: 30; IBL: 100	None		Bentonite Seal
2													
		Compact, grey brown silty sand and gravel, some clay, possible cobbles and boulders (GLACIAL TILL)		62.96 2.44	4	SS	350	20		Hex: 25; IBL: 75	None		Filter Sand
3				62.35									
		Compact, grey gravelly silty sand, trace clay, possible cobbles and boulders (GLACIAL TILL)		3.05	5	SS	250	23		Hex: 60; IBL: 88	None		50mm diameter, 3.05m long PVC screen
4					6	SS	300	20		Hex: 10; IBL: 100	None		Filter Sand
				60.98									
		End of Borehole		4.42									

GROUNDWATER OBSERVATIONS

DATE	DEPTH (m)	ELEVATION (m)
Aug. 07/24	0.99 ▽	64.41

GEMTEC
Consulting Engineers and Scientists

LOGGED: ML
CHECKED: LB/DE

ENV - BOREHOLE LOG 100117.051_BH_LOGS_2024-07-25.GPJ GEMTEC 2018.GDT 10/1/24

RECORD OF BOREHOLE 24-11

CLIENT: J.L. Richards & Associates Limited
PROJECT: Casselman Main Sewage Pumping Station (SPS) Upgrades
JOB#: 100117.051
LOCATION: See Figures A.1 to A.3, Appendix A

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Jul 22 2024

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	SOIL PROFILE: STRATA PLOT	SOIL PROFILE: ELEV. / DEPTH (m)	SAMPLE DATA: NUMBER	SAMPLE DATA: TYPE	SAMPLE DATA: RECOVERY (mm)	SAMPLE DATA: BLOWS/0.3m	SAMPLE DATA: LABORATORY ANALYSES	COMBUSTIBLE VAPOUR CONCENTRATION (ppm)	ODOUR	TPH (mg/kg)	MONITORING WELL INSTALLATION AND NOTES
		Ground Surface		65.35									
0	Power Auger Hollow Stem Auger (210mm OD)	Probe Hole - Soil not sampled											Asphaltic coldpatch repair
1													
2													
3													Backfilled with auger cuttings
4													
5				60.16									
		End of Probe Hole		5.19									

GEMTEC
Consulting Engineers and Scientists

LOGGED: ML
CHECKED: LB/DE

ENV - BOREHOLE LOG 100117.051_BH_LOGS_2024-07-25.GPJ GEMTEC 2018.GDT 10/1/24

RECORD OF BOREHOLE 24-12

CLIENT: J.L. Richards & Associates Limited
PROJECT: Casselman Main Sewage Pumping Station (SPS) Upgrades
JOB#: 100117.051
LOCATION: See Figures A.1 to A.3, Appendix A

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Jul 22 2024

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY (mm)	BLOWS/0.3m	LABORATORY ANALYSES	COMBUSTIBLE VAPOUR CONCENTRATION (ppm)	ODOUR	TPH (mg/kg)	MONITORING WELL INSTALLATION AND NOTES
		Ground Surface		64.82									
0	Power Auger Hollow Stem Auger (210mm OD)	60mm ASPHALTIC CONCRETE		0.06									Asphaltic coldpatch repair
		Grey, crushed sand and gravel, trace silt (BASE MATERIAL)		64.59 0.23									
		Brown sand and gravel, trace to some silt (SUBBASE MATERIAL)		64.37 0.45	1	SS	375	42		Hex: 15; IBL: 58	None		
1		Light brown silty sand (FILL MATERIAL)		63.60	2	SS	375	12	M&Is, PAHs, PHC F1-F4/BTEX	Hex: 10; IBL: 74	None		
		FORMER TOPSOIL LAYER		1.22 63.45									
		Stiff to very stiff, red grey brown SILTY CLAY		1.37	3	SS	450	15		Hex: 5; IBL: 55	None		
2					4	SS	450	11		Hex: 20; IBL: 56	None		Backfilled with auger cuttings
				62.07									
		Loose to compact, grey brown silty sand and gravel, some clay, possible cobbles and boulers (GLACIAL TILL)		2.75									
3					5	SS	400	19		Hex: 39; IBL: 70	None		
				61.46									
		Loose to compact, grey silty sand and gravel, some clay, possible cobbles and boulers (GLACIAL TILL)		3.36									
4					6	SS	150	6		Hex: 0; IBL: 90	None		
				60.25									
		Loose, grey coarse SAND, some gravel		4.57	7	SS	400	8		Hex: 50; IBL: 65	None		
5				59.63									
		End of borehole		5.19									

GEMTEC
Consulting Engineers and Scientists

LOGGED: ML
CHECKED: LB/DE

ENV - BOREHOLE LOG 100117.051_BH_LOGS_2024-07-25.GPJ GEMTEC 2018.GDT 10/1/24

RECORD OF BOREHOLE 24-14

CLIENT: J.L. Richards & Associates Limited
PROJECT: Casselman Main Sewage Pumping Station (SPS) Upgrades
JOB#: 100117.051
LOCATION: See Figures A.1 to A.3, Appendix A

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Jul 26 2024

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	SOIL PROFILE: STRATA PLOT	SOIL PROFILE: ELEV. / DEPTH (m)	SAMPLE DATA: NUMBER	SAMPLE DATA: TYPE	SAMPLE DATA: RECOVERY (mm)	SAMPLE DATA: BLOWS/0.3m	SAMPLE DATA: LABORATORY ANALYSES	COMBUSTIBLE VAPOUR CONCENTRATION (ppm)	ODOUR	TPH (mg/kg)	MONITORING WELL INSTALLATION AND NOTES
		Ground Surface		67.69									
0	Power Auger / Hollow Stem Auger (210mm OD)	Probe Hole - Not Sampled											Asphaltic coldpatch repair
1													
2													Backfilled with auger cuttings
3													
4													
		End of borehole		63.11 4.58									

GEMTEC
Consulting Engineers and Scientists

LOGGED: ML
CHECKED: LB/DE

ENV - BOREHOLE LOG 100117.051_BH_LOGS_2024-07-25.GPJ GEMTEC 2018.GDT 10/1/24

RECORD OF BOREHOLE 24-15

CLIENT: J.L. Richards & Associates Limited
PROJECT: Casselman Main Sewage Pumping Station (SPS) Upgrades
JOB#: 100117.051
LOCATION: See Figures A.1 to A.3, Appendix A

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Jul 26 2024

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY (mm)	BLOWS/0.3m	LABORATORY ANALYSES	COMBUSTIBLE VAPOUR CONCENTRATION (ppm)	ODOUR	TPH (mg/kg)	MONITORING WELL INSTALLATION AND NOTES
		Ground Surface		67.77									
0	Power Auger / Hollow Stem Auger (210mm OD)	TOPSOIL		0.03	1	SS	400	10		Hex: 0; IBL: 30	None		
		Grey brown silt and sand, some clay, trace gravel and organice material (FILL MATERIAL)			2	SS	350	10		Hex: 30; IBL: 45	None		
1					3	SS	450	11	M&Is, PAHs, PHC F1-F4/BTEX	Hex: 50; IBL: 53	None		
2					4	SS	450	6		Hex: 30; IBL: 30	None		Backfilled with auger cuttings
3				64.72									
		Compact, grey SANDY SILT		3.05	5	SS	450	21		Hex: 90; IBL: 11	None		
				63.96									
4		Stiff to very stif, grey brown SILTY CLAY		3.81	6	SS	610	2		Hex: 20; IBL: 8	None		
				63.35									
		End of borehole		4.42									

GEMTEC
Consulting Engineers and Scientists

LOGGED: ML
CHECKED: LB/DE

RECORD OF BOREHOLE 24-16

CLIENT: J.L. Richards & Associates Limited
PROJECT: Casselman Main Sewage Pumping Station (SPS) Upgrades
JOB#: 100117.051
LOCATION: See Figures A.1 to A.3, Appendix A

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Jul 26 2024

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLE DATA: NUMBER	TYPE	RECOVERY (mm)	BLOWS/0.3m	LABORATORY ANALYSES	COMBUSTIBLE VAPOUR CONCENTRATION (ppm)	ODOUR	TPH (mg/kg)	MONITORING WELL INSTALLATION AND NOTES
		Ground Surface		67.58									
0	Power Auger / Hollow Stem Auger (210mm OD)	TOPSOIL		0.05	1	SS	250	3		Hex: 25; IBL: 2	None		Flush mount protective cover
		Grey brown silty sand, some clay, trace gravel and organice material (FILL MATERIAL)			2	SS	350	6		Hex: 15; IBL: 4	None		
1					3	SS	350	4	M&Is, PAHs, PHC F1-F4/VOCs	Hex: 15; IBL: 6	None		
2					4	SS	500	8		Hex: 30; IBL: 15	None		Auger cuttings
3					5	SS	400	3		Hex: 15; IBL: 3	None		
4					6	SS	500	3		Hex: 15; IBL: 6	None		Bentonite Seal
					7	SS	500	6		Hex: 75; IBL: 7	None		Filter sand
5				62.39									
		Stiff to very stiff, red grey brown SILTY CLAY		5.19	8	SS	610	6		Hex: 35; IBL: 2	None		50mm diameter, 1.5m long PVC screen
6				61.48									
		Stiff to very stiff, grey brown SILTY CLAY		6.10	9	SS	610	2		Hex: 40; IBL: 2	None		
				60.87									
		End of borehole		6.71									

GROUNDWATER OBSERVATIONS

DATE	DEPTH (m)	ELEVATION (m)
Aug. 07/24	1.09 ▽	66.49

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Consulting Engineers and Scientists

LOGGED: ML
CHECKED: LB/DE

ENV - BOREHOLE LOG 100117.051_BH_LOGS_2024-07-25.GPJ GEMTEC 2018.GDT 10/1/24

RECORD OF BOREHOLE 24-17

CLIENT: J.L. Richards & Associates Limited
PROJECT: Casselman Main Sewage Pumping Station (SPS) Upgrades
JOB#: 100117.051
LOCATION: See Figures A.1 to A.3, Appendix A

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Jul 22 2024

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY (mm)	BLOWS/0.3m	LABORATORY ANALYSES	COMBUSTIBLE VAPOUR CONCENTRATION (ppm)	ODOUR	TPH (mg/kg)	MONITORING WELL INSTALLATION AND NOTES
		Ground Surface		67.69									
0	Power Auger / Hollow Stem Auger (210mm OD)	TOPSOIL		0.05									Asphaltic coldpatch repair
		Brown sand, some silt and clay, trace gravel, trace organic material (FILL MATERIAL)			1	SS	350	14		Hex: 30; IBL: 90	None		
1					2	SS	400	8		Hex: 40; IBL: 60	None		
				65.86	3	SS	400	6		Hex: 35; IBL: 90	None		
2		Stiff to very stiff, red grey brown SILTY CLAY, trace sand		1.83									Backfilled with auger cuttings
					4	SS	450	7	M&Is, PHC F1-F4/BTEX	Hex: 10; IBL: 70	None		
3					5	SS	100	2		Hex: 20; IBL: 45	None		
4					6	SS	610	4		Hex: 20; IBL: 65	None		
				63.27									
		End of borehole		4.42									

GEMTEC
Consulting Engineers and Scientists

LOGGED: ML
CHECKED: LB/DE

RECORD OF BOREHOLE 24-18

CLIENT: J.L. Richards & Associates Limited
PROJECT: Casselman Main Sewage Pumping Station (SPS) Upgrades
JOB#: 100117.051
LOCATION: See Figures A.1 to A.3, Appendix A

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Jul 18 2024

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLE DATA: NUMBER	TYPE	RECOVERY (mm)	BLOWS/0.3m	LABORATORY ANALYSES	COMBUSTIBLE VAPOUR CONCENTRATION (ppm)	ODOUR	TPH (mg/kg)	MONITORING WELL INSTALLATION AND NOTES
		Ground Surface		61.54									
0	Power Auger / Hollow Stem Auger (210mm OD)	TOPSOIL		0.08									Above Ground Protective Casing and Bentonite
		Brown sandy clayey silt, trace gravel, trace boulders (FILL MATERIAL)			1	SS	350	8		Hex: 0; IBL: 1	None		
1					2	SS	225	51 for 200mm		Hex: 15; IBL: 1	None		
2					3	SS	250	53 for 250mm		Hex: 15; IBL: 1	None		Auger Cuttings
					4	SS	125	5		Hex: 15; IBL: 4	None		
3					5	SS	250	4		Hex: 20; IBL: 2	None		
4					6	SS	400	2	M&Is, PHC F1-F4/BTEX	Hex: 15; IBL: 3	None		
				56.91									
		BEDROCK		4.63	7	SS	50	50 for 125mm		Hex: 0; IBL: 1	None		
5					8	RC		TCR= 94%, SCR=75%, RQD= 53%					Bentonite Seal
6					9	RC		TCR= 100%, SCR=71%, RQD= 60%					Filter Sand
7													50mm diameter, 1.5m long PVC SCREEN
8					10	RC		TCR= 98%, SCR=89%, RQD= 85%					
				52.75									
		End of borehole		8.79									

GROUNDWATER OBSERVATIONS

DATE	DEPTH (m)	ELEVATION (m)
Aug. 07/24	4.85 ▽	56.69

GEMTEC
Consulting Engineers and Scientists

LOGGED: ML
CHECKED: LB/DE

ENV - BOREHOLE LOG 100117.051 BH_LOGS 2024-07-25.GPJ GEMTEC 2018.GDT 10/1/24

RECORD OF BOREHOLE MW24-1

CLIENT: J.L. Richards & Associates Limited
PROJECT: Casselman Main Sewage Pumping Station (SPS) Upgrades
JOB#: 100117.051
LOCATION: See Figures A.1 to A.3, Appendix A

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Jul 18 2024

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	SOIL PROFILE: STRATA PLOT	SOIL PROFILE: ELEV. / DEPTH (m)	SAMPLE DATA: NUMBER	SAMPLE DATA: TYPE	SAMPLE DATA: RECOVERY (mm)	SAMPLE DATA: BLOWS/0.3m	SAMPLE DATA: LABORATORY ANALYSES	COMBUSTIBLE VAPOUR CONCENTRATION (ppm)	ODOUR	TPH (mg/kg)	MONITORING WELL INSTALLATION AND NOTES
0	Power Auger / Hollow Stem Auger (210mm OD)	Ground Surface		62.03									
0		Borehole not sampled											Flush Mount Casing and sand
1													Auger Cuttings
2													Bentonite Seal
2													Filter Sand
3				58.04 / 3.99									50mm diameter, 1.5m long PVC screen

GROUNDWATER OBSERVATIONS

DATE	DEPTH (m)	ELEVATION (m)
Aug. 07/24	2.42 ▽	59.61

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LOGGED: ML
CHECKED: LB/DE

ENV - BOREHOLE LOG 100117.051_BH_LOGS_2024-07-25.GPJ GEMTEC 2018.GDT 10/1/24

APPENDIX C

Soil Analytical Results

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Table C.1: Summary of Soil Analytical Results
Metals, Inorganics, and Polycyclic Aromatic Hydrocarbons
Casselman Main Sewage Pumping Station (SPS) Upgrades
Casselman, Ontario

Contaminants of Concern	O.Reg. 406/19 MECP Table 1 Agri or Other Property Uses	O.Reg. 406/19 MECP Table 2.1 RPI	O.Reg. 406/19 MECP Table 3.1 ICC	Reporting Detection Limit	Sample ID	BH24-1 SS1	BH24-2 SS3	BH24-4 SS1	BH24-6 SA3	BH24-8 SA5	BH24-10 SS3	BH24-12 SS2	BH24-15 SA3	BH24-16 SS3	BH24-17 SS4	BH24-18 SS6
					Sample Depth (m bgs)	0.15 - 0.76	1.52 - 2.13	0.00 - 0.61	1.52 - 2.13	3.04 - 3.65	1.52 - 2.13	0.76 - 1.37	1.52 - 2.13	1.52 - 2.13	2.28 - 2.89	3.81 - 4.42
					Lab ID	6024428	6024430	6024431	6032861	6032884	6024432	6024433	6032885	6032886	6024434	6024435
					Sampling Date	07/18/2024	07/18/2024	07/19/2024	07/26/2024	07/26/2024	07/22/2024	07/22/2024	07/26/2024	07/26/2024	07/22/2024	07/18/2024
					Units											
Metals and Inorganics - Soil																
Antimony	1	7.5	40	0.8	µg/g	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8
Arsenic	11	18	18	1	µg/g	1	2	2	2	4	2	1	2	1	2	1
Barium	210	390	670	2	µg/g	28.3	164	79.9	**436**	43.1	**236**	23.4	107	73.7	143	55.5
Beryllium	2.5	4	8	0.5	µg/g	<0.5	1	<0.5	1	<0.5	1.2	<0.5	0.6	<0.5	1	<0.5
Boron	36	120	120	5	µg/g	<5	7	9	10	6	13	<5	7	5	10	<5
Boron, available	NS	1.5	2	0.1	µg/g	0.11	<0.10	0.31	0.11	<0.10	0.11	<0.10	<0.10	0.13	0.1	0.27
Cadmium	1	1.2	1.9	0.5	µg/g	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium	67	160	160	5	µg/g	7	**72**	16	**96**	11	**127**	10	65	45	**97**	30
Cobalt	19	22	80	0.8	µg/g	2.4	15.5	4.7	**23.3**	4.9	**21.6**	4.2	11	7.9	**20.2**	5.8
Copper	62	140	230	1	µg/g	4.6	16.6	10.4	45.6	17.2	46.2	13.7	24.3	15.3	36.3	12.3
Lead	45	120	120	1	µg/g	10	8	7	9	3	11	2	6	5	9	16
Molybdenum	2	6.9	40	0.5	µg/g	0.6	<0.5	1.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Nickel	37	100	270	1	µg/g	1	33	7	**56**	8	**64**	7	33	22	**51**	15
Selenium	1.2	2.4	5.5	0.8	µg/g	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8
Silver	0.5	20	40	0.5	µg/g	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Thallium	1	1	3.3	0.5	µg/g	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Uranium	1.9	23	33	0.5	µg/g	<0.50	0.96	<0.50	0.67	0.58	0.81	0.74	0.83	0.73	0.7	0.64
Vanadium	86	86	86	2	µg/g	6.2	65	16.6	**107**	18.9	**92.2**	18.9	52.3	36	77	26.9
Zinc	290	340	340	5	µg/g	11	90	25	131	32	106	22	50	37	75	46
Chromium (VI)	0.66	8	8	0.2	µg/g	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Cyanide, free	0.051	0.051	0.051	0.04	µg/g	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040
Mercury	0.16	0.27	0.27	0.1	µg/g	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Conductivity	0.47	0.7	1.4	0.005	mS/cm	0.31	**0.845**	0.202	0.065	0.099	**0.791**	0.172	0.16	0.126	0.195	0.286
SAR	1	5	12	-	N/A	**4.75**	**4.71**	**1.51**	0.459	0.274	**4.1**	**2.86**	0.301	0.366	**1.1**	**2.57**
pH	Surface Soil: 5-9 Subsurface Soil: 5-11	Surface Soil: 5-9 Subsurface Soil: 5-11	Surface Soil: 5-9 Subsurface Soil: 5-11	-	pH Units	6.72	6.63	6.67	6.77	6.82	6.73	6.71	6.9	6.67	6.7	6.68
Polycyclic Aromatic Hydrocarbons - Soil																
Naphthalene	0.05	0.2	1.8	0.05	µg/g	<0.05	NA	<0.05	<0.05	NA	NA	<0.05	<0.05	<0.05	NA	NA
Acenaphthylene	0.093	0.093	0.093	0.05	µg/g	<0.05	NA	<0.05	<0.05	NA	NA	<0.05	<0.05	<0.05	NA	NA
Acenaphthene	0.05	2.5	15	0.05	µg/g	<0.05	NA	<0.05	<0.05	NA	NA	<0.05	<0.05	<0.05	NA	NA
Fluorene	0.05	6.8	6.8	0.05	µg/g	<0.05	NA	<0.05	<0.05	NA	NA	<0.05	<0.05	<0.05	NA	NA
Phenanthrene	0.19	6.2	12	0.05	µg/g	<0.05	NA	<0.05	<0.05	NA	NA	<0.05	<0.05	<0.05	NA	NA
Anthracene	0.05	0.16	0.16	0.05	µg/g	<0.05	NA	<0.05	<0.05	NA	NA	<0.05	<0.05	<0.05	NA	NA
Fluoranthene	0.24	0.69	70	0.05	µg/g	<0.05	NA	<0.05	<0.05	NA	NA	<0.05	<0.05	<0.05	NA	NA
Pyrene	0.19	28	70	0.05	µg/g	<0.05	NA	<0.05	<0.05	NA	NA	<0.05	<0.05	<0.05	NA	NA
Benzo[a]anthracene	0.095	0.5	1	0.05	µg/g	<0.05	NA	<0.05	<0.05	NA	NA	<0.05	<0.05	<0.05	NA	NA
Chrysene	0.18	7	14	0.05	µg/g	<0.05	NA	<0.05	<0.05	NA	NA	<0.05	<0.05	<0.05	NA	NA
Benzo[b]fluoranthene	0.3	3.2	7	0.05	µg/g	<0.05	NA	<0.05	<0.05	NA	NA	<0.05	<0.05	<0.05	NA	NA
Benzo[k]fluoranthene	0.05	3.1	7	0.05	µg/g	<0.05	NA	<0.05	<0.05	NA	NA	<0.05	<0.05	<0.05	NA	NA
Benzo[a]pyrene	0.05	0.31	0.7	0.05	µg/g	<0.05	NA	<0.05	<0.05	NA	NA	<0.05	<0.05	<0.05	NA	NA
Indeno [1,2,3-cd] pyrene	0.11	0.38	0.76	0.05	µg/g	<0.05	NA	<0.05	<0.05	NA	NA	<0.05	<0.05	<0.05	NA	NA
Dibenzo[a,h]anthracene	0.1	0.57	0.7	0.05	µg/g	<0.05	NA	<0.05	<0.05	NA	NA	<0.05	<0.05	<0.05	NA	NA
Benzo[g,h,i]perylene	0.2	6.6	13	0.05	µg/g	<0.05	NA	<0.05	<0.05	NA	NA	<0.05	<0.05	<0.05	NA	NA
1,2-Methylnaphthalene	0.05	0.59	8.7	0.05	µg/g	<0.05	NA	<0.05	<0.05	NA	NA	<0.05	<0.05	<0.05	NA	NA

Notes:
RPI - Residential/Parkland/Institutional
ICC - Industrial/Commercial/Community
m bgs' - Metres Below Ground Surface
'NA' - Not Analyzed
<' - Non-Detect Sample

MECP Table 1 Agri ESQS: Full Depth Background Site Condition Standards, Agriculture or Other Property Use.

MECP Table 2.1 Agri ESQS: Full Depth Excess Soil Quality Standards in a Potable Ground Water Condition, Agricultural or Other Property Use.

MECP Table 3.1 ICC ESQS: Full Depth Excess Soil Quality Standards in a Non-Potable Ground Water Condition, ICC Property Use.

BOLD	- Exceeds MECP Table 1 Agri ESQS
BOLD	- Exceeds MECP Table 2.1 RPI ESQS
BOLD	- Exceeds MECP Table 3.1 ICC ESQS

Client: J.L. Richards & Associates Limited
Project Number: 100117.051
September 2024

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Table C.2: Summary of Soil Analytical Results
Petroleum Hydrocarbon F1-F4 and Volatile Organic Compounds
Casselman Main Sewage Pumping Station (SPS) Upgrades
Casselman, Ontario

Contaminants of Concern	O.Reg. 406/19 MECP Table 1 Agri or Other Property Uses	O.Reg. 406/19 MECP Table 2.1 RPI	O.Reg. 406/19 MECP Table 3.1 ICC	Reporting Limit or Method Detection Limit	Sample ID	BH24-1 SS1	BH24-2 SS3	BH24-4 SS1	BH24-6 SA3	BH24-8 SA5	BH24-10 SS3	BH24-12 SS2	BH24-15 SA3	BH24-16 SS3	BH24-17 SS4	BH24-18 SS6
					Sample Depth (m bgs)	0.15 - 0.76	1.52 - 2.13	0.00 - 0.61	1.52 - 2.13	3.04 - 3.65	1.52 - 2.13	0.76 - 1.37	1.52 - 2.13	1.52 - 2.13	2.28 - 2.89	3.81 - 4.42
					Lab ID	6024428	6024430	6024431	6032861	6032884	6024432	6024433	6032885	6032886	6024434	6024435
					Sampling Date	07/18/2024	07/18/2024	07/19/2024	07/26/2024	07/26/2024	07/22/2024	07/22/2024	07/26/2024	07/26/2024	07/22/2024	07/18/2024
					Units											
Petroleum Hydrocarbons - Soil																
F1 PHCs (C6-C10)	17	25	25	5	µg/g	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
F1 PHCs (C6-C10) minus BTEX	NS	NS	NS	5	µg/g	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
F2 PHCs (C10-C16)	10	10	26	10	µg/g	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
F3 PHCs (C16-C34)	240	240	1700	50	µg/g	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
F4 PHCs (C34-C50)	120	2800	3300	50	µg/g	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Volatile Organic Compounds - Soil																
Benzene	0.02	0.02	0.034	0.02	µg/g	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Toluene	0.2	0.2	7.8	0.05	µg/g	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ethylbenzene	0.05	0.05	1.9	0.05	µg/g	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
m/p-Xylene	NS	NS	NS	0.05	µg/g	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
o-Xylene	NS	NS	NS	0.05	µg/g	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Xylenes, total	0.05	0.091	3	0.05	µg/g	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Dichlorodifluoromethane	0.05	1.5	1.8	0.05	µg/g	NA	NA	NA	NA	NA	NA	NA	NA	<0.05	NA	NA
Vinyl Chloride	0.02	0.02	0.02	0.02	µg/g	NA	NA	NA	NA	NA	NA	NA	NA	<0.02	NA	NA
Bromomethane	0.05	0.05	0.05	0.05	µg/g	NA	NA	NA	NA	NA	NA	NA	NA	<0.05	NA	NA
Trichlorofluoromethane	0.05	0.25	0.46	0.05	µg/g	NA	NA	NA	NA	NA	NA	NA	NA	<0.05	NA	NA
Acetone	0.5	0.5	1.8	0.5	µg/g	NA	NA	NA	NA	NA	NA	NA	NA	<0.50	NA	NA
1,1-Dichloroethylene	0.05	0.05	0.05	0.05	µg/g	NA	NA	NA	NA	NA	NA	NA	NA	<0.05	NA	NA
Methylene Chloride	0.05	0.05	0.2	0.05	µg/g	NA	NA	NA	NA	NA	NA	NA	NA	<0.05	NA	NA
trans-1,2-Dichloroethylene	0.05	0.05	0.05	0.05	µg/g	NA	NA	NA	NA	NA	NA	NA	NA	<0.05	NA	NA
Methyl tert-butyl Ether	0.05	0.05	0.05	0.05	µg/g	NA	NA	NA	NA	NA	NA	NA	NA	<0.05	NA	NA
1,1-Dichloroethane	0.05	0.05	0.57	0.02	µg/g	NA	NA	NA	NA	NA	NA	NA	NA	<0.02	NA	NA
Methyl Ethyl Ketone	0.5	0.5	26	0.5	µg/g	NA	NA	NA	NA	NA	NA	NA	NA	<0.50	NA	NA
cis-1,2-Dichloroethylene	0.05	0.05	0.05	0.02	µg/g	NA	NA	NA	NA	NA	NA	NA	NA	<0.02	NA	NA
Chloroform	0.05	0.05	0.26	0.04	µg/g	NA	NA	NA	NA	NA	NA	NA	NA	<0.04	NA	NA
1,2-Dichloroethane	0.05	0.05	0.05	0.03	µg/g	NA	NA	NA	NA	NA	NA	NA	NA	<0.03	NA	NA
1,1,1-Trichloroethane	0.05	0.11	0.4	0.05	µg/g	NA	NA	NA	NA	NA	NA	NA	NA	<0.05	NA	NA
Carbon Tetrachloride	0.05	0.05	0.05	0.05	µg/g	NA	NA	NA	NA	NA	NA	NA	NA	<0.05	NA	NA
1,2-Dichloropropane	0.05	0.05	0.05	0.03	µg/g	NA	NA	NA	NA	NA	NA	NA	NA	<0.03	NA	NA
Trichloroethylene	0.05	0.05	0.05	0.03	µg/g	NA	NA	NA	NA	NA	NA	NA	NA	<0.03	NA	NA
Bromodichloromethane	0.05	0.05	5.8	0.05	µg/g	NA	NA	NA	NA	NA	NA	NA	NA	<0.05	NA	NA
Methyl Isobutyl Ketone	0.5	0.5	17	0.5	µg/g	NA	NA	NA	NA	NA	NA	NA	NA	<0.50	NA	NA
1,1,2-Trichloroethane	0.05	0.05	0.05	0.04	µg/g	NA	NA	NA	NA	NA	NA	NA	NA	<0.04	NA	NA
Dibromochloromethane	0.05	0.05	5.5	0.05	µg/g	NA	NA	NA	NA	NA	NA	NA	NA	<0.05	NA	NA
Ethylene Dibromide	0.05	0.05	0.05	0.04	µg/g	NA	NA	NA	NA	NA	NA	NA	NA	<0.04	NA	NA
Tetrachloroethylene	0.05	0.05	0.05	0.05	µg/g	NA	NA	NA	NA	NA	NA	NA	NA	<0.05	NA	NA
1,1,1,2-Tetrachloroethane	0.05	0.05	0.05	0.04	µg/g	NA	NA	NA	NA	NA	NA	NA	NA	<0.04	NA	NA
Chlorobenzene	0.05	0.083	0.28	0.05	µg/g	NA	NA	NA	NA	NA	NA	NA	NA	<0.05	NA	NA
Bromoform	0.05	0.05	2.5	0.05	µg/g	NA	NA	NA	NA	NA	NA	NA	NA	<0.05	NA	NA
Styrene	0.05	0.05	6.8	0.05	µg/g	NA	NA	NA	NA	NA	NA	NA	NA	<0.05	NA	NA
1,1,2,2-Tetrachloroethane	0.05	0.05	0.05	0.05	µg/g	NA	NA	NA	NA	NA	NA	NA	NA	<0.05	NA	NA
1,3-Dichlorobenzene	0.05	0.26	6.8	0.05	µg/g	NA	NA	NA	NA	NA	NA	NA	NA	<0.05	NA	NA
1,4-Dichlorobenzene	0.05	0.05	0.05	0.05	µg/g	NA	NA	NA	NA	NA	NA	NA	NA	<0.05	NA	NA
1,2-Dichlorobenzene	0.05	3.4	6.8	0.05	µg/g	NA	NA	NA	NA	NA	NA	NA	NA	<0.05	NA	NA
1,3-Dichloropropene, total	0.05	0.05	0.05	0.05	µg/g	NA	NA	NA	NA	NA	NA	NA	NA	<0.05	NA	NA
Hexane	0.05	2.5	2.5	0.05	µg/g	NA	NA	NA	NA	NA	NA	NA	NA	<0.05	NA	NA

Notes:
RPI - Residential/Parkland/Institutional
ICC - Industrial/Commercial/Community
m bgs' - Metres Below Ground Surface
'NS' - No Standard
'NA' - Not Analyzed
<' - Non-Detect Sample

MECP Table 1 Agri ESQS: Full Depth Background Site Condition Standards, Agriculture or Other Property Use.

MECP Table 2.1 RPI ESQS: Full Depth Excess Soil Quality Standards in a Potable Ground Water Condition, RPI Property Use.

MECP Table 3.1 ICC ESQS: Full Depth Excess Soil Quality Standards in a Non-Potable Ground Water Condition, ICC Property Use.

BOLD	- Exceeds MECP Table 1 Agri ESQS
BOLD	- Exceeds MECP Table 2.1 RPI ESQS
BOLD	- Exceeds MECP Table 3.1 ICC ESQS

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Table C.3: Summary of Soil Analytical Results
modified Synthetic Precipitation Leaching Procedure
Metals
Casselman Main Sewage Pumping Station (SPS) Upgrades
Casselman, Ontario

Contaminants of Concern	Table 1: Leachate Screening Levels Agri or Other Property Use	Table 2.1: Leachate Screening Levels RPI	Table 3.1: Leachate Screening Levels ICC	Reporting Detection Limit	Sample ID Sample Depth Lab ID Sampling Date Units	BH24-2 SS3 1.52 - 2.13 6024430 07/18/2024	BH24-6 SA3 1.52 - 2.13 6032861 07/26/2024	BH24-10 SS3 1.52 - 2.13 6024432 07/22/2024	BH24-17 SS4 2.28 - 2.89 6024434 07/22/2024
SPLP - Metals									
Antimony	6	6	NS	0.6	µg/L	<0.6	<0.6	<0.6	<0.6
Arsenic	NS	NS	NS	5	µg/L	<5	<5	<5	<5
Barium	NS	1000	4600	100	µg/L	<100	<100	<100	<100
Beryllium	NS	4	11	0.8	µg/L	<0.8	<0.8	<0.8	<0.8
Boron (total)	NS	5000	NS	500	µg/L	<500	<500	<500	<500
Cadmium	NS	NS	0.5	0.2	µg/L	<0.20	<0.20	<0.20	<0.20
Chromium Total	NS	50	130	10	µg/L	<10	<10	<10	<10
Cobalt	NS	3.8	10	0.3	µg/L	0.4	<0.3	<0.3	<0.3
Copper	NS	14	14	6.9	µg/L	<6.9	<6.9	<6.9	<6.9
Lead	NS	NS	NS	1	µg/L	<1.0	<1.0	<1.0	<1.0
Molybdenum	23	23	1500	1.5	µg/L	<1.5	<1.5	<1.5	<1.5
Nickel	NS	78	78	10	µg/L	<10	<10	<10	<10
Selenium	NS	10	10	5	µg/L	<5.0	<5.0	<5.0	<5.0
Silver	0.3	0.3	0.3	0.1	µg/L	<0.10	<0.10	<0.10	<0.10
Thallium	2	2	80	0.5	µg/L	<0.5	<0.5	<0.5	<0.5
Uranium	NS	20	66	2	µg/L	<2	<2	<2	<2
Vanadium	NS	NS	NS	0.6	µg/L	5.4	7.5	8.5	1.5
Zinc	NS	180	180	20	µg/L	<20	<20	<20	<20

Notes:
mb gs' - Metres Below Ground Surface
'NS' - No Standard
<' - Non-Detect Sample

MECP Table 1 ESQS (O.Reg. 406/19): Rules for Soil Management and Excess Soil Quality Standards. Table 1: Leachate Screening Levels for Excess Soil Reuse, Agriculture or Other Property Use.

MECP Table 2.1 ESQS (O.Reg. 406/19): Rules for Soil Management and Excess Soil Quality Standards. Table 2.1: Leachate Screening Levels for Full Depth Excess Soil in a Potable Ground Water Condition, RPI Property Use.

MECP Table 3.1 ESQS (O.Reg. 406/19): Rules for Soil Management and Excess Soil Quality Standards. Table 3.1: Leachate Screening Levels for Full Depth Excess Soil in a Non-Potable Ground Water Condition, ICC Property Use.

BOLD	- Exceeds MECP Table 1 RPI/ICC SCS
BOLD	- Exceeds MECP Table 9 RPI/ICC SCS
BOLD	- Exceeds MECP Table 2.1 RPI ESQS

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Table C.4: Summary of Soil Analytical Results
Toxicity Characteristic Leaching Procedure
Casselman Main Sewage Pumping Station (SPS) Upgrades
Casselman, Ontario

Contaminants of Concern	O.Reg. 347/558 Schedule 4	Reporting Detection Limit	Sample ID Lab ID Sampling Date Units	TCLP 6071900 07/31/2024
Physical Characteristics				
Flashpoint	NS	-	Deg C	>100
EPA 1311 - TCLP Leachate Inorganics				
Fluoride	150	0.1	mg/L	0.16
Cyanide, free	20	0.05	mg/L	<0.05
Nitrate + Nitrite (as Nitrogen)	1000	0.7	mg/L	<0.70
EPA 1311 - TCLP Leachate Metals				
Arsenic	2.5	0.01	mg/L	<0.010
Barium	100	0.02	mg/L	0.682
Boron	500	0.05	mg/L	<0.050
Cadmium	0.5	0.01	mg/L	<0.010
Chromium	5	0.05	mg/L	<0.050
Lead	5	0.01	mg/L	0.015
Mercury	0.1	0.01	mg/L	<0.01
Selenium	1	0.02	mg/L	<0.020
Silver	5	0.01	mg/L	<0.010
Arsenic	2.5	0.05	mg/L	<0.050
EPA 1311 - TCLP Leachate Volatiles				
Benzene	0.5	0.02	mg/L	<0.020
Carbon Tetrachloride	0.5	0.02	mg/L	<0.020
Chlorobenzene	8	0.01	mg/L	<0.010
Chloroform	10	0.02	mg/L	<0.020
1,2-Dichlorobenzene	20	0.01	mg/L	<0.010
1,4-Dichlorobenzene	0.5	0.01	mg/L	<0.010
1,2-Dichloroethane	0.5	0.02	mg/L	<0.020
1,1-Dichloroethylene	1.4	0.02	mg/L	<0.020
Methyl Ethyl Ketone (2-Butanone)	200	0.09	mg/L	<0.090
Methylene Chloride	5	0.03	mg/L	<0.030
Tetrachloroethylene	3	0.05	mg/L	<0.050
Trichloroethylene	5	0.02	mg/L	<0.020
Vinyl Chloride	0.2	0.03	mg/L	<0.030
EPA 1311 - TCLP Leachate Organics				
Benzo[a]pyrene	0.001	0.001	mg/L	<0.001

Notes:
NS ' : No Standard Established
ND ' : Non Detect
1. O.Reg. 347/558 Schedule 4: O.Reg 347 and O. Reg. 558/00: General – Waste Management. Schedule 4: Leachate Quality Criteria. (MECP, 2011)
Bold Exceeds O.Reg 347/558 Schedule 4

APPENDIX D

Laboratory Certificate of Analysis

Report to: J.L. Richards & Associates Limited
GEMTEC Project: 100117.051 (January 13, 2025)

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*Notes

Disclaimer:

- All work conducted herein has been done using accepted standard protocols, and generally accepted practices and methods. AGAT test methods may incorporate modifications from the specified reference methods to improve performance.
- All samples will be disposed of within 30 days after receipt unless a Long Term Storage Agreement is signed and returned. Some specialty analysis may be exempt, please contact your Client Project Manager for details.
- AGAT's liability in connection with any delay, performance or non-performance of these services is only to the Client and does not extend to any other third party. Unless expressly agreed otherwise in writing, AGAT's liability is limited to the actual cost of the specific analysis or analyses included in the services.
- This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
- The test results reported herewith relate only to the samples as received by the laboratory.
- Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, or non-infringement. AGAT assumes no responsibility for any errors or omissions in the guidelines contained in this document.
- All reportable information is available on request from AGAT Laboratories, in accordance with ISO/IEC 17025:2017, ISO/IEC 17025:2005 (Quebec), DR-12-PALA and/or NELAP Standards.
- This document is signed by an authorized signatory who meets the requirements of the MELCCFP, CALA, CCN and NELAP.
- For environmental samples in the Province of Quebec: The analysis is performed on and results apply to samples as received. A temperature above 6°C upon receipt, as indicated in the Sample Reception Notification (SRN), could indicate the integrity of the samples has been compromised if the delay between sampling and submission to the laboratory could not be minimized.

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Results relate only to the items tested. Results apply to samples as received.

AGAT Laboratories

Have feedback? Scan here for a quick survey!

5835 Coopers Avenue
Mississauga, Ontario L4Z 1Y2
Ph: 905.712.5100 Fax: 905.712.5122
webearth.agatlabs.com

Chain of Custody Record

If this is a Drinking Water sample, please use Drinking Water Chain of Custody Form (potable water consumed by humans)

Laboratory Use Only

Work Order #: 24Z176894

Cooler Quantity: one - ice packs

Arrival Temperatures: 12.9 | 12.5 | 12.1 | 8.2 | 7.0 | 6.9

Custody Seal Intact: ☐ Yes ☐ No ☐ N/A

Notes: B I

Report Information:

Company: GEMTEC
Contact: Mohit Bhargav
Address: 32 Steacie Drive
Ottawa, ON, K2K 2A9
Phone: 5068970427 Fax:
Reports to be sent to:
1. Email: mohit.bhargav@gemtec.ca
2. Email: dan.elliot@gemtec.ca

Regulatory Requirements:

(Please check all applicable boxes)

☑ Regulation 153/04
Table (Indicate One): ☐ Ind/Com ☐ Res/Park ☑ Agriculture
Soil Texture (Check One): ☐ Coarse ☐ Fine

☐ Regulation 406
Table (Indicate One)

☐ Regulation 558

☐ CCME

☐ Sewer Use ☐ Sanitary ☐ Storm
Region

☐ Prov. Water Quality Objectives (PWQO)

☐ Other
Indicate One

Is this submission for a **Record of Site Condition?** ☐ Yes ☐ No

Report Guideline on *Certificate of Analysis* ☐ Yes ☐ No

Turnaround Time (TAT) Required:

Regular TAT ☑ 5 to 7 Business Days

Rush TAT (Rush Surcharges Apply)

☐ 3 Business Days ☐ 2 Business Days ☐ Next Business Day

OR Date Required (Rush Surcharges May Apply):

Please provide prior notification for rush TAT
**TAT is exclusive of weekends and statutory holidays*

For 'Same Day' analysis, please contact your AGAT CPM

Project Information:

Project: 100117.051
Site Location: Casselman
Sampled By: ML
AGAT Quote #: PO:
Please note: If quotation number is not provided, client will be billed full price for analysis.

Invoice Information:

Bill To Same: Yes ☑ No ☐

Company:
Contact:
Address:
Email:

Sample Matrix Legend

GW	Ground Water
O	Oil
P	Paint
S	Soil
SD	Sediment
SW	Surface Water

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Field Filtered - Metals, Hg, CrVI, DOC (Y/N)	O. Reg 153: Metals & Inorganics	O. Reg 153: Metals - ☐ CrVI, ☑ Hg, ☐ HWSB	O. Reg 153: BTEX, F1-F4 PHCs	VOC	PAHs	PCBs	PCBs: Arochlors ☐	O. Reg 558: Landfill Disposal Characterization TCLP: ☐ M&I ☐ VOCs ☐ ABNs ☐ B(a)P ☐ PCBs	O. Reg 406: Regulation 406 SPLP Rainwater Leach SPLP: ☑ Metals ☐ VOCs ☐ SVOCs	O. Reg 406: Regulation 406 Characterization Package pH, ICPMS Metals, BTEX, F1-F4	Corrosivity: ☐ Moisture ☐ Sulphide	Potentially Hazardous or High Concentration (Y/N)
1. BH24-1 SS1	July 18, 24	AM	3	S	1x250ml/bag; 1x120ml; 1x vial		☑		☑		☑							
2. BH24-2 SS3	July 18, 24																	
3. BH24-4 SS1	July 19, 24																	
4. BH24-10 SS3	July 22, 24																	
5. BH24-12 SS2	July 22, 24																	
6. BH24-17 SS4	July 22, 24																	
7. BH24-18 SS6	July 19, 24																	
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Samples Relinquished By (Print Name and Sign)	Date	Time	Samples Received By (Print Name and Sign)	Date	Time
Mohit Bhargava	23 July 24	11am	C. Cuthbertson	07/23/24	13h10
CC to DE10	07/23/24	15h00	T. Tiffin	July 24	8:40

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Disclaimer:

- All work conducted herein has been done using accepted standard protocols, and generally accepted practices and methods. AGAT test methods may incorporate modifications from the specified reference methods to improve performance.
- All samples will be disposed of within 30 days after receipt unless a Long Term Storage Agreement is signed and returned. Some specialty analysis may be exempt, please contact your Client Project Manager for details.
- AGAT's liability in connection with any delay, performance or non-performance of these services is only to the Client and does not extend to any other third party. Unless expressly agreed otherwise in writing, AGAT's liability is limited to the actual cost of the specific analysis or analyses included in the services.
- This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
- The test results reported herewith relate only to the samples as received by the laboratory.
- Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, or non-infringement. AGAT assumes no responsibility for any errors or omissions in the guidelines contained in this document.
- All reportable information is available on request from AGAT Laboratories, in accordance with ISO/IEC 17025:2017, ISO/IEC 17025:2005 (Quebec), DR-12-PALA and/or NELAP Standards.
- This document is signed by an authorized signatory who meets the requirements of the MELCCFP, CALA, CCN and NELAP.
- For environmental samples in the Province of Quebec: The analysis is performed on and results apply to samples as received. A temperature above 6°C upon receipt, as indicated in the Sample Reception Notification (SRN), could indicate the integrity of the samples has been compromised if the delay between sampling and submission to the laboratory could not be minimized.

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Results relate only to the items tested. Results apply to samples as received.

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Results relate only to the items tested. Results apply to samples as received.

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Certified By: Jinkal Patel

Results relate only to the items tested. Results apply to samples as received.

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Results relate only to the items tested. Results apply to samples as received.

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Results relate only to the items tested. Results apply to samples as received.

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Results relate only to the items tested. Results apply to samples as received.

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Results relate only to the items tested. Results apply to samples as received.

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Results relate only to the items tested. Results apply to samples as received.

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Results relate only to the items tested. Results apply to samples as received.

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Results relate only to the items tested. Results apply to samples as received.

AGAT Laboratories

5835 Coopers Avenue
Mississauga, Ontario L4Z 1Y2
Ph: 905.712.5100 Fax: 905.712.5122
webearth.agatlabs.com

Chain of Custody Record

If this is a Drinking Water sample, please use Drinking Water Chain of Custody Form (potable water consumed by humans)

Laboratory Use Only

Work Order #: 247178590

Cooler Quantity: one - melted ice

Arrival Temperatures: 9.8 19.7 19.2 / 3.9 13.8 14.5

Custody Seal Intact: ☐ Yes ☐ No ☒ N/A

Notes: B/I

Report Information:

Company: GEMTEC
Contact: Mohit Bhargav
Address: 32 Steacie Drive Ottawa Ontario K2K 2A9
Phone: 5068970427 Fax:
Reports to be sent to:
1. Email: mohit.bhargav@gemtec.ca
2. Email: dan.elliot@gemtec.ca

Regulatory Requirements:

(Please check all applicable boxes)

☑ Regulation 153/04 — Table 1 (Indicate One) ☐ Ind/Com ☐ Res/Park ☑ Agriculture
Soil Texture (Check One) ☐ Coarse ☐ Fine

☐ Excess Soils R406 — Table (Indicate One)
☐ Regulation 558
☐ CCME

☐ Sewer Use ☐ Sanitary ☐ Storm — (Region)
☐ Prov. Water Quality Objectives (PWQO)
☐ Other (Indicate One)

Is this submission for a **Record of Site Condition?** ☐ Yes ☐ No

Report Guideline on *Certificate of Analysis* ☐ Yes ☐ No

Turnaround Time (TAT) Required:

Regular TAT ☑ 5 to 7 Business Days

Rush TAT (Rush Surcharges Apply)

☐ 3 Business Days ☐ 2 Business Days ☐ Next Business Day

OR Date Required (Rush Surcharges May Apply):

Please provide prior notification for rush TAT
**TAT is exclusive of weekends and statutory holidays*

For 'Same Day' analysis, please contact your AGAT CPM

Project Information:

Project: 100117.051
Site Location: Casselman
Sampled By: ML
AGAT Quote #: PO:
Please note: If quotation number is not provided, client will be billed full price for analysis.

Invoice Information:

Bill To Same: Yes ☑ No ☐

Company:
Contact:
Address:
Email:

Sample Matrix Legend

B	Biota
GW	Ground Water
O	Oil
P	Paint
S	Soil
SD	Sediment
SW	Surface Water

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Field Filtered - Metals, Hg, CrVI, DOC (Y/N)	O. Reg 153: Metals & Inorganics	O. Reg 153: Metals - ☐ CrVI, ☐ Hg, ☐ HWSB	O. Reg 153: BTEX, F1-F4 PHCs Analyze F4G if required ☑ Yes ☐ No	O. Reg 153: PAHs	O. Reg 153: PCBs	O. Reg 153: VOC	O. Reg 558: Landfill Disposal Characterization TCLP: ☐ M&I ☑ VOCs ☐ ABNs ☑ B(a)P ☐ PCBs	O. Reg 406: Excess Soils SPLP Rainwater Leach SPLP: ☐ Metals ☐ VOCs ☐ SVOCs	O. Reg 406: Excess Soils Characterization Package pH, ICPMS Metals, BTEX, F1-F4	Salt - EC/SAR	Potentially Hazardous or High Concentration (Y/N)
BH24-6 SA3	26 Jul 2024	AM	3	SOIL	1x120 ml; 1x250 ml/bag; 1xvial		☑		☑	☑							
BH24-8 SA5	26 Jul 2024	AM	3	SOIL	1x120 ml; 1x250 ml/bag; 1xvial		☑		☑								
BH24-15 SA3	26 Jul 2024	AM	3	SOIL	1x120 ml; 1x250 ml/bag; 1xvial		☑		☑	☑							
BH24-16 SS3	26 Jul 2024	AM	3	SOIL	1x120 ml; 1x250 ml/bag; 1xvial		☑		☑	☑		☑					

Samples Relinquished By (Print Name and Sign)	Date	Time	Samples Received By (Print Name and Sign)	Date	Time
Mohit Bhargav	26 July 2024	3 pm	C. Guilletin	07/26/24	13h15
C. to Perio	07/26/24	15h00		Aug 27	10:42

Page 1 of 1

Document ID: DIV-78-1511.021

Pink Copy - Client | Yellow Copy - AGAT | White Copy- AGAT

Date Issued: March 9, 2021

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*Notes

Disclaimer:

- *All work conducted herein has been done using accepted standard protocols, and generally accepted practices and methods. AGAT test methods may incorporate modifications from the specified reference methods to improve performance.*
- *All samples will be disposed of within 30 days after receipt unless a Long Term Storage Agreement is signed and returned. Some specialty analysis may be exempt, please contact your Client Project Manager for details.*
- *AGAT's liability in connection with any delay, performance or non-performance of these services is only to the Client and does not extend to any other third party. Unless expressly agreed otherwise in writing, AGAT's liability is limited to the actual cost of the specific analysis or analyses included in the services.*
- *This Certificate shall not be reproduced except in full, without the written approval of the laboratory.*
- *The test results reported herewith relate only to the samples as received by the laboratory.*
- *Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, or non-infringement. AGAT assumes no responsibility for any errors or omissions in the guidelines contained in this document.*
- *All reportable information is available on request from AGAT Laboratories, in accordance with ISO/IEC 17025:2017, ISO/IEC 17025:2005 (Quebec), DR-12-PALA and/or NELAP Standards.*
- *This document is signed by an authorized signatory who meets the requirements of the MELCCFP, CALA, CCN and NELAP.*
- *For environmental samples in the Province of Quebec: The analysis is performed on and results apply to samples as received. A temperature above 6°C upon receipt, as indicated in the Sample Reception Notification (SRN), could indicate the integrity of the samples has been compromised if the delay between sampling and submission to the laboratory could not be minimized.*

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Certified By:

Results relate only to the items tested. Results apply to samples as received.

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Certified By: R. Chakraberty

Results relate only to the items tested. Results apply to samples as received.

Certified By: R. Chakraberty

Results relate only to the items tested. Results apply to samples as received.

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Certified By: R. Chakraberty

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Results relate only to the items tested. Results apply to samples as received.

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Results relate only to the items tested. Results apply to samples as received.

AGAT Laboratories

Have feedback? Scan here for a quick survey!

5835 Coopers Avenue
Mississauga, Ontario L4Z 1Y2
Ph: 905.712.5100 Fax: 905.712.5122
webearth.agatlabs.com

Chain of Custody Record

If this is a Drinking Water sample, please use Drinking Water Chain of Custody Form (potable water consumed by humans)

Report Information:

Company: GEMTEC
Contact: MOHIT BHARGAV
Address: 32 STEACIE DRIVE
OTTAWA ON K2H2A9
Phone: 5068970427 Fax:
Reports to be sent to:
1. Email: mohit.bhargav@gemtec.ca
2. Email:

Project Information:

Project: 100117-051
Site Location:
Sampled By: NL
AGAT Quote #: PO:
Please note: If quotation number is not provided, client will be billed full price for analysis.

Invoice Information:

Bill To Same: Yes ☐ No ☐

Company:
Contact:
Address:
Email:

Regulatory Requirements:

(Please check all applicable boxes)

☐ Regulation 153/04
Table (Indicate One) ☐ Ind/Com ☐ Res/Park ☐ Agriculture
Soil Texture (Check One) ☐ Coarse ☐ Fine

☐ Regulation 406
Table (Indicate One) ☐ Ind/Com ☐ Res/Park ☐ Agriculture
☑ Regulation 558
☐ CCME

☐ Sewer Use ☐ Sanitary ☐ Storm
Region
☐ Prov. Water Quality Objectives (PWQO)
☐ Other
Indicate One

Is this submission for a **Record of Site Condition (RSC)**? ☐ Yes ☐ No

Report Guideline on *Certificate of Analysis* ☐ Yes ☐ No

Legal Sample ☐

Sample Matrix Legend

GW	Ground Water	**SD**	Sediment
O	Oil	**SW**	Surface Water
P	Paint	**R**	Rock/Shale
S	Soil		

Laboratory Use Only

Work Order #: 24718419 5

Cooler Quantity: CNE - no ice packs.
Arrival Temperatures: 19.4 | 19.3 | 19.4
~~Depot~~ Temperatures: 6.5 | 6.9 | 7.0
Custody Seal Intact: ☐ Yes ☐ No ☐ N/A
Notes: BI

Turnaround Time (TAT) Required:

Regular TAT ☐ 5 to 7 Business Days

Rush TAT (Rush Surcharges Apply)

☐ 3 Business Days ☐ 2 Business Days ☐ Next Business Day

OR Date Required (Rush Surcharges May Apply):

Please provide prior notification for rush TAT
**TAT is exclusive of weekends and statutory holidays*

For 'Same Day' analysis, please contact your AGAT CSR

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Field Filtered - Metals, Hg, CrVI, DOC (Y/N)	O. Reg 153: Metals & Inorganics	O. Reg 153: Metals - ☐ CrVI, ☐ Hg, ☐ HWSB	O. Reg 153: BTEX, F1-F4 PHCs	O. Reg 153: VOC	O. Reg 153: PAHs	O. Reg 153: PCBs: Aroclors ☐	O. Reg 406: Regulation 406 Characterization Package pH, Metals, BTEX, F1-F4	O. Reg 406: EC, SAR	O. Reg 406: Regulation 406 SPLP Rainwater Leach mSPLP: ☐ Metals ☐ VOCs ☐ SVOCs ☐ OC	O. Reg 558: Landfill Disposal Characterization TCLP: ☐ M&I ☐ VOCs ☐ ABNs ☑ B(a)P ☐ PCBs	O. Reg 558: Corrosivity: ☐ Moisture ☐ Sulphide	Flashpoint	Potentially Hazardous or High Concentration (Y/N)
1. TCLP	31-July-24	AM	4	Soil	2x250mL; 2x120mL											✓		✓	
2.		AM/PM																	
3.		AM/PM																	
4.		AM/PM																	
5.		AM/PM																	
6.		AM/PM																	
7.		AM/PM																	
8.		AM/PM																	
9.		AM/PM																	
10.		AM/PM																	
11.		AM/PM																	

Samples Relinquished By (Print Name and Sign)	Date	Time	Samples Received By (Print Name and Sign)	Date	Time
Mohit Bhargav.	12-Aug-24	10 a.m	C Cwithers	08/12/24	09h50
MOHIT BHARGAV				Aug 13	9:30 AM
CC to Perso	08/12/24	15h00			

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Appendix D2

Geotechnical and Hydrogeological Investigation, Casselman Lagoon Upgrades (Golder 2018)

REPORT

Geotechnical and Hydrogeological Investigation

Casselman Lagoon
Casselman, Ontario

Submitted to:

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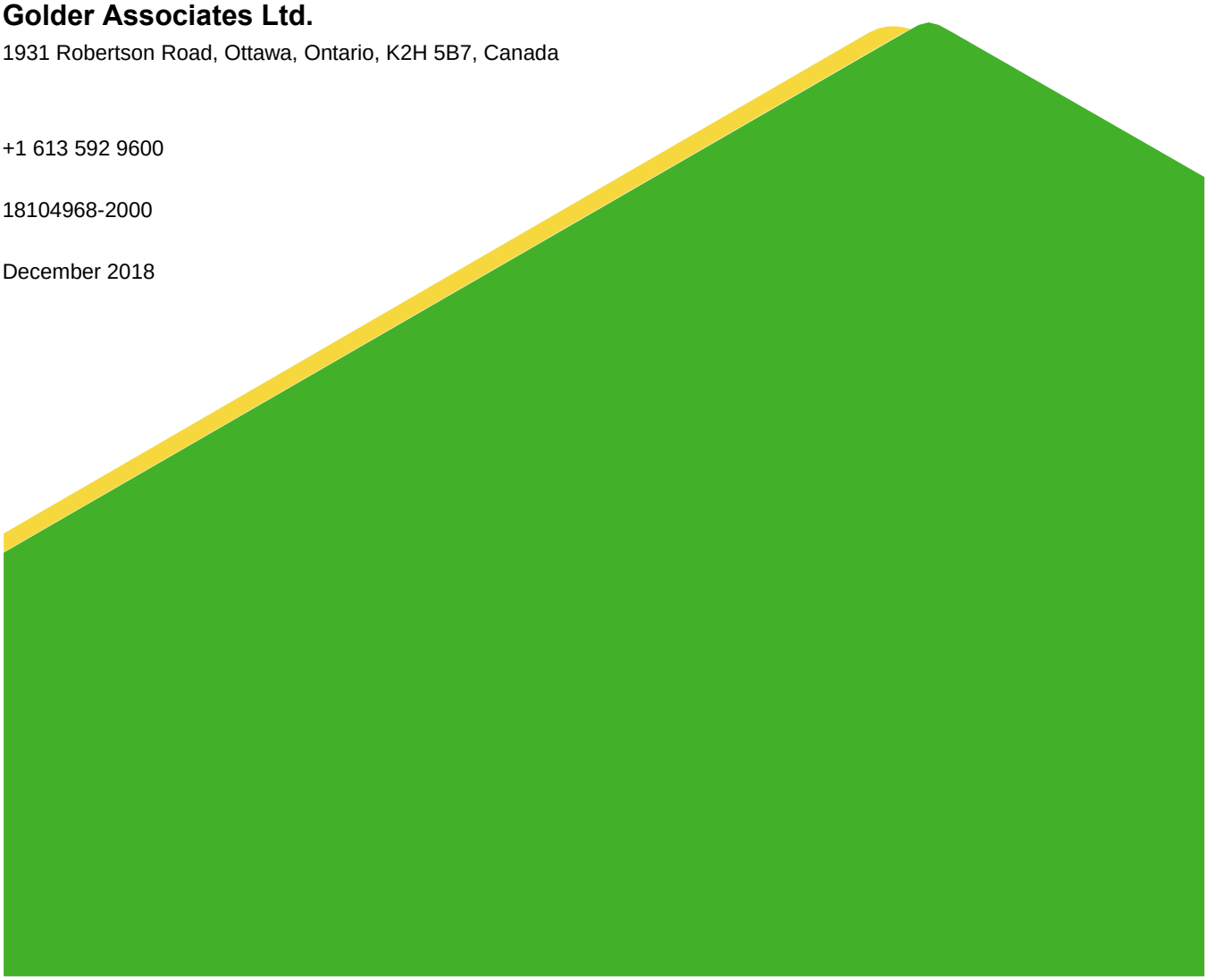
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1.0 INTRODUCTION

This report presents the results of a preliminary geotechnical and hydrogeological investigation carried out for the proposed works at the Casselman Lagoon in Casselman, Ontario. It is understood that a pump station, two concrete tanks, and a small at-grade building will be constructed at the south end of the existing Casselman Lagoon site.

The geotechnical investigation included an assessment of the general subsurface conditions in the area of the proposed development by means of two boreholes and limited laboratory testing. Based on an interpretation of the factual information obtained, a general description of the subsurface conditions is presented. These interpreted subsurface conditions and available project details were used to prepare engineering guidelines on the geotechnical design aspects of the project, including construction considerations which could influence design decisions.

The reader is referred to the “Important Information and Limitations of This Report” which follows the text but forms an integral part of this document.

2.0 DESCRIPTION OF PROJECT AND SITE

Plans are being prepared for the construction of a pump station, two concrete tanks, and a small at-grade building to be located at the south end of the existing Casselman Lagoon site in Casselman, Ontario. The approximate location of the site is shown on the Key Map inset on the attached Site Plan (Figure 1). It is understood that geotechnical design input is required for the construction of the new buildings and also for input to excavations for the new concrete tanks, which are anticipated to be at a depth of about 4.5 metres below the existing ground surface.

Relevant subsurface information from the following previous study conducted at this site by Golder Associates Ltd. was reviewed and included in the current study:

- “*Report on Geotechnical Investigation for Proposed Pumping Station and Forcemain, Casselman, Ontario*”, dated January 2006 (Report No. 05-1120-157).

Existing borehole information at the site indicates that the site is underlain by deposits of sand and silt overlying deposits of soft silty clay and glacial till. The surficial geological mapping produced by the Geological Survey of Canada (GSC) indicates that the study area is underlain by a transitional zone of deltaic deposits of sand, offshore marine deposits of clay and silt, and glacial till. The published drift thickness (depth to bedrock) mapping indicates that the bedrock surface is generally located at depths in the range of about 5 to 10 metres. The bedrock geology mapping indicates that the bedrock consists of interbedded limestone and shale of the Lindsay formation.

3.0 PROCEDURE

The fieldwork for this investigation was carried out in two phases, as follows:

- Phase 1 drilling was carried out on August 10, 2018, during which two (2) boreholes (numbered 18-01 and 18-02) were advanced at the approximate locations shown on the attached Site Plan (Figure 1). These boreholes were advanced to depths of about 7.0 to 8.2 metres below the existing ground surface.
- Phase 2 drilling was carried out on October 25 and 26, 2018, during which time two (2) boreholes (numbered 18-03 and 18-04) were advanced at the approximate location shown on the attached Site Plan (Figure 1). These boreholes were advanced to depths of about 16.4 and 16.2 metres below the existing ground surface.

All of the boreholes were advanced using hollow-stem augers driven by a truck-mounted drill rig which was operated by George Downing Estate Drilling Ltd. of Grenville-sur-la-rouge, Québec. In boreholes 18-01 and 18-02, standard penetration tests were carried out at regular intervals of depth within the overburden. Samples of the soils encountered were recovered using split-spoon sampling equipment. In situ vane testing was carried out, where possible, in the silty clay deposit to measure the undrained shear strength of this soil unit.

In boreholes 18-03 and 18-04, a limited number of samples were recovered using split-spoon sampling equipment. Upon encountering refusal to auger advancement, the boreholes were advanced into the bedrock for a length of about 3.0 and 3.5 metres using rotary diamond drilling techniques while recovering NQ sized bedrock core.

A monitoring well was sealed into boreholes 18-01 and 18-02 to allow for measurement of the groundwater level and hydraulic conductivity testing. The groundwater level measurements and hydraulic conductivity testing were carried out on August 23, 2018. A second set of groundwater level measurements were obtained on November 8, 2018

The fieldwork was supervised by experienced personnel from our engineering staff who directed the drilling and in situ testing operations, logged the boreholes and samples, and took custody of the soil samples retrieved. On completion of the drilling operations, the soil samples were transported to our laboratory for further examination by the project engineer and for laboratory testing, which included natural water content, Atterberg limits, and grain size distribution tests on selected soil samples and unconfined compressive strength (UCS) testing on selected bedrock samples.

One sample of soil from borehole 18-02 was submitted to Eurofins Scientific for basic chemical analysis related to potential sulphate attack on buried concrete elements and corrosion of buried ferrous elements.

The boreholes were selected, marked in the field, and subsequently surveyed by Golder Associates personnel. The borehole coordinates and ground surface elevations were determined using a Trimble R8 GPS survey unit. The geodetic reference system used for the survey is the North American datum of 1983 (NAD83). The borehole coordinates are based on the Modified Transverse Mercator (MTM Zone 9) coordinate system. The elevations are referenced to Geodetic datum (CGVD28).

4.0 SUBSURFACE CONDITIONS

4.1 General

Information on the subsurface conditions is presented as follows:

- Record of Borehole Sheets from the current investigation are provided in Appendix A.
- Record of Borehole Sheets and relevant laboratory testing from the previous investigation completed by Golder are provided in Appendix B.
- Results of the hydraulic conductivity testing are provided in Appendix C.
- Results of the basic chemical analyses from the current investigation are provided in Appendix D.
- Results of the UCS testing and bedrock core photographs are provided in Appendix E.
- Results of the water content and Atterberg limits testing from the current investigation are provided on the respective Record of Borehole Sheets.
- Results of the grain size distribution testing from the current investigation are provided on Figures 2 and 3.

In general, the subsurface conditions within the project limits consist of native deposits of sand and silt overlying deposits of soft silty clay, glacial till, and limestone bedrock.

The following sections present an overview of the subsurface conditions encountered in the boreholes.

4.2 Topsoil and Fill

Topsoil was encountered at ground surface in boreholes 18-01 and 18-02 from the current investigation, as well as in borehole 05-16 advanced by Golder in the previous investigation. The thickness of topsoil varies from between about 150 and 340 millimetres.

A 610 millimetre thick layer of clayey silt fill was encountered from ground surface in borehole 18-04. A 150 millimetre thick layer of buried topsoil was encountered beneath the clayey silt fill at this location.

4.3 Sand and Silt

A thin deposit of sand and silt was encountered at ground surface in borehole 18-03, and beneath the topsoil at all of the remaining borehole locations. This deposit extends to depths ranging from between about 1.2 to 1.8 metres below existing ground surface.

Standard penetration tests carried out within this deposit gave ‘N’ values ranging from 5 to 15 blows per 0.3 metres, indicating a loose to compact state of packing.

The measured natural moisture content of one sample of the sand and silt was about 26 percent. The results of grain size distribution testing on the same sample of the silt and sand are presented on Figure 2. The results of grain size distribution testing carried out on a sample of the silt and sand from the previous investigation is provided in Appendix B.

4.4 Silty Clay to Clay

At all of the borehole locations, the sand and silt deposit is underlain by a deposit of sensitive silty clay to clay. The silty clay deposit was not sampled in boreholes 18-03 and 18-04, and is inferred from drilling resistance.

The upper portion of the silty clay has been weathered to a red brown to grey brown crust. The weathered crust extends to depths ranging from between about 2.1 to 2.9 metres below existing ground surface (i.e. an Elevation of between about 64.5 to 63.1 meters).

Standard penetration tests carried out within the weathered silty clay gave ‘N’ values ranging from 1 to 3 blows per 0.3 metres, indicating a firm to very stiff consistency. The results of in situ vane testing in the weathered portion of the silty clay, from the previous investigation conducted by Golder, gave undrained shear strengths ranging from between about 33 to 39 kilopascals, indicating a firm consistency.

The measured water content of two samples of the weathered silty clay crust were about 42 and 57 percent.

Beneath the weathered zone of silty clay, the clay is grey in colour. The unweathered clay was fully penetrated in borehole 18-01 at a depth of about 6.1 metres below existing ground surface. The grey clay was not fully penetrated at current borehole 18-02 and previous borehole 05-16, but was proven to extend to depths of about 7.0 and 3.7 metres below existing ground surface, respectively.

The results of in situ vane testing in the unweathered portion of the silty clay from the current investigation gave undrained shear strengths ranging from between about 25 to 58 kilopascals, indicating a soft to stiff consistency.

The measured water contents of four samples of the grey silty clay ranged from about 61 to 83 percent.

The results of Atterberg limit testing carried out on two samples of the silty clay gave plasticity index values of about 33 and 57 percent and liquid limit values of about 55 and 83 percent, indicating a high plasticity soil. The results of Atterberg Limit Testing are also provided on Figure 4.

At a depth of about 5.6 metres below the ground surface in borehole 18-01, the silty clay transitions to a silty clay to clayey silt. The result of an in-situ vane test conducted in the silty clay and clayey silt gave an undrained shear strength of 51 kilopascals, indicating a stiff consistency.

4.5 Glacial Till

A deposit of glacial till was encountered beneath the silty clay and clayey silt in borehole 18-01. The glacial till was not fully penetrated at boreholes 18-01 and 18-02, but was proven to a depth of about 8.2 metres below the existing ground surface. The glacial till generally consists of gravel, cobbles, and boulders in a matrix of sandy silt to silty sand. Borehole 18-02 was terminated at a depth of about 7.0 meters at the inferred top of the glacial till.

Standard penetration tests carried out within the glacial till deposit gave SPT ‘N’ values ranging from 6 to 20 blows per 0.3 metres of penetration, indicating a loose to compact state of packing.

The measured natural moisture content of two samples of the glacial till were about 9 and 10 percent. The results of grain size distribution testing on one sample of the glacial till are presented on Figure 3.

4.6 Bedrock and Auger Refusal

The bedrock surface was confirmed at boreholes 18-03 and 18-04 which were extended into the bedrock using rotary diamond drilling techniques while retrieving NQ sized core. The depths and elevations of the bedrock surface, as well as the ground surface elevation at the borehole locations, are shown in the following table:

Borehole Number	Existing Ground Surface Elevation (m)	Bedrock Surface	
		Depth (m)	Elevation (m)
18-03	65.95	13.40	52.55
18-04	66.50	12.65	53.85

The bedrock encountered consists of slightly fresh, thinly bedded, grey limestone with sandy dolostone interbeds. The Rock Quality Designation (RQD) values measured on the recovered bedrock core samples range from about 24 to 95 percent, indicating poor to excellent quality rock.

Unconfined compressive strength (UCS) testing carried out on one sample each from boreholes 18-03 and 18-04 gave compressive strengths of about 140 and 137 megapascals, respectively, indicating very strong rock.

The results of the UCS testing and photographs of the bedrock core are provided in Appendix E.

4.7 Groundwater

A monitoring well was sealed into each of the boreholes from the current investigation, to allow for groundwater level measurements and hydraulic response testing. The results of the hydraulic conductivity analyses are provided in Appendix C. The measured groundwater levels and estimated hydraulic conductivity values are provided in the following table:

Testhole No.	Geologic Unit of Screened Interval	Ground Elevation (masl)	Groundwater Level Depth (mbgs)	Groundwater Elevation (masl)	Date of Measurement	Hydraulic Conductivity (cm/s)
18-01	Glacial Till	66.00	3.24	62.76	August 23, 2018	6×10^{-7}
			2.98	63.02	November 8, 2018	--
18-02	Grey Silty Clay	65.83	1.80	64.03	August 23, 2018	5×10^{-6}
			1.58	64.25	November 8, 2018	--

It should be noted that groundwater levels are expected to fluctuate seasonally. Higher groundwater levels are expected during wet periods of the year, such as spring.

4.8 Corrosion

One sample of soil from borehole 18-02 was submitted to Eurofins Scientific for basic chemical analyses related to potential sulphate attack on buried concrete elements and potential corrosion of buried ferrous elements. The results of this testing are provided in Appendix D and are summarized in the following table.

Borehole Number / Sample Number	Chloride (%)	Sulphate (%)	pH	Resistivity (Ohm-cm)
18-02 / Sa 4	<0.002	<0.01	8.31	2860

5.0 DISCUSSION

5.1 General

This section of the report provides engineering guidelines on the geotechnical design aspects of the proposed development based on our interpretation of the borehole information and project requirements. Reference should be made to the “Important Information and Limitations of This Report”, which follows the text but forms part of this document.

The following guidelines are provided on the basis that the multi-storey building will be designed in accordance with Part 4 of the 2012 Ontario Building Code (OBC).

5.2 Site Grading

The subsurface conditions on this site generally consist of a relatively thin surficial layer of topsoil and sand and silt overlying a thick deposit of sensitive silty clay.

The silty clay deposit encountered at this site is considered to be compressible and, therefore, has limited capacity to support the combined loading from grade raise filling, foundation loads, groundwater level lowering, floor loads, etc. Overstressing of the silty clay will lead to excessive settlements. For the purposes of this assessment, no grade raise allowance has been considered. This will need to be maintained for the bearing resistance values given in Section 5.3 to be applicable. Additional filling will require additional geotechnical analysis.

The topsoil is not suitable as engineered fill and should be removed from the site or stockpiled separately for re-use in landscaping applications only. It is important that stockpiles, if located on site, not be adjacent to any excavations but rather should be located within the future landscaping areas.

5.3 Proposed Slab-on-Grade Buildings

As discussed previously, the subsurface conditions at this site consist of surficial fill underlain by a thick deposit of sensitive silty clay.

The Serviceability Limit States (SLS) bearing resistance value for spread footing foundations is based on limiting the stress increases on the firm grey silty clay to an acceptable level, so that foundation settlements do not become excessive. Important parameters in calculating the stress increase on the grey silty clay are:

- The thickness of the weathered crust below the underside of the footings;
- The size (dimensions) of the footings;
- The amount of surcharge in the vicinity of the foundation due to landscape fill, underslab fill, floor loads, etc.; and,
- The effects of groundwater lowering caused by this or other construction.

Shallow spread footings can be considered provided that they can be designed using the bearing resistance values provided below. It is understood that the underside of footing elevations will be 64.2 metres (i.e. 1.8 metres below the existing ground surface) and 63.35 metres (i.e. 2.65 metres below the existing ground surface). At these elevations, the spread footings would bear on the very stiff to stiff weathered silty clay crust or the grey silty clay. It is further understood that a disc filter with an unfactored weight of about 16 kPa will be placed within the interior slab.

Based on a footing elevation of 64.2 metres and the surcharge loadings, the net bearing resistance at Serviceability Limit States (SLS) for footings up to 1.0 metres wide bearing on the approved, undisturbed, native silty clay to clay subgrade may be taken as 50 kilopascals. The factored bearing resistance at Ultimate Limit States (ULS) may be taken as 120 kilopascals.

Based on a footing elevation of 63.35 metres and the surcharge loadings, the net bearing resistance at SLS for footings up to 2.5 metres wide bearing on the approved, undisturbed, native grey silty clay to clay subgrade may be taken as 45 kilopascals. The factored bearing resistance at Ultimate Limit States (ULS) may be taken as 120 kilopascals.

Based on a footing elevation of 63.35 metres and surcharge loadings, the net bearing resistance at SLS for the proposed 3.7 by 7.0 metre raft slabs at this elevation may be taken as 35 kilopascals. The factored bearing resistance at Ultimate Limit States (ULS) may be taken as 95 kilopascals.

The post construction total and differential settlements of footings sized using the above SLS net bearing resistance value should be less than about 25 and 15 millimetres, respectively, provided that the soil below founding level is consistent with the assumptions made during design and is not disturbed during construction.

The SLS resistance corresponds to a settlement resulting from consolidation of the silty clay. Consolidation of silty clay is a process which takes months or longer and, as such, results from sustained loading. Therefore, the foundation loads to be used in conjunction with the SLS resistance given above should be the full dead load plus sustained live load. The factored dead load plus full factored live load should be used in conjunction with the ULS factored bearing resistance.

For the above bearing resistance values to be applicable, the zone of influence of adjacent footings must not overlap within the softer portions of the silty clay deposit. If overlapping occurs, reduced bearing resistance values will apply. The zone of influence is a function of the footing size and contact pressure. Further geotechnical guidance can be provided in this regard once additional details are provided.

Resistance to sliding across the interface between the concrete footings and the silty clay at founding level may be calculated using the following parameters:

Interface	Parameter
Concrete or Engineered Fill – clay subgrade	Apparent adhesion = 25 kPa
Concrete – Engineered Fill	Effective friction angle = 28 degrees

The silty clay subgrade is sensitive to disturbance (such as from construction traffic) and a mud slab of lean concrete, at least 50 millimetres in thickness, should be provided on the bearing surfaces after excavation to founding level following review/approval of the bearing surface by geotechnical personnel. Excavations to expose the silty clay subgrade should be carried out using a smooth-edged excavator bucket (i.e., no teeth) to minimize disturbance.

5.3.1 Foundation Backfill

The soils at this site are frost susceptible and should not be used as backfill against exterior, unheated, or well insulated foundation elements. To avoid problems with frost adhesion and heaving, these foundations should be backfilled with non-frost susceptible sand or sand and gravel conforming to the requirements for OPSS Granular B Type I.

In areas where pavement or other hard surfacing will abut the building, differential frost heaving could occur between the granular fill and other areas. To reduce this differential heaving, the backfill adjacent to the wall should be placed to form a frost taper. The frost taper should be brought up to pavement subgrade level from 1.5 metres below finished exterior grade at a slope of 3 horizontal to 1 vertical, or flatter, away from the wall. The fill should be placed in maximum 300-millimetre thick lifts and should be compacted to at least 100 percent of the material's standard Proctor maximum dry density using suitable vibratory compaction equipment.

The pavement could be expected to perform better in the long term if the granular backfill against the foundation walls is drained by means of a perforated pipe subdrain in a surround of 19 millimetre clear stone, fully wrapped in geotextile, which leads by gravity drainage to a positive outlet.

5.3.2 Frost Protection

All perimeter and exterior foundation elements or interior foundation elements in unheated areas should be provided with a minimum of 1.5 metres of earth cover for frost protection purposes. Isolated, unheated exterior footings adjacent to surfaces which are cleared of snow cover during winter months should be provided with a minimum of 1.8 metres of earth cover.

5.4 Proposed Storage Tank

It is understood that a storage tank about 18 by 22 metres in dimension is proposed and that the bottom of the tank may be between about elevations 63.5 and 61.1 metres.

5.4.1 Raft Foundations

Consideration could be given to supporting the proposed storage tank on raft foundations, which spread the foundation loads over the entire structure footprint.

For design purposes, the raft foundations could be designed using the following parameters for gross SLS bearing resistance and factored ULS bearing resistance:

Foundation Elevation (masl)	SLS Bearing Resistance (kPa)	ULS Bearing Resistance (kPa)
63.0	50	100
62.5	54	105
61.5	62	115
60.6	70	125

The above SLS resistances should be consistent with total and differential settlements not exceeding about 25 and 15 millimetres.

The SLS resistance corresponds to a settlement resulting from consolidation of the silty clay. Consolidation of silty clay is a process which takes months or longer and, as such, results from sustained loading. Therefore, the foundation loads to be used in conjunction with the SLS resistance given above should be the full dead load plus sustained live load. The factored dead load plus full factored live load should be used in conjunction with the ULS factored bearing resistance.

The raft foundations will need to be sufficiently rigid so that the design loads will be uniformly distributed over the entire tank footprint, which depends on the relative stiffness between the raft slab and the underlying subgrade. The distribution of the contact stress, the raft slab deflections, and the resulting forces and bending moments in the slab to be used in its structural design could be determined by structural analysis using a modulus of subgrade reaction, k_s, for the subgrade. It should be noted however that the modulus of subgrade reaction is not a fundamental soil property and its value depends, in part, on the size and shape of the loaded area. For the analysis of the contact stress distribution beneath a raft foundation, its value would depend on the size of the areas over which increased/concentrated contact stresses are anticipated (analogous to equivalent footings beneath the walls and columns) and the size of these areas is in turn related to the value the modulus of subgrade reaction, i.e., they are inter-related. Accordingly, the analysis of the raft slabs should ideally involve an iterative analysis between the determination of the contact stress distribution by the structural engineer and the geotechnical determination of the modulus of subgrade reaction value, until the two are consistent with each other.

The permissible SLS gross contact stress given above assumes a relatively uniform contact stress under the raft. Areas of higher contact stress could lead to localized overstressing of the silty clay with some resulting higher settlements and unanticipated raft slab deflections and forces. For a 1.0 metre by 1.0 metre section of the tank foundation, the modulus of subgrade reaction may be assumed to be in the range of 1 to 5 megapascals per metre. The structural design of the slab at any location should be determined based on whichever value causes the larger effect, since the maximum and minimum values may govern for different locations and load effects.

The raft should be designed not only to resist the forces and moments calculated in this manner, but should also be designed to resist the *hydrostatic uplift pressures* on the raft.

Based on an assumed static ground water level of elevation 64.5 metres (i.e. 0.5 metres above the measured water level to account for reasonable seasonal variations), the hydrostatic uplift pressure analysis indicates that the foundation resistance to uplift based on shearing through the native soils will vary from 55 to 120 kN per metre of foundation length; varying linearly with founding elevations ranging from 63.0 to 60.6 m. The analysis also indicates that, based on the tanks being completely emptied, the hydrostatic uplift force will exceed the uplift resistance provided by the soils. Unless the water level in the tanks can be maintained no lower than the surrounding groundwater level, uplift restraint (e.g. rock anchors) will need to be provided.

The SLS resistance and corresponding settlement estimates are dependent upon the soil at or below founding level not being disturbed during construction. Where the subgrade consists of silty clay this material will be very sensitive to disturbance and should therefore be protected with a mud slab of lean concrete, which should be placed immediately following inspection and approval of the subgrade.

5.4.2 Steel Piles

The tank could also be supported on driven or drilled steel piles (pipe piles or micropiles), which would be driven or drilled through the silty clay layer to the underlying competent glacial till, or bedrock. Pile depths required would be determined by the integrity of the competent soil material or bedrock.

The tank may be supported on driven steel H-piles or closed end pipe piles or micro-piles founded on or within the underlying bedrock.

Based on the borehole results from this investigation, the following table provides an overview of the expected elevations of the very dense glacial till, as well as the bedrock surface elevations within the vicinity of the tank.

Borehole Number	Approximate Bedrock Surface Elevation (m)
18-03	52.6
18-04	53.9

H-piles should be reinforced at the tip with rock point driving shoes to improve seating of the piles on the bedrock and to reduce the potential for damage to the piles during driving through the overlying cobbles and boulders, in accordance with Ontario Provincial Standard Specification (OPSS) 903 *(Deep Foundations)*. To ensure adequate penetration into the hard and locally steeply sloping bedrock to provide fixity, a Titus HD Rock Injector rock point (or equivalent) driving shoe should be used.

As an alternative to driven piles (i.e. H-piles and/or closed-ended pipe piles), the use of an open-ended drilled pile advanced into the bedrock could also be considered. This pile type requires a specialized contractor and is generally more expensive than driven piles, but the use of drilled piles greatly reduces the risk of pile deflections, pile damage and piles 'hanging up' in the glacial till. For design purposes, the drilled pipe piles should be advanced to a minimum embedment depth of 1.5 metres into the bedrock.

5.4.2.1 Axial Geotechnical Resistance

For design purposes, HP 310x110 piles or 254 millimetre closed end pipe piles driven to found on the limestone bedrock may be designed based on a factored axial ultimate geotechnical resistance (ULS) of 4,000 kN.
The factored ULS geotechnical resistance may be greater than the structural capacity of the pile, which could govern design and should be checked by the structural design engineer. The factored serviceability geotechnical resistance does not apply to piles founded on the bedrock, because the SLS resistance for 25 mm of settlement is greater than the factored axial geotechnical resistance at ULS.

5.4.2.2 Resistance to Lateral Loads

It is understood that lateral loading will be resisted fully or partially by the piles. Additional resistance to lateral loading may be derived from the soil in front of the piles.

For preliminary design of the tank structure, the SLS geotechnical response of the soil in front of the piles under lateral loading may be calculated using subgrade reaction theory where the coefficient of horizontal subgrade reaction, k_h, is based on the equation given below, as described by Terzaghi (1955) and the Canadian Foundation Engineering Manual (3rd Edition). It may be assumed that this resistance will be nearly the same for vertical and inclined piles.

For cohesionless soils:

$$k_h = \frac{n_h z}{B}$$

Where: n_h is the constant of horizontal subgrade reaction, as given below;

z is the depth (m); and,

B is the pile diameter/width (m).

For cohesive soils:

$$k_h = \frac{67 s_u}{B}$$

Where: s_u is the undrained shear strength of the soil (kPa); and,

B is the pile diameter/width (m).

The following values of s_u and n_h may be used in the preliminary structural analysis. The ranges in values reflect the variability in the subsurface conditions, the soil properties and the approximate nature of the analysis and the non-linear nature of the soil behaviour (such that k_h is a function of deflection).

Elevation (m)	Soil Type	Su (kPa)	n_h (MN/m^3)
66.0 - 64.5	Silty Sand	-	2.2
64.5 – 64.0	Silty Clay to Clay (Weathered Crust)	100	-
64.0 – 57.0	Silty Clay to Clay	30	-
57.0 – 53.0	Glacial Till	-	4.4

Group action should be considered using the generalized p-multipliers (i.e. p-reduction factors) for a range of pile provided in Section C6.11.3.4 of CHBDC.

The ULS *geotechnical* resistance to lateral loading may be calculated using passive earth pressure theory as outlined in Section C6.11.2.2.1 of the *Commentary to the CHBDC.*

5.4.3 Helical Piers

Consideration may also be given to founding the proposed storage tank on helical piers. Helical piers consist of a steel shaft with one, two, or three auger flights (helixes). The pier is augered into the ground to the desired depth until a predetermined torque is achieved. The foundations would then be constructed on brackets supported on each shaft. The design capacity and the anticipated settlements of the helical piers should be confirmed by the supplier of the units.

5.5 Lateral Earth Pressures for Design

The lateral earth pressures acting on the tank walls will depend on the existing soil conditions, on the magnitude of surcharge including construction loadings, on the freedom of lateral movement of the structure, and on the drainage conditions behind the walls. Seismic (earthquake) loading must also be taken into account in the design.

The following recommendations are made concerning the design of the foundation walls.

Where the wall support and structure allow lateral yielding, (e.g., for unrestrained retaining walls), active earth pressures may be used in the design of the wall. Where the support does not allow lateral yielding, (i.e., for the proposed tank walls) at-rest earth pressures should be assumed for design.

If a shored excavation (in overburden) is used as part of the formwork for the tank walls, the lateral earth pressures for foundation walls are based on the existing retained soils (i.e., sand and silt and silty clay) and the following parameters (unfactored) may be used:

Soil	Unit Weight (kN/m^3)	Coefficients of static lateral earth pressure	
		Active, Ka	At rest, Ko
Silty Sand	21	0.33	0.50
Silty Clay	17	0.36	0.53
Glacial Till	22	0.31	0.47

If the tank wall is backfilled with granular free draining fill either in a zone with width equal to at least 50 percent of the height of the wall or within the wedge-shaped zone defined by a line drawn at 1 horizontal to 1 vertical (1H:1V) extending up and back from the rear face of the footing/pile cap, the following parameters (unfactored) may be used:

Material	Unit Weight (kN/m^3)	Coefficients of static lateral earth pressure	
		Active, Ka	At rest, Ko
Granular A or Granular B Type II	22	0.27	0.43
Granular B Type I	22	0.31	0.47

Seismic loading will result in increased lateral earth pressures acting on the walls. The walls should be designed to withstand the combined lateral loading for the appropriate static pressure conditions given above, plus the earthquake-induced dynamic earth pressure.

The horizontal seismic coefficient, k_h, used in the calculation of the seismic active pressure coefficient is taken as 1.0 times the design PGA (i.e., $k_h = 0.40$). For structures which allow lateral yielding, k_h is taken as 0.5 times the design PGA (i.e., $k_h = 0.20$).

The following seismic active pressure coefficients (K_{AE}) and seismic passive pressure coefficients (K_{PE}) may be used in design; these coefficients reflect the K_{AE} and K_{PE} obtained using the k_h values described above and assumed no vertical acceleration and wall to soil friction. These seismic earth pressure coefficients assume that the back of the wall is vertical and the ground surface behind the wall is flat. Where sloping backfill is present above the top of the wall, the lateral earth pressures under seismic loading conditions should be calculated by treating the weight of the backfill located above the top of the wall as a surcharge.

Wall Type	Site PGA (2475-year Earthquake)	K_{AE}				
		Granular A/ Granular B Type II	Granular B Type I	Silty Sand	Silty Clay	Glacial Till
Yielding Wall	0.40g	0.42	0.47	0.50	0.54	0.47
Non-Yielding Wall		0.61	0.68	0.73	0.80	0.68

Wall Type	Site PGA (2475-year Earthquake)	K_{PE}				
		Granular A/ Granular B Type II	Granular B Type I	Silty Sand	Silty Clay	Glacial Till
Yielding Wall	0.40g	3.66	3.20	2.93	2.69	3.20
Non-Yielding Wall		3.58	3.10	2.81	2.55	3.10

The earthquake-induced dynamic pressure distribution, which is to be added to the static earth pressure distribution, is a linear distribution with maximum pressure at the top of the wall and minimum pressure at its toe (i.e., an inverted triangular pressure distribution).

A minimum surcharge pressure of 12 kilopascals due to traffic and compaction induced pressure should be included in the total lateral earth pressures for the structural design of the wall.

The total pressure distribution (static plus seismic) may be determined as follows:

$$\sigma_h(d) = K_o \gamma d + (K_{AE} - K_a) \gamma (H-d) + q$$

Where: $\sigma_h(d)$ = Lateral earth pressure at depth, d, (kPa);

K_o = Coefficient of static earth pressure;

γ = Unit weight of the backfill soil (kN/m^3); as given previously;

d = Depth below the top of the wall (m);

K_{AE} = Seismic active earth pressure coefficient;

q = Surcharge to account for traffic and compaction pressure, where applicable; and,

H = Total height of the wall (m).

All of the lateral earth pressure equations are given in an unfactored format and will need to be factored for Ultimate Limit States design purposes.

5.6 Seismic Design

The seismic design provisions of the 2012 OBC depend, in part, on the shear wave velocity of the upper 30 metres of soil and/or rock below founding level. The OBC also permits the Site Class to be specified based solely on the stratigraphy and in situ testing data (i.e., shear strengths and standard penetration test results), rather than from direct measurements of the shear wave velocity.

Based on the in situ testing data, this site can be assigned a Site Class E for seismic design purposes.

5.7 Site Servicing

At least 150 millimetres of OPSS Granular A should be used as pipe bedding for sewer and water pipes. Where unavoidable disturbance to the subgrade surface occurs during construction, it may be necessary to place a sub-bedding layer consisting of 300 millimetres of compacted OPSS Granular B Type II beneath the Granular A. The bedding material should, in all cases, extend to the spring line of the pipe and should be compacted to at least 95 percent of the material's standard Proctor maximum dry density. The use of clear crushed stone as a bedding layer should not be permitted anywhere on this project since fine particles from the sandy backfill materials and native soils could potentially migrate into the voids in the clear crushed stone and cause loss of lateral pipe support.

Cover material, from the spring line of the pipe to at least 300 millimetres above the top of pipe, should consist of OPSS Granular A or Granular B Type I with a maximum particle size of 25 millimetres. The cover material should be compacted to at least 95 percent of the material's standard Proctor maximum dry density.

It should generally be possible to re-use the existing inorganic fill and weathered silty clay as trench backfill. Where the trench will be covered with hard surfaced areas, the type of material placed in the frost zone (between subgrade level and 1.8 metres depth) should match the soil exposed on the trench walls for frost heave compatibility. Trench backfill should be placed in maximum 300 millimetre thick lifts and should be compacted to at least 95 percent of the material's standard Proctor maximum dry density using suitable vibratory compaction equipment.

5.8 Excavations

Only relatively shallow excavations will be required for the building foundations. Excavations for the proposed storage tanks will be about 4.5 metres below the existing ground surface. Deeper excavations may be required for the site services, however the design invert levels are not yet known. Depending on the depth and alignment of these services, much of the excavation may be made within the silty clay to clay.

In general, it is anticipated that open-cut methods will be feasible for the proposed excavations for this project. Where space is restricted, it is anticipated that stacked trench boxes, possibly in conjunction with steel plates and/or unsupported slopes at the surface, may be required to accommodate the service excavations. The silty clay at this site would be classified as Type 3 soils in accordance with the Occupational Health and Safety Act of Ontario, and therefore excavations in these materials should be provided with side slopes no steeper than 1H:1V (horizontal:vertical).

Basal instability results when the shear strength of the soil beneath a shored excavation is inadequate to support the weight of the soil retained by the shoring (i.e., to resist the unbalanced weight of the external/retained soil versus the 'excavated' condition within the shoring). The factor of safety against basal instability depends on the width, depth and length of the excavation, as well as the shear strength and unit weight (i.e., the density) of the retained and underlying clay. The stability of braced excavations that extend into the grey silty clay should be assessed individually based on the length, width, and depth of the trench box. For example, the factor of safety against basal instability of a braced excavation 18 metres wide by 22 metres long by up to 4.5 metres deep would be about 2, which is acceptable. Shorter, narrower or shallower excavations will therefore also be stable. Stockpiling of soil beside the excavations should be avoided; the weight of the stockpiled soil could lead to basal instability of braced excavations or slope instability of unsupported excavations.

Basal heave due to hydrostatic uplift can result when only a limited thickness of low-permeability soil (e.g., silty clay) beneath the base of the excavation is underlain by higher permeability soil (e.g., sand and gravel or glacial till) or bedrock with high groundwater pressures. The groundwater level in the sandy layer was measured at about 3.2 metres depth, which is about 2 metres above the deepest proposed excavation level. There is therefore the potential for basal heaving of the floor of the excavation for excavations deeper than about Elevation 62.5 metres; i.e., the factor of safety between the piezometric pressure in the glacial till versus the weight of the overlying silty clay would be less than 2. Although the hydraulic conductivity of the glacial till measured in borehole 18-01 is lower than the hydraulic conductivity of the silty clay measured in borehole 18-02, the hydraulic conductivity of glacial till can be highly variable and may be higher across the site and therefore the risk of basal heave during construction should be considered.

Heaving of the excavation floor could disturb the subgrade soils (making them untrafficable and unsuitable for the support of the structure foundations), which in turn can lead to a rapid increase in the rate of groundwater inflow, destabilize the shoring (if toe support in the subgrade soils is part of the shoring design, if required), as well as make compaction of materials and the placement of concrete not feasible.

The resulting disturbance from basal heaving, or from groundwater inflow would result in increased settlements of foundations that were subsequently supported on the subgrade soils (if, for example, a raft foundation system is selected). These settlements would be unpredictable in magnitude and likely highly differential.

It should therefore be planned to depressurize the glacial till layer in advance of excavation and for the duration of the construction if the excavations will be below Elevation 62.5 metres.

Based on the groundwater conditions observed in the monitoring wells (Section 4.7), excavations deeper than approximately 1.8 metres below ground surface (depending on site location) may be below the groundwater level, depending on the time of year that construction occurs. The rate of groundwater inflow into the excavations will depend on many factors, including the contractor's schedule and rate of excavation, the size of the excavation and the time of year at which the excavation is made. Also, there may be instances where precipitation collects in an open excavation and must be rapidly pumped out.

According to O.Reg 63/16 and O.Reg 387/04, if the volume of water to be pumped from excavations for the purpose of construction dewatering is greater than 50,000 litres per day and less than 400,000 litres per day, the water taking will need to be registered as a prescribed activity in the Environmental Activity and Sector Registry (EASR) and requires the completion of a "Water Taking Plan" and "Discharge Plan". Alternatively, a Permit to Take Water (PTTW) is required from the Ministry of the Environment Conservation and Parks (MECP) if a volume of water greater than 400,000 litres per day is to be pumped from an excavation.

Groundwater inflow into the concrete tank excavation was calculated based on the assumption that the depth of the excavation will be 0.5 metres deeper than the provided design inverts and the groundwater level will be 1.5 metres higher than what was measured in monitoring well 18-02. Based on the preliminary designs provided, the size of the excavation was assumed to be approximately 22 by 18 metres with a bottom elevation of 60.6 metres above sea level (masl).

The initial groundwater inflow for the excavation was calculated to be approximately 11,800 litres per day. If trenches are required for site servicing, the groundwater inflow would be expected to be approximately 4,750 litres per day assuming a 20-metre trench length and an excavation depth equivalent to what is required for the concrete tanks. It should be noted that the incident precipitation could add approximately 28,500 litres of water per day to the tank excavation, based on a 72 millimetre precipitation event (a 10 year event as observed at the Ottawa International Airport weather station).

As the amount of predicted groundwater inflow (and incident precipitation) into any single excavation is below 50,000 Litres per day, registry on the EASR or a PTTW is likely not required for construction dewatering. Should several excavations be open at one time, such that greater than 50,000 Litres per day is pumped for construction dewatering, then registration on the EASR would be required. If excavations are left open and precipitation is allowed to accumulate for an extended period of time, the volume of water could exceed 50,000 Litres. In this case, if rapid dewatering is desired, then registration on the EASR may be necessary. If active dewatering is required for excavation for the proposed storage tank, the need for an EASR or a PTTW will need to be reassessed.

The design of the dewatering system should be the responsibility of the contractor. In general, it is anticipated that dewatering for the building excavations can be handled by pumping from properly constructed and filtered sumps located within the excavations. An outlet (or outlets) should be identified which the contractor can use to dispose of the pumped groundwater and incident precipitation.

5.9 Corrosion and Cement Type

One selected soil sample from borehole 18-02 was submitted to Eurofins Laboratories for basic chemical analyses related to potential sulphate attack on buried concrete elements and potential corrosion of buried ferrous elements. The results of this testing are provided in Appendix B.

The results indicate that concrete made with Type GU Portland cement should be acceptable for substructures. The results also indicate a potential for corrosion of exposed ferrous metal, which should be considered in the design of substructures.

6.0 ADDITIONAL CONSIDERATIONS

The soils at this site are sensitive to disturbance from ponded water, construction traffic, and frost.

All footing and subgrade areas should be inspected by experienced geotechnical personnel prior to filling or concreting to ensure that soil having adequate bearing capacity has been reached and that the bearing surfaces have been properly prepared. The placing and compaction of any engineered fill should be inspected to ensure that the materials used conform to the specifications from both a grading and compaction view point. Pile driving activities should be monitored on a full time basis to confirm the final installation depths, deviations from plumb and location, and that the final set criteria has been achieved.

Ontario Regulation 903 would ultimately require abandonment of the monitoring wells installed for this investigation. However, these devices may be useful during construction. It is therefore proposed that decommissioning of these devices be made part of the construction contract.

At the time of the writing of this report, only conceptual details for the proposed works were available. Golder Associates should be retained to review the final drawings and specifications for this project prior to tendering to ensure that the guidelines in this report have been adequately interpreted.

Golder Associates Ltd.

Sarah Ghadbane, P.Eng.
Geotechnical Engineer

Bill Cavers, P.Eng.
Associate, Senior Geotechnical Engineer

CRG/SG/WC/mvrd
https://golderassociates.sharepoint.com/sites/29549g/deliverables/updated draft/18104968-001-r-revb-casselman lagoon geotech report-december2018.docx

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Unless otherwise stated, the suggestions, recommendations and opinions given in this report are intended only for the guidance of the Client in the design of the specific project. The extent and detail of investigations, including the number of test holes, necessary to determine all of the relevant conditions which may affect construction costs would normally be greater than has been carried out for design purposes. Contractors bidding on, or undertaking the work, should rely on their own investigations, as well as their own interpretations of the factual data presented in the report, as to how subsurface conditions may affect their work, including but not limited to proposed construction techniques, schedule, safety and equipment capabilities.

Soil, Rock and Groundwater Conditions: Classification and identification of soils, rocks, and geologic units have been based on commonly accepted methods employed in the practice of geotechnical engineering and related disciplines. Classification and identification of the type and condition of these materials or units involves judgment, and boundaries between different soil, rock or geologic types or units may be transitional rather than abrupt. Accordingly, Golder does not warrant or guarantee the exactness of the descriptions.

Special risks occur whenever engineering or related disciplines are applied to identify subsurface conditions and even a comprehensive investigation, sampling and testing program may fail to detect all or certain subsurface conditions. The environmental, geologic, geotechnical, geochemical and hydrogeologic conditions that Golder interprets to exist between and beyond sampling points may differ from those that actually exist. In addition to soil variability, fill of variable physical and chemical composition can be present over portions of the site or on adjacent properties. **The professional services retained for this project include only the geotechnical aspects of the subsurface conditions at the site, unless otherwise specifically stated and identified in the report.** The presence or implication(s) of possible surface and/or subsurface contamination resulting from previous activities or uses of the site and/or resulting from the introduction onto the site of materials from off-site sources are outside the terms of reference for this project and have not been investigated or addressed.

Soil and groundwater conditions shown in the factual data and described in the report are the observed conditions at the time of their determination or measurement. Unless otherwise noted, those conditions form the basis of the recommendations in the report. Groundwater conditions may vary between and beyond reported locations and can be affected by annual, seasonal and meteorological conditions. The condition of the soil, rock and groundwater may be significantly altered by construction activities (traffic, excavation, groundwater level lowering, pile driving, blasting, etc.) on the site or on adjacent sites. Excavation may expose the soils to changes due to wetting, drying or frost. Unless otherwise indicated the soil must be protected from these changes during construction.

Sample Disposal: Golder will dispose of all uncontaminated soil and/or rock samples 90 days following issue of this report or, upon written request of the Client, will store uncontaminated samples and materials at the Client's expense. In the event that actual contaminated soils, fills or groundwater are encountered or are inferred to be present, all contaminated samples shall remain the property and responsibility of the Client for proper disposal.

Follow-Up and Construction Services: All details of the design were not known at the time of submission of Golder's report. Golder should be retained to review the final design, project plans and documents prior to construction, to confirm that they are consistent with the intent of Golder's report.

During construction, Golder should be retained to perform sufficient and timely observations of encountered conditions to confirm and document that the subsurface conditions do not materially differ from those interpreted conditions considered in the preparation of Golder's report and to confirm and document that construction activities do not adversely affect the suggestions, recommendations and opinions contained in Golder's report. Adequate field review, observation and testing during construction are necessary for Golder to be able to provide letters of assurance, in accordance with the requirements of many regulatory authorities. In cases where this recommendation is not followed, Golder's responsibility is limited to interpreting accurately the information encountered at the borehole locations, at the time of their initial determination or measurement during the preparation of the Report.

Changed Conditions and Drainage: Where conditions encountered at the site differ significantly from those anticipated in this report, either due to natural variability of subsurface conditions or construction activities, it is a condition of this report that Golder be notified of any changes and be provided with an opportunity to review or revise the recommendations within this report. Recognition of changed soil and rock conditions requires experience and it is recommended that Golder be employed to visit the site with sufficient frequency to detect if conditions have changed significantly.

Drainage of subsurface water is commonly required either for temporary or permanent installations for the project. Improper design or construction of drainage or dewatering can have serious consequences. Golder takes no responsibility for the effects of drainage unless specifically involved in the detailed design and construction monitoring of the system.



KEY MAP



SCALE 1:50,000

LEGEND

type

- APPROXIMATE BOREHOLE LOCATION, CURRENT INVESTIGATION
- APPROXIMATE BOREHOLE LOCATION, PREVIOUS INVESTIGATION
- WATERCOURSE
- ROADWAY

NOTE(S)

1. ALL LOCATIONS ARE APPROXIMATE

REFERENCE(S)

1. LAND INFORMATION ONTARIO (LIO) DATA PRODUCED BY GOLDER ASSOCIATES LTD. UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2014
2. SERVICE LAYER CREDITS: © OPENSTREETMAP (AND) CONTRIBUTORS, CC-BY-SA © 2018 MICROSOFT CORPORATION © 2018 DIGITALGLOBE ©CNES (2018) DISTRIBUTION AIRBUS DS
3. PROJECTION: TRANSVERSE MERCATOR, DATUM: NAD 83, COORDINATE SYSTEM: MTM ZONE 9, VERTICAL DATUM: CGVD28

DRAFT

0 15 30 60

1:1,500 METRES

CLIENT

J.L. RICHARDS & ASSOCIATES LIMITED

PROJECT

GEOTECHNICAL INVESTIGATION
UPGRADES TO CASSELMAN LAGOON, CASSELMAN, ON

TITLE

SITE PLAN

CONSULTANT

GOLDER

YYYY-MM-DD	2018-10-16
DESIGNED	----
PREPARED	JEM/BR
REVIEWED	----
APPROVED	----

PROJECT NO.	CONTROL	REV.	FIGURE
18104968	0001	A	**1**

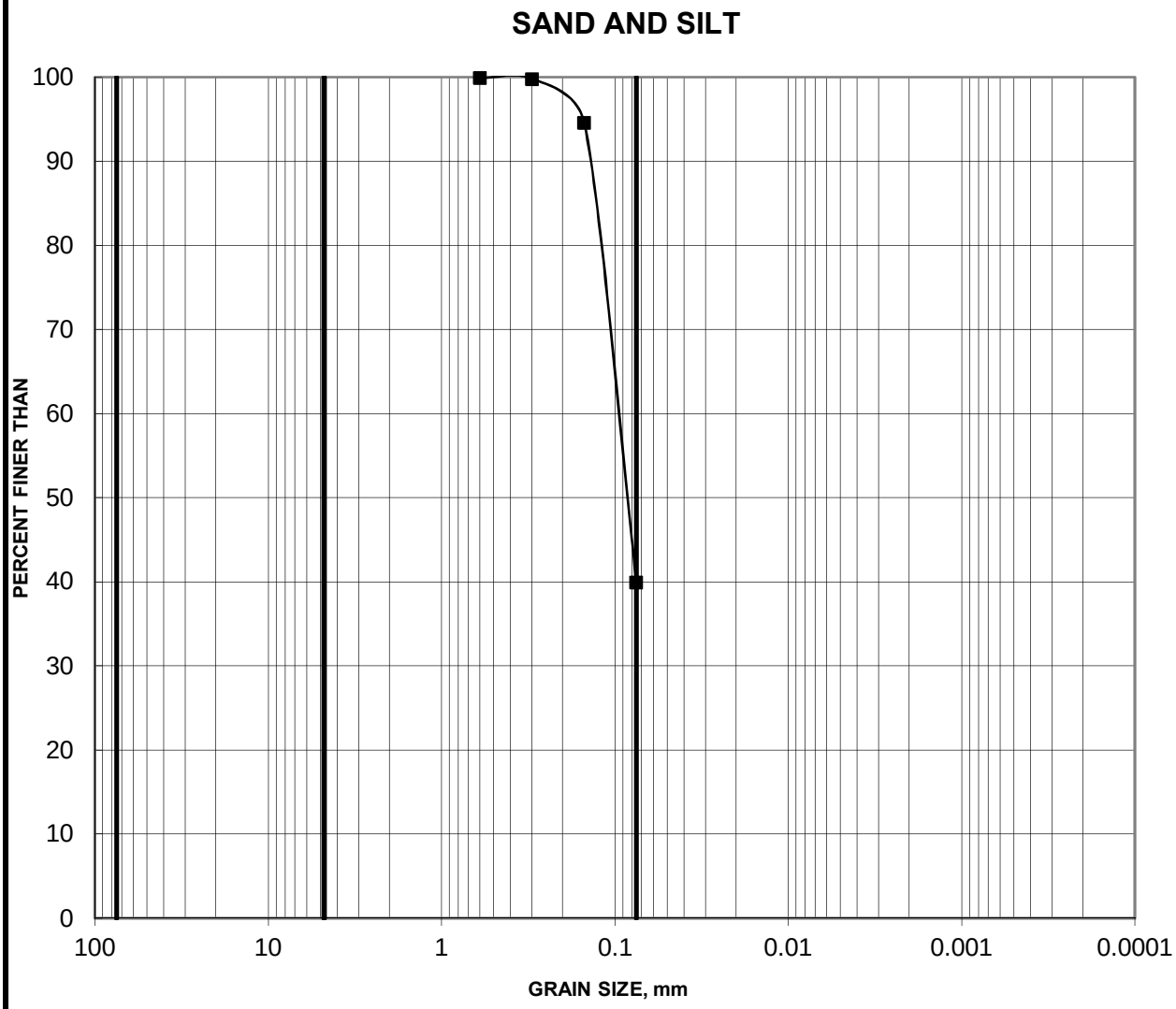
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25mm

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Path: N:\Active\Spatial_IM\Village\OC\Casselman\Casselman\Lagoon\99_PROJ\18104968_JLR_GeotechHydroGr\40_PROD\10\01_Geotech_Investigation\18104968-00\01-BIG-0001.mxd

GRAIN SIZE DISTRIBUTION	FIGURE 2



Cobble	coarse	fine	coarse	medium	fine	SILT AND CLAY
Size	GRAVEL SIZE		SAND SIZE			

Borehole	Sample	Depth (m)
18-01	2	0.76-1.37

Project: 18104968

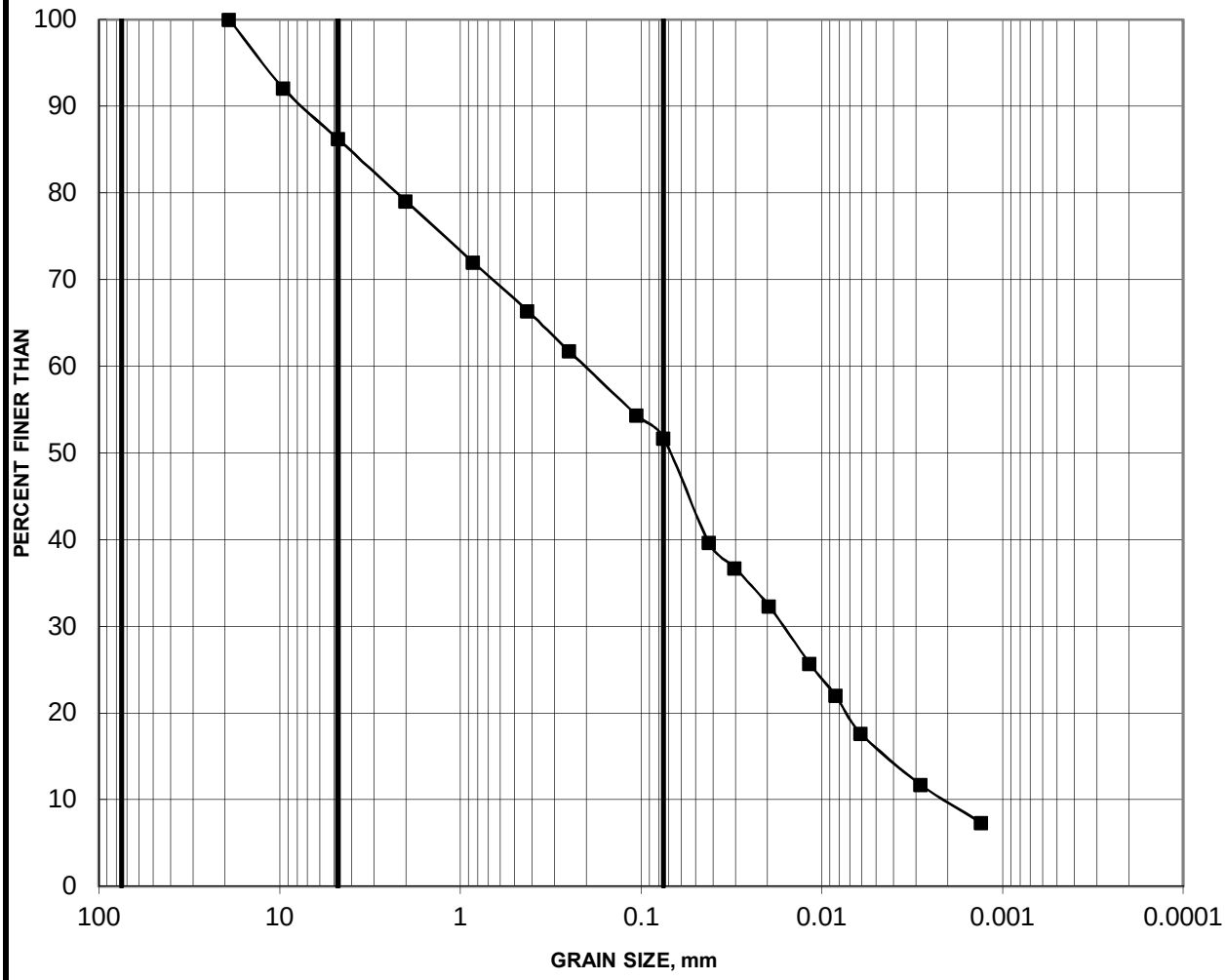
Golder Associates

Created by: MI
Checked by: CW

GRAIN SIZE DISTRIBUTION

FIGURE 3

GLACIAL TILL



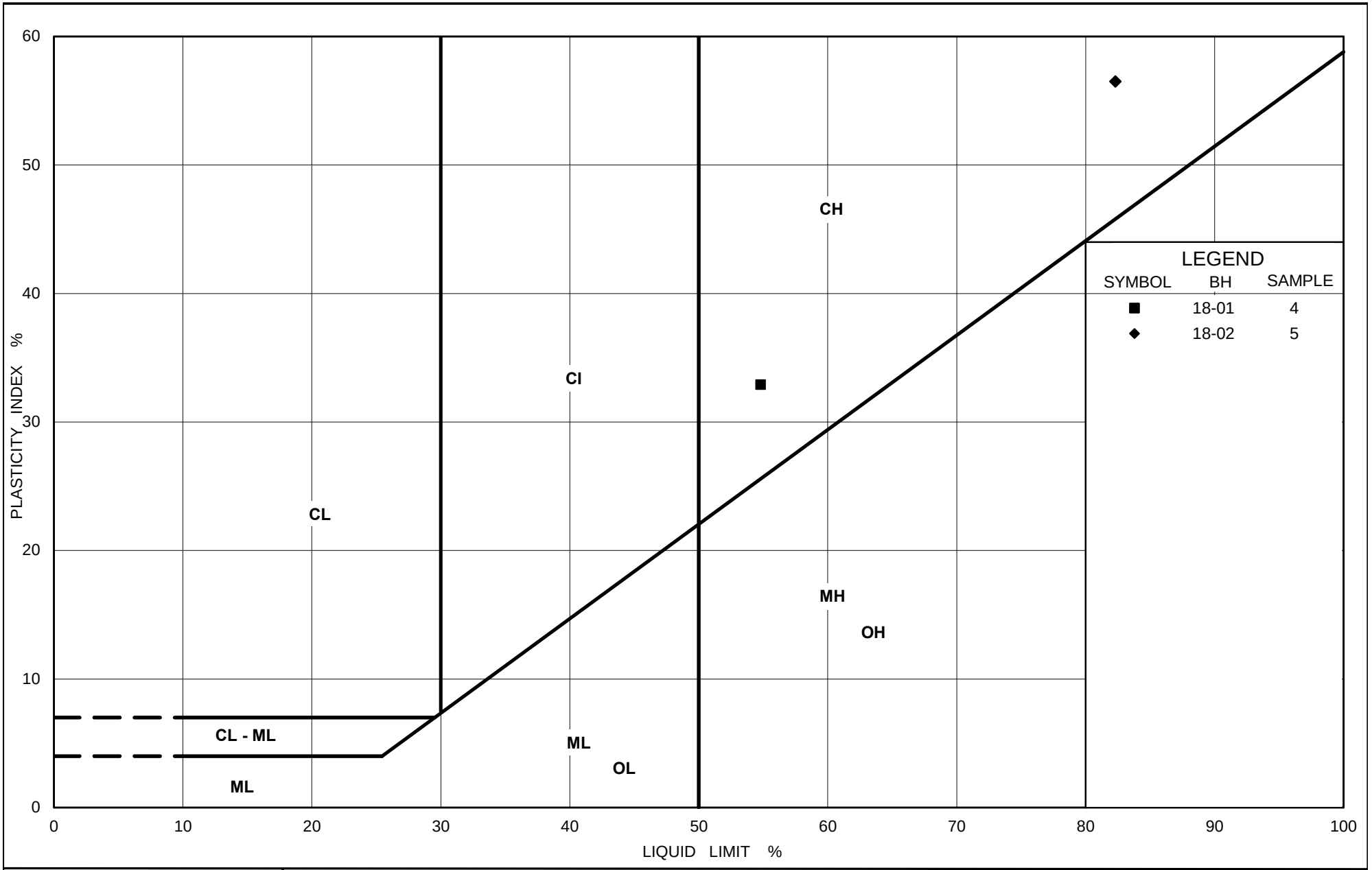
Cobble	coarse	fine	coarse	medium	fine	SILT AND CLAY
Size	GRAVEL SIZE		SAND SIZE			

Borehole	Sample	Depth (m)
18-01	8	7.62-8.23

Project: 18104968

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Checked by: MI



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PLASTICITY CHART
SILTY CLAY TO CLAY

Figure : 4

Project No.: 18104968

Compiled By : CW Checked By : MI

APPENDIX A

Borehole Logs - Current Investigation

LITHOLOGICAL AND GEOTECHNICAL ROCK DESCRIPTION TERMINOLOGY

WEATHERINGS STATE

Fresh: no visible sign of rock material weathering.

Faintly weathered: weathering limited to the surface of major discontinuities.

Slightly weathered: penetrative weathering developed on open discontinuity surfaces but only slight weathering of rock material.

Moderately weathered: weathering extends throughout the rock mass but the rock material is not friable.

Highly weathered: weathering extends throughout rock mass and the rock material is partly friable.

Completely weathered: rock is wholly decomposed and in a friable condition but the rock and structure are preserved.

BEDDING THICKNESS

Description	Bedding Plane Spacing
Very thickly bedded	Greater than 2 m
Thickly bedded	0.6 m to 2 m
Medium bedded	0.2 m to 0.6 m
Thinly bedded	60 mm to 0.2 m
Very thinly bedded	20 mm to 60 mm
Laminated	6 mm to 20 mm
Thinly laminated	Less than 6 mm

JOINT OR FOLIATION SPACING

Description	Spacing
Very wide	Greater than 3 m
Wide	1 m to 3 m
Moderately close	0.3 m to 1 m
Close	50 mm to 300 mm
Very close	Less than 50 mm

GRAIN SIZE

Term	Size*
Very Coarse Grained	Greater than 60 mm
Coarse Grained	2 mm to 60 mm
Medium Grained	60 microns to 2 mm
Fine Grained	2 microns to 60 microns
Very Fine Grained	Less than 2 microns

Note: * Grains greater than 60 microns diameter are visible to the naked eye.

CORE CONDITION

Total Core Recovery (TCR)
The percentage of solid drill core recovered regardless of quality or length, measured relative to the length of the total core run.

Solid Core Recovery (SCR)
The percentage of solid drill core, regardless of length, recovered at full diameter, measured relative to the length of the total core run.

Rock Quality Designation (RQD)
The percentage of solid drill core, greater than 100 mm length, as measured along the centerline axis of the core, relative to the length of the total core run. RQD varies from 0% for completely broken core to 100% for core in solid segments.

DISCONTINUITY DATA

Fracture Index
A count of the number of naturally occuring discontinuities (physical separations) in the rock core. Mechanically induced breaks caused by drilling are not included.

Dip with Respect to Core Axis
The angle of the discontinuity relative to the axis (length) of the core. In a vertical borehole a discontinuity with a 90^{o} angle is horizontal.

Description and Notes
An abbreviation description of the discontinuities, whether naturally occurring separations such as fractures, bedding planes and foliation planes and mechanically separated bedding or foliation surfaces. Additional information concerning the nature of fracture surfaces and infillings are also noted.

Abbreviations

JN	Joint	PL	Planar
FLT	Fault	CU	Curved
SH	Shear	UN	Undulating
VN	Vein	IR	Irregular
FR	Fracture	K	Slickensided
SY	Stylolite	PO	Polished
BD	Bedding	SM	Smooth
FO	Foliation	SR	Slightly Rough
CO	Contact	RO	Rough
AXJ	Axial Joint	VR	Very Rough
KV	Karstic Void		
MB	Mechanical Break		

PROJECT: 18104968

RECORD OF BOREHOLE: 18-01

SHEET 1 OF 1

LOCATION: N 5021200.5 ;E 416033.1

BORING DATE: August 10, 2018

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) SHEAR STRENGTH Cu, kPa (nat V. + Q - ● rem V. ⊕ U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) WATER CONTENT PERCENT (Wp W Wl)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		66.00							
0	Power Auger 200 mm Diam. (Hollow Stem)	TOPSOIL - (SM) SILTY SAND		0.00							
		(SM/ML) SAND and SILT; grey brown, layered; non-cohesive, moist to wet, loose to compact		0.15	1	SS	5				Silica Sand
1					2	SS	15			M	Native Backfill
				64.55							
		(CI/CH) SILTY CLAY to CLAY; red brown (WEATHERED CRUST); cohesive, w>PL, very stiff to stiff		1.45	3	SS	3				Bentonite Seal
2				63.87							
		(CI/CH) SILTY CLAY to CLAY; grey; cohesive, w>PL, firm		2.13							
3					4	SS	WH				Native Backfill
4											
					5	SS	WH				
5				60.36							Bentonite Seal
		(CL/ML) SILTY CLAY and CLAYEY SILT; grey, layered; cohesive, w>PL, stiff		5.64							
6				59.90							Silica Sand
		(ML) sandy SILT, some gravel to gravelly; grey, contains cobbles and boulders (GLACIAL TILL); wet, loose to compact		6.10	6	SS	20				
7					7	SS	6				50mm Diam. PVC #10 Slot Screen
8					8	SS	16			MH	Silica Sand
				57.77							
		End of Borehole		8.23							
9											WL in Screen at Elev. 62.76 m on Aug. 23, 2018
10											

DRAFT

DEPTH SCALE

1 : 50

GOLDER

LOGGED: PAH

CHECKED:

PROJECT: 18104968

RECORD OF BOREHOLE: 18-02

SHEET 1 OF 1

LOCATION: N 5021179.1 ;E 416070.1

BORING DATE: August 10, 2018

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m; SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s; WATER CONTENT PERCENT (Wp, W, Wl)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		65.83							
0	Power Auger 200 mm Diam. (Hollow Stem)	TOPSOIL - (SM) SILTY SAND		0.00							
				65.53	1	SS	8				Native Backfill
		(SM/ML) SAND and SILT; grey brown; non-cohesive, moist to wet, compact		0.30							
1					2	SS	13				Bentonite Seal
				64.46							
		(CI/CH) SILTY CLAY to CLAY; red brown and grey brown (WEATHERED CRUST); cohesive, w>PL, stiff		1.37							
					3	SS	2				
2				63.70							Native Backfill
		(CI/CH) SILTY CLAY to CLAY; grey; cohesive, w>PL, firm		2.13							Bentonite Seal
3					4	SS	WH				Silica Sand
4											50mm Diam. PVC #10 Slot Screen
					5	SS	WH				
5											Silica Sand
6											Bentonite Seal
					6	SS	WH				
7				58.79							
		End of Borehole Inferred top of glacial till		7.04							
8											WL in Screen at Elev. 64.03 m on Aug. 23, 2018
9											
10											

DRAFT

DEPTH SCALE

1 : 50

GOLDER

LOGGED: PAH

CHECKED:

PROJECT: 18104968

RECORD OF BOREHOLE: 18-03

SHEET 1 OF 3

LOCATION: N 5021188.7 ;E 416057.7

BORING DATE: October 25-26, 2018

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp — W — Wl) (20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		65.95							
0	Power Auger 200 mm Diam. (Hollow Stem)	SAND		0.00							
1				64.73							
		Inferred SILTY CLAY		1.22							
2											
3											
4											
5											
6				59.85							
		Inferred GLACIAL TILL, gravel/cobbles evident by auger resistance		6.10							
7											
8											
9	Rotary Drill NW Casing										
10		*CONTINUED NEXT PAGE*									

DRAFT

DEPTH SCALE

1 : 50

GOLDER

LOGGED: PAH

CHECKED:

PROJECT: 18104968

RECORD OF BOREHOLE: 18-03

SHEET 2 OF 3

LOCATION: N 5021188.7 ;E 416057.7

BORING DATE: October 25-26, 2018

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp — W — Wl) (20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---									
10	Rotary Drill NW Casing	Inferred GLACIAL TILL, gravel/cobbles evident by auger resistance									
11					R1	RC	DD				
12											
13					R2	RC	DD				
				52.55							
		Borehole continued on RECORD OF DRILLHOLE 18-03		13.40							
14											
15											
16											
17											
18											
19											
20											

DRAFT

DEPTH SCALE

1 : 50

GOLDER

LOGGED: PAH

CHECKED:

PROJECT: 18104968

RECORD OF DRILLHOLE: 18-03

SHEET 3 OF 3

LOCATION: N 5021188.7 ;E 416057.7

DRILLING DATE: October 25-26, 2018

DATUM: Geodetic

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: CME LC-55

DRILLING CONTRACTOR: Downing Drilling

JN - Joint; FLT - Fault; SHR- Shear; VN - Vein; CJ - Conjugate
BD - Bedding; FO- Foliation; CO- Contact; OR- Orthogonal; CL - Cleavage
PL - Planar; CU- Curved; UN- Undulating; ST - Stepped; IR - Irregular
PO- Polished; K - Slickensided; SM- Smooth; Ro - Rough; MB- Mechanical Break
BR - Broken Rock
NOTE: For additional abbreviations refer to list of abbreviations & symbols.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. / DEPTH (m)	RUN No.	COLOUR % RETURN / FLUSH	RECOVERY: TOTAL CORE %	RECOVERY: SOLID CORE %	R.Q.D. %	FRACT. INDEX PER 0.25 m	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	Jcon	Jr	Ja	HYDRAULIC CONDUCTIVITY K, cm/sec	Diametral Point Load Index (MPa)	RMC -Q' AVG.
		BEDROCK SURFACE		52.55														
14	Rotary Drill / NQ Core	Slightly weathered, thinly bedded, medium grey, fine to medium grained, faintly porous, very strong SHALEY LIMESTONE, with sandy dolostone interbeds		13.40	1	100												
15					2	100												
16				49.55	3	100												
		End of Drillhole		16.40														
17																		
18																		
19																		
20																		
21																		
22																		
23																		

DRAFT

DEPTH SCALE

1 : 50

GOLDER

LOGGED: PAH

CHECKED:

PROJECT: 18104968

RECORD OF BOREHOLE: 18-04

SHEET 1 OF 3

LOCATION: N 5021166.6 ;E 416046.1

BORING DATE: October 25, 2018

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp — W — Wl)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		66.50							
0	Power Auger 200 mm Diam. (Hollow Stem)	FILL - (ML) CLAYEY SILT, some sand, trace gravel		0.00	1	GRAB	-				
				65.89							
		TOPSOIL - (ML) sandy SILT; dark brown		0.61							
1		(SP) SAND, fine; grey brown; non-cohesive, moist, compact		0.76	2	SS	10				
				64.67							
2		Inferred (CI/CH) SILTY CLAY		1.83							
3											
4											
5											
6											
7				59.18							
		Inferred GLACIAL TILL		7.32							
8											
9											
10		*CONTINUED NEXT PAGE*									

DRAFT

DEPTH SCALE
1 : 50

GOLDER

LOGGED: PAH
CHECKED:

MIS-BHS 001 18104968.GPJ GAL-MIS.GDT 11/19/18 ZS

PROJECT: 18104968

RECORD OF BOREHOLE: 18-04

SHEET 2 OF 3

LOCATION: N 5021166.6 ;E 416046.1

BORING DATE: October 25, 2018

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp — W — Wl) (20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---									
10	Power Auger 200 mm Diam. (Hollow Stem)	Inferred GLACIAL TILL									
11											
12					R1	RC	DD				
					R2	RC	DD				
				53.85							
		Borehole continued on RECORD OF DRILLHOLE 18-04		12.65							
13											
14											
15											
16											
17											
18											
19											
20											

DRAFT

DEPTH SCALE

1 : 50

GOLDER

LOGGED: PAH

CHECKED:

PROJECT: 18104968

RECORD OF DRILLHOLE: 18-04

SHEET 3 OF 3

LOCATION: N 5021166.6 ;E 416046.1

DRILLING DATE: October 25, 2018

DATUM: Geodetic

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: CME LC-55

DRILLING CONTRACTOR: Downing Drilling

JN - Joint; FLT - Fault; SHR- Shear; VN - Vein; CJ - Conjugate
BD - Bedding; FO- Foliation; CO- Contact; OR- Orthogonal; CL - Cleavage
PL - Planar; CU- Curved; UN- Undulating; ST - Stepped; IR - Irregular
PO- Polished; K - Slickensided; SM- Smooth; Ro - Rough; MB- Mechanical Break
BR - Broken Rock
NOTE: For additional abbreviations refer to list of abbreviations & symbols.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. / DEPTH (m)	RUN No.	COLOUR % RETURN / FLUSH	RECOVERY: TOTAL CORE %	RECOVERY: SOLID CORE %	R.Q.D. %	FRACT. INDEX PER 0.25 m	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	Jcon	Jr	Ja	HYDRAULIC CONDUCTIVITY K, cm/sec	Diametral Point Load Index (MPa)	RMC -Q' AVG.
		BEDROCK SURFACE		53.85														
13	Rotary Drill / NQ Core	Slightly weathered, thinly bedded, medium grey, fine to medium grained, faintly porous, very strong SHALEY LIMESTONE, with sandy dolostone interbeds		12.65	1	100												
14					2	100												
15					3	100												
16				50.34	4	100												
					5	100												
		End of Drillhole		16.16														
17																		
18																		
19																		
20																		
21																		
22																		

DRAFT

DEPTH SCALE
1 : 50

GOLDER

LOGGED: PAH
CHECKED:

APPENDIX B

Borehole Logs and Lab - Previous Investigation

PROJECT: 05-1120-157

RECORD OF BOREHOLE: 05-16

SHEET 1 OF 1

LOCATION: See Site Plan

BORING DATE: November 11, 2005

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl; 20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		Ground Surface		66.04							
0	Power Auger 200mm Diam. (Hollow Stem)	Dark silty TOPSOIL		0.00 / 65.70							
		Compact brown stratified SILTY fine SAND		0.34	1	50 DO	13			MH	
1				64.46							
		Firm grey brown and red brown SILTY CLAY (Weathered Crust)		1.58	2	50 DO	1	⊕ + ⊕ +			
2				63.14							
		Firm grey SILTY CLAY		2.90	3	50 DO	WH				
3				62.38							
		End of Borehole		3.66							
4											
5											
6											
7											
8											
9											
10											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: D.J.S.

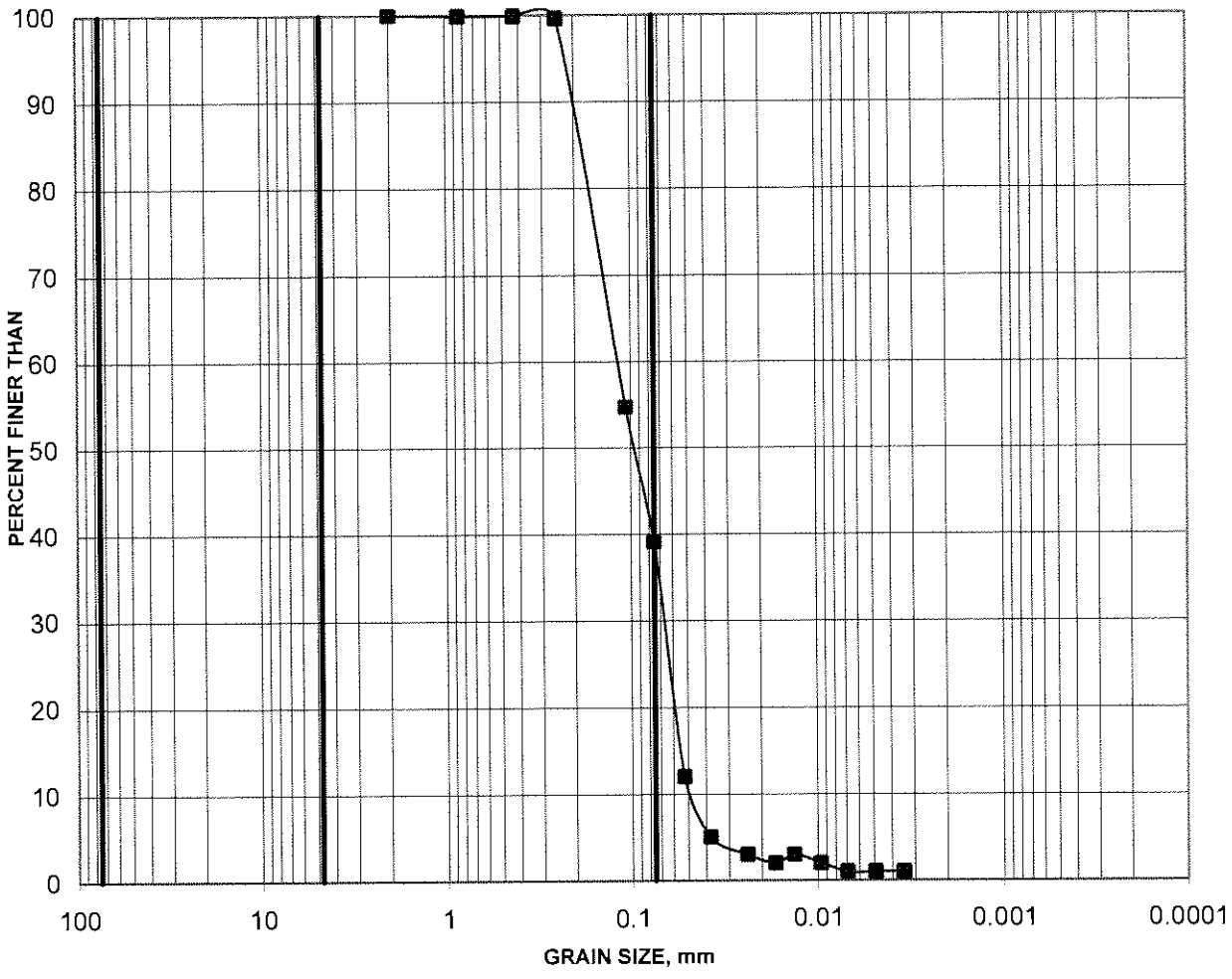
CHECKED: F.H.

BOREHOLE 05-1120-157.GPJ HYDROGEO.GDT 12/7/05

GRAIN SIZE DISTRIBUTION

FIGURE 3

Silty Fine Sand



Cobble	coarse	fine	coarse	medium	fine	SILT AND CLAY
Size	GRAVEL SIZE		SAND SIZE			

Borehole	Sample	Depth (m)
05-16	1	0.8-1.4

Project: 051120157

Golder Associates

Created by: MaD

Checked by: BaJ

APPENDIX C

Results of Hydraulic Conductivity Testing

BOUWER AND RICE SLUG TEST ANALYSIS
RISING HEAD TEST 18-01

INTERVAL (metres below ground surface)

Top of Interval =	**6.10**
Bottom of Interval =	**7.62**

$$K = \frac{r_c^2 \ln\left(\frac{R_e}{r_w}\right)}{2L_e} \frac{1}{t} \ln\frac{y_0}{y_t}$$

where K=m/sec

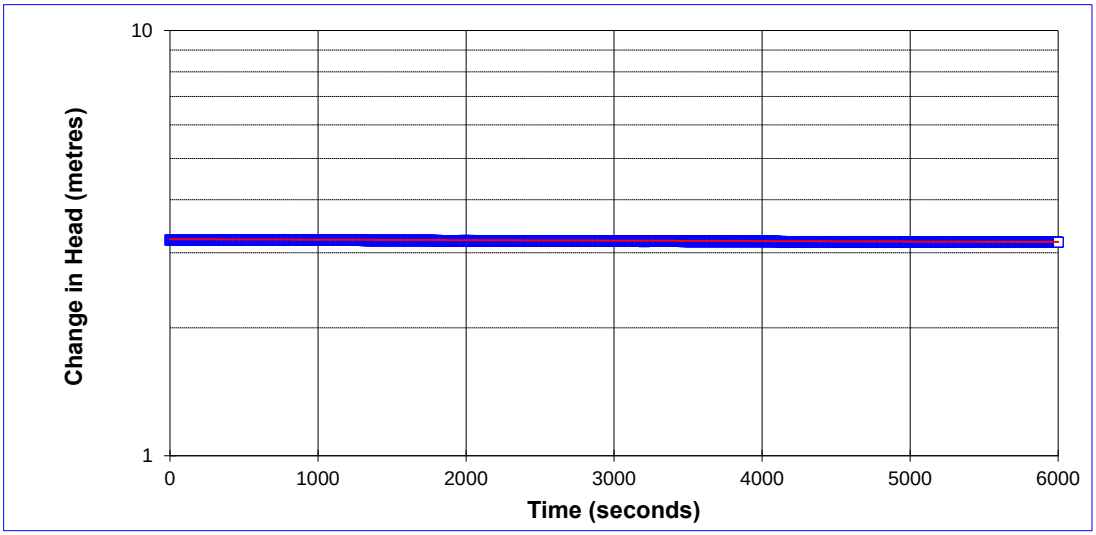
where:

r_c = casing radius (metres);
R_e = effective radius (metres);
L_e = length of screened interval (metres);
r_w = radial distance to undisturbed aquifer (metres)
y_0 = initial drawdown (metres)
y_t = drawdown (metres) at time t (seconds)

INPUT PARAMETERS	
r_c =	**0.06**
r_w =	**0.10**
L_e =	**1.52**
$\ln(R_e/r_w)$ =	**2.00**
y_0 =	**3.23**
y_t =	**3.19**
t =	**5000.0**

RESULTS

K=	**6E-09**	**m/sec**
K=	**6E-07**	**cm/sec**



Project Name: JLR/Casselman Lagoon/Ottawa
Project No.: 18104968
Test Date: 8/23/2018

Analysis By: BH
Checked By: BTB
Analysis Date: 8/30/2018

BOUWER AND RICE SLUG TEST ANALYSIS
RISING HEAD TEST 18-02

INTERVAL (metres below ground surface)

Top of Interval =	**3.35**
Bottom of Interval =	**4.88**

$$K = \frac{r_c^2 \ln\left(\frac{R_e}{r_w}\right)}{2L_e} \frac{1}{t} \ln\frac{y_0}{y_t}$$

where K=m/sec

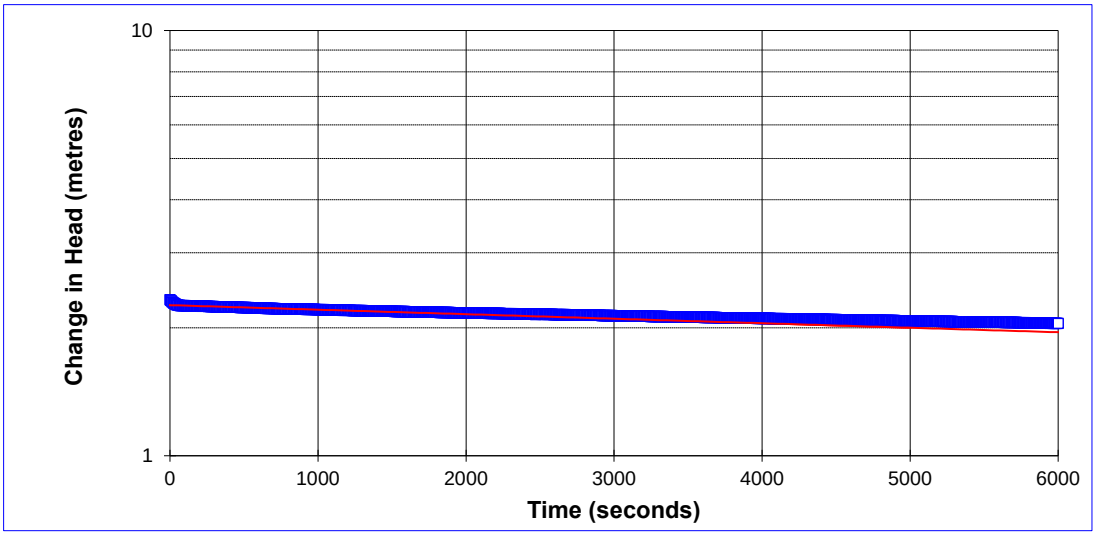
where:

r_c = casing radius (metres);
R_e = effective radius (metres);
L_e = length of screened interval (metres);
r_w = radial distance to undisturbed aquifer (metres)
y_0 = initial drawdown (metres)
y_t = drawdown (metres) at time t (seconds)

INPUT PARAMETERS	
r_c =	**0.06**
r_w =	**0.10**
L_e =	**1.53**
$\ln(R_e/r_w)$ =	**1.88**
y_0 =	**2.26**
y_t =	**2.00**
t =	**5000.0**

RESULTS

K=	**5E-08**	**m/sec**
K=	**5E-06**	**cm/sec**



Project Name: JLR/Casselman Lagoon/Ottawa
Project No.: 18104968
Test Date: 8/23/2018

Analysis By: BH
Checked By: BTB
Analysis Date: 8/30/2018

APPENDIX D

Results of Chemical Analyses

Certificate of Analysis

eurofins | Environment Testing

Client: Golder Associates Ltd. (Ottawa)
1931 Robertson Road
Ottawa, ON
K2H 5B7
Attention: Ms. Sarah Ghadbane
PO#:
Invoice to: Golder Associates Ltd. (Ottawa)

Report Number: 1815791
Date Submitted: 2018-08-31
Date Reported: 2018-09-07
Project: 18104968
COC #: 835333

				Lab I.D.	1384713
				Sample Matrix	Soil
				Sample Type	
				Sampling Date	2018-08-10
				Sample I.D.	18-02 SA 4/10-12
Group	**Analyte**	**MRL**	**Units**	**Guideline**	
Anions	Cl	0.002	%		<0.002
	SO4	0.01	%		<0.01
General Chemistry	Electrical Conductivity	0.05	mS/cm		0.35
	pH	2.00			8.31
	Resistivity	1	ohm-cm		2860

Guideline = *** = Guideline Exceedence**

Results relate only to the parameters tested on the samples submitted.
Methods references and/or additional QA/QC information available on request.

MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality Guideline, IPWQO = Interim Provincial Water Quality Objective, TDR = Typical Desired Range

APPENDIX E

Results of UCS Testing and Core Photos

Golder Associates Ltd.
1931 Robertson Road
Ottawa, Ontario
K2H 5B7

GOLDER

UNCONFINED COMPRESSIVE STRENGTH OF ROCK CORE

Project: JLR Casselman Lagoon

Project No.: 18104968

Date: November 5, 2018

Location(s): See Table Below

Bore Hole No.	Depth (m)	Date Tested	Core Size	Diameter (mm)	Density (kg/m³)	Compressive Strength (MPa)	Failure Mode
18-03	13.42-13.53	Oct 2/18	NQ	47.3	2709	139.9	
18-04	13.48-13.59	Oct 2/18	NQ	45.2	2692	137.1	

REMARKS :
- Cores tested in vertical direction.
- Cores tested in air-dry condition.
- Specimen ends prepared with high-strength plaster, but un-restrained.
- L/D ratio's between 2.0:1 and 2.5:1
- Time to failure > 2 and < 15 minutes.
- This report constitutes a testing service only. Interpretation of results will be provided on request only.

TESTING WAS CARRIED OUT IN GENERAL ACCORDANCE WITH ASTM D7012 - Method C

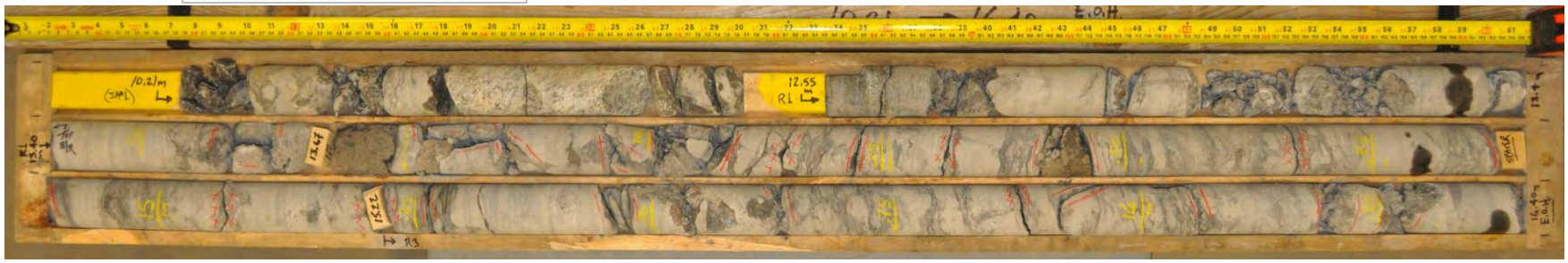
SIGNED: Melanie Ireland

BH 18-03 (Dry)

Cored Length of 10.21 to 16.40 metres

Core Box 1 of 1

10.21 m Top of Bedrock



16.40 m End of Borehole

GOLDER	**Geotechnical Investigation** **Casselman Lagoon** **Casselman, Ontario**	Project No. 18104968 Drawn: SG Date: 12/10/2018 Checked: Review:	**Figure E1**

BH 18-03 (Wet)

Cored Length of 10.21 to 16.40 metres

Core Box 1 of 1

10.21 m Top of Bedrock



16.40 m End of Borehole

GOLDER	**Geotechnical Investigation** **Casselman Lagoon** **Casselman, Ontario**	Project No. 18104968 Drawn: SG Date: 12/10/2018 Checked: Review:	**Figure E2**

BH 18-04 (Dry)

Cored Length of 11.58 to 16.16 metres

Core Box 1 of 1

11.58 m Top of Bedrock



16.16 m End of Borehole

GOLDER	**Geotechnical Investigation** **Casselman Lagoon** **Casselman, Ontario**	Project No. 18104968 Drawn: SG Date: 12/10/2018 Checked: Review:	**Figure E3**

BH 18-04 (Wet)

Cored Length of 11.58 to 16.16 metres

Core Box 1 of 1

11.58 m Top of Bedrock



16.16 m End of Borehole

GOLDER	**Geotechnical Investigation** **Casselman Lagoon** **Casselman, Ontario**	Project No. 18104968 Drawn: SG Date: 12/10/2018 Checked: Review:	**Figure E4**



golder.com

Appendix D3

Geotechnical and Hydrogeological Investigation, Casselman Main Sewage Pumping Station Upgrades (January 2025)

GEMTEC
www.gemtec.ca

Geotechnical and Hydrogeological Investigation
Casselman Main Sewage Pumping Station Upgrades
Casselman, Ontario

GEMTEC
www.gemtec.ca

Submitted to:

J. L. Richards & Associates Limited
700-1565 Carling Avenue
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Geotechnical and Hydrogeological Investigation
Casselman Main Sewage Pumping Station Upgrades
Casselman, Ontario

January 6, 2025
Project: 100117.051-Rev1

experience • knowledge • integrity

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January 6, 2025 File: 100117.051-Rev1

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Attention: Mr. Jordan Morrissette, P.Eng., M.Eng.

Re: Geotechnical and Hydrogeological Investigation
Casselman Main Sewage Pumping Station Upgrades
Casselman, Ontario

Please find enclosed our geotechnical and hydrogeological investigation report for the above noted project, in accordance with our proposal dated January 26, 2024, and revised July 17, 2024. This report was prepared by Mr. Luc Bouchard, P.Eng. ing.

Luc Bouchard, P.Eng. ing.

LB/AP/DC/AB

Enclosures
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1.0 INTRODUCTION

This report presents the results of a geotechnical and hydrogeological investigation carried out by GEMTEC Consulting Engineers and Scientists Limited (GEMTEC) for the proposed Casselman Main Sewage Pumping Station Upgrades project in Casselman, Ontario (see Borehole Location Plan, Figure A1 to A3) in Appendix A.

The purpose of the investigation was to identify the general subsurface conditions at the site by means of a limited number of boreholes and probe holes and, based on the factual information obtained along with supplemental information from a previous geotechnical investigation undertaken at the site by Golder Associates, to provide engineering guidelines and recommendations on the geotechnical design aspects of the project, including construction considerations that could influence design decisions. In addition, hydraulic testing was carried out to assess the hydraulic conductivity of the soil at selected locations along the proposed alignment. The investigation was carried out in general accordance with our proposals dated January 26, 2024, and July 17, 2024.

The results of the Environmental Excess Soil Investigation and a Species at Risk assessment carried out by GEMTEC are provided in separate reports.

This report is subject to the Conditions and Limitations of This Report, which follows the text of the report, and which are considered an integral part of the report.

2.0 BACKGROUND

2.1 Project Description

Based on information provided to GEMTEC by JLR the project will consist of upgrading the existing Casselman Main Sewage Pumping Station (SPS). Details of the proposed works are shown on drawings C101 to C109 inclusive, titled “Forcemain Plan & Profile” dated September 2024 and prepared by J.L. Richards. The upgrading works include:

- Installation of a new 525 millimetre diameter concrete overflow pipe and flapper type gate value. The overflow pipe will be installed from an existing manhole on the north side of the SPS, with the flapper gate outletting into the South Nation River a relatively short distance to the north of the SPS. The details of this component of the works are to be confirmed., however shallow excavations within about 3 metres depth are anticipated.
- Installation of a new 400 millimetre diameter HDPE forcemain from the existing SPS at the intersection of Brisson Street and Principale Street to the location identified as Lagoon Cell 1 East Berm. The length of forcemain to be installed is about 2,000 metres. The alignment is expected to be along the same alignment as the existing forcemain (within road allowances and existing easements). The forcemain will be constructed within Laurier Street.

It is also understood full road width reconstruction is being considered along Brisson Street, and that trench reinstatement of the roadway is being considered along Laurier Street, the Sainte-Euphémie Catholic Elementary School, and the lagoon access road.

2.2 Summary of Existing Information

From a review of geological maps its noted that variable soil conditions are identified along the pipeline routes. These include the following:

- Fine-textured glaciomarine deposits of silt and clay with minor sand and gravel in the vicinity of the SPS and lagoons;
- Sandy silt to silty sand glacial till, which frequently contains cobbles and boulders east of the pump station;
- Coarse-textured glaciomarine deposits of sand and gravel with minor silt and clay in the vicinity of the lagoons.

The mapped bedrock types include limestone, dolostone, shale and sandstone of the Shallow Lake Formation.

Table 2.1 provides a summary of available information for the existing pipelines and anticipated conditions in the area of the sewers. In addition to the anticipated conditions identified in the table fill material associated with the existing roadway and buried services should also be expected – particularly where excavations are carried out next to or through existing utility / service trenches.

JLR has provided GEMTEC with the report "Application for a Permit to Take Water for Construction Excavation Dewatering, Sewage Pumping Station Expansion and Upgrade, Casselman, Ontario" by Golder Associates, dated March 2006. The report, which is referred to further as Golder (2006) includes borehole logs of the overburden material along the original alignment of the forcemain. Upon review of the logs, the overburden material is noted to be consistent with the anticipated overburden material provided in Table 2.1. It is understood that GEMTEC is permitted to use the information within the report for the purpose of this investigation.

Table 2.1: Summary of Available Information

Roadway Segment	Length (metres)	Approximate Invert Depth of Existing Sewer (metres)	Anticipated Overburden Material
New Influent Sewer at SPS (To Be Confirmed)	-	6 to 7	Fill Material, Silty clay, Shallow Bedrock
Brisson St (SPS (pump station) to easement)	285	2.6 to 3.2	Fill Material, Silty clay, Shallow Bedrock

Roadway Segment	Length (metres)	Approximate Invert Depth of Existing Sewer (metres)	Anticipated Overburden Material
Easement (from Brisson St. to Laurier St)	650	2.5 to 3.0	Silty clay, glacial till, Shallow Bedrock Along West Portion of the Easement
Laurier St (Easement to Lagoon Access Road)	225	3.0 to 3.5	Silty Clay, Glacial Till, Possible Bedrock Near Mid-Point
Lagoon Access Road (Laurier St. to Berm Between Lagoon Cells)	480	2.5 to 3.0	Sand, Silty Clay, Glacial Till
Berm Between Lagoon Cells (Lagoon Access Rd to project limit)	290	2.5	Fill material, Sand, Silty Clay, Glacial Till

3.0 SUBSURFACE INVESTIGATION

3.1 Geotechnical Investigation

The fieldwork for this investigation was carried out between July 18 and July 26, 2024. During that time, a total of 17 boreholes and probe holes were advanced within the project area. Details of the ground investigation points are provided in Table 3.1.

The boreholes were advanced using a truck and a track mounted drill rig supplied and operated by George Downing Estate Drilling Ltd. of Grenville-Sur-La-Rouge, Quebec.

The fieldwork was observed by members of our engineering staff who directed the drilling operations, observed the in-situ testing and logged the samples and boreholes. Standard penetration tests (SPT) were carried out where possible within the overburden deposits and samples of the soils encountered were recovered using drive open sampling equipment. The bedrock samples were collected using HQ size coring equipment.

Table 3.1: Ground Investigation Details

Borehole ID	Ground Surface Elevation (metres)	Borehole Depth (metres)	Cored Bedrock (Y/N)	Well Screen Installed (Y/N)
24-1	61.9	3.8 (Refusal)	N	N
MW24-1	62.0	4.0 (Refusal)	N	Y
24-2	59.2	4.4	Y	N
24-3	58.6	1.9 (Refusal)	N	N
24-4	58.3	4.9	Y	Y
24-5	Removed from work program due to unlocatable sanitary forcemain			
24-6	63.9	4.42	N	N
24-7 (probe)	64.4	4.6	N	N
24-8	65.8	4.4	N	N
24-9 (probe)	66.5	4.6	N	N
24-10	65.4	4.4	N	Y
24-11 (probe)	65.4	5.2	N	N
24-12	64.8	5.2	N	N
24-13	Removed from work program due to unlocatable sanitary forcemain			
24-14 (probe)	67.7	4.6	N	N
24-15	67.8	4.4	N	N
24-16	67.6	6.7	N	Y
24-17	67.7	4.4	N	N
24-18	61.5	8.8	Y	Y

Well screens were sealed in the overburden at boreholes MW24-1, 24-4, 24-10, 24-16, and 24-18 to measure the groundwater levels, carry out hydraulic testing, and to allow groundwater sampling. Well screens were surrounded by a sand filter pack, above which bentonite sealant, native materials, and/or sand were used to fill the annular space back to surface. Details of the well construction are presented on the Record of Borehole sheets in Appendix B. It should be noted that the monitoring well MW24-1 was constructed about 1.5 metres south of borehole 24-1.

Following the borehole drilling work, the soil and bedrock samples were returned to our laboratory for examination by a geotechnical engineer. Selected samples of the soil were tested for water content, grain size distribution, Atterberg limits testing, and unconfined compressive strength testing. Samples of the groundwater were recovered from selected boreholes and sent to Paracel Laboratories Ltd. for basic chemical testing relating to corrosion of buried concrete and steel.

The approximate locations of the boreholes are shown on the Borehole Location Plan, Figure A1 to A3 provided in Appendix A. Descriptions of the subsurface conditions logged in the boreholes are provided on the Record of Borehole Sheets in Appendix B. The results of the soil classification testing are provided in Appendix C.

The borehole locations were positioned at the site by GEMTEC personnel and placed relative to existing site features. The location and ground surface elevations at the boreholes were determined using a Trimble R10 GPS survey instrument. The elevations are referenced to datum CGVD28.

3.2 Hydrogeological Investigation

3.2.1 Hydraulic Testing

Hydraulic testing was carried out in the well screens to estimate the hydraulic conductivity of the overburden soils within the anticipated depth of possible excavations and, if possible, to provide an estimate of the potential quantity of water entering future excavations.

The hydraulic testing consisted of a series of bail down tests. Bail down testing involved introducing a rapid pressure decrease to the water column within the well screen by pumping the well rapidly and monitoring the recovery of the water level over time using a groundwater data logging pressure transducer together with an electric water level tape. A summary of the hydraulic testing carried out is provided in Table 3.2.

The water level recovery was analysed in Aqtesolv® Version 4.50 (HydroSOLVE Inc., 2007) to estimate the hydraulic conductivities of screened materials.

Table 3.2: Summary of Hydraulic Testing

Borehole / Well ID	Geological Material Screened
MW24-1	Silty Clay / Silty Sand (Glacial Till)
24-4	Bedrock
24-10	Silty Sand (Glacial Till)

Borehole / Well ID	Geological Material Screened
24-16	Silty Sand / Silty Clay
24-18	Bedrock

Notes: Soil layers from MW24-1 are assumed to be comparable to borehole 24-1

3.2.2 Groundwater Quality Sampling

Groundwater quality samples were collected from the monitoring wells at boreholes 24-10, 24-16, and 24-18 on August 8, 2024. Boreholes 24-10, 24-16, and 24-18 were resampled on September 10, 2024, due to high sediment loads in the original samples, following additional well development. All samples were collected in laboratory supplied bottles and submitted to a CALA-accredited laboratory. The first samples were submitted for the "Baseline Monitoring Report" parameters, as described in the "Request to Discharge Wastewater from Construction Remediation Projects" application form, distributed by the City of Ottawa, and filtered metals; these parameters include pH, electrical conductivity, total suspended solids, volatile suspended solids, total and dissolved phosphorous, Total Kjeldahl Nitrogen (TKN), total PHCs, volatile organic compounds, semi-volatile organic compounds, hexachlorobenzene (pesticide), dissolved and total metals, and polychlorinated biphenyls. The second round of samples included a subset of the same parameters that may have been impacted by excessive sediments in the first round and dissolved phosphorous.

4.0 SUBSURFACE CONDITIONS

A description of the subsurface conditions along portions of the project extent are provided in the subsections below. These are as follows:

- SPS and Brission Street
- Field and School Yard
- Laurier Street
- Lagoon area.

4.1 SPS and Brisson Street (Boreholes 24-1 to 24-4, and 24-18)

4.1.1 Existing Roadway Structure

Boreholes 24-1 to 24-4 inclusive were advanced through the roadway structure along Brisson Street. At borehole 24-1, the roadway consisted of about 30 millimetres of asphaltic concrete overlying about 0.4 metres of grey, crushed sand and gravel with trace silt (base/subbase material).

At boreholes 24-2 to 24-4, the gravel roadway structure consists of about 0.2 to 0.7 metres of grey crushed sand and gravel with trace silt (Roadway Material) from surface.

The water content of a sample of the base/subbase material from borehole 24-1 is about 3 percent.

4.1.2 Topsoil

At boreholes 24-18, an 80-millimetre-thick layer of topsoil was encountered at ground surface.

4.1.3 Fill Material

Fill material was encountered below the gravel roadway structure at boreholes 24-2 and 24-3, and below the topsoil at boreholes 24-18. The fill material generally consists brown silty sand with varying amounts of gravel, silt, and clay. Boulders were inferred in the fill material at borehole 24-18. The fill material at boreholes 24-3 consisted of grey gravel with some sand.

In the roadway, the fill material thickness is about 1 metre at the borehole locations. At the location of borehole 24-18, by the SPS, the fill material has a thickness of about 4.6 metres.

Standard penetration tests carried out in the fill material gave N values of 2 to greater than 50 blows per 0.3 metres of penetration, which reflect a very loose to very dense relative density. The higher N values may reflect the presence of cobbles and boulders or other hard material within the fill material.

A grain size distribution test was undertaken on a sample of the fill material from borehole 24-18. The results are provided in Appendix C and are summarized in the Table 4.1. The water content of samples of the fill material from borehole 24-18 range from about 15 to 23 percent.

Table 4.1: Summary of Grain Size Distribution Results – Fill Material

Borehole & Sample ID	Depth (metres)	Clay (<2 µm) (%)	Silt (2 - 75 µm) (%)	Sand (75 µm - 5 mm) (%)	Gravel (5 - 80 mm) (%)	Water Content (%)
24-18 (SA4)	2.3 – 2.9	31	42	22	5	19

4.1.4 Silty Clay

A native deposit of silty clay was encountered at boreholes 24-1 to 24-3 at depths ranging from about 0.4 to 1.2 metres below surface grade.

The silty clay encountered has been weathered to a grey brown and red brown crust. The silty clay has a thickness ranging from about 0.7 to 2.6 metres and extends to a depth of about 1.9 to

3.1 metres. Borehole 24-3 was terminated within the silty clay at a depth of 1.9 metres due to auger refusal on the inferred bedrock surface (at about elevation 56.8 metres).

Standard penetration tests carried out in the weathered silty clay gave N values of 7 to 14 blows per 0.3 metres of penetration, which reflect a stiff to very stiff consistency.

Grain size distribution tests and an Atterberg limits tests were undertaken on samples of the silty clay. The results are provided in Appendix C and are summarized in the Tables 4.2 and 4.3.

The moisture content of samples of the silty clay was found to range from about 20 to 41 percent. The moisture content of the samples tested are generally below the measured liquid limit value.

Table 4.2: Summary of Grain Size Distribution Results – Silty Clay Deposit

Borehole & Sample ID	Depth (metres)	Clay (<2 µm) (%)	Silt (2 - 75 µm) (%)	Sand (75 µm - 5 mm) (%)	Gravel (5 - 80 mm) (%)
24-1 (SA3)	1.5 – 2.1	68	31	1	0

Table 4.3: Summary of Atterberg Limits Test Results

Borehole & Sample ID	Depth (metres)	Liquid Limit (%)	Plastic Limit (%)	Water Content (%)
24-1 (SA3)	1.5 – 2.1	57	24	28

4.1.5 Glacial Till

Deposits of glacial till were encountered below the silty clay in boreholes 24-1 and 24-2 at depths of 3.1 and 2.3 metres below surface grade, respectively. Borehole 24-1 was terminated within the glacial till deposits at about 3.8 metres below ground surface at auger refusal.

The glacial till can be generally described as brown and grey silty sand with variable amounts of clay, silt and gravel. Cobbles and boulders should be expected within the glacial till.

Standard penetration tests carried out in the glacial till gave an N values of 34 to greater than 50 blows per 0.3 metres of penetration, which reflects dense to very dense relative density. However, the higher N values may also indicate the presence of cobbles or boulders within the glacial till.

The water content of a glacial till sample from borehole 24-1 was about 11 percent.

4.1.6 Auger Refusal / Bedrock

Auger refusal on the inferred bedrock surface was encountered at all of the borehole locations at depths of 0.7 to 4.6 metres below surface grade (elevations 56.7 to 58.1 metres).

Rotary coring was carried out at boreholes 24-2, 24-4, and 24-18 to confirm the presence of bedrock at these locations. The recovered bedrock core consists of slightly weathered to fresh limestone bedrock with shale beds which has close to moderately close discontinuity spacings. The solid core recovery (SCR) values range from about 77 to 99 percent, and the rock quality designation (RQD) values range from about 48 to 92 percent. Therefore, the bedrock quality according to the recovered core samples is poor to excellent. It should be noted that the quality of the bedrock is lower near the surface of the bedrock. Bedrock core photographs are provided in Appendix F.

Selected samples of bedrock core were tested for unconfined compressive strength and the results are summarized in Table 4.4 below. Based the results the strength of the recovered core samples may be classified as strong to very strong, according to the rock strength classification system provide in the Canadian Foundation Engineering Manual, 4th Edition.

Table 4.4: Unconfined Compressive Strength of Bedrock Cores

Borehole ID	Sample No.	Depth (metres)	Unconfined Compressive Strength (MPa)
24-2	RC5	2.54 – 2.76	85
24-4	RC4	2.94 – 3.14	65
24-18	RC12	6.66 – 6.71	97

4.1.7 Golder (2006) Borehole Logs, BH05-1 to BH05-7

Four boreholes identified as BH05-1 to BH05-4 from Golder (2006) were advanced around the pumps station, and three boreholes identified as BH05-5 to BH05-7 were advanced along Brisson Street.

The subsurface conditions described in Golder (2006) appear relatively consistent with those encountered by GEMTEC. Around the SPS in boreholes 05-1 to 05-4 bedrock was confirmed at 1 location at a depth of 3.7 metres (elevation 57.1 m), and auger refusal occurred at a depth of about 3.0 metres below surface grade (elevations 57.2 to 57.6 metres). Further north along Brison Street, in boreholes 05-05 to 05-07 auger refusal was encountered at depths of 1.3 to 2.0 metres below surface grade (elevations 56.5 to 57.8 metres).

4.2 Field / School Yard (Boreholes 24-6, 24-8 and 24-10, Probeholes 24-07 and 24-09)

4.2.1 Topsoil

The field boreholes 24-6 and 24-8 were advanced through a surficial layer of topsoil ranging in thickness from 30 millimetres to 50 millimetres.

4.2.2 Access Roadway Structure

Borehole 24-10 was advanced through the school yard access roadway structure near Laurier Street. The access roadway structure consisted of about 100 millimetres of asphaltic concrete overlying about 550 millimetres of grey, crushed sand and gravel with trace silt (base/subbase material).

The water content of a sample of the base/subbase material was about 4 percent.

4.2.3 Fill Material

Fill material was encountered below the topsoil at borehole 24-8. The fill material consists brown silty clay with trace sand and has a thickness of about 1.0 metres.

Standard penetration tests carried out in the fill material gave N values of 2 to 3 blows per 0.3 metres of penetration.

4.2.4 Former Topsoil

A former topsoil layer was encountered below the fill material in borehole 24-8 at a depth of about 1.1 metres.

4.2.5 Silty Clay

A native deposit of silty clay was encountered below the topsoil and former topsoil at boreholes 24-6 and 24-8 at depths ranging of about 0.0 and 1.1 metres, and below the pavement structure at borehole 24-10 at a depth of about 0.7 metres.

The silty clay has been weathered to a grey brown and red brown crust, has a thickness ranging from about 1.7 to 2.6 metres, and extends to a depth of about 2.4 to 2.8 metres.

Standard penetration tests carried out in the weathered silty clay gave N values of 3 to 12 blows per 0.3 metres of penetration, which reflect a stiff to very stiff consistency.

A grain size distribution and Atterberg limits test was undertaken on a sample of the weathered silty clay from boreholes 24-10. The results are provided on the Record of Borehole Sheets in Appendix B and are summarized in the Tables 4.5 and 4.6. The moisture content of samples of the weathered silty clay was found to range from about 25 to 51 percent. The moisture content of the samples tested are below the measured liquid limit value.

Table 4.5: Summary of Grain Size Distribution Results – Silty Clay

Borehole & Sample ID	Depth (metres)	Clay (<2 µm) (%)	Silt (2 - 75 µm) (%)	Sand (75 µm - 5 mm) (%)	Gravel (5 - 80 mm) (%)
24-10 (SA3)	1.5 – 2.1	73	26	1	0

Table 4.6: Summary of Atterberg Limits Test Results – Silty Clay

Borehole & Sample ID	Depth (metres)	Liquid Limit (%)	Plastic Limit (%)	Water Content (%)
24-10 (SA3)	1.5 – 2.1	59	26	51

4.2.6 Glacial Till

Deposits of glacial till were encountered below the silty clay in boreholes 24-6, 24-8, and 24-10 at depth of 2.4 to 2.8 metres. The boreholes were terminated within the glacial till deposit at a depth of about 4.4 metres below ground surface (elevation 59.5 to 61.3 metres).

The glacial till can be generally described as grey brown and grey silty sand with variable amounts of clay, silt and gravel. Cobbles and boulders should be expected within the glacial till.

Standard penetration tests carried out in the glacial till gave N values of 20 to greater than 50 blows per 0.3 metres of penetration, which reflect a variable, compact to very dense relative density. The higher N values may reflect the presence of cobbles and boulders within the glacial till.

The water content of tested samples of the glacial till ranged from about 9 to 14 percent.

4.2.7 Auger Refusal / Bedrock

Auger or Probehole refusal was not encountered within the depth of investigation along this section, which ranged from about 4.4 to 4.6 metres (or between elevations 59.5 to 61.9 metres).

4.2.8 Golder (2006) Borehole Logs, BH05-8 to BH05-12

Five boreholes identified as BH05-08 to BH05-12 from Golder (2006) were advanced along this section of the proposed forcemain.

The subsurface conditions in the Golder (2006) boreholes appear relatively consistent with those encountered by GEMTEC, except for the encountered auger refusal levels. Auger refusal and the inferred bedrock surface was encountered at boreholes BH05-8 to BH05-10 at depths of 2.1

to 2.7 metres below surface grade (elevations 56.2 to 61.3). Boreholes 5-11 and 05-12 were terminated at a depth of 3.7 metres without encountering auger refusal / bedrock.

Considering that GEMTEC did not encounter auger refusal within this portion of the alignment, it is possible that the auger refusal and fractured bedrock noted by Golder Associates consists of boulders present within the glacial till.

4.3 Laurier Street (Borehole 24-12 and Probehole 24-11)

4.3.1 Roadway Structure

Borehole 24-12 was advanced through the Laurier Street roadway. The roadway structure consisted of about 60 millimetres of asphaltic concrete overlying about 170 millimetres of grey, crushed sand and gravel with trace silt (base material), and 220 millimetres of brown sand and gravel with trace to some silt (subbase material).

4.3.2 Fill Material

At borehole 24-12 a layer of fill material was encountered below the roadway structure consisting of light brown silty sand with a thickness of about 0.8 metres. The fill material extends to a depth of about 1.2 metres.

4.3.3 Former Topsoil

A 150-millimetre-thick former topsoil layer was encountered below the fill material in borehole 24-12 at a depth of about 1.2 metres.

4.3.4 Silty Clay

A native deposit of silty clay was encountered below the former topsoil layer at borehole 24-12 at a depth of about 1.4 metres.

The silty clay has been weathered to a grey brown and red brown crust. The weathered silty clay has a thickness of about 1.4 metres and extends to a depth of about 2.8 metres.

Standard penetration tests carried out in the weathered silty clay gave N values of 11 and 15 blows per 0.3 metres of penetration, which reflect a stiff to very stiff consistency.

4.3.5 Glacial Till

A deposit of glacial till was encountered below the silty clay in borehole 24-12 at depth of 2.8 metres (elevation 62.1 metres).

The glacial till can be generally described as grey brown and grey silty sand and gravel with some clay. Cobbles and boulders should be expected within the glacial till.

Standard penetration tests carried out in the glacial till gave N values of 6 to 19 blows per 0.3 metres of penetration, which reflect a variable, loose to compact relative density.

4.3.6 Sand

A layer of grey coarse sand with some gravel was encountered at borehole 24-12 below the glacial till at a depth of about 4.6 metres below surface grade (elevation 60.3 metres).

A standard penetration test carried out in the sand gave an N value of 8 blows per 0.3 metres of penetration, which reflects a loose relative density.

Borehole 24-12 was terminated within the sand at a depth of 5.2 metres (elevation 59.6 metres).

4.3.7 Auger Refusal / Bedrock

Auger or Probe refusal was not encountered within the 5.2 metres depth of investigation along this section of the forcemain. The corresponding elevation is 60.2 metres.

4.3.8 Golder (2006) Borehole Logs, BH05-13 to BH05-15

3 boreholes identified as BH05-13 to BH05-15 from Golder (2006) were advanced along Laurier Street from the school entrance to the lagoon entrance.

The subsurface conditions in the Golder (2006) boreholes appear relatively consistent with those encountered by GEMTEC, with the exception of the encountered auger refusal at BH05-14. Auger refusal was encountered at borehole BH05-14 at a depth of 2.0 metres or elevation 62.9 metres. It is possible that the auger refusal noted by Golder Associates occurred because of boulders present within the glacial till, however coring was not carried out to confirm the cause of the refusal.

4.4 Lagoon (Boreholes 24-15 to 24-17 and Probehole 24-14)

4.4.1 Topsoil

The lagoon area boreholes were advanced through a surficial layer of topsoil ranging in thickness from 30 millimetres to 50 millimetres.

4.4.2 Fill Material

Fill material was encountered below the topsoil at all of the borehole locations. The fill material is variable but generally consists of sand with variable amounts of clay and gravel and containing trace amounts of organic material. The fill material has a thickness of about 1.8 to 5.1 metres at the borehole location. The fill material extends to depths of about 1.8 to 5.2 metres below surface grade (elevations 62.4 to 65.9 metres).

Grain size distribution tests were undertaken on samples of the fill material from borehole 24-15 and 24-17. The results are provided in Appendix C and are summarized in the Table 4.7.

The moisture content on samples of the fill material was found to range from about 12 to 38 percent – refer to the borehole logs for all test results in detail.

Table 4.7: Summary of Grain Size Distribution Results – Fill Material

Borehole & Sample ID	Depth (metres)	Clay (<2 µm) (%)	Silt (2 - 75 µm) (%)	Sand (75 µm - 5 mm) (%)	Gravel (5 - 80 mm) (%)	Water Content (%)
24-15 (SA2)	0.8 – 1.4	15	48	36	1	16
24-17 (SA1)	0.0 – 0.6	14 (combined clay & silt)		83	3	12

4.4.3 Sandy Silt

A 0.8-metre-thick layer of grey sandy silt was encountered at borehole 24-15 below the fill material at a depth of about 3.1 metres below surface grade (elevation 64.7 metres).

A standard penetration test carried out in the sandy silt gave an N value of 21 blows per 0.3 metres of penetration, which reflects a compact relative density.

The moisture content on a sample of the sandy silt was found to be about 19 percent.

4.4.4 Silty Clay

A native deposit of silty clay was encountered below the sandy silt layer at borehole 24-15 at a depth of about 3.8 metres below surface grade (elevation 64.0 metres), and below the fill material at boreholes 24-16 and 24-17 at depths of 5.2 and 1.8 metres below surface grade (elevations 62.4 and 65.9 metres, respectively).

The silty clay is grey brown, red grey brown, and grey in colour. The boreholes were terminated within the silty clay at depths of 4.4 to 6.7 metres below surface grade (elevations 60.9 to 63.3 metres).

Standard penetration tests carried out in the silty clay gave N values of 2 to 7 blows per 0.3 metres of penetration, which reflects a stiff to very stiff consistency.

A grain size distribution and an Atterberg limits test were undertaken on a sample of the silty clay from boreholes 24-17. The results are provided on the Record of Borehole Sheets in Appendix B and are summarized in the Tables 4.8 and 4.9.

The moisture content on samples of the silty clay was found to range from about 30 to 50 percent. The moisture content of the samples tested are generally below the measured liquid limit value, with the exception of the bottom sample from borehole 24-17.

Table 4.8: Summary of Grain Size Distribution Results – Silty Clay Deposit

Borehole & Sample ID	Depth (metres)	Clay (<2 µm) (%)	Silt (2 - 75 µm) (%)	Sand (75 µm - 5 mm) (%)	Gravel (5 - 80 mm) (%)
24-17 (SA4)	3.8 – 4.4	46	53	1	0

Table 4.9: Summary of Atterberg Limits Test Results

Borehole & Sample ID	Depth (metres)	Liquid Limit (%)	Plastic Limit (%)	Water Content (%)
24-17 (SA4)	3.8 – 4.4	46	20	50

4.4.5 Auger Refusal / Bedrock

Auger or Probe refusal was not encountered within the depth of investigation along this section of the forcemain which ranged from 4.4 to 6.7 metres. The corresponding range of elevation is from 60.9 to 63.4 metres.

4.4.6 Golder (2006) Borehole Log BH05-16

One borehole, identified as BH05-16 from Golder (2006) was advanced alongside the access road to the lagoon near Laurier Street.

The subsurface conditions in the Golder (2006) borehole consisted of a 0.3m thick layer of topsoil overlying silty sand which extended to a depth of about 1.6 metres. Below the silty sand, a deposit of firm, grey brown and red brown, becoming grey silty clay was encountered. The borehole was terminated within the grey silty clay at a depth of about 3.7 metres (elevation 62.4 metres).

4.5 Groundwater Level

The groundwater levels measured in the monitoring wells on August 7 and September 9, 2024, are summarized in Table 4.10. The groundwater levels may be higher during wet periods of the year such as the early spring or following periods of precipitation.

The groundwater levels reported in Golder (2006) are summarised in Table 4.11 below.

Table 4.10: Groundwater Levels

Borehole ID	Location	Screened Material	Date	Groundwater Depth (mbgs[1])	Groundwater Elevation (masl[1])
MW24-1	Brisson Street (South End)	Silty Clay and Glacial Till	August 7, 2024 Sept. 9, 2024	2.4 1.6	59.6 60.4
24-4	Brisson Street (North End)	Bedrock	August 7, 2024 Sept. 9, 2024	0.9 0.9	57.3 57.3
24-10	School Entrance	Glacial Till	August 7, 2024 Sept. 9, 2024	1.0 1.8	64.4 63.6
24-16	Lagoon Access Rd	Fill Material and Silty Clay	August 7, 2024 Sept. 9, 2024	1.1 0.8	66.5 66.8
24-18	Pumping Station	Bedrock	August 7, 2024 Sept. 9, 2024	4.9 4.3	56.7 57.3

Note: 1. mbgs = metres below ground surface ; masl = metres above mean sea level, CGVD28

Table 4.11: Groundwater Levels – Golder (2006)

Borehole ID	Location	Screened Material	Date	Groundwater Depth (mbgs[1])	Groundwater Elevation (masl[1])
05-01	SPS	Bedrock	December 3, 2005	1.5	59.3
05-02	SPS	NA – borehole observation	November 8, 2005	2.7	57.4
05-03	SPS	NA – borehole observation	November 9, 2005	2.5	58.3
05-06	Brisson Street (North End)	NA – borehole observation	November 9, 2005	0.9	57.5
05-07	Brisson Street (North End)	NA – borehole observation	November 10, 2005	0.6	57.6

Borehole ID	Location	Screened Material	Date	Groundwater Depth (mbgs[1])	Groundwater Elevation (masl[1])
05-08	Fields before school entrance	NA – borehole observation	November 10, 2005	0.2	58.1
05-09	Fields before school entrance	Silty Clay	December 3, 2005	frozen	frozen
05-13	School Entrance	Glacial Till	December 3, 2005	0.9	64.5
05-15	Lagoon Access Rd	Glacial Till	December 3, 2005	1.2	63.1

Note: 1. mbgs = metres below ground surface ; masl = metres above mean sea level, CGVD28

4.6 Hydraulic Conductivity

The results of the hydraulic testing carried out in the well screens are provided in Appendix D. A summary of the recovery measurements made during the bail down tests in the monitoring wells is provided in Table 4.12.

Table 4.12: Summary of Bail Down Test Results

Borehole ID	Geological Material Screened	Static Groundwater Depth (mbgs[1])	Estimated Groundwater Level Decrease (metres)	Recovery Time (minutes)	Recovery (percent)
MW24-1	Silty Clay / Glacial Till (Silty Sand)	2.42	0.33	10	100
24-4	Bedrock	0.88	3.62	660	22
24-10	Glacial Till (Silty Sand)	1.83	2.44	64	95
24-16	Fill Material / Silty Clay	0.80	1.89	735	99
24-18	Bedrock	4.26	0.82	5.5	100

Note: 1. mbgs = metres below ground surface

Hydraulic conductivities were calculated using the Hvorslev method of analysis on the well response data and are summarized in Table 4.13. The static water level was above the screen in all wells except MW24-1, wherein the static water level was within the filter pack of the well at the time of testing. To compensate for potential filter pack effects, the Bower and Rice (1976) correction was used, with an assumed effective porosity for the filter pack of 0.3.

The recovery in well 24-4 over the monitoring period was too small for a meaningful analysis; more detailed hydraulic conductivity analyses focused on wells MW24-1, 24-10, 24-16, and 24-18, as presented in Appendix D. The dual slope behaviour noted in some wells (i.e., MW24-01, 24-10, and 24-16) is suspected of being a product of the non-instantaneous well bailing/purging methodology and the filter pack. Where uncertainty in the analyses of the well response behaviour was identified, the more conservative interpretation of the results was adopted (e.g., the late time slope was analysed in MW24-01) to produce more conservative dewatering recommendations.

Table 4.13: Calculated Hydraulic Conductivities

Borehole ID	Geological Material Screened	Hydraulic Conductivity, k (m/s)
MW24-1	Silty Clay / Silty Sand (Glacial Till)	2×10^{-5}
24-4	Bedrock	$\leq 10^{-8}$ (estimated)
24-10	Silty Sand (Glacial Till)	1×10^{-6}
24-16	Silty Sand (Fill) / Silty Clay	2×10^{-7}
24-18	Bedrock	1×10^{-5}

The calculated hydraulic conductivities range from $\leq 10^{-8}$ (estimated) to 2×10^{-5} m/s. The most conductive units are anticipated to be the sandy glacial till, coarse fill (if present), and/or areas of fractured bedrock. The differences in hydraulic conductivity of the wells screened in bedrock are interpreted to be associated with differences in secondary porosity at the locations and depths tested. Literature values (Freeze & Cherry, 1979) for glacial till range from 10^{-6} to 10^{-12} m/s and for silty clay from 10^{-9} to 10^{-6} m/s.

Golder Associates Limited (2005) prepared a report title “Application for a Permit to Take Water for Construction Excavation Dewatering, Sewage Pumping Station Expansion and Upgrade, Casselman, Ontario”, wherein they performed rising head tests in a well screened across the upper bedrock near the existing sewage pumping station. They reported that the hydraulic conductivity of the bedrock was between 3.3×10^{-6} and 6.9×10^{-6} m/s. Furthermore, they provided estimates based on professional experience for the fill and glacial till of 1×10^{-5} and 1×10^{-7} m/s, respectively. The hydraulic conductivities proposed by Golder Associates Limited (2005) are in general agreement with those calculated in this report.

4.7 Groundwater Quality

The groundwater quality analytical results are included in Appendix E. No parameter limits associated with a local sewer-use by-law was identified for Casselman, so the results were compared against the following for consideration: the City of Ottawa Sewer Use By-law (No. 2003-

514), Provincial Water Quality Objectives (PWQO), and the Site Conditions Standards Table 2: Potable Groundwater Environment (O. Reg. 153/04). General inorganics, total and filtered metals, volatiles and semi-volatiles were resampled after further well development, due to high sediment loads in the first rounds of samples, and where re-sampling data is available the most recent results for these parameters are considered in the discussion of exceedances below (included in Appendix E):

Ottawa Sewer Use By-law – Storm Sewers:

- Total suspended solids (TSS) of 142 mg/L exceeded the limit of 15 mg/L at well 24-16;
- Manganese concentration in the filtered and unfiltered samples exceeded the limit of 0.05 mg/L at wells 24-16 and 24-18; and
- Toluene concentration of 0.0183 mg/L exceeded the limit of 0.002 mg/L at well 24-16.

Ottawa Sewer Use By-law – Sanitary and Combined Sewers:

- Manganese concentration in the filtered and unfiltered samples exceeded the limit of 5 mg/L at well 24-16. This concentration may be associated with elevated sediments or the proximity of the test hole to the sewage lagoon.

Provincial Water Quality Objectives (for discharge to be received by surface water features):

- Total phosphorous concentrations exceeded the PWQO in the samples collected from wells 24-16 and 24-18. Total phosphorous concentrations were shown to decrease below the PWQO following filtration of both well samples, suggesting that these exceedances are likely to be mitigated with the removal of suspended sediments.
- Cobalt concentration in the filtered and unfiltered samples exceeded the PWQO of 0.0009 mg/L at well 24-16.
- Toluene concentration of 0.0183 mg/L exceeded the PWQO of 0.0008 mg/L at well 24-16.
- Aluminum concentration in clay-free samples (filtered) exceeded the PWQO of 0.075 mg/L at well 24-16.

Site Conditions Standards Table 2: Potable Groundwater Environment (for discharge to the environment):

- Cobalt concentration in the filtered and unfiltered samples exceeded the limit of 0.0038 mg/L at well 24-16; and
- Vanadium concentration in the unfiltered samples exceeded the limit of 0.0062 mg/L at well 24-16 but fell below the limit following filtration.

The water quality at BH24-16 had exceedances of toluene, manganese, cobalt, and aluminum. Its distinct water quality may be indicative of degraded water quality due to its proximity to the sewage lagoon. These exceedances will need to be considered by the Qualified Person when considering discharge options and may require further investigation.

Which regulations are applicable will depend on the discharge receiver(s) (e.g., surface water, ground surface for infiltration, storm sewer, and/or sanitary sewer). Approval from the Municipality of Casselman must be granted for discharges of groundwater to sewer systems within the municipality.

4.8 Groundwater Chemistry Relating to Corrosion

The results of chemical testing on groundwater samples recovered from boreholes 24-4, 24-10, 24-16, and 24-18 are provided in Appendix E and summarized in Table 4.14.

Table 4.14: Summary of Corrosion Testing - Groundwater

Parameter	Borehole 24-4	Borehole 24-10	Borehole 24-16	Borehole 24-18
Chloride Content (mg/L)	31	224	21	493
Resistivity (Ohm·m)	12.0	6.61	7.5	3.85
pH	8.1	8.2	6.6	7.6
Sulphate Content (mg/L)	36	87	1	93

5.0 RECOMMENDATIONS AND GUIDELINES - PIPELINES

5.1 Excavation

Based on the results of the investigation, together with the planned excavation depth, the overburden excavations for the proposed pipelines will be carried out through zones of existing pavement structures, fill material, former topsoil, sand, silty clay, and glacial till. Based on the results of the boreholes, bedrock excavation will be required along Brisson Street (unless the existing pipe trench excavation is reused). Some bedrock excavation may also be required at the SPS, depending on the depth of excavation proposed at this location (which has not been finalised at the time of preparing this report).

5.1.1 Overburden Excavation

The sides of the excavations within overburden soils should be sloped in accordance with the requirements in Ontario Regulation 213/91 under the Occupational Health and Safety Act. According to the Act, most of the soils at this site can be classified as Type 3 soils. Therefore, for design purposes, allowance should be made for 1 horizontal to 1 vertical, or flatter, excavation slopes for soils above the groundwater level. Sands below the groundwater level would be

classified as Type 4 soils and in such conditions 3 horizontal to 1 vertical excavation sides slopes would be required in such conditions.

As an alternative or where space constraints dictate, installation of the pipelines could be carried out within a tightly fitting, braced steel trench box, which is specifically designed for this purpose. It is noted that some unavoidable inward horizontal movement and settlement of the ground behind the trench box should be anticipated, which could affect existing services located behind the trench box. Additional information on impacts to adjacent services is provided in Section 5.3.

Based on the measured groundwater levels and anticipated invert elevation, excavation will extend below the measured groundwater levels along the new forcemain alignment. Excavation of the overburden deposits above the groundwater level should not present significant constraints. Below the groundwater level, sloughing of the sand and silt material, and glacial till into the excavation should be anticipated along with disturbance to the native soils in the bottom of the excavation. It is anticipated that all of the excavation works will be feasible from a trench box.

In areas where glacial till is encountered cobbles and boulders should be anticipated in the glacial till which may lead to increased excavation effort and slower progress. As such, allowance should be made for removal of boulders from the glacial till during excavation. In order to advance the trench box, even boulders that partially intrude into the sides of the excavation must be removed, which may result in a wider excavation than anticipated.

5.1.2 Bedrock Excavation

Localized bedrock removal to shallow depths at this site (Brisson Street) could be carried out using hoe ramming techniques in conjunction with line drilling on close centres. Due to the proximity of existing structures and services, it is suggested that allowance be made for line drilling 75- to 100-millimetre diameter holes on 200-to-300-millimetre centres to limit the horizontal overbreak of the bedrock. It is noted, based on observations during drilling and local experience, that the bedrock contains horizontal bedding planes and likely also near vertical joints. Therefore, some horizontal and vertical overbreak should be expected. Allowance should be made for additional granular material below the services in bedrock excavations.

For deeper excavations in the bedrock (if required, noting that the design of the works at the SPS are under development) drill and blasting could be carried out. However, based on the bedrock quality encountered up to a depth of about 6 metres, the bedrock excavation could possible be undertaken using hoe ramming techniques in conjunction with line drilling on close centres – at slower excavation rates. It should be noted that this technique may require significant effort, and the bedrock quality should be assessed by the contractor.

The vibration effects of hoe ramming are usually minor and localized. Any blasting should be controlled to limit the peak particle velocities in order to avoid blast induced damage and, any blasting should be carried out under the supervision of a blasting specialist engineer. The peak

vibration limits provided in Table 5.1 are suggested as a guide. It is pointed out that these criteria, although conservative, were established to prevent damage to existing buildings and services that are in good condition; more stringent criteria may be required to prevent damage to freshly placed (uncured) concrete or vibration sensitive equipment or utilities. Monitoring should be carried out to ensure that the excavation activities meet the limiting vibration criteria. Pre-construction condition surveys of nearby structures and existing buried services should be carried out so that any claims can be dealt with in a fair manner.

Fractured bedrock and/or weathered bedrock should be excavated using 1 horizontal to 1 vertical, or flatter, side slopes. Sound bedrock may be excavated with near vertical sidewalls. Any loose bedrock should be scaled from the sides of the excavation.

Table 5.1: Peak Vibration Limits

Frequency of Vibration (Hz)	Vibration Limits (millimetres/second)
<10	5
10 to 40	5 to 50 (interpolated)
>40	50

5.1.3 Excavation Adjacent to Existing Services

As previously indicated, some unavoidable inward horizontal movement and settlement of the ground behind the trench box should be anticipated, which could affect existing services located in this zone of movement. As such, we recommend that the excavations not encroach within a line extending downwards and outwards at an inclination of 1 vertical to 2 horizontal from the base of the existing services (i.e., sewers, watermains).

Where the recommended separation distance is not possible, a 1 horizontal to 1 vertical encroachment zone between the horizontal excavation extent and the base of the existing service is acceptable provided that the contractor's construction methodology is observed at the beginning of construction. Temporary intrusion within this zone is also acceptable provided that all measures to mitigate movement of the excavation sides slopes are undertaken (ex. filling space between trench box and excavation with sand, ensuring adequate compaction of all fill materials within encroachment zone, etc.). Field directions should be provided as required based on field conditions to ensure that the base of the adjacent services and the supporting soil are not compromised. Site visits by geotechnical personnel should be carried out daily where excavation is required within the 1 vertical to 2 horizontal zone described above.

5.2 Construction Dewatering and Drainage

Groundwater inflow into trench excavations could likely be handled by pumping from within the excavations using sump pumps – noting that:

- Variability in groundwater inflows may be encountered due to heterogeneity in fill and till composition. Inflows may potentially diminish with time once storage is depleted.
- Zones of higher permeability bedrock may be encountered at bedrock surface and also with depth and groundwater inflow may be more significant in these zones, and
- Bedrock removal may change the rock mass properties (particularly if drill and blasting is carried out) which can increase groundwater inflows.

Any sump pumps should be installed in perforated casings surrounded by graded granular sand to reduce the potential for loss of fines into the sump. Filter cloth / geotextile may be considered to further reduce sediment uptake into the sump pump.

Where possible, excavation works should be scheduled for the drier parts of the year – and relatively small test excavations could be opened to assess dewatering requirements initially and if necessary, pumping could be carried out in advance of site wide excavations to lower the groundwater level.

It is suggested that an excavation and groundwater management plan be submitted for review and approval as part of the contract. The plan should be prepared by a specialist dewatering contractor, using a methodology based on their own assessment of site conditions, the proposed construction approach, and on their experience and equipment.

5.2.1 Effects of Temporary Groundwater Lowering

Based on the results of the investigation, it is not expected that short-term pumping during excavation will have a significant effect on nearby structures and services.

5.2.2 Water Taking Permits and Registrations

This section presents a preliminary evaluation of dewatering needs to inform recommendations regarding water taking permits and registrations. Groundwater takings less than 50,000 litres per day do not need a permit. Conversely, water takings above 50,000 but below 400,000 litres per day will require an Environmental Activity and Sector Registry (EASR), and water takings in excess of 400,000 litres per day will require a Category 3 Permit to Take Water (PTTW). Water takings from multiple water taking sources (e.g., wells, surface water features, or excavations) are only considered cumulatively for permitting purposes when their drawdown areas of influence are overlapping.

It has been assumed that excavations down to a maximum of about four metres below ground surface for the sanitary sewer infrastructure. These assumed excavation depths will extend below

the measured groundwater levels, necessitating groundwater management to support construction.

For the purposes of estimating groundwater inflow volumes, it was assumed that the excavations will be completed in 30-metre-long sections that are 4.5 metres wide. Calculations were completed using groundwater levels of 0.6 metres below ground surface and the highest calculated hydraulic conductivity of 2×10^{-5} m/s.

Based on the intended works proposed, assumed conditions, the possibility of precipitation and snowmelt, and the incorporation of a three times safety factor, groundwater inflows are estimated to exceed 50,000 litres per day but remain below 400,000 litres per day for a single open excavation. Accordingly, an EASR registration is likely sufficient for the construction dewatering associated with the proposed works. An EASR registration requires a Qualified Person to prepare a Water Taking and Discharge Plan report, which will consider the groundwater taking volumes and discharge options.

It should be noted that the conductivity and connectivity of fractures/discontinuities, fill, and glacial till deposits across the site is uncertain, and water levels during construction could be higher than those presented herein. These dewatering estimates should be reviewed by a Qualified Person once detailed design drawings are available.

5.3 Pipe Bedding

The pipe bedding material should consist of well graded crushed stone meeting OPSS requirements for Granular A. The minimum bedding thickness should be 150 millimetres for excavation within overburden. The granular materials used in the service trenches should be composed of virgin (i.e., not recycled) material only.

Saturated native deposits of silty clay and/or glacial till will likely be encountered at subgrade level along the proposed forcemain alignment. These deposits are susceptible to weakening under vibration and/or repeated loading and it is suggested that final trimming to subgrade level be carried out using a hydraulic shovel equipped with a flat blade bucket. We recommend that a contingency allowance be made in the contract for a 300-millimetre thick subbedding layer of OPSS Granular B Type II granular material and a woven geotextile meeting OPSS 1860 Class II requirements in the event that the subgrade soils are disturbed during construction.

Where boulders are encountered at subgrade level some over-excavation may occur, and additional bedding material may be required to fill any voids left following the removal of boulders. Where subexcavation occurs, the material should be replaced with OPSS Granular B Type II granular material.

The use of clear crushed stone as bedding or subbedding material should not be permitted.

Cover material, from pipe spring line to at least 300 millimetres above the top of the pipe, should consist of granular material, such as OPSS Granular A.

The subbedding, bedding and cover materials should be compacted in maximum 300-millimetre-thick lifts to at least 95 percent of the standard Proctor dry density value.

5.4 Trench Backfill

The backfill materials within the zone of seasonal frost penetration (i.e., 1.8 metres below finished grade) should match the materials exposed on the trench walls. This will reduce the potential for differential frost heaving between the area over the trench and the adjacent areas. The above is recommended when working in access roads and areas where differential frost heaving is a concern. In landscaped areas or where differential frost heave is not a concern, it is not necessary for the backfill material to match the materials exposed on the trench walls.

Backfill below the zone of seasonal frost penetration could consist of either acceptable native material or imported granular material conforming to OPSS Granular B Type I or II, or imported OPSS Select Subgrade Material. Any organic soils or topsoil, if encountered, should be wasted from the excavation.

To minimize future settlement of the backfill and achieve an acceptable subgrade for any roadways, curbs, etc., the trench backfill should be compacted in maximum 300-millimetre-thick lifts to at least 95 percent of the standard Proctor dry density value. In landscaped areas, and where some settlements are permissible, the backfill could be compacted in maximum 300-millimetre-thick lifts to at least 90 percent of the standard Proctor dry density value.

The deeper deposits of silty clay and glacial till may have a moisture content that is too high for compaction. Furthermore, these materials are sensitive to changes in moisture content due to precipitation. As such, the specified densities may not be possible to achieve, and, as a consequence, some settlement of these backfill materials could occur. Consideration could be given to implementing one or a combination of the following measures to reduce post construction settlement above the trenches, depending on the weather conditions encountered during the construction:

- Allow the overburden materials to dry prior to compaction;
- Reuse any wet materials in the lower part of the trenches and make provision to defer hard surfacing (i.e., paving, concrete, etc.) for 3 months, or longer, to allow the trench backfill settlement to occur and thereby improve the final appearance of the hard surfacing.
- Avoid reusing any wet material within the trench. If additional material is required for trench backfill, consideration could be given to using imported, relatively dry, earth fill material within the zone of frost penetration, and granular material conforming to OPSS

Granular B Type I or II or imported OPSS Select Subgrade Material below the zone of frost penetration. The frost susceptibility of the earth fill should be assessed prior to use for frost compatibility with the material on the sides of the trench.

5.5 Seepage Barriers

To prevent the granular bedding in the services trench from acting as a “French Drain” and thereby resulting in excessive groundwater lowering, seepage barriers should be installed along the service trenches. The seepage barriers should begin at subgrade level and extend vertically through the granular pipe bedding and granular surround to within the native backfill materials, and horizontally across the full width of the service trench excavation. The seepage barriers could consist of 1.5-metre-wide dykes of compacted silty clay. The silty clay should be compacted in maximum 300-millimetre-thick lifts to at least 95 percent of the standard Proctor dry density value.

Based on the project extents, seepage barriers should be placed at the project limits along the roadways (outside of the intersection) at Brisson Street and Laurier Street, at the project limits of the field, and the project limits in the area of lagoon. Between the project limits, seepage barriers should be placed at a spacing of 80 metres along the proposed alignments.

5.6 Corrosion of Buried Concrete and Steel

The measured sulphate concentration from the groundwater samples recovered from the monitoring wells in 24-4, 24-10, 24-16, and 24-18 range from 1 to 93 mg/L. According to Canadian Standards Association (CSA) “Concrete Materials and Methods of Concrete Construction”, the sulphate concentration in the groundwater is considered low. Therefore, any concrete in contact with the native soil and groundwater could be batched with General Use (GU) cement. The effects of freeze thaw in the presence of de-icing chemicals (sodium chloride) use on the roadway should be considered in selecting the air entrainment and the concrete mix proportions for any concrete.

Based on the resistivity, pH, and the measured chloride content of the groundwater samples tested, the groundwater and native soils can be classified as slightly aggressive to aggressive towards unprotected steel. It is noted that the corrosivity of the soil/groundwater could vary throughout the year due to the application of sodium chloride for de-icing.

5.7 Winter Construction

Most of the soils at this site are highly frost susceptible and are prone to significant ice lensing. In order to carry out the work during freezing temperatures, the service trenches should be opened for as short a time as practicable and the excavations should be carried out only in lengths that allow all of the construction operations, including backfilling, to be fully completed in one working day. The materials on the sides of the trenches should not be allowed to freeze. In addition, the backfill should be excavated, stored and replaced without being disturbed by frost or contaminated by snow or ice.

5.8 Seismic Site Classification

The seismic Site Class in the vicinity of the existing pump station is Site Class C (very dense soil and soft rock), based on the presence of stiff to very stiff silty clay over glacial till over relatively shallow bedrock. Refer to boreholes 24-1 to 24-4, and 24-18.

In the vicinity of the lagoon area where a seismic Site Class assessment is also required Site Class C is likely also applicable, based on the findings of borehole 05-15 from Golder (2006) in which reasonably shallow glacial till (which typically overlies bedrock) was encountered. However, the borehole is located about 150 metres from the point of interest.

6.0 ROADWAY RECONSTRUCTION

6.1 Subgrade Preparation

It is understood full road width reconstruction is being considered along Brisson Street, and that trench reinstatement of the roadway is being considered along Laurier Street, the access road to the Sainte-Euphémie Catholic Elementary School, and the lagoon access road.

Prior to placing granular material, the subgrade surfaces should be proof rolled with an 8-tonne or larger steel drum roller under dry conditions. Any soft areas should be subexcavated and replaced with suitable, compacted earth borrow that is similar to that exposed in adjacent subgrade areas.

6.2 Pavement Design (Brisson)

Traffic volumes are not available at the time of this report. However, based on the use of the roadway, it is expected that vehicle types will consists primarily of light vehicles accessing the residences on Brisson Street and the future Brisson Waterfront Rehabilitation Project. Occasional heavy vehicle use associated with the Laplante Generating Station should be expected.

The following minimum pavement structure may be used for the full depth reconstruction of Brisson Street:

- 40 millimetres of Superpave 12.5 Traffic Category B, PG 58-34, over
- 50 millimetres of Superpave 12.5 Traffic Category B, PG 58-34
- 150 millimetres of OPSS Granular A; over,
- 450 millimetres of OPSS Granular B Type II.

The proposed full depth reconstruction will provide a new SN of approximately 108 millimetres which should perform under the anticipated loading on Brisson Street, in the absence of detailed traffic data.

6.3 Trench Reinstatement (School Access, Laurier Street, Lagoon Access Road)

It is understood that the proposed pipelines will cross the school access road, possibly along a portion of Laurier Street, and along the lagoon access road. The current investigation was limited due to the unlocatable forcemain and as such, no information on the existing lagoon access road structure is available, but it is confirmed that the access road is gravel surfaced. The Golder borehole logs do not provide any details on the lagoon access road either. As such, the following roadway structures are provided:

6.3.1 School Access Road

Typically, school access roads are designed to support heavy vehicle traffic (busses, fire trucks). Based on the existing structure encountered in borehole 24-10, this appears to be consistent. As such, the following pavement structure is recommended at the school:

- 100 millimetres of asphaltic concrete, comprising:
  - 50 millimetres of Superpave 12.5, Traffic Level B, PG 58-34; over,
  - 50 millimetres of Superpave 12.5, Traffic Level B, PG 58-34
- 150 millimetres of OPSS Granular A (Base); over,
- 450 millimetres of OPSS Granular B Type II (Subbase).

Alternatively, if the use of an additional mix is feasible to the project constraints, the following pavement structure may be considered at the school:

- 100 millimetres of asphaltic concrete, comprising:
  - 40 millimetres of Superpave 12.5, Traffic Level B, PG 58-34; over,
  - 60 millimetres of Superpave 19, Traffic Level B, PG 58-34
- 150 millimetres of OPSS Granular A (Base); over,
- 450 millimetres of OPSS Granular B Type II (Subbase).

6.3.2 Laurier Street

Based on the pavement structure encountered at borehole 24-12, the following pavement structure could be used to reinstate the trench along Laurier Street:

- 90 millimetres of asphaltic concrete, comprising:
  - 40 millimetres of Superpave 12.5, Traffic Level C, over
  - 50 millimetres of Superpave 12.5, Traffic Level C, over
- 150 millimetres of OPSS Granular A (Base); over,
- 450 millimetres of OPSS Granular B Type II (Subbase).

The above pavement structure is thicker than that encountered in the borehole, but is recommended as a minimum for the type of roadway. Should it be preferable to use Superpave

19.0 for the base layer of the asphalt the thickness of the layer should be increased to 60 millimetres (to avoid possible issues with compaction of the layer).

6.3.3 Lagoon Access

As previously noted, no information is available on the gravel structure of the lagoon access. It is recommended that the roadway structure be reinstated as found at the time of construction. For project costing purposes, the following roadway structure should be used:

- 200 millimetres of OPSS Granular A (Base); over,
- 400 millimetres of OPSS Granular B Type II (Subbase).

Based on a recent project, it is understood that Marshall Mixes are typically employed by the Municipality of Casselman. As such, the asphaltic concrete layers could be substituted directly for HL3 (wear course) and HL8 (base course).

6.4 Effects of Soil Disturbance and Construction

The pavement structures provided above assumes that the roadway subgrade surface is properly prepared and proof rolled at the time of construction (i.e., the subgrade is not disturbed or wetted due to construction operations or precipitation). If the roadway subgrade surface becomes disturbed or wetted due to construction operations or precipitation, the Granular B Type II thicknesses provided above may not be adequate and it may be necessary to increase the thickness of the Granular B Type II subbase and/or place a geotextile over the subgrade surface.

The required thickness of the subbase materials will depend on a number of factors, including schedule, contractor methodology, soil types and weather conditions, and should be assessed by geotechnical personnel at the time of construction. In our opinion, the preferred approach from a geotechnical point of view is to:

- Proof roll the subgrade at the time of construction under the supervision of experienced geotechnical personnel.
- Adjust the thickness of the subbase material and include a woven geotextile, as required. Unit rate allowances should be made in the contract for a geotextile (woven, OPSS1860 Type II) and subexcavation and replacement with OPSS Granular B Type II.

6.5 Compaction Requirements

All imported granular materials for the roadway structure should be placed in maximum 200-millimetre-thick lifts and should be compacted to at least 98 percent of the standard Proctor dry density value using suitable vibratory compaction equipment.

6.6 Pavement Drainage (Brisson Street)

Adequate drainage of the pavement granular materials and subgrade is important for the long-term performance of the pavement at this site. The granular base and subbase materials should extend horizontally to the adjacent ditches/swales. Where possible, the bottom of the swales/ditches should be at least about 0.3 metres below the bottom of the Granular B Type II.

6.7 Pavement Transitions

As part of the roadway reinstatement, the new pavements will abut existing pavements. The following is suggested to improve the performance of the joint between the new and the existing pavements:

- Neatly saw cut the existing asphaltic concrete;
- Remove the asphaltic concrete and slope the bottom of the excavation within the existing granular base and subbase at 3 horizontal to 1 vertical, or flatter, to avoid undermining of the existing asphaltic concrete and provide a gradual transition between the new and existing granular materials.
- Remove (mill off) 40 to 50 millimetres of the existing asphaltic concrete (to match the thickness of the wear course asphaltic concrete) to a distance of 300 millimetres at the joint and tack coat the asphaltic concrete at the joint in accordance with the requirements in OPSS 310.

Notwithstanding the above, based on our experience, there will likely be some unavoidable reflective cracking of the asphaltic concrete at the joint.

6.8 Comments on Slope Stability – SPS

Excavations to the north of the PSP will be carried out into the sloping ground towards the South Nation River. GEMTEC has not carried out a stability assessment of the existing slopes.

The long-term effects of the permanent works are not anticipated to cause significant additional loading to the slopes. However, erosion can occur where flow from pipe outflows occurs and measures to protect the slopes from increased erosion should be considered.

To address short term conditions during construction, the following conditions could be applied to the tender documentation as a cautious approach;

- Materials should not be stockpiled on the ground surface within about 10 metres of the top of slope.
- Trenches should remain open for the minimum time practically possible. It is recommended that trenches are not left open for instance over the weekend or days where construction works are not being carried out.

- During inclement weather, infiltration of water into the trench should be minimised using tarps or other means
- Surface water should be directed away from the trench, while open and while backfilled until a vegetated surface is restored such that infiltration of water into the trench and soils below is minimized.
- Where possible, only light compaction equipment should be used for the works.
- The contractor shall retain a geotechnical firm to confirm that the proposed equipment and construction methodology will not adversely impact the stability of the slopes.

Vegetative cover, which includes the reinforcing effects of root systems has been identified as a significant influencing factor in the stability of slopes. Removal of existing vegetation should be avoided wherever possible, and any cleared sections should be revegetated as soon as possible.

7.0 ADDITIONAL CONSIDERATIONS

7.1 Effects of Construction Induced Vibration

Some of the construction operations (such as granular material compaction, excavation, etc.) will cause ground vibration on and off of the site. The vibrations will attenuate with distance from the source but may be felt at nearby structures. The magnitude of the vibrations will be much less than that required to cause damage to the nearby structures or services in good condition. Precondition surveys of the adjacent structures should be considered so that any claims can be reasonably addressed.

7.2 Monitoring Well Abandonment

All monitoring wells installed as part of this investigation should be decommissioned by a licensed well technician in accordance with Ontario Regulation 903, as amended by Ontario Regulation 128/03. The well abandonment could be carried out in advance or during construction.

8.0 CLOSURE

We trust this report provides sufficient information for your present purposes. If you have any questions concerning this report, please do not hesitate to contact our office.



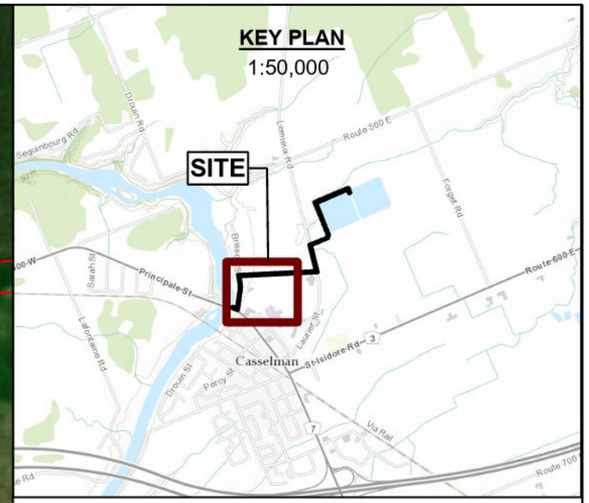
Luc Bouchard, P.Eng., ing.
Geotechnical Engineer

LB/JKA/DC/DE/AB

APPENDIX A

Borehole Location Plan, Figure A1 to A3





LEGEND

BH # — BOREHOLE ID
XX.XX — GROUND SURFACE ELEVATIONS, IN METRES GEODETIC DATUM

BOREHOLE LOCATION

APPROXIMATE BOREHOLE LOCATION (GOLDER, 2005)

PROJECT LIMIT

GENERAL NOTES:

1. Coordinate system: NAD83(CSRS) / UTM zone 18N
2. Survey Reference based on PRS579626392983
   Easting: 476040.80m
   Northing: 5012925.07m
   Elevation: 78.42m
2. Geographic dataset source: Ontario GeoHub.
3. Contains information licensed under the Open Government Licence – Ontario.
4. Service Layer Credits: World Topographic Map: Esri Canada, Esri, HERE, Garmin, INCREMENT P, USGS, METI/NASA, EPA, USDA, AAFC, NRCan, World Imagery: SDG Counties, Maxar, Microsoft

Scale:
1:2,000 Meters
0 27.5 55 110 165

Drawing
SOIL EXCEEDANCES

Client:
J. L. RICHARDS & ASSOCIATES LIMITED

Project
CASSELMAN MAIN SEWAGE PUMPING STATION (SPS) UPGRADES
CASSELMAN, ONTARIO

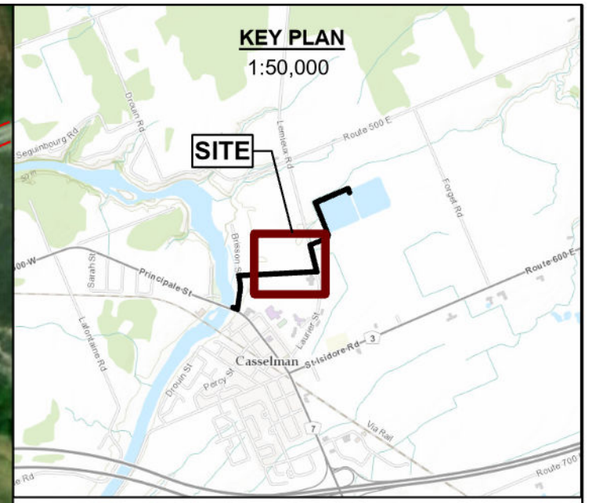
Drwn By:	S.L.	Chkd By:	L.B.
Project No.	100117.051	Revision No.	0
Date	DECEMBER 2024		**FIGURE A1**

GEMTEC
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KEY PLAN
1:50,000



LEGEND

BH # — BOREHOLE ID
XX.XX — GROUND SURFACE ELEVATIONS, IN METRES GEODETIC DATUM

BOREHOLE LOCATION

APPROXIMATE BOREHOLE LOCATION (GOLDER, 2005)

PROJECT LIMIT

GENERAL NOTES:

1. Coordinate system: NAD83(CSRS) / UTM zone 18N
2. Survey Reference based on PRS579626392983
   Easting: 476040.80m
   Northing: 5012925.07m
   Elevation: 78.42m
2. Geographic dataset source: Ontario GeoHub.
3. Contains information licensed under the Open Government Licence – Ontario.
4. Service Layer Credits: World Topographic Map: Esri Canada, Esri, HERE, Garmin, INCREMENT P, USGS, METI/NASA, EPA, USDA, AAFC, NRCan, World Imagery: SDG Counties, Maxar, Microsoft

Scale:
1:2,000 Meters
0 27.5 55 110 165

Drawing
BOREHOLE LOCATION PLAN

Client:
J. L. RICHARDS & ASSOCIATES LIMITED

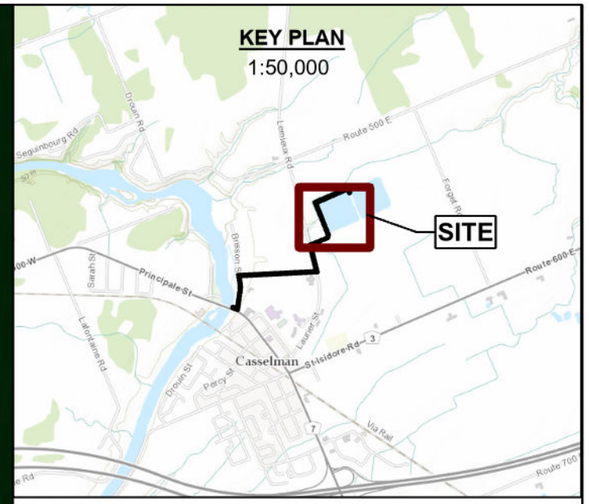
Project
CASSELMAN MAIN SEWAGE PUMPING STATION (SPS) UPGRADES
CASSELMAN, ONTARIO

Drwn By:	S.L.	Chkd By:	L.B.
Project No.	100117.051	Revision No.	0
Date	DECEMBER 2024		**FIGURE A2**

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LEGEND

BH # — BOREHOLE ID
XX.XX — GROUND SURFACE ELEVATIONS, IN METRES GEODETIC DATUM

BOREHOLE

APPROXIMATE BOREHOLE LOCATION (GOLDER, 2005)

PROJECT LIMIT

GENERAL NOTES:

1. Coordinate system: NAD83(CSRS) / UTM zone 18N
2. Survey Reference based on PRS579626392983
   Easting: 476040.80m
   Northing: 5012925.07m
   Elevation: 78.42m
2. Geographic dataset source: Ontario GeoHub.
3. Contains information licensed under the Open Government Licence – Ontario.
4. Service Layer Credits: World Topographic Map: Esri Canada, Esri, HERE, Garmin, INCREMENT P, USGS, METI/NASA, EPA, USDA, AAFC, NRCan, World Imagery: SDG Counties, Maxar, Microsoft

Scale:

1:2,000 Meters

0 27.5 55 110 165

Drawing: BOREHOLE LOCATION PLAN

Client: J. L. RICHARDS & ASSOCIATES LIMITED

Project: CASSELMAN MAIN SEWAGE PUMPING STATION (SPS) UPGRADES
CASSELMAN, ONTARIO

Drwn By:	S.L.	Chkd By:	L.B.
Project No.	100117.051	Revision No.	0
Date	DECEMBER 2024		**FIGURE A3**

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APPENDIX B

Record of Borehole Sheets
List of Abbreviations and Symbols

RECORD OF BOREHOLE 24-1

CLIENT: J.L. Richards & Associates Limited
PROJECT: Casselman Main Sewage Pumping Station Upgrades
JOB#: 100117.051
LOCATION: See Borehole Location Plan - Figure A1

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Jul 18 2024

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0	Power Auger Hollow Stem Auger (210mm OD)	Ground Surface		61.93						Asphaltic coldpatch repair
		28mm ASPHALTIC CONCRETE		0.03						
		Grey, crushed sand and gravel, trace silt (BASE/SUBBASE MATERIAL)		61.51						
		Stiff to very stiff, red grey brown SILTY CLAY		0.42	1	SS	250	16		
1					2	SS	400	9		
				60.41						
		Very stiff, grey brown SILTY CLAY, trace sand		1.52	3	SS	500	14	MH	Backfilled with auger cuttings
2					4	SS	350	14		
				58.88						
3		Dense to very dense, brown silty sand, trace clay and gravel (GLACIAL TILL)		3.05	5	SS	350	34		
				58.12						
4		End of Borehole Auger refusal		3.81						
5										
6										
7										
8										
9										
10										

SOIL PROFILE
SAMPLES
PENETRATION RESISTANCE (N), BLOWS/0.3m
DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m
SHEAR STRENGTH (Cu), kPA
NATURAL
REMOULDED
WATER CONTENT, %
W_P W W_L
10 20 30 40 50 60 70 80 90

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CHECKED: LB

GEO - BOREHOLE LOG 100117.051_BH_LOGS_2024-07-25.GPJ GEMTEC 2018.GDT 25/1/6

RECORD OF BOREHOLE 24-2

CLIENT: J.L. Richards & Associates Limited
PROJECT: Casselman Main Sewage Pumping Station Upgrades
JOB#: 100117.051
LOCATION: See Borehole Location Plan - Figure A1

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Jul 18 2024

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		Ground Surface		59.21						Asphaltic coldpatch
0	Power Auger Hollow Stem Auger (210mm OD)	Grey, crushed sand and gravel, trace silt (ROADWAY MATERIAL)		0.20						
		Brown silty sand and gravel, trace clay (FILL MATERIAL)			1	SS	300	26		
1					2	SS	200	16		Backfilled with auger cuttings
		Stiff to very stiff, grey brown SILTY CLAY		57.99 1.22						
2					3	SS	450	7		
		Grey silty sand and gravel, trace clay (GLACIAL TILL)		56.92 2.29	4	SS	75	50 for 75mm		
	Diamond Rotary Core HQ (89mm OD)	BEDROCK		56.67 2.54	5	RC		TCR= 77%, SCR=77%, RQD= 77%	UC= 84.8 MPa	
3										Bentonite seal
4					6	RC		TCR= 94%, SCR=89%, RQD= 79%		
		End of Borehole		54.81 4.40						
5										
6										
7										
8										
9										
10										

PENETRATION RESISTANCE (N), BLOWS/0.3m
DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m
SHEAR STRENGTH (Cu), kPA: NATURAL, REMOULDED
WATER CONTENT, %: W_P, W, W_L
10 20 30 40 50 60 70 80 90

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CHECKED: LB

GEO - BOREHOLE LOG 100117.051_BH_LOGS_2024-07-25.GPJ GEMTEC 2018.GDT 25/1/6

RECORD OF BOREHOLE 24-3

CLIENT: J.L. Richards & Associates Limited
PROJECT: Casselman Main Sewage Pumping Station Upgrades
JOB#: 100117.051
LOCATION: See Borehole Location Plan - Figure A1

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Jul 19 2024

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	PENETRATION RESISTANCE (N), BLOWS/0.3m / DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m / SHEAR STRENGTH (Cu), kPA (NATURAL, REMOULDED) / WATER CONTENT, % (W_P, W, W_L)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0	Power Auger Hollow Stem Auger (210mm OD)	Ground Surface		58.60							
		Grey, crushed sand and gravel (ROADWAY MATERIAL)		0.20							Asphaltic coldpatch repair
1		Grey gravel, some sand (FILL MATERIAL)		57.42							Backfilled with auger cuttings
		Stiff to very stiff, grey brown SILTY CLAY		1.18							
2		End of Probe Hole Auger Refusal		56.75 1.85							
3											
4											
5											
6											
7											
8											
9											
10											

PENETRATION RESISTANCE (N), BLOWS/0.3m
DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m
SHEAR STRENGTH (Cu), kPA: + NATURAL, ⊕ REMOULDED
WATER CONTENT, %: W_P — W — W_L
10 20 30 40 50 60 70 80 90

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LOGGED: ML
CHECKED: LB

GEO - BOREHOLE LOG 100117.051_BH_LOGS_2024-07-25.GPJ GEMTEC 2018.GDT 25/1/6

RECORD OF BOREHOLE 24-4

CLIENT: J.L. Richards & Associates Limited
PROJECT: Casselman Main Sewage Pumping Station Upgrades
JOB#: 100117.051
LOCATION: See Borehole Location Plan - Figure A1

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Jul 19 2024

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	PENETRATION RESISTANCE (N), BLOWS/0.3m / DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m / SHEAR STRENGTH (Cu), kPA / WATER CONTENT, %	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0	Power Auger (210mm OD)	Ground Surface		58.26							Flush Mount Casing and sand
		Grey, crushed sand and gravel (ROADWAY MATERIAL)		57.60	1	SS		41			
1	Diamond Rotary Core HQ (89mm OD) Hollow Stem Auger	BEDROCK		0.66	2	RC		TCR= 89%, SCR= 68%, RQD= 48%			Bentonite Seal
2					3	RC		TCR= 93%, SCR= 91%, RQD= 91%			
3					4	RC		TCR= 99%, SCR= 99, RQD= 92%		UC= 65.4 MPa	Filter Sand
4					5	RC		TCR= 100%, SCR= 89%, RQD= 89%			50mm diameter, 1.5m long PVC screen
5		End of Borehole		53.38 4.88							
6											
7											
8											
9											
10											

PENETRATION RESISTANCE (N), BLOWS/0.3m
DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m
SHEAR STRENGTH (Cu), kPA: + NATURAL ⊕ REMOULDED
WATER CONTENT, %: W_P — W — W_L
10 20 30 40 50 60 70 80 90

GROUNDWATER OBSERVATIONS

DATE	DEPTH (m)	ELEV. (m)
24/08/07	0.9 ▽	57.3

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CHECKED: LB

GEO - BOREHOLE LOG 100117.051_BH_LOGS_2024-07-25.GPJ GEMTEC 2018.GDT 25/1/6

RECORD OF BOREHOLE 24-6

CLIENT: J.L. Richards & Associates Limited
PROJECT: Casselman Main Sewage Pumping Station Upgrades
JOB#: 100117.051
LOCATION: See Borehole Location Plan - Figure A1

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Jul 25 2024

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		Ground Surface		63.91						
0	Power Auger Hollow Stem Auger (210mm OD)	TOPSOIL		0.03						Asphaltic coldpatch repair
		Stiff to very stiff, grey brown SILTY CLAY			1	SS	450	3		
1					2	SS	500	12		
2					3	SS	610	10		Backfilled with auger cuttings
				61.32	4	SS	425	21		
		Compact to very dense, grey brown gravelly silty sand, some clay, possible cobbles and boulders (GLACIAL TILL)		2.59						
3					5	SS	125	50 for 75mm		
4					6	SS	350	28	M	
				59.49						
		End of borehole		4.42						
5										
6										
7										
8										
9										
10										

PENETRATION RESISTANCE (N), BLOWS/0.3m
DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m
SHEAR STRENGTH (Cu), kPA: + NATURAL ⊕ REMOULDED
WATER CONTENT, % (W, W_P, W_L)
10 20 30 40 50 60 70 80 90

GEMTEC
Consulting Engineers and Scientists

LOGGED: ML
CHECKED: LB

GEO - BOREHOLE LOG 100117.051_BH_LOGS_2024-07-25.GPJ GEMTEC 2018.GDT 25/1/6

RECORD OF BOREHOLE 24-7

CLIENT: J.L. Richards & Associates Limited
PROJECT: Casselman Main Sewage Pumping Station Upgrades
JOB#: 100117.051
LOCATION: See Borehole Location Plan - Figure A1

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Jul 25 2024

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	PENETRATION RESISTANCE (N), BLOWS/0.3m; DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m; SHEAR STRENGTH (Cu), kPA (NATURAL, REMOULDED); WATER CONTENT, % (W_P, W, W_L); 10 20 30 40 50 60 70 80 90	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0	Power Auger / Hollow Stem Auger (210mm OD)	Ground Surface		64.35							Asphaltic coldpatch repair
		Probe Hole - Soil not sampled									
1											
2											Backfilled with auger cuttings
3											
4				59.77							
		End of Probe Hole		4.58							
5											
6											
7											
8											
9											
10											

GEMTEC
Consulting Engineers and Scientists

LOGGED: ML
CHECKED: LB

GEO - BOREHOLE LOG 100117.051_BH_LOGS_2024-07-25.GPJ GEMTEC 2018.GDT 25/1/6

RECORD OF BOREHOLE 24-8

CLIENT: J.L. Richards & Associates Limited
PROJECT: Casselman Main Sewage Pumping Station Upgrades
JOB#: 100117.051
LOCATION: See Borehole Location Plan - Figure A1

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Jul 25 2024

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	PENETRATION RESISTANCE (N), BLOWS/0.3m / DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m / SHEAR STRENGTH (Cu), kPA (NATURAL, REMOULDED) / WATER CONTENT, % (W_P, W, W_L)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0	Power Auger Hollow Stem Auger (210mm OD)	Ground Surface		65.76							
		TOPSOIL		0.05							Asphaltic coldpatch repair
		Grey brown silty clay, trace sand (FILL MATERIAL)			1	SS	350	2			
1				64.69	2	SS	400	3			
		FORMER TOPSOIL LAYER		1.07							
		Stiff to very stiff, grey brown SILTY CLAY		1.10							
2					3	SS	610	8			Backfilled with auger cuttings
					4	SS	610	9			
				63.01							
3		Compact to very dense, grey brown silty sand, some clay and gravel, possible cobbles and boulders (GLACIAL TILL)		2.75	5	SS	400	32			
4					6	SS	450	52			
				61.34							
		End of borehole		4.42							
5											
6											
7											
8											
9											
10											

GEMTEC
Consulting Engineers and Scientists

LOGGED: ML
CHECKED: LB

GEO - BOREHOLE LOG 100117.051_BH_LOGS_2024-07-25.GPJ GEMTEC 2018.GDT 25/1/6

RECORD OF BOREHOLE 24-9

CLIENT: J.L. Richards & Associates Limited
PROJECT: Casselman Main Sewage Pumping Station Upgrades
JOB#: 100117.051
LOCATION: See Borehole Location Plan - Figure A1

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Jul 22 2024

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	PENETRATION RESISTANCE (N), BLOWS/0.3m; DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m; SHEAR STRENGTH (Cu), kPA (NATURAL, REMOULDED); WATER CONTENT, % (W_P, W, W_L); 10 20 30 40 50 60 70 80 90	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0	Power Auger / Hollow Stem Auger (210mm OD)	Ground Surface		66.47							Asphaltic coldpatch repair
		Probe Hole - Soil not sampled									
1											
2											Backfilled with auger cuttings
3											
4				61.89							
		End of Probe Hole		4.58							
5											
6											
7											
8											
9											
10											

GEMTEC
Consulting Engineers and Scientists

LOGGED: ML
CHECKED: LB

RECORD OF BOREHOLE 24-10

CLIENT: J.L. Richards & Associates Limited
PROJECT: Casselman Main Sewage Pumping Station Upgrades
JOB#: 100117.051
LOCATION: See Borehole Location Plan - Figure A1

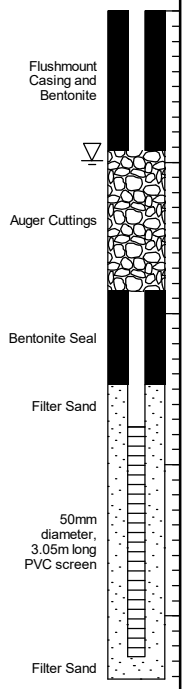
SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Jul 22 2024

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	ADDITIONAL LAB. TESTING
0	Power Auger Hollow Stem Auger (210mm OD)	Ground Surface		65.40					
		100mm ASPHALTIC CONCRETE		0.10					
		Grey crushed sand and gravel, trace silt (BASE MATERIAL)		65.07 0.33	1	SS	250	10	
		Grey crushed sand and gravel, trace silt (SUBBASE MATERIAL)		64.75 0.65					
1		Stiff to very stiff, red grey brown SILTY CLAY, trace sand			2	SS	200	5	
2					3	SS	610	4	MH
		Compact, grey brown silty sand and gravel, some clay, possible cobbles and boulders (GLACIAL TILL)		62.96 2.44	4	SS	350	20	
3		Compact, grey gravelly silty sand, trace clay, possible cobbles and boulders (GLACIAL TILL)		62.35 3.05	5	SS	250	23	MH
4					6	SS	300	20	
		End of Borehole		60.98 4.42					
5									
6									
7									
8									
9									
10									

SAMPLES

PENETRATION RESISTANCE (N), BLOWS/0.3m
DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m
SHEAR STRENGTH (Cu), kPA: + NATURAL ⊕ REMOULDED
WATER CONTENT, %: W_P W W_L
10 20 30 40 50 60 70 80 90

PIEZOMETER OR STANDPIPE INSTALLATION



GROUNDWATER OBSERVATIONS

DATE	DEPTH (m)	ELEV. (m)
24/08/07	1.0 ▽	64.4

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LOGGED: ML
CHECKED: LB

GEO - BOREHOLE LOG 100117.051_BH_LOGS_2024-07-25.GPJ GEMTEC 2018.GDT 25/1/6

RECORD OF BOREHOLE 24-11

CLIENT: J.L. Richards & Associates Limited
PROJECT: Casselman Main Sewage Pumping Station Upgrades
JOB#: 100117.051
LOCATION: See Borehole Location Plan - Figure A1

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Jul 22 2024

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	PENETRATION RESISTANCE (N), BLOWS/0.3m / DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m / SHEAR STRENGTH (Cu), kPA (NATURAL, REMOULDED) / WATER CONTENT, % (W_P, W, W_L)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0	Power Auger / Hollow Stem Auger (210mm OD)	Ground Surface		65.35					10 20 30 40 50 60 70 80 90		Asphaltic coldpatch repair
		Probe Hole - Soil not sampled									Backfilled with auger cuttings
5				60.16							
		End of Probe Hole		5.19							
10											

GEMTEC
Consulting Engineers and Scientists

LOGGED: ML
CHECKED: LB

GEO - BOREHOLE LOG 100117.051_BH_LOGS_2024-07-25.GPJ GEMTEC 2018.GDT 25/1/6

RECORD OF BOREHOLE 24-12

CLIENT: J.L. Richards & Associates Limited
PROJECT: Casselman Main Sewage Pumping Station Upgrades
JOB#: 100117.051
LOCATION: See Borehole Location Plan - Figure A1

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Jul 22 2024

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m
		Ground Surface		64.82				
0	Power Auger Hollow Stem Auger (210mm OD)	60mm ASPHALTIC CONCRETE		0.06				
		Grey, crushed sand and gravel, trace silt (BASE MATERIAL)		64.59 0.23				
		Brown sand and gravel, trace to some silt (SUBBASE MATERIAL)		64.37 0.45	1	SS	375	42
1		Light brown silty sand (FILL MATERIAL)			2	SS	375	12
		FORMER TOPSOIL LAYER		63.60 1.22				
		Stiff to very stiff, red grey brown SILTY CLAY		63.45 1.37	3	SS	450	15
2					4	SS	450	11
		Loose to compact, grey brown silty sand and gravel, some clay, possible cobbles and boulers (GLACIAL TILL)		62.07 2.75				
3		Loose to compact, grey silty sand and gravel, some clay, possible cobbles and boulers (GLACIAL TILL)		61.46 3.36	5	SS	400	19
4					6	SS	150	6
		Loose, grey coarse SAND, some gravel		60.25 4.57	7	SS	400	8
5		End of borehole		59.63 5.19				
6								
7								
8								
9								
10								

SAMPLES

PENETRATION RESISTANCE (N), BLOWS/0.3m
DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m
SHEAR STRENGTH (Cu), kPA: + NATURAL ⊕ REMOULDED
WATER CONTENT, % W_P W W_L
10 20 30 40 50 60 70 80 90

ADDITIONAL LAB. TESTING

PIEZOMETER OR STANDPIPE INSTALLATION

Asphaltic coldpatch repair

Backfilled with auger cuttings

GEMTEC
Consulting Engineers and Scientists

LOGGED: ML
CHECKED: LB

GEO - BOREHOLE LOG 100117.051_BH_LOGS_2024-07-25.GPJ GEMTEC 2018.GDT 25/1/6

RECORD OF BOREHOLE 24-14

CLIENT: J.L. Richards & Associates Limited
PROJECT: Casselman Main Sewage Pumping Station Upgrades
JOB#: 100117.051
LOCATION: See Borehole Location Plan - Figure A1

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Jul 26 2024

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	PENETRATION RESISTANCE (N), BLOWS/0.3m; DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m; SHEAR STRENGTH (Cu), kPA (NATURAL, REMOULDED); WATER CONTENT, % (W_P, W, W_L)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0	Power Auger / Hollow Stem Auger (210mm OD)	Ground Surface		67.69							Asphaltic coldpatch repair
		Probe Hole - Not Sampled									
1											
2											Backfilled with auger cuttings
3											
4				63.11							
		End of borehole		4.58							
5											
6											
7											
8											
9											
10											

PENETRATION RESISTANCE (N), BLOWS/0.3m
DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m
SHEAR STRENGTH (Cu), kPA: + NATURAL, ⊕ REMOULDED
WATER CONTENT, %: W_P — W — W_L
10 20 30 40 50 60 70 80 90

GEMTEC
Consulting Engineers and Scientists

LOGGED: ML
CHECKED: LB

GEO - BOREHOLE LOG 100117.051_BH_LOGS_2024-07-25.GPJ GEMTEC 2018.GDT 25/1/6

RECORD OF BOREHOLE 24-15

CLIENT: J.L. Richards & Associates Limited
PROJECT: Casselman Main Sewage Pumping Station Upgrades
JOB#: 100117.051
LOCATION: See Borehole Location Plan - Figure A1

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Jul 26 2024

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0	Power Auger / Hollow Stem Auger (210mm OD)	Ground Surface		67.77						
		TOPSOIL		0.03						
		Grey brown silt and sand, some clay, trace gravel and organice material (FILL MATERIAL)			1	SS	400	10		
1					2	SS	350	10	MH	
					3	SS	450	11		
2					4	SS	450	6		Backfilled with auger cuttings
3				64.72						
		Compact, grey SANDY SILT		3.05	5	SS	450	21		
				63.96						
4		Stiff to very stif, grey brown SILTY CLAY		3.81	6	SS	610	2		
				63.35						
		End of borehole		4.42						
5										
6										
7										
8										
9										
10										

PENETRATION RESISTANCE (N), BLOWS/0.3m
DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m
SHEAR STRENGTH (Cu), kPA: + NATURAL ⊕ REMOULDED
WATER CONTENT, % — W_P — W — W_L
10 20 30 40 50 60 70 80 90

GEMTEC
Consulting Engineers and Scientists

LOGGED: ML
CHECKED: LB

GEO - BOREHOLE LOG 100117.051_BH_LOGS_2024-07-25.GPJ GEMTEC 2018.GDT 25/1/6

RECORD OF BOREHOLE 24-16

CLIENT: J.L. Richards & Associates Limited
PROJECT: Casselman Main Sewage Pumping Station Upgrades
JOB#: 100117.051
LOCATION: See Borehole Location Plan - Figure A1

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Jul 26 2024

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	PENETRATION RESISTANCE (N), BLOWS/0.3m / DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m / SHEAR STRENGTH (Cu), kPA (NATURAL, REMOULDED) / WATER CONTENT, % (W_P, W, W_L)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0	Power Auger, Hollow Stem Auger (210mm OD)	Ground Surface		67.58							
		TOPSOIL		0.05							
		Grey brown silty sand, some clay, trace gravel and organice material (FILL MATERIAL)			1	SS	250	3			
1					2	SS	350	6			
					3	SS	350	4			
2					4	SS	500	8			
3					5	SS	400	3			
4					6	SS	500	3			
					7	SS	500	6			
5				62.39							
		Stiff to very stiff, red grey brown SILTY CLAY		5.19	8	SS	610	6			
6				61.48							
		Stiff to very stiff, grey brown SILTY CLAY		6.10	9	SS	610	2			
				60.87							
		End of borehole		6.71							
7											
8											
9											
10											

10 20 30 40 50 60 70 80 90

Flush mount protective cover
Auger cuttings
Bentonite Seal
Filter sand
50mm diameter, 1.5m long PVC screen

GROUNDWATER OBSERVATIONS

DATE	DEPTH (m)	ELEV. (m)
24/08/07	1.1 ▽	66.5

GEMTEC
Consulting Engineers and Scientists

LOGGED: ML
CHECKED: LB

GEO - BOREHOLE LOG 100117.051_BH_LOGS_2024-07-25.GPJ GEMTEC 2018.GDT 25/1/6

RECORD OF BOREHOLE 24-17

CLIENT: J.L. Richards & Associates Limited
PROJECT: Casselman Main Sewage Pumping Station Upgrades
JOB#: 100117.051
LOCATION: See Borehole Location Plan - Figure A1

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Jul 22 2024

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		Ground Surface		67.69						
0	Power Auger Hollow Stem Auger (210mm OD)	TOPSOIL		0.05						Asphaltic coldpatch repair
		Brown sand, some silt and clay, trace gravel, trace organic material (FILL MATERIAL)			1	SS	350	14	M	
1					2	SS	400	8		
				65.86	3	SS	400	6		
2		Stiff to very stiff, red grey brown SILTY CLAY, trace sand		1.83						Backfilled with auger cuttings
					4	SS	450	7		
3					5	SS	100	2		
4					6	SS	610	4	MH	
				63.27						
		End of borehole		4.42						
5										
6										
7										
8										
9										
10										

SAMPLES: ● PENETRATION RESISTANCE (N), BLOWS/0.3m; ▲ DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m

SHEAR STRENGTH (Cu), kPA: + NATURAL ⊕ REMOULDED

WATER CONTENT, %: W_P — W — W_L

10 20 30 40 50 60 70 80 90

GEMTEC
Consulting Engineers and Scientists

LOGGED: ML
CHECKED: LB

GEO - BOREHOLE LOG 100117.051_BH_LOGS_2024-07-25.GPJ GEMTEC 2018.GDT 25/1/6

RECORD OF BOREHOLE 24-18

CLIENT: J.L. Richards & Associates Limited
PROJECT: Casselman Main Sewage Pumping Station Upgrades
JOB#: 100117.051
LOCATION: See Borehole Location Plan - Figure A1

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Jul 18 2024

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	PENETRATION RESISTANCE (N), BLOWS/0.3m / DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m / SHEAR STRENGTH (Cu), kPA / WATER CONTENT, %	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0		Ground Surface		61.54							
		TOPSOIL		0.08							
	Power Auger Hollow Stem Auger (210mm OD)	Brown sandy clayey silt, trace gravel, trace boulders (FILL MATERIAL)			1	SS	350	8			Above Ground Protective Casing and Bentonite
1					2	SS	225	51 for 200mm			
2					3	SS	250	53 for 250mm			Auger Cuttings
					4	SS	125	5		MH	
3					5	SS	250	4			
4					6	SS	400	2			
				56.91	7	SS	50	50 for 125mm			
		BEDROCK		4.63							
5					8	RC		TCR= 94%, SCR=75%, RQD= 53%			Bentonite Seal
6					9	RC		TCR= 100%, SCR=71%, RQD= 60%		UC= 97.2 MPa	Filter Sand
7											50mm diameter, 1.5m long PVC screen
8					10	RC		TCR= 98%, SCR=89%, RQD= 85%			
				52.75							
		End of borehole		8.79							
9											
10											

GROUNDWATER OBSERVATIONS

DATE	DEPTH (m)	ELEV. (m)
24/08/07	4.9 ▽	56.7

GEMTEC
Consulting Engineers and Scientists

LOGGED: ML
CHECKED: LB

GEO - BOREHOLE LOG 100117.051_BH_LOGS_2024-07-25.GPJ GEMTEC 2018.GDT 25/1/6

RECORD OF BOREHOLE MW24-1

CLIENT: J.L. Richards & Associates Limited
PROJECT: Casselman Main Sewage Pumping Station Upgrades
JOB#: 100117.051
LOCATION: See Borehole Location Plan - Figure A1

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Jul 18 2024

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	PENETRATION RESISTANCE (N), BLOWS/0.3m; DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m; SHEAR STRENGTH (Cu), kPA (NATURAL, REMOULDED); WATER CONTENT, % (W_P, W, W_L)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0	Power Auger Hollow Stem Auger (210mm OD)	Ground Surface		62.03							Flush Mount Casing and sand
		Borehole not sampled									
1											Auger Cuttings
2											Bentonite Seal
											Filter Sand
3											50mm diameter, 1.5m long PVC screen
4				58.04 3.99							
5											
6											
7											
8											
9											
10											

GROUNDWATER OBSERVATIONS

DATE	DEPTH (m)	ELEV. (m)
24/08/07	2.4 ▽	59.6

GEMTEC
Consulting Engineers and Scientists

LOGGED: ML
CHECKED: LB

GEO - BOREHOLE LOG 100117.051_BH_LOGS_2024-07-25.GPJ GEMTEC 2018.GDT 25/1/6

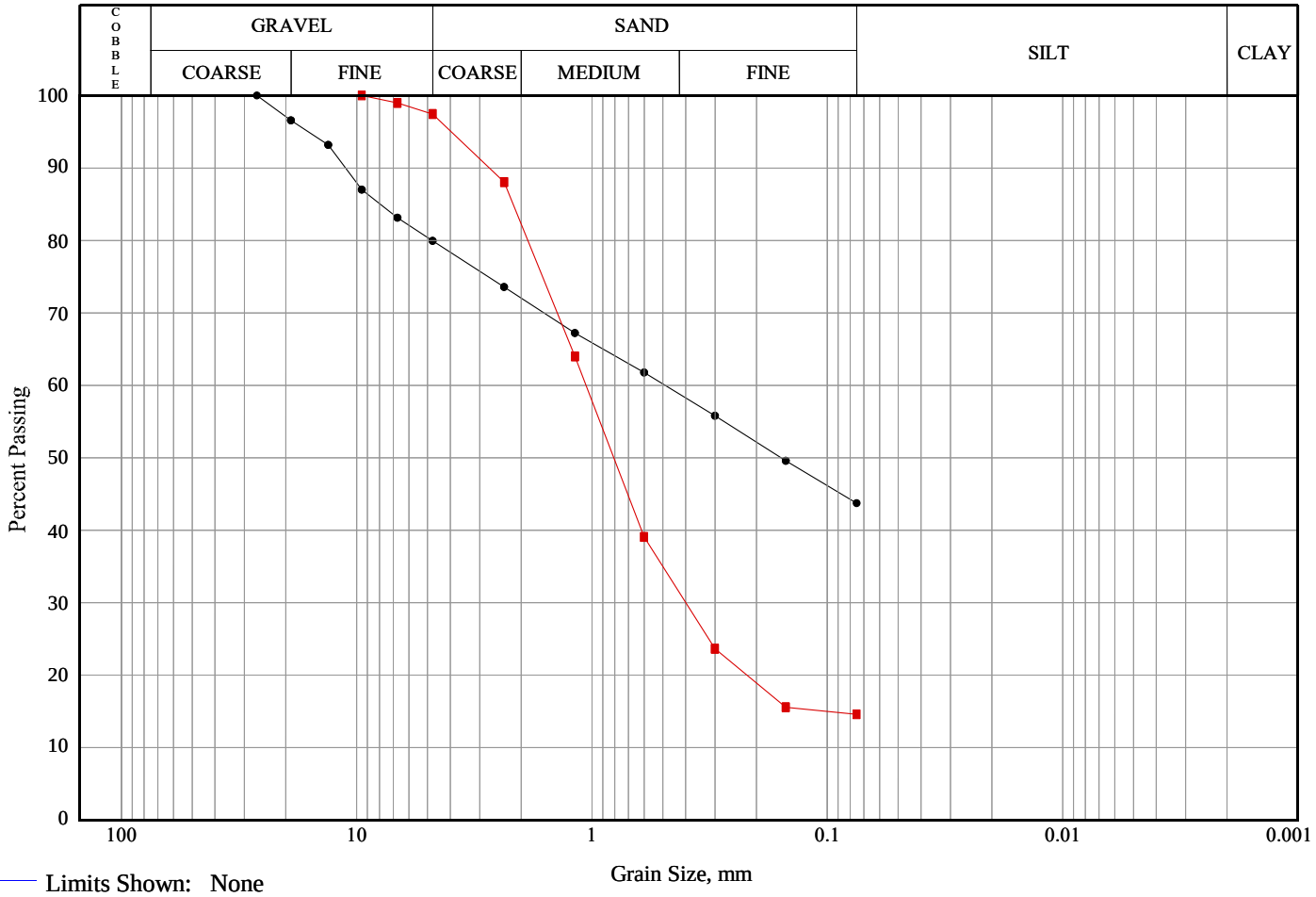
APPENDIX C

Soil Classification Test Results

GEMTEC
Consulting Engineers and Scientists

Client:	J. L. Richards & Associates Limited
Project:	Casselman Main Sewage Pumping Station
Project #:	100117051

Soils Grading Chart



Limits Shown: None

Line Symbol	Sample	Borehole/ Test Pit	Sample Number	Depth	% Cob.+ Gravel	% Sand	% Silt	% Clay
●	a ia i	24-06	SS6	3.81-4.41	20.1	36.2	43.7	
■	i at ria	24-17	SS2	0.76-1.52	2.6	82.9	14.6	

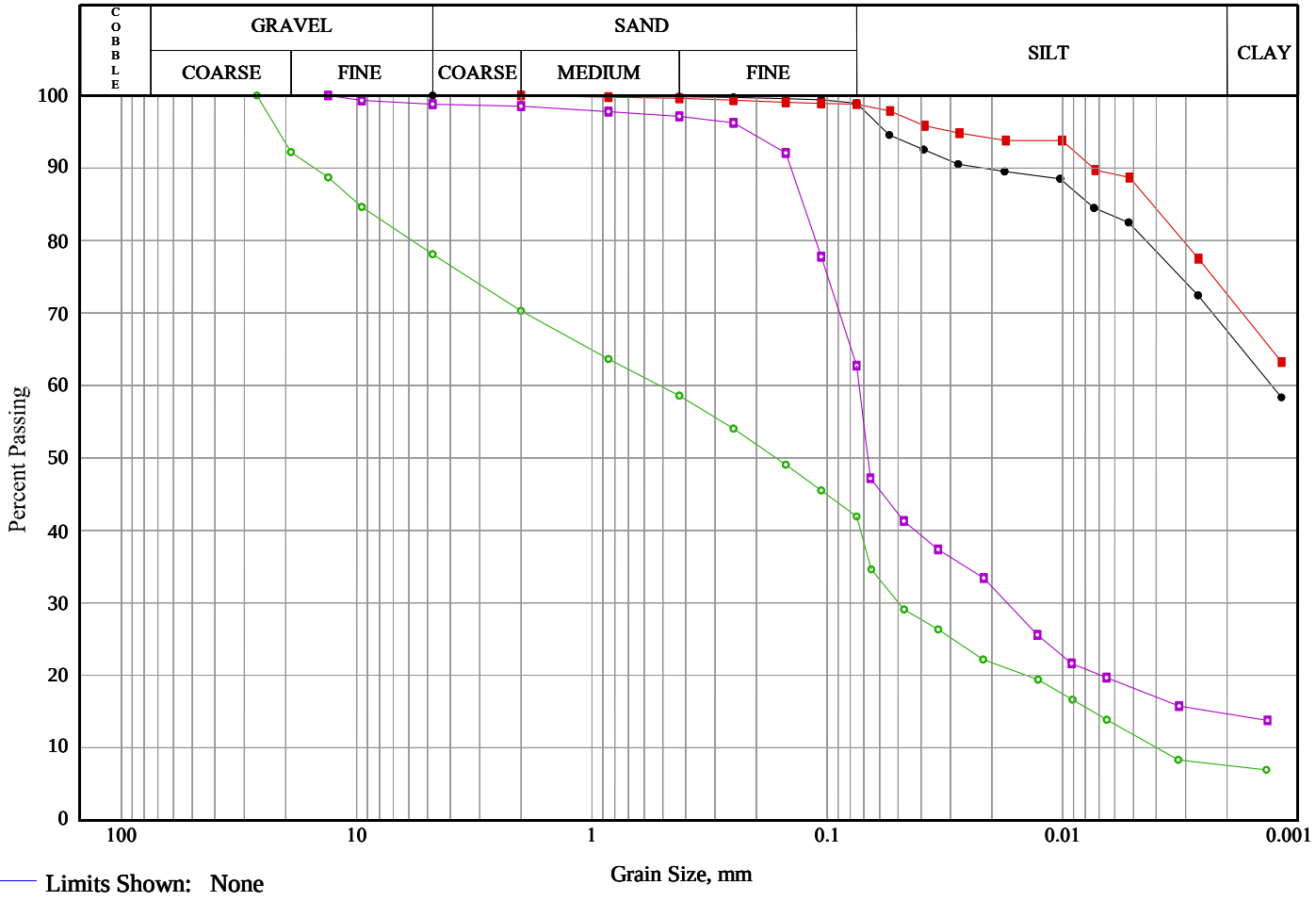
Line Symbol	CanFEM Classification	USCS Symbol	D_{10}	D_{15}	D_{30}	D_{50}	D_{60}	D_{85}	% 5-75µm
●	Gravelly silt and sand	N/A	---	---	---	0.16	0.49	7.94	---
■	Sand , some silt , trace gravel	N/A	---	0.102	0.40	0.81	1.06	2.16	---

Note: More information available upon request

GEMTEC
Consulting Engineers and Scientists

Client:	J. L. Richards & Associates Limited
Project:	Casselman Main Sewage Pumping Station
Project #:	100117051

Soils Grading Chart (LS-702/ ASTM D-422)



Line Symbol	Sample	Borehole/ Test Pit	Sample Number	Depth	% Cob.+ Gravel	% Sand	% Silt	% Clay
		24-01	SS3	1.52-2.13	0.0	1.1	31.4	67.5
		24-10	SS3	1.52-2.13	0.0	1.2	26.2	72.6
	a ia i	24-10	SS5	3.04-3.65	21.9	36.2	34.4	7.5
	i at ria	24-15	SS2	0.76-1.37	1.2	36.1	48.1	14.7

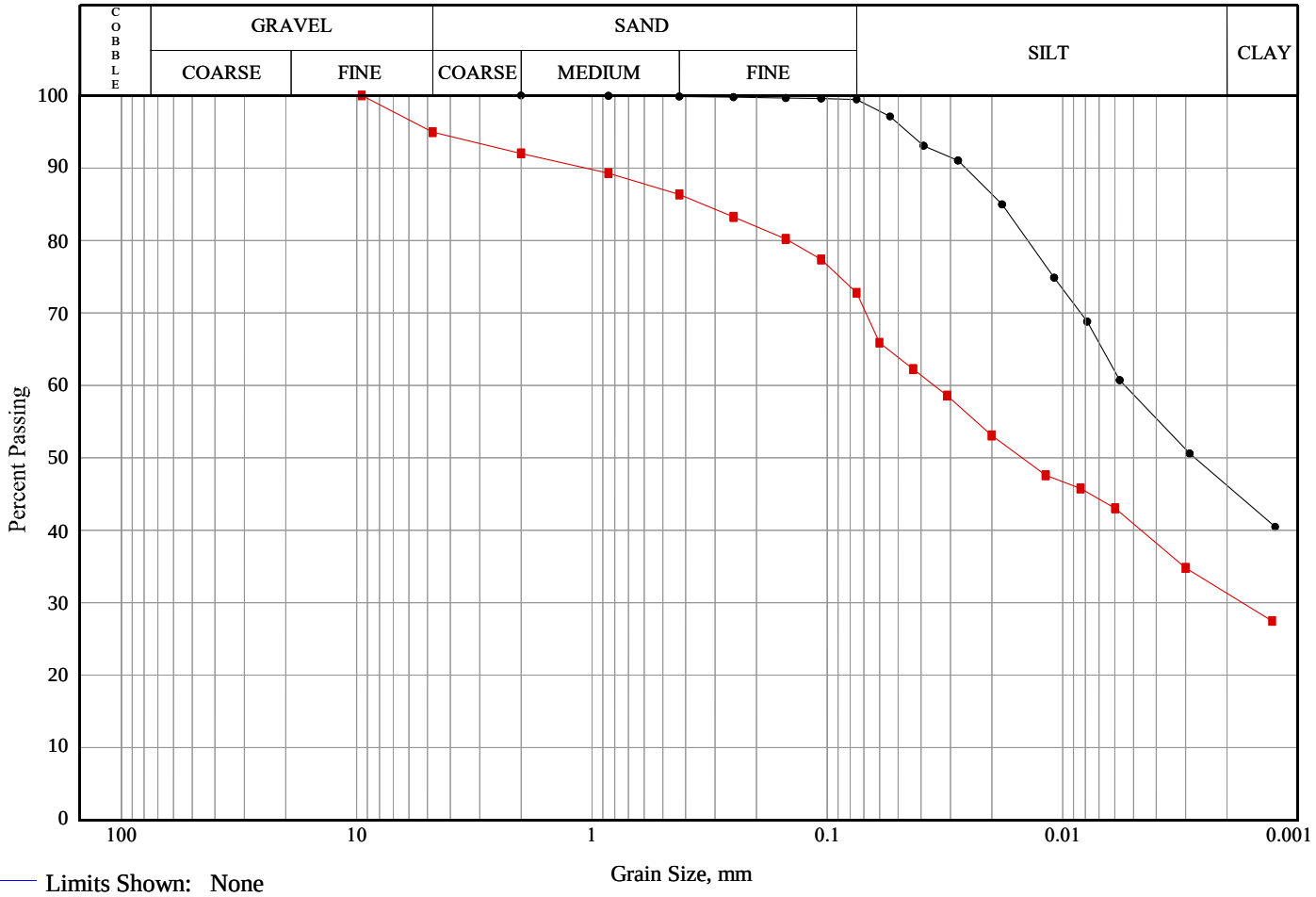
Line Symbol	CanFEM Classification	USCS Symbol	D_{10}	D_{15}	D_{30}	D_{50}	D_{60}	D_{85}	% 5-75µm
	Silty clay , trace sand	CH	---	---	---	---	0.00	0.01	31.4
	Silty clay , trace sand	CH	---	---	---	---	---	0.00	26.2
	Gravelly silty sand , trace clay	N/A	0.004	0.007	0.05	0.17	0.52	9.80	34.4
	Silt and sand , some clay , trace gravel	N/A	---	0.002	0.02	0.07	0.07	0.13	48.1

Note: More information available upon request

GEMTEC
Consulting Engineers and Scientists

Client:	J. L. Richards & Associates Limited
Project:	Casselman Main Sewage Pumping Station
Project #:	100117051

Soils Grading Chart (LS-702/ ASTM D-422)



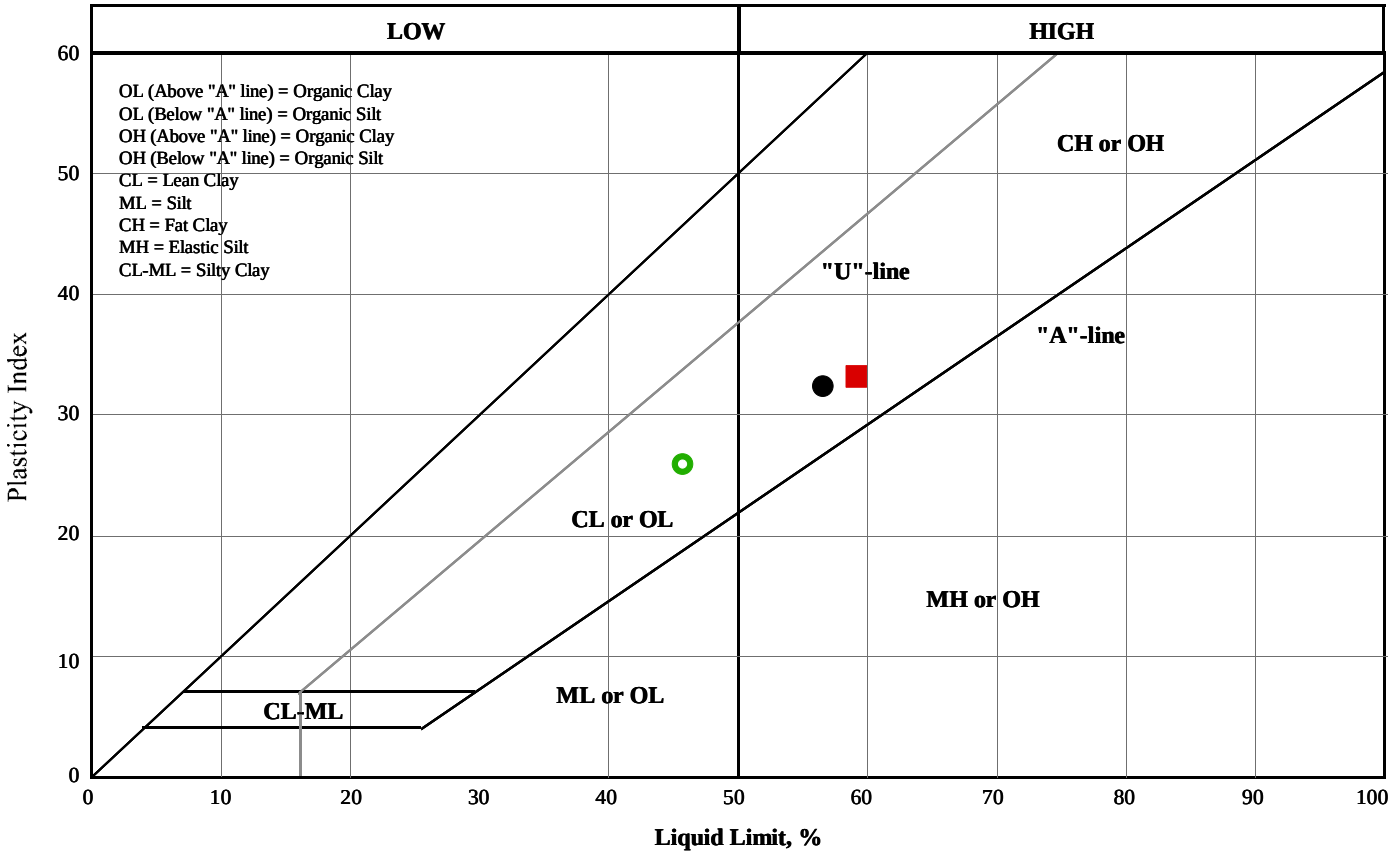
Limits Shown: None

Line Symbol	Sample	Borehole/ Test Pit	Sample Number	Depth	% Cob.+ Gravel	% Sand	% Silt	% Clay
●		24-17	SS6	3.81-4.41	0.0	0.6	53.3	46.2
■	i at ria	24-18	SS4	2.28-2.89	5.1	22.2	41.5	31.3

Line Symbol	CanFEM Classification	USCS Symbol	D_{10}	D_{15}	D_{30}	D_{50}	D_{60}	D_{85}	% 5-75µm
●	Silt and clay , trace sand	CL	---	---	---	0.00	0.01	0.02	53.3
■	Sandy clayey silt , trace gravel	N/A	---	---	0.00	0.01	0.04	0.34	41.5

Note: More information available upon request

GEMTEC Consulting Engineers and Scientists Ottawa, ON	Client: J. L. Richards & Associates Limited	Plasticity Chart (LS-7034/ASTM D4318)
	Project: Casselman Main Sewage Pumping Station	
	Project #: 100117051	



Symbol	Borehole /Test Pit	Sample Number	Depth	Liquid Limit	Plastic Limit	Plasticity Index	Non-Plastic	Moisture Content, %
●	24-01	SS3	1.52-2.13	56.5	24.2	32	N/A	28.3
■	24-10	SS3	1.52-2.13	59.1	26.0	33	N/A	50.5
○	24-17	SS6	3.81-4.41	45.7	19.8	26	N/A	49.8

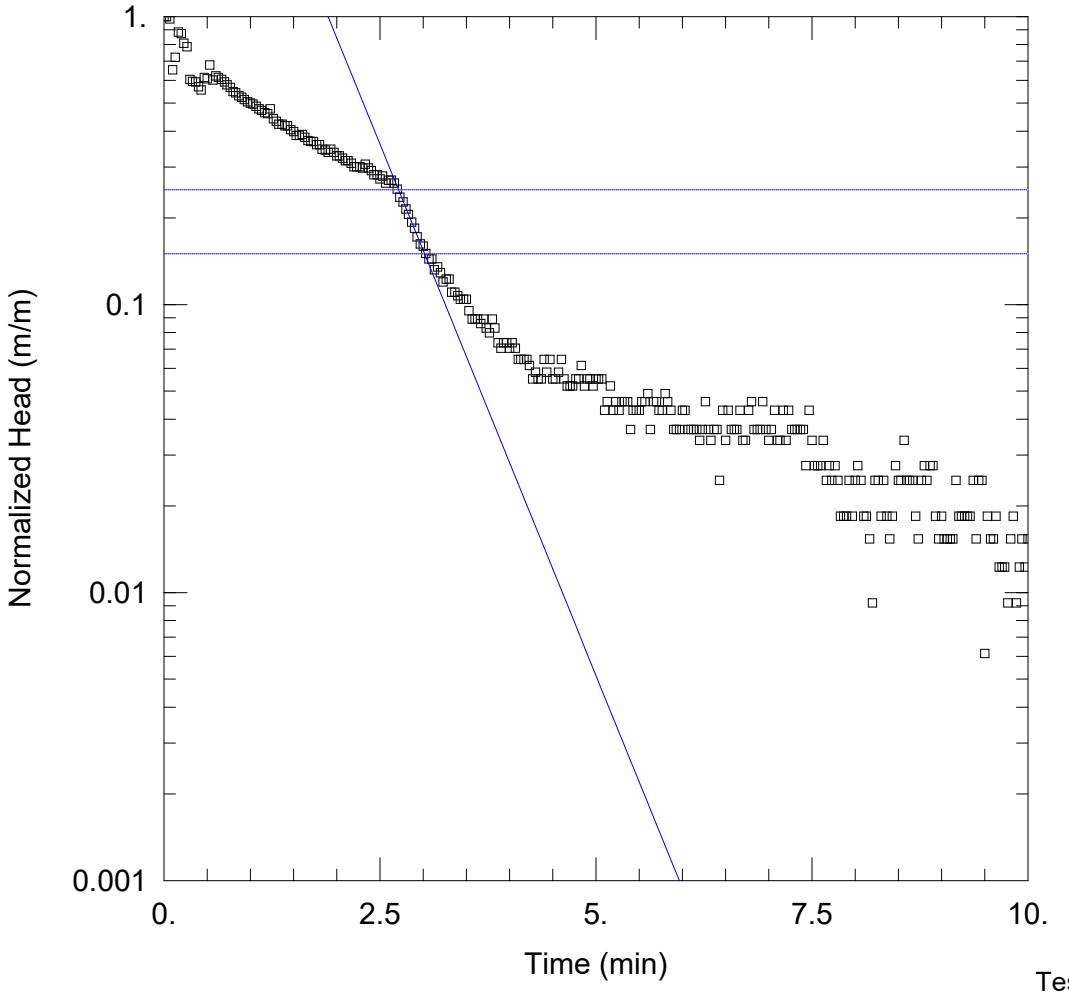
Note: More information available upon request

APPENDIX D

Hydraulic Testing Results

MW24-1: Rising Head Test

Prepared By:	Prepared For:
GEMTEC	JLR
Project:	**Location:**
100117.051	Casselman



Test Date: 2023-09-17

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev

K = 2.0E-5 m/sec y0 = 8.19 m

AQUIFER DATA

Saturated Thickness: 2.42 m
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (MW24-01)

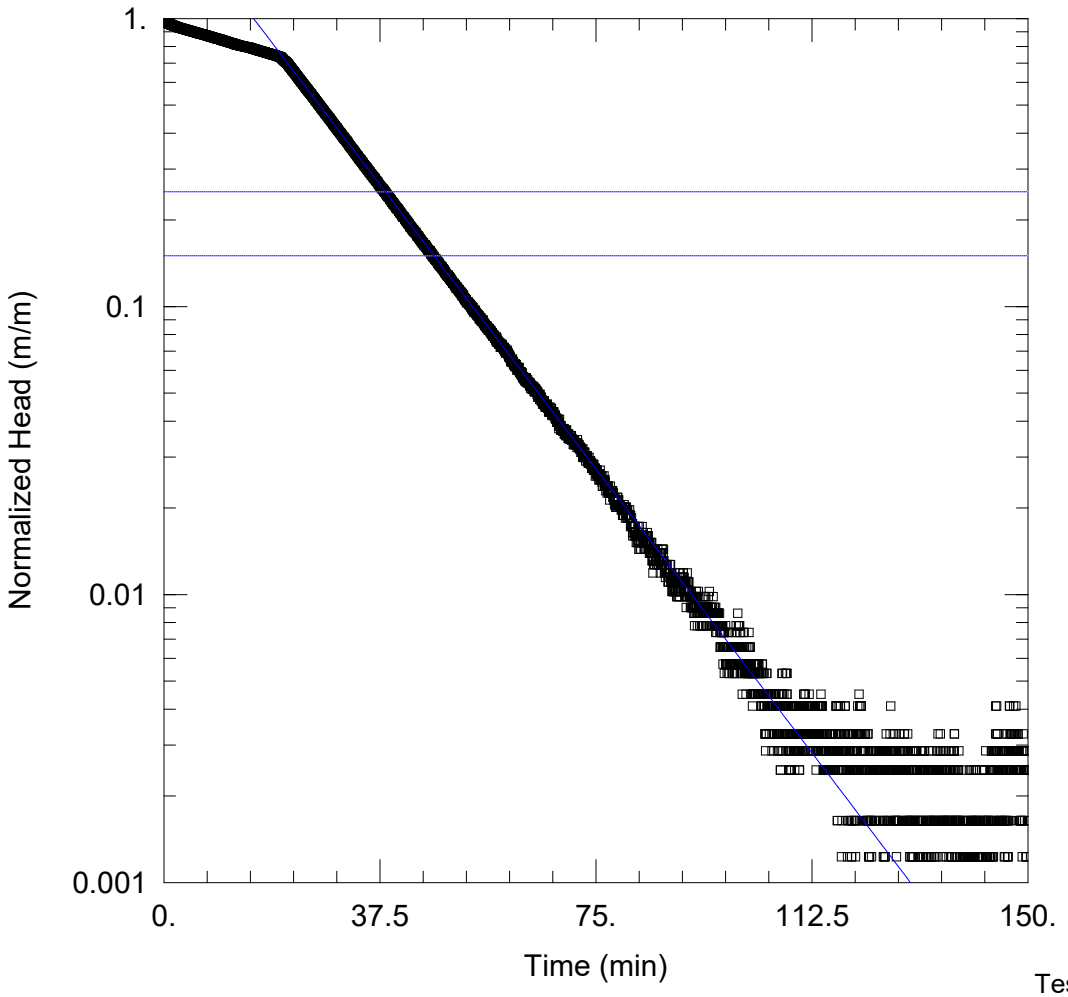
Initial Displacement: 0.33 m
Static Water Column Height: 2.42 m
Total Well Penetration Depth: 2.42 m
Screen Length: 2.42 m
Casing Radius: 0.0254 m
Well Radius: 0.0254 m
Gravel Pack Porosity: 0.3

Analysed by: JKA
Reviewed by: AP

GEMTEC
Consulting Engineers and Scientists

BH24-10: Rising Head Test

Prepared By:	Prepared For:
GEMTEC	JLR
Project:	**Location:**
100117.051	Casselman



Test Date: 2024-09-09

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev

K = 1.1E-6 m/sec y0 = 6.26 m

AQUIFER DATA

Saturated Thickness: 2.44 m
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (BH24-10)

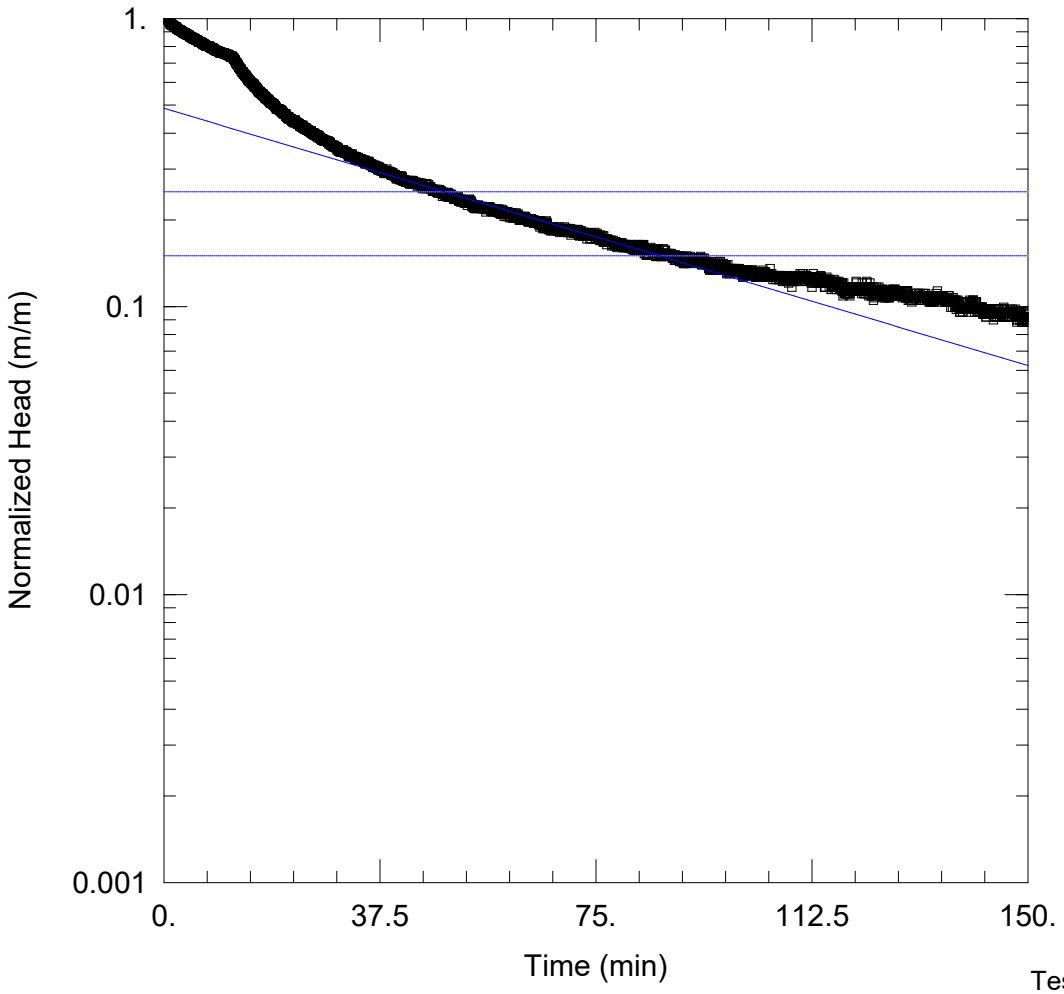
Initial Displacement: 2.44 m
Static Water Column Height: 2.44 m
Total Well Penetration Depth: 2.44 m
Screen Length: 1.8 m
Casing Radius: 0.0254 m
Well Radius: 0.0254 m

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Analysed by: JKA
Reviewed by: AP

BH24-16: Rising Head Test

Prepared By:	Prepared For:
GEMTEC	JLR
Project:	**Location:**
100117.051	Casselman



Test Date: 2023-09-09

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev

K = 1.9E-7 m/sec y0 = 0.92 m

AQUIFER DATA

Saturated Thickness: 5.91 m
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (BH24-16)

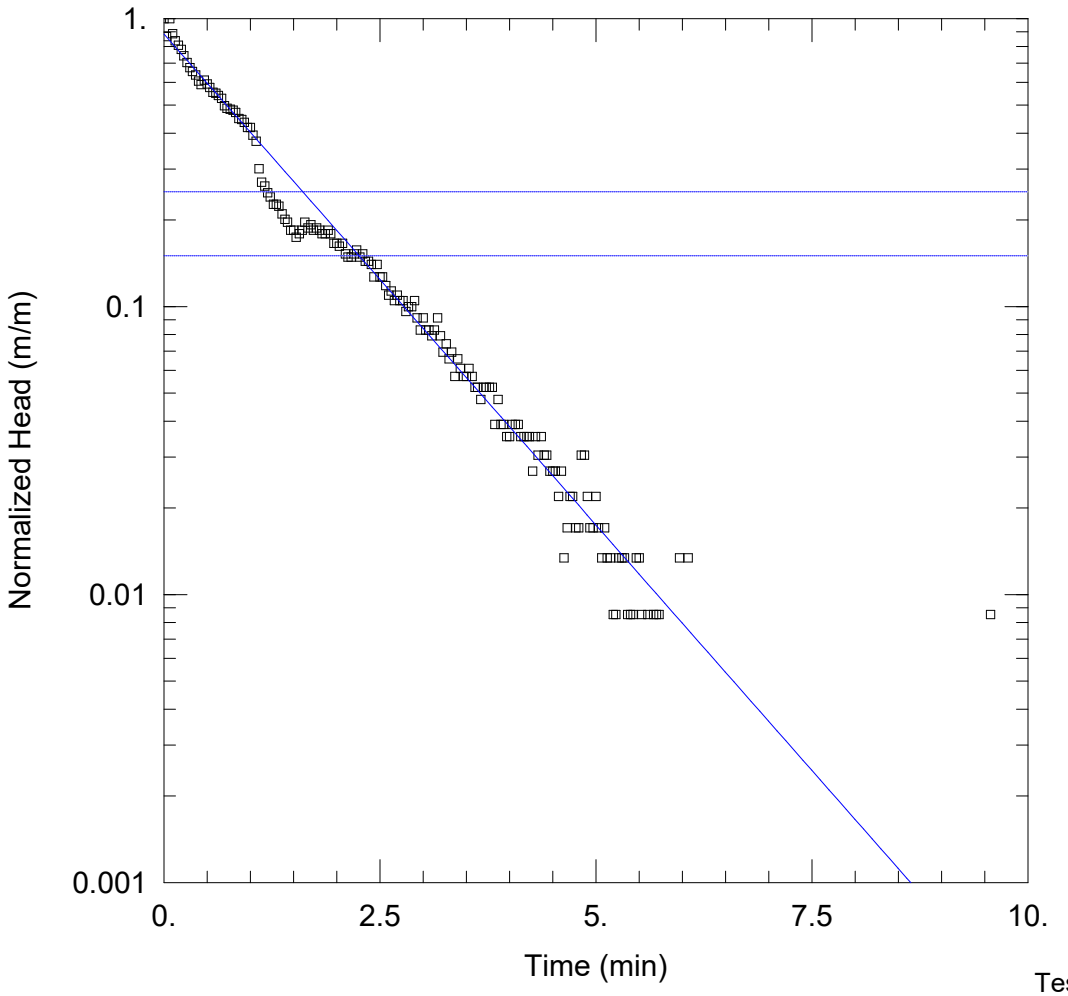
Initial Displacement: 1.89 m
Static Water Column Height: 5.91 m
Total Well Penetration Depth: 5.91 m
Screen Length: 2.44 m
Casing Radius: 0.0254 m
Well Radius: 0.0254 m

Analysed by: JKA
Reviewed by: AP

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BH24-18: Rising Head Test

Prepared By:	Prepared For:
GEMTEC	JLR
Project:	**Location:**
100117.051	Casselman



Test Date: 2023-08-30

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev

K = 1.1E-5 m/sec y0 = 0.72 m

AQUIFER DATA

Saturated Thickness: 4.53 m
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (BH24-18)

Initial Displacement: 0.82 m
Static Water Column Height: 4.53 m
Total Well Penetration Depth: 4.53 m
Screen Length: 2.21 m
Casing Radius: 0.0254 m
Well Radius: 0.0254 m

Analysed by: JKA
Reviewed by: AP

GEMTEC
Consulting Engineers and Scientists

APPENDIX E

Groundwater Quality Results
Chemical Analysis of Groundwater Samples
Relating to Corrosion
(Paracel Laboratories Ltd. Order No. 2432488, 2437224)

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Certificate of Analysis

GEMTEC Consulting Engineers and Scientists Limited
32 Steacie Drive
Kanata, ON K2K 2A9
Attn: Andrius Paznekas

Client PO:
Project: 100117.051
Custody: 137760

Report Date: 19-Aug-2024
Order Date: 9-Aug-2024

Order #: 2432488

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID	Client ID
2432488-01	MW24-10
2432488-02	MW24-16
2432488-03	MW24-18

Approved By:

Mark Foto

Mark Foto, M.Sc.
Lab Supervisor

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Anions	EPA 300.1 - IC	12-Aug-24	12-Aug-24
Hexachlorobenzene	EPA 8081B - GC-ECD	14-Aug-24	14-Aug-24
Mercury by CVAA	EPA 245.2 - Cold Vapour AA	12-Aug-24	12-Aug-24
Metals, ICP-MS	EPA 200.8 - ICP-MS	12-Aug-24	12-Aug-24
Ottawa - San/Comb: SVOCs with PAHs	EPA 625 - GC-MS, extraction	15-Aug-24	16-Aug-24
PCBs, total	EPA 608 - GC-ECD	14-Aug-24	14-Aug-24
pH	EPA 150.1 - pH probe @25 °C	12-Aug-24	12-Aug-24
PHC F1	CWS Tier 1 - P&T GC-FID	13-Aug-24	13-Aug-24
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	14-Aug-24	14-Aug-24
Phosphorus, total, water	EPA 365.4 - Auto Colour, digestion	12-Aug-24	12-Aug-24
Resistivity	EPA 120.1 - probe	12-Aug-24	12-Aug-24
Total Kjeldahl Nitrogen	EPA 351.2 - Auto Colour, digestion	12-Aug-24	12-Aug-24
Total Suspended Solids	SM 2540D - Gravimetric	10-Aug-24	12-Aug-24
VOCs by P&T GC-MS	EPA 624 - P&T GC-MS	13-Aug-24	13-Aug-24
Volatile Suspended Solids	SM 2540D - Gravimetric, 550C	10-Aug-24	12-Aug-24

Certificate of Analysis

Report Date: 19-Aug-2024

Client: **GEMTEC Consulting Engineers and Scientists Limited**

Order Date: 9-Aug-2024

Client PO:

Project Description: 100117.051

	Client ID:	MW24-10	MW24-16	MW24-18	-	-	-
	Sample Date:	08-Aug-24 15:00	08-Aug-24 16:00	08-Aug-24 14:00	-		
	Sample ID:	2432488-01	2432488-02	2432488-03	-		
	Matrix:	Ground Water	Ground Water	Ground Water	-		
	MDL/Units						
General Inorganics							
pH	0.1 pH Units	8.2	6.6	7.6	-	-	-
Phosphorus, total	0.01 mg/L	0.80	4.48	3.02	-	-	-
Resistivity	0.01 Ohm.m	6.61	7.50	3.85	-	-	-
Total Suspended Solids	2 mg/L	308	2630	7180	-	-	-
Volatile Suspended Solids	2 mg/L	21	70	470	-	-	-
Total Kjeldahl Nitrogen	0.1 mg/L	0.3	7.1	4.0	-	-	-
Anions							
Chloride	1 mg/L	224	21	493	-	-	-
Sulphate	1 mg/L	87	1	93	-	-	-
Metals - Total							
Aluminum	0.01 mg/L	0.92	23.3	53.5	-	-	-
Antimony	0.001 mg/L	<0.001	0.001	0.001	-	-	-
Arsenic	0.01 mg/L	<0.01	<0.01	0.02	-	-	-
Bismuth	0.005 mg/L	<0.005	<0.005	<0.005	-	-	-
Boron	0.05 mg/L	<0.05	<0.05	0.07	-	-	-
Cadmium	0.001 mg/L	<0.001	<0.001	<0.001	-	-	-
Chromium	0.05 mg/L	<0.05	0.06	0.17	-	-	-
Cobalt	0.001 mg/L	<0.001	0.027	0.034	-	-	-
Copper	0.005 mg/L	<0.005	0.028	0.095	-	-	-
Lead	0.001 mg/L	<0.001	0.007	0.065	-	-	-
Manganese	0.05 mg/L	0.08	37.8	2.75	-	-	-
Mercury	0.0001 mg/L	<0.0001	0.0001	<0.0001	-	-	-
Molybdenum	0.005 mg/L	<0.005	<0.005	0.012	-	-	-
Nickel	0.005 mg/L	<0.005	0.033	0.092	-	-	-
Selenium	0.005 mg/L	<0.005	0.008	0.010	-	-	-

	Client ID:	MW24-10	MW24-16	MW24-18	-	-	-
	Sample Date:	08-Aug-24 15:00	08-Aug-24 16:00	08-Aug-24 14:00	-		
	Sample ID:	2432488-01	2432488-02	2432488-03	-		
	Matrix:	Ground Water	Ground Water	Ground Water	-		
	MDL/Units						
Metals - Total							
Silver	0.001 mg/L	<0.001	<0.001	0.011	-	-	-
Tin	0.01 mg/L	<0.01	<0.01	<0.01	-	-	-
Titanium	0.01 mg/L	0.05	1.25	2.64	-	-	-
Vanadium	0.001 mg/L	0.003	0.059	0.119	-	-	-
Zinc	0.02 mg/L	<0.02	0.04	0.23	-	-	-
Volatiles							
Acetone	0.0050 mg/L	<0.0050	<0.0050	<0.0050	-	-	-
Benzene	0.0005 mg/L	<0.0005	<0.0005	<0.0005	-	-	-
Bromodichloromethane	0.0005 mg/L	<0.0005	<0.0005	<0.0005	-	-	-
Bromoform	0.0005 mg/L	<0.0005	<0.0005	<0.0005	-	-	-
Bromomethane	0.0005 mg/L	<0.0005	<0.0005	<0.0005	-	-	-
Carbon Tetrachloride	0.0002 mg/L	<0.0002	<0.0002	<0.0002	-	-	-
Chlorobenzene	0.0005 mg/L	<0.0005	<0.0005	<0.0005	-	-	-
Chloroethane	0.0010 mg/L	<0.0010	<0.0010	<0.0010	-	-	-
Chloroform	0.0005 mg/L	<0.0005	<0.0005	0.0022	-	-	-
Chloromethane	0.0030 mg/L	<0.0030	<0.0030	<0.0030	-	-	-
Dibromochloromethane	0.0005 mg/L	<0.0005	<0.0005	<0.0005	-	-	-
Dichlorodifluoromethane	0.0010 mg/L	<0.0010	<0.0010	<0.0010	-	-	-
1,2-Dibromoethane	0.0002 mg/L	<0.0002	<0.0002	<0.0002	-	-	-
1,2-Dichlorobenzene	0.0005 mg/L	<0.0005	<0.0005	<0.0005	-	-	-
1,3-Dichlorobenzene	0.0005 mg/L	<0.0005	<0.0005	<0.0005	-	-	-
1,4-Dichlorobenzene	0.0005 mg/L	<0.0005	<0.0005	<0.0005	-	-	-
1,1-Dichloroethane	0.0005 mg/L	<0.0005	<0.0005	<0.0005	-	-	-
1,2-Dichloroethane	0.0005 mg/L	<0.0005	<0.0005	<0.0005	-	-	-
1,1-Dichloroethylene	0.0005 mg/L	<0.0005	<0.0005	<0.0005	-	-	-

	Client ID:	MW24-10	MW24-16	MW24-18	-	-	-
	Sample Date:	08-Aug-24 15:00	08-Aug-24 16:00	08-Aug-24 14:00	-		
	Sample ID:	2432488-01	2432488-02	2432488-03	-		
	Matrix:	Ground Water	Ground Water	Ground Water	-		
	MDL/Units						
Volatiles							
cis-1,2-Dichloroethylene	0.0005 mg/L	<0.0005	<0.0005	<0.0005	-	-	-
trans-1,2-Dichloroethylene	0.0005 mg/L	<0.0005	<0.0005	<0.0005	-	-	-
1,2-Dichloroethylene, total	0.0005 mg/L	<0.0005	<0.0005	<0.0005	-	-	-
1,2-Dichloropropane	0.0005 mg/L	<0.0005	<0.0005	<0.0005	-	-	-
cis-1,3-Dichloropropylene	0.0005 mg/L	<0.0005	<0.0005	<0.0005	-	-	-
trans-1,3-Dichloropropylene	0.0005 mg/L	<0.0005	<0.0005	<0.0005	-	-	-
1,3-Dichloropropene, total	0.0005 mg/L	<0.0005	<0.0005	<0.0005	-	-	-
Ethylbenzene	0.0005 mg/L	<0.0005	<0.0005	<0.0005	-	-	-
Hexane	0.0010 mg/L	<0.0010	<0.0010	<0.0010	-	-	-
Methyl Ethyl Ketone (2-Butanone)	0.0050 mg/L	<0.0050	<0.0050	<0.0050	-	-	-
Methyl Butyl Ketone (2-Hexanone)	0.0100 mg/L	<0.0100	<0.0100	<0.0100	-	-	-
Methyl Isobutyl Ketone	0.0050 mg/L	<0.0050	<0.0050	<0.0050	-	-	-
Methyl tert-butyl ether	0.0020 mg/L	<0.0020	<0.0020	<0.0020	-	-	-
Methylene Chloride	0.0050 mg/L	<0.0050	<0.0050	<0.0050	-	-	-
Styrene	0.0005 mg/L	<0.0005	<0.0005	<0.0005	-	-	-
1,1,1,2-Tetrachloroethane	0.0005 mg/L	<0.0005	<0.0005	<0.0005	-	-	-
1,1,2,2-Tetrachloroethane	0.0005 mg/L	<0.0005	<0.0005	<0.0005	-	-	-
Tetrachloroethylene	0.0005 mg/L	<0.0005	<0.0005	<0.0005	-	-	-
Toluene	0.0005 mg/L	<0.0005	<0.0005	<0.0005	-	-	-
1,1,1-Trichloroethane	0.0005 mg/L	<0.0005	<0.0005	<0.0005	-	-	-
1,1,2-Trichloroethane	0.0005 mg/L	<0.0005	<0.0005	<0.0005	-	-	-
Trichloroethylene	0.0005 mg/L	<0.0005	<0.0005	<0.0005	-	-	-
Trichlorofluoromethane	0.0010 mg/L	<0.0010	<0.0010	<0.0010	-	-	-
1,3,5-Trimethylbenzene	0.0005 mg/L	<0.0005	<0.0005	<0.0005	-	-	-
Vinyl chloride	0.0005 mg/L	<0.0005	<0.0005	<0.0005	-	-	-

	Client ID:	MW24-10	MW24-16	MW24-18	-	-	-
	Sample Date:	08-Aug-24 15:00	08-Aug-24 16:00	08-Aug-24 14:00	-		
	Sample ID:	2432488-01	2432488-02	2432488-03	-		
	Matrix:	Ground Water	Ground Water	Ground Water	-		
	MDL/Units						
Volatiles							
m,p-Xylenes	0.0005 mg/L	<0.0005	<0.0005	<0.0005	-	-	-
o-Xylene	0.0005 mg/L	<0.0005	<0.0005	<0.0005	-	-	-
Xylenes, total	0.0005 mg/L	<0.0005	<0.0005	<0.0005	-	-	-
Toluene-d8	Surrogate	105%	105%	106%	-	-	-
Dibromofluoromethane	Surrogate	105%	107%	105%	-	-	-
4-Bromofluorobenzene	Surrogate	116%	117%	117%	-	-	-
Hydrocarbons							
F1 PHCs (C6-C10)	0.025 mg/L	<0.025	<0.025	<0.025	-	-	-
F2 PHCs (C10-C16)	0.1 mg/L	<0.1	<0.1	<0.1	-	-	-
F3 PHCs (C16-C34)	0.1 mg/L	<0.1	<0.1	<0.1	-	-	-
F4 PHCs (C34-C50)	0.1 mg/L	<0.1	<0.1	<0.1	-	-	-
Semi-Volatiles							
1-Methylnaphthalene	0.00005 mg/L	<0.00005	<0.00005	<0.00005	-	-	-
2-Methylnaphthalene	0.00005 mg/L	<0.00005	<0.00005	<0.00005	-	-	-
7H-Dibenzo[c,g]carbazole	0.00050 mg/L	<0.00050	<0.00050	<0.00050	-	-	-
Anthracene	0.00001 mg/L	<0.00001	<0.00001	<0.00001	-	-	-
Benzo [a] anthracene	0.00001 mg/L	<0.00001	<0.00001	0.00010	-	-	-
Benzo [a] pyrene	0.00001 mg/L	<0.00001	<0.00001	0.00013	-	-	-
Benzo [b&j] fluoranthene	0.00005 mg/L	<0.00005	<0.00005	<0.00005	-	-	-
Benzo [e] pyrene	0.00005 mg/L	<0.00005	<0.00005	0.00009	-	-	-
Benzo [g,h,i] perylene	0.00005 mg/L	<0.00005	<0.00005	0.00010	-	-	-
Benzo [k] fluoranthene	0.00005 mg/L	<0.00005	<0.00005	<0.00005	-	-	-
Benzylbutylphthalate	0.00050 mg/L	<0.00050	<0.00050	<0.00050	-	-	-
Biphenyl	0.00005 mg/L	<0.00005	<0.00005	<0.00005	-	-	-
Bis(2-chloroethoxy)methane	0.00100 mg/L	<0.00100	<0.00100	<0.00100	-	-	-

	Client ID:	MW24-10	MW24-16	MW24-18	-	-	-
	Sample Date:	08-Aug-24 15:00	08-Aug-24 16:00	08-Aug-24 14:00	-		
	Sample ID:	2432488-01	2432488-02	2432488-03	-		
	Matrix:	Ground Water	Ground Water	Ground Water	-		
	MDL/Units						
Semi-Volatiles							
Bis(2-ethylhexyl)phthalate	0.00100 mg/L	0.00332	<0.00100	<0.00100	-	-	-
Chrysene	0.00005 mg/L	<0.00005	<0.00005	0.00013	-	-	-
Dibenzo [a,h] anthracene	0.00005 mg/L	<0.00005	<0.00005	<0.00005	-	-	-
Dibenzo [a,i] pyrene	0.00050 mg/L	<0.00050	<0.00050	<0.00050	-	-	-
Dibenzo [a,j] acridine	0.00050 mg/L	<0.00050	<0.00050	<0.00050	-	-	-
Diethylphthalate	0.00100 mg/L	<0.00100	<0.00100	<0.00100	-	-	-
Di-n-butylphthalate	0.00100 mg/L	<0.00100	<0.00100	0.00121	-	-	-
Di-n-octylphthalate	0.00100 mg/L	<0.00100	<0.00100	<0.00100	-	-	-
Fluoranthene	0.00001 mg/L	<0.00001	0.00004	0.00021	-	-	-
Fluorene	0.00005 mg/L	<0.00005	<0.00005	<0.00005	-	-	-
Indeno [1,2,3-cd] pyrene	0.00005 mg/L	<0.00005	<0.00005	0.00011	-	-	-
Indole	0.00100 mg/L	<0.00100	<0.00100	<0.00100	-	-	-
Naphthalene	0.00005 mg/L	<0.00005	<0.00005	<0.00005	-	-	-
Phenanthrene	0.00005 mg/L	<0.00005	<0.00005	<0.00005	-	-	-
Perylene	0.00050 mg/L	<0.00050	<0.00050	<0.00050	-	-	-
Pyrene	0.00001 mg/L	0.000085	0.00006	0.00016	-	-	-
2,4-Dichlorophenol	0.00100 mg/L	<0.00100	<0.00100	<0.00100	-	-	-
PAHs, Total	0.0025 mg/L	<0.0025	<0.0025	<0.0025	-	-	-
2-Fluorobiphenyl	Surrogate	67.9%	65.5%	75.3%	-	-	-
Nitrobenzene-d5	Surrogate	55.1%	56.4%	64.2%	-	-	-
Terphenyl-d14	Surrogate	82.7%	76.9%	71.6%	-	-	-
2,4,6-Tribromophenol	Surrogate	77.3%	90.8%	85.4%	-	-	-
2-Fluorophenol	Surrogate	2.85% [2]	3.26% [2]	4.98% [2]	-	-	-
Phenol-d6	Surrogate	3.36% [2]	3.69% [2]	5.17% [2]	-	-	-
Pesticides, OC							

	Client ID:	MW24-10	MW24-16	MW24-18	-		
	Sample Date:	08-Aug-24 15:00	08-Aug-24 16:00	08-Aug-24 14:00	-	-	-
	Sample ID:	2432488-01	2432488-02	2432488-03	-		
	Matrix:	Ground Water	Ground Water	Ground Water	-		
	MDL/Units						
Pesticides, OC							
Hexachlorobenzene	0.00001 mg/L	<0.00001	<0.00001	<0.00001	-	-	-
Decachlorobiphenyl	Surrogate	86.0%	62.0%	90.0%	-	-	-
PCBs							
PCBs, total	0.05 ug/L	<0.05	<0.05	<0.05	-	-	-
Decachlorobiphenyl	Surrogate	98.8%	64.3%	100%	-	-	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions								
Chloride	ND	1	mg/L					
Sulphate	ND	1	mg/L					
General Inorganics								
Phosphorus, total	ND	0.01	mg/L					
Resistivity	ND	0.01	Ohm.m					
Total Suspended Solids	ND	2	mg/L					
Volatile Suspended Solids	ND	2	mg/L					
Total Kjeldahl Nitrogen	ND	0.1	mg/L					
Hydrocarbons								
F1 PHCs (C6-C10)	ND	0.025	mg/L					
F2 PHCs (C10-C16)	ND	0.1	mg/L					
F3 PHCs (C16-C34)	ND	0.1	mg/L					
F4 PHCs (C34-C50)	ND	0.1	mg/L					
Metals - Total								
Aluminum	ND	0.01	mg/L					
Antimony	ND	0.001	mg/L					
Arsenic	ND	0.01	mg/L					
Bismuth	ND	0.005	mg/L					
Boron	ND	0.05	mg/L					
Cadmium	ND	0.001	mg/L					
Chromium	ND	0.05	mg/L					
Cobalt	ND	0.001	mg/L					
Copper	ND	0.005	mg/L					
Lead	ND	0.001	mg/L					
Mercury	ND	0.0001	mg/L					
Manganese	ND	0.05	mg/L					
Molybdenum	ND	0.005	mg/L					
Nickel	ND	0.005	mg/L					
Selenium	ND	0.005	mg/L					
Silver	ND	0.001	mg/L					
Tin	ND	0.01	mg/L					
Titanium	ND	0.01	mg/L					

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
Vanadium	ND	0.001	mg/L					
Zinc	ND	0.02	mg/L					
PCBs								
PCBs, total	ND	0.05	ug/L					
Surrogate: Decachlorobiphenyl	*0.472*		*%*	*94.4*	*60-140*			
Pesticides, OC								
Hexachlorobenzene	ND	0.00001	mg/L					
Surrogate: Decachlorobiphenyl	*.00035*		*%*	*70.0*	*50-140*			
Semi-Volatiles								
1-Methylnaphthalene	ND	0.00005	mg/L					
2-Methylnaphthalene	ND	0.00005	mg/L					
7H-Dibenzo[c,g]carbazole	ND	0.00050	mg/L					
Anthracene	ND	0.00001	mg/L					
Benzo [a] anthracene	ND	0.00001	mg/L					
Benzo [a] pyrene	ND	0.00001	mg/L					
Benzo [b&j] fluoranthene	ND	0.00005	mg/L					
Benzo [e] pyrene	ND	0.00005	mg/L					
Benzo [g,h,i] perylene	ND	0.00005	mg/L					
Benzo [k] fluoranthene	ND	0.00005	mg/L					
Benzylbutylphthalate	ND	0.00050	mg/L					
Biphenyl	ND	0.00005	mg/L					
Bis(2-chloroethoxy)methane	ND	0.00100	mg/L					
Bis(2-ethylhexyl)phthalate	ND	0.00100	mg/L					
Chrysene	ND	0.00005	mg/L					
Dibenzo [a,h] anthracene	ND	0.00005	mg/L					
Dibenzo [a,i] pyrene	ND	0.00050	mg/L					
Dibenzo [a,j] acridine	ND	0.00050	mg/L					
Diethylphthalate	ND	0.00100	mg/L					
Di-n-butylphthalate	ND	0.00100	mg/L					
Di-n-octylphthalate	ND	0.00100	mg/L					
Fluoranthene	ND	0.00001	mg/L					
Fluorene	ND	0.00005	mg/L					

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
Indeno [1,2,3-cd] pyrene	ND	0.00005	mg/L					
Indole	ND	0.00100	mg/L					
Naphthalene	ND	0.00005	mg/L					
Phenanthrene	ND	0.00005	mg/L					
Perylene	ND	0.00050	mg/L					
Pyrene	ND	0.00001	mg/L					
2,4-Dichlorophenol	ND	0.00100	mg/L					
Surrogate: 2-Fluorobiphenyl	*0.0166*		*%*	*83.0*	*50-140*			
Surrogate: Nitrobenzene-d5	*0.0134*		*%*	*67.2*	*50-140*			
Surrogate: Terphenyl-d14	*0.0168*		*%*	*83.9*	*50-140*			
Surrogate: 2,4,6-Tribromophenol	*0.0388*		*%*	*97.1*	*50-140*			
Surrogate: 2-Fluorophenol	*0.00295*		*%*	*7.39*	*50-140*			S-GC
Surrogate: Phenol-d6	*0.00328*		*%*	*8.20*	*50-140*			S-GC
Volatiles								
Acetone	ND	0.0050	mg/L					
Benzene	ND	0.0005	mg/L					
Bromodichloromethane	ND	0.0005	mg/L					
Bromoform	ND	0.0005	mg/L					
Bromomethane	ND	0.0005	mg/L					
Carbon Tetrachloride	ND	0.0002	mg/L					
Chlorobenzene	ND	0.0005	mg/L					
Chloroethane	ND	0.0010	mg/L					
Chloroform	ND	0.0005	mg/L					
Chloromethane	ND	0.0030	mg/L					
Dibromochloromethane	ND	0.0005	mg/L					
Dichlorodifluoromethane	ND	0.0010	mg/L					
1,2-Dibromoethane	ND	0.0002	mg/L					
1,2-Dichlorobenzene	ND	0.0005	mg/L					
1,3-Dichlorobenzene	ND	0.0005	mg/L					
1,4-Dichlorobenzene	ND	0.0005	mg/L					
1,1-Dichloroethane	ND	0.0005	mg/L					
1,2-Dichloroethane	ND	0.0005	mg/L					

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
1,1-Dichloroethylene	ND	0.0005	mg/L					
cis-1,2-Dichloroethylene	ND	0.0005	mg/L					
trans-1,2-Dichloroethylene	ND	0.0005	mg/L					
1,2-Dichloroethylene, total	ND	0.0005	mg/L					
1,2-Dichloropropane	ND	0.0005	mg/L					
cis-1,3-Dichloropropylene	ND	0.0005	mg/L					
trans-1,3-Dichloropropylene	ND	0.0005	mg/L					
1,3-Dichloropropene, total	ND	0.0005	mg/L					
Ethylbenzene	ND	0.0005	mg/L					
Hexane	ND	0.0010	mg/L					
Methyl Ethyl Ketone (2-Butanone)	ND	0.0050	mg/L					
Methyl Butyl Ketone (2-Hexanone)	ND	0.0100	mg/L					
Methyl Isobutyl Ketone	ND	0.0050	mg/L					
Methyl tert-butyl ether	ND	0.0020	mg/L					
Methylene Chloride	ND	0.0050	mg/L					
Styrene	ND	0.0005	mg/L					
1,1,1,2-Tetrachloroethane	ND	0.0005	mg/L					
1,1,2,2-Tetrachloroethane	ND	0.0005	mg/L					
Tetrachloroethylene	ND	0.0005	mg/L					
Toluene	ND	0.0005	mg/L					
1,1,1-Trichloroethane	ND	0.0005	mg/L					
1,1,2-Trichloroethane	ND	0.0005	mg/L					
Trichloroethylene	ND	0.0005	mg/L					
Trichlorofluoromethane	ND	0.0010	mg/L					
1,3,5-Trimethylbenzene	ND	0.0005	mg/L					
Vinyl chloride	ND	0.0005	mg/L					
m,p-Xylenes	ND	0.0005	mg/L					
o-Xylene	ND	0.0005	mg/L					
Xylenes, total	ND	0.0005	mg/L					
Surrogate: 4-Bromofluorobenzene	*0.0909*		*%*	*114*	*50-140*			
Surrogate: Dibromofluoromethane	*0.0789*		*%*	*98.6*	*50-140*			
Surrogate: Toluene-d8	*0.0799*		*%*	*99.8*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	17.2	1	mg/L	17.0			0.6	20	
Sulphate	50.5	1	mg/L	50.7			0.4	10	
General Inorganics									
pH	8.2	0.1	pH Units	8.2			0.0	3.3	
Phosphorus, total	0.037	0.01	mg/L	0.041			10.3	15	
Total Suspended Solids	303	2	mg/L	308			1.6	10	
Volatile Suspended Solids	22.0	2	mg/L	21.0			4.7	10	
Total Kjeldahl Nitrogen	6.02	0.2	mg/L	5.74			4.7	16	
Hydrocarbons									
F1 PHCs (C6-C10)	ND	0.025	mg/L	ND			NC	30	
Metals - Total									
Aluminum	2.94	0.01	mg/L	2.85			3.2	20	
Antimony	0.005	0.001	mg/L	0.005			1.4	20	
Arsenic	ND	0.01	mg/L	ND			NC	20	
Bismuth	ND	0.005	mg/L	ND			NC	20	
Boron	0.42	0.05	mg/L	0.41			3.3	20	
Cadmium	ND	0.001	mg/L	ND			NC	20	
Chromium	ND	0.05	mg/L	ND			NC	20	
Cobalt	ND	0.001	mg/L	ND			NC	20	
Copper	0.015	0.005	mg/L	0.015			0.2	20	
Lead	ND	0.001	mg/L	ND			NC	20	
Mercury	ND	0.0001	mg/L	ND			NC	20	
Manganese	ND	0.05	mg/L	ND			NC	20	
Molybdenum	0.028	0.005	mg/L	0.028			0.9	20	
Nickel	0.014	0.005	mg/L	0.014			1.6	20	
Selenium	ND	0.005	mg/L	ND			NC	20	
Silver	ND	0.001	mg/L	ND			NC	20	
Tin	ND	0.01	mg/L	ND			NC	20	
Titanium	ND	0.01	mg/L	ND			NC	20	
Vanadium	0.003	0.001	mg/L	0.003			1.7	20	

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Zinc	ND	0.02	mg/L	ND			NC	20	
Volatiles									
Acetone	ND	0.0050	mg/L	ND			NC	30	
Benzene	ND	0.0005	mg/L	ND			NC	30	
Bromodichloromethane	ND	0.0005	mg/L	ND			NC	30	
Bromoform	ND	0.0005	mg/L	ND			NC	30	
Bromomethane	ND	0.0005	mg/L	ND			NC	30	
Carbon Tetrachloride	ND	0.0002	mg/L	ND			NC	30	
Chlorobenzene	ND	0.0005	mg/L	ND			NC	30	
Chloroethane	ND	0.0010	mg/L	ND			NC	30	
Chloroform	0.00222	0.0005	mg/L	0.00220			0.9	30	
Chloromethane	ND	0.0030	mg/L	ND			NC	30	
Dibromochloromethane	ND	0.0005	mg/L	ND			NC	30	
Dichlorodifluoromethane	ND	0.0010	mg/L	ND			NC	30	
1,2-Dibromoethane	ND	0.0002	mg/L	ND			NC	30	
1,2-Dichlorobenzene	ND	0.0005	mg/L	ND			NC	30	
1,3-Dichlorobenzene	ND	0.0005	mg/L	ND			NC	30	
1,4-Dichlorobenzene	ND	0.0005	mg/L	ND			NC	30	
1,1-Dichloroethane	ND	0.0005	mg/L	ND			NC	30	
1,2-Dichloroethane	ND	0.0005	mg/L	ND			NC	30	
1,1-Dichloroethylene	ND	0.0005	mg/L	ND			NC	30	
cis-1,2-Dichloroethylene	ND	0.0005	mg/L	ND			NC	30	
trans-1,2-Dichloroethylene	ND	0.0005	mg/L	ND			NC	30	
1,2-Dichloropropane	ND	0.0005	mg/L	ND			NC	30	
cis-1,3-Dichloropropylene	ND	0.0005	mg/L	ND			NC	30	
trans-1,3-Dichloropropylene	ND	0.0005	mg/L	ND			NC	30	
Ethylbenzene	ND	0.0005	mg/L	ND			NC	30	
Hexane	ND	0.0010	mg/L	ND			NC	30	
Methyl Ethyl Ketone (2-Butanone)	ND	0.0050	mg/L	ND			NC	30	
Methyl Butyl Ketone (2-Hexanone)	ND	0.0100	mg/L	ND			NC	30	
Methyl Isobutyl Ketone	ND	0.0050	mg/L	ND			NC	30	

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Methyl tert-butyl ether	ND	0.0020	mg/L	ND			NC	30	
Methylene Chloride	ND	0.0050	mg/L	ND			NC	30	
Styrene	ND	0.0005	mg/L	ND			NC	30	
1,1,1,2-Tetrachloroethane	ND	0.0005	mg/L	ND			NC	30	
1,1,2,2-Tetrachloroethane	ND	0.0005	mg/L	ND			NC	30	
Tetrachloroethylene	ND	0.0005	mg/L	ND			NC	30	
Toluene	ND	0.0005	mg/L	ND			NC	30	
1,1,1-Trichloroethane	ND	0.0005	mg/L	ND			NC	30	
1,1,2-Trichloroethane	ND	0.0005	mg/L	ND			NC	30	
Trichloroethylene	ND	0.0005	mg/L	ND			NC	30	
Trichlorofluoromethane	ND	0.0010	mg/L	ND			NC	30	
1,3,5-Trimethylbenzene	ND	0.0005	mg/L	ND			NC	30	
Vinyl chloride	ND	0.0005	mg/L	ND			NC	30	
m,p-Xylenes	ND	0.0005	mg/L	ND			NC	30	
o-Xylene	ND	0.0005	mg/L	ND			NC	30	
Surrogate: 4-Bromofluorobenzene	*0.0923*		*%*		*115*	*50-140*			
Surrogate: Dibromofluoromethane	*0.0840*		*%*		*105*	*50-140*			
Surrogate: Toluene-d8	*0.0846*		*%*		*106*	*50-140*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	26.2	1	mg/L	17.0	91.7	70-124			
Sulphate	59.6	1	mg/L	50.7	88.3	74-126			
General Inorganics									
Phosphorus, total	0.912	0.01	mg/L	0.041	87.1	80-120			
Total Suspended Solids	23.0	2	mg/L	ND	107	75-125			
Total Kjeldahl Nitrogen	0.96	0.1	mg/L	ND	96.3	81-126			
Hydrocarbons									
F1 PHCs (C6-C10)	1.86	0.025	mg/L	ND	108	85-115			
F2 PHCs (C10-C16)	1.6	0.1	mg/L	ND	103	60-140			
F3 PHCs (C16-C34)	4.1	0.1	mg/L	ND	105	60-140			
F4 PHCs (C34-C50)	2.3	0.1	mg/L	ND	93.7	60-140			
Metals - Total									
Aluminum	349	0.01	mg/L	285	128	80-120			QM-07
Arsenic	50.2	0.01	mg/L	0.132	100	80-120			
Bismuth	44.8	0.005	mg/L	0.006	89.6	80-120			
Boron	91.0	0.05	mg/L	40.8	100	80-120			
Cadmium	44.9	0.001	mg/L	0.003	89.8	80-120			
Chromium	55.9	0.05	mg/L	0.396	111	80-120			
Cobalt	52.8	0.001	mg/L	0.096	105	80-120			
Copper	50.7	0.005	mg/L	1.47	98.5	80-120			
Lead	46.9	0.001	mg/L	0.084	93.7	80-120			
Mercury	0.0028	0.0001	mg/L	ND	93.2	70-130			
Manganese	54.9	0.05	mg/L	1.31	107	80-120			
Molybdenum	53.8	0.005	mg/L	2.80	102	80-120			
Nickel	52.6	0.005	mg/L	1.38	102	80-120			
Selenium	46.2	0.005	mg/L	0.259	91.9	80-120			
Silver	37.2	0.001	mg/L	0.003	74.4	80-120			QM-07
Tin	47.0	0.01	mg/L	0.447	93.1	80-120			
Titanium	57.7	0.01	mg/L	0.056	115	80-120			
Vanadium	56.3	0.001	mg/L	0.272	112	80-120			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Zinc	48.0	0.02	mg/L	0.555	94.9	80-120			
PCBs									
PCBs, total	1.17	0.05	ug/L	ND	117	65-135			
Surrogate: Decachlorobiphenyl	*0.502*		*%*		*100*	*60-140*			
Pesticides, OC									
Hexachlorobenzene	0.00060	0.00001	mg/L	ND	121	50-140			
Surrogate: Decachlorobiphenyl	*0.000315*		*%*		*63.0*	*50-140*			
Semi-Volatiles									
1-Methylnaphthalene	0.00933	0.00005	mg/L	ND	93.3	50-140			
2-Methylnaphthalene	0.00935	0.00005	mg/L	ND	93.5	50-140			
7H-Dibenzo[c,g]carbazole	0.00880	0.00050	mg/L	ND	88.0	50-140			
Anthracene	0.00868	0.00001	mg/L	ND	86.8	50-140			
Benzo [a] anthracene	0.00915	0.00001	mg/L	ND	91.5	50-140			
Benzo [a] pyrene	0.00814	0.00001	mg/L	ND	81.4	50-140			
Benzo [b&j] fluoranthene	0.0100	0.00005	mg/L	ND	100	50-140			
Benzo [e] pyrene	0.00922	0.00005	mg/L	ND	92.2	50-140			
Benzo [g,h,i] perylene	0.00752	0.00005	mg/L	ND	75.2	50-140			
Benzo [k] fluoranthene	0.00900	0.00005	mg/L	ND	90.0	50-140			
Benzylbutylphthalate	0.00634	0.00050	mg/L	ND	63.4	50-140			
Biphenyl	0.00890	0.00005	mg/L	ND	89.0	50-140			
Bis(2-chloroethoxy)methane	0.00809	0.00100	mg/L	ND	80.9	50-140			
Bis(2-ethylhexyl)phthalate	0.00628	0.00100	mg/L	ND	62.8	50-140			
Chrysene	0.00914	0.00005	mg/L	ND	91.4	50-140			
Dibenzo [a,h] anthracene	0.0102	0.00005	mg/L	ND	102	50-140			
Dibenzo [a,i] pyrene	0.0101	0.00050	mg/L	ND	101	50-140			
Dibenzo [a,j] acridine	0.00948	0.00050	mg/L	ND	94.8	50-140			
Diethylphthalate	0.00919	0.00100	mg/L	ND	91.9	50-140			
Di-n-butylphthalate	0.00941	0.00100	mg/L	ND	94.1	50-140			
Di-n-octylphthalate	0.00582	0.00100	mg/L	ND	58.2	50-140			
Fluoranthene	0.0102	0.00001	mg/L	ND	102	50-140			
Fluorene	0.00888	0.00005	mg/L	ND	88.8	50-140			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Indeno [1,2,3-cd] pyrene	0.00939	0.00005	mg/L	ND	93.9	50-140			
Indole	0.00906	0.00100	mg/L	ND	90.6	50-140			
Naphthalene	0.00857	0.00005	mg/L	ND	85.7	50-140			
Phenanthrene	0.00925	0.00005	mg/L	ND	92.5	50-140			
Perylene	0.00917	0.00050	mg/L	ND	91.7	50-140			
Pyrene	0.00759	0.00001	mg/L	ND	75.9	50-140			
2,4-Dichlorophenol	0.00775	0.00100	mg/L	ND	77.5	50-140			
Surrogate: 2-Fluorobiphenyl	*0.0196*		*%*		*98.1*	*50-140*			
Surrogate: Nitrobenzene-d5	*0.0164*		*%*		*81.9*	*50-140*			
Surrogate: Terphenyl-d14	*0.0196*		*%*		*97.8*	*50-140*			
Surrogate: 2,4,6-Tribromophenol	*0.0491*		*%*		*123*	*50-140*			
Surrogate: 2-Fluorophenol	*0.00342*		*%*		*8.56*	*50-140*			*S-GC*
Surrogate: Phenol-d6	*0.00545*		*%*		*13.6*	*50-140*			*S-GC*
Volatiles									
Acetone	0.0998	0.0050	mg/L	ND	99.8	50-140			
Benzene	0.0408	0.0005	mg/L	ND	102	60-130			
Bromodichloromethane	0.0411	0.0005	mg/L	ND	103	60-130			
Bromoform	0.0423	0.0005	mg/L	ND	106	60-130			
Bromomethane	0.0424	0.0005	mg/L	ND	106	50-140			
Carbon Tetrachloride	0.0402	0.0002	mg/L	ND	101	60-130			
Chlorobenzene	0.0414	0.0005	mg/L	ND	104	60-130			
Chloroethane	0.0480	0.0010	mg/L	ND	120	50-140			
Chloroform	0.0419	0.0005	mg/L	ND	105	60-130			
Chloromethane	0.0486	0.0030	mg/L	ND	121	50-140			
Dibromochloromethane	0.0433	0.0005	mg/L	ND	108	60-130			
Dichlorodifluoromethane	0.0380	0.0010	mg/L	ND	95.0	50-140			
1,2-Dibromoethane	0.0436	0.0002	mg/L	ND	109	60-130			
1,2-Dichlorobenzene	0.0407	0.0005	mg/L	ND	102	60-130			
1,3-Dichlorobenzene	0.0423	0.0005	mg/L	ND	106	60-130			
1,4-Dichlorobenzene	0.0407	0.0005	mg/L	ND	102	60-130			
1,1-Dichloroethane	0.0433	0.0005	mg/L	ND	108	60-130			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
1,2-Dichloroethane	0.0444	0.0005	mg/L	ND	111	60-130			
1,1-Dichloroethylene	0.0424	0.0005	mg/L	ND	106	60-130			
cis-1,2-Dichloroethylene	0.0395	0.0005	mg/L	ND	98.7	60-130			
trans-1,2-Dichloroethylene	0.0346	0.0005	mg/L	ND	86.6	60-130			
1,2-Dichloropropane	0.0392	0.0005	mg/L	ND	98.0	60-130			
cis-1,3-Dichloropropylene	0.0431	0.0005	mg/L	ND	108	60-130			
trans-1,3-Dichloropropylene	0.0396	0.0005	mg/L	ND	99.0	60-130			
Ethylbenzene	0.0376	0.0005	mg/L	ND	94.1	60-130			
Hexane	0.0325	0.0010	mg/L	ND	81.3	60-130			
Methyl Ethyl Ketone (2-Butanone)	0.106	0.0050	mg/L	ND	106	50-140			
Methyl Butyl Ketone (2-Hexanone)	0.115	0.0100	mg/L	ND	115	50-140			
Methyl Isobutyl Ketone	0.110	0.0050	mg/L	ND	110	50-140			
Methyl tert-butyl ether	0.138	0.0020	mg/L	ND	138	50-140			
Methylene Chloride	0.0457	0.0050	mg/L	ND	114	60-130			
Styrene	0.0393	0.0005	mg/L	ND	98.3	60-130			
1,1,1,2-Tetrachloroethane	0.0409	0.0005	mg/L	ND	102	60-130			
1,1,2,2-Tetrachloroethane	0.0457	0.0005	mg/L	ND	114	60-130			
Tetrachloroethylene	0.0381	0.0005	mg/L	ND	95.3	60-130			
Toluene	0.0399	0.0005	mg/L	ND	99.8	60-130			
1,1,1-Trichloroethane	0.0410	0.0005	mg/L	ND	103	60-130			
1,1,2-Trichloroethane	0.0421	0.0005	mg/L	ND	105	60-130			
Trichloroethylene	0.0361	0.0005	mg/L	ND	90.2	60-130			
Trichlorofluoromethane	0.0487	0.0010	mg/L	ND	122	60-130			
1,3,5-Trimethylbenzene	0.0365	0.0005	mg/L	ND	91.2	60-130			
Vinyl chloride	0.0323	0.0005	mg/L	ND	80.8	50-140			
m,p-Xylenes	0.0807	0.0005	mg/L	ND	101	60-130			
o-Xylene	0.0388	0.0005	mg/L	ND	97.0	60-130			
Surrogate: 4-Bromofluorobenzene	*0.0790*		*%*		*98.7*	*50-140*			
Surrogate: Dibromofluoromethane	*0.0839*		*%*		*105*	*50-140*			
Surrogate: Toluene-d8	*0.0770*		*%*		*96.2*	*50-140*			

Qualifier Notes:

Sample Qualifiers :

2: Surrogate recovery outside of control limits. The data was accepted based on valid recovery of the remaining surrogate.

QC Qualifiers:

QM-07 The spike recovery was outside acceptance limits for the MS and/or MSD. The batch was accepted based on other acceptable QC.

S-GC Surrogate recovery outside of control limits. The data was accepted based on valid recovery of the remaining surrogate.

Sample Data Revisions:

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable

ND: Not Detected

MDL: Method Detection Limit

Source Result: Data used as source for matrix and duplicate samples

%REC: Percent recovery.

RPD: Relative percent difference.

NC: Not Calculated

CCME PHC additional information:

- The method for the analysis of PHCs complies with the Reference Method for the CWS PHC and is validated for use in the laboratory. All prescribed quality criteria identified in the method has been met.

- F1 range corrected for BTEX.

- F2 to F3 ranges corrected for appropriate PAHs where available.

- The gravimetric heavy hydrocarbons (F4G) are not to be added to C6 to C50 hydrocarbons.

- In the case where F4 and F4G are both reported, the greater of the two results is to be used for comparison to CWS PHC criteria.

- When reported, data for F4G has been processed using a silica gel cleanup.

Any use of these results implies your agreement that our total liabilty in connection with this work, however arising, shall be limited to the amount paid by you for this work, and that our employees or agents shall not under any circumstances be liable to you in connection with this work.

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Certificate of Analysis

GEMTEC Consulting Engineers and Scientists Limited
32 Steacie Drive
Kanata, ON K2K 2A9
Attn: Jason Karis-Allen

Client PO:
Project: 100117.051
Custody: 74579

Report Date: 17-Sep-2024
Order Date: 10-Sep-2024

Order #: 2437224

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID	Client ID
2437224-01	BH24-18
2437224-02	BH24-18 (Filtered)
2437224-03	BH24-04
2437224-04	BH24-10
2437224-05	BH24-10 (Filtered)
2437224-06	BH24-16
2437224-07	BH24-16 (Filtered)

Approved By:

Mark Foto

Mark Foto, M.Sc.
Lab Supervisor

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Anions	EPA 300.1 - IC	12-Sep-24	12-Sep-24
Mercury by CVAA	EPA 245.2 - Cold Vapour AA	12-Sep-24	12-Sep-24
Metals, ICP-MS	EPA 200.8 - ICP-MS	16-Sep-24	16-Sep-24
Ottawa - San/Comb: SVOCs with PAHs	EPA 625 - GC-MS, extraction	11-Sep-24	12-Sep-24
pH	EPA 150.1 - pH probe @25 °C	13-Sep-24	13-Sep-24
Phosphorus, total dissolved	EPA 365.4; IC, filtration	16-Sep-24	16-Sep-24
Phosphorus, total, water	EPA 365.4 - Auto Colour, digestion	16-Sep-24	16-Sep-24
Resistivity	EPA 120.1 - probe	13-Sep-24	13-Sep-24
Total Kjeldahl Nitrogen	EPA 351.2 - Auto Colour, digestion	16-Sep-24	16-Sep-24
Total Suspended Solids	SM 2540D - Gravimetric	14-Sep-24	16-Sep-24
VOCs by P&T GC-MS	EPA 624 - P&T GC-MS	11-Sep-24	11-Sep-24
Volatile Suspended Solids	SM 2540D - Gravimetric, 550C	14-Sep-24	16-Sep-24

PARACEL LABORATORIES LTD.

Order #: 2437224

Certificate of Analysis

Report Date: 17-Sep-2024

Client: **GEMTEC Consulting Engineers and Scientists Limited**

Order Date: 10-Sep-2024

Client PO:

Project Description: 100117.051

	Client ID:	BH24-18	BH24-18 (Filtered)	BH24-04	BH24-10	-	-
	Sample Date:	10-Sep-24 11:40	10-Sep-24 11:40	10-Sep-24 12:25	10-Sep-24 13:25		
	Sample ID:	2437224-01	2437224-02	2437224-03	2437224-04		
	Matrix:	Ground Water	Ground Water	Ground Water	Ground Water		
	MDL/Units						
General Inorganics							
pH	0.1 pH Units	7.5	-	8.1	7.6	-	-
Phosphorus, total	0.01 mg/L	0.03	-	-	0.01	-	-
Phosphorus, total dissolved	0.01 mg/L	-	<0.01	-	-	-	-
Resistivity	0.01 Ohm.m	-	-	12.0	-	-	-
Total Suspended Solids	2 mg/L	7	-	-	4	-	-
Volatile Suspended Solids	2 mg/L	<2	-	-	<2	-	-
Total Kjeldahl Nitrogen	0.1 mg/L	0.5	-	-	0.1	-	-
Anions							
Chloride	1 mg/L	-	-	31	-	-	-
Sulphate	1 mg/L	-	-	36	-	-	-
Metals							
Aluminum	0.010 mg/L	-	0.016	-	-	-	-
Antimony	0.001 mg/L	-	<0.001	-	-	-	-
Arsenic	0.010 mg/L	-	<0.010	-	-	-	-
Bismuth	0.005 mg/L	-	<0.005	-	-	-	-
Boron	0.050 mg/L	-	0.057	-	-	-	-
Cadmium	0.001 mg/L	-	<0.001	-	-	-	-
Chromium	0.050 mg/L	-	<0.050	-	-	-	-
Cobalt	0.001 mg/L	-	<0.001	-	-	-	-
Copper	0.005 mg/L	-	<0.005	-	-	-	-
Lead	0.001 mg/L	-	<0.001	-	-	-	-
Manganese	0.050 mg/L	-	0.609	-	-	-	-
Mercury	0.0001 mg/L	-	<0.0001	-	-	-	-
Molybdenum	0.005 mg/L	-	<0.005	-	-	-	-
Nickel	0.005 mg/L	-	<0.005	-	-	-	-

	Client ID:	BH24-18	BH24-18 (Filtered)	BH24-04	BH24-10	-	-
	Sample Date:	10-Sep-24 11:40	10-Sep-24 11:40	10-Sep-24 12:25	10-Sep-24 13:25		
	Sample ID:	2437224-01	2437224-02	2437224-03	2437224-04		
	Matrix:	Ground Water	Ground Water	Ground Water	Ground Water		
	MDL/Units						
Metals							
Selenium	0.005 mg/L	-	<0.005	-	-	-	-
Silver	0.001 mg/L	-	<0.001	-	-	-	-
Tin	0.010 mg/L	-	<0.010	-	-	-	-
Titanium	0.010 mg/L	-	<0.010	-	-	-	-
Vanadium	0.001 mg/L	-	<0.001	-	-	-	-
Zinc	0.020 mg/L	-	<0.020	-	-	-	-
Metals - Total							
Aluminum	0.01 mg/L	0.21	-	-	0.10	-	-
Antimony	0.001 mg/L	<0.001	-	-	<0.001	-	-
Arsenic	0.01 mg/L	<0.01	-	-	<0.01	-	-
Bismuth	0.005 mg/L	<0.005	-	-	<0.005	-	-
Boron	0.05 mg/L	0.06	-	-	<0.05	-	-
Cadmium	0.001 mg/L	<0.001	-	-	<0.001	-	-
Chromium	0.05 mg/L	<0.05	-	-	<0.05	-	-
Cobalt	0.001 mg/L	<0.001	-	-	<0.001	-	-
Copper	0.005 mg/L	<0.005	-	-	<0.005	-	-
Lead	0.001 mg/L	<0.001	-	-	<0.001	-	-
Mercury	0.0001 mg/L	<0.0001	-	-	<0.0001	-	-
Manganese	0.05 mg/L	0.62	-	-	<0.05	-	-
Molybdenum	0.005 mg/L	<0.005	-	-	<0.005	-	-
Nickel	0.005 mg/L	<0.005	-	-	<0.005	-	-
Selenium	0.005 mg/L	<0.005	-	-	<0.005	-	-
Silver	0.001 mg/L	<0.001	-	-	<0.001	-	-
Tin	0.01 mg/L	<0.01	-	-	<0.01	-	-
Titanium	0.01 mg/L	<0.01	-	-	<0.01	-	-

	Client ID:	BH24-18	BH24-18 (Filtered)	BH24-04	BH24-10	-	-
	Sample Date:	10-Sep-24 11:40	10-Sep-24 11:40	10-Sep-24 12:25	10-Sep-24 13:25		
	Sample ID:	2437224-01	2437224-02	2437224-03	2437224-04		
	Matrix:	Ground Water	Ground Water	Ground Water	Ground Water		
	MDL/Units						
Metals - Total							
Vanadium	0.001 mg/L	<0.001	-	-	<0.001	-	-
Zinc	0.02 mg/L	<0.02	-	-	<0.02	-	-
Volatiles							
Acetone	0.0050 mg/L	<0.0050	-	-	<0.0050	-	-
Benzene	0.0005 mg/L	<0.0005	-	-	<0.0005	-	-
Bromodichloromethane	0.0005 mg/L	<0.0005	-	-	<0.0005	-	-
Bromoform	0.0005 mg/L	<0.0005	-	-	<0.0005	-	-
Bromomethane	0.0005 mg/L	<0.0005	-	-	<0.0005	-	-
Carbon Tetrachloride	0.0002 mg/L	<0.0002	-	-	<0.0002	-	-
Chlorobenzene	0.0005 mg/L	<0.0005	-	-	<0.0005	-	-
Chloroethane	0.0010 mg/L	<0.0010	-	-	<0.0010	-	-
Chloroform	0.0005 mg/L	<0.0005	-	-	<0.0005	-	-
Chloromethane	0.0030 mg/L	<0.0030	-	-	<0.0030	-	-
Dibromochloromethane	0.0005 mg/L	<0.0005	-	-	<0.0005	-	-
Dichlorodifluoromethane	0.0010 mg/L	<0.0010	-	-	<0.0010	-	-
1,2-Dibromoethane	0.0002 mg/L	<0.0002	-	-	<0.0002	-	-
1,2-Dichlorobenzene	0.0005 mg/L	<0.0005	-	-	<0.0005	-	-
1,3-Dichlorobenzene	0.0005 mg/L	<0.0005	-	-	<0.0005	-	-
1,4-Dichlorobenzene	0.0005 mg/L	<0.0005	-	-	<0.0005	-	-
1,1-Dichloroethane	0.0005 mg/L	<0.0005	-	-	<0.0005	-	-
1,2-Dichloroethane	0.0005 mg/L	<0.0005	-	-	<0.0005	-	-
1,1-Dichloroethylene	0.0005 mg/L	<0.0005	-	-	<0.0005	-	-
cis-1,2-Dichloroethylene	0.0005 mg/L	<0.0005	-	-	<0.0005	-	-
trans-1,2-Dichloroethylene	0.0005 mg/L	<0.0005	-	-	<0.0005	-	-
1,2-Dichloroethylene, total	0.0005 mg/L	<0.0005	-	-	<0.0005	-	-

	Client ID:	BH24-18	BH24-18 (Filtered)	BH24-04	BH24-10	-	-
	Sample Date:	10-Sep-24 11:40	10-Sep-24 11:40	10-Sep-24 12:25	10-Sep-24 13:25		
	Sample ID:	2437224-01	2437224-02	2437224-03	2437224-04		
	Matrix:	Ground Water	Ground Water	Ground Water	Ground Water		
	MDL/Units						
Volatiles							
1,2-Dichloropropane	0.0005 mg/L	<0.0005	-	-	<0.0005	-	-
cis-1,3-Dichloropropylene	0.0005 mg/L	<0.0005	-	-	<0.0005	-	-
trans-1,3-Dichloropropylene	0.0005 mg/L	<0.0005	-	-	<0.0005	-	-
1,3-Dichloropropene, total	0.0005 mg/L	<0.0005	-	-	<0.0005	-	-
Ethylbenzene	0.0005 mg/L	<0.0005	-	-	<0.0005	-	-
Hexane	0.0010 mg/L	<0.0010	-	-	<0.0010	-	-
Methyl Ethyl Ketone (2-Butanone)	0.0050 mg/L	<0.0050	-	-	<0.0050	-	-
Methyl Butyl Ketone (2-Hexanone)	0.0100 mg/L	<0.0100	-	-	<0.0100	-	-
Methyl Isobutyl Ketone	0.0050 mg/L	<0.0050	-	-	<0.0050	-	-
Methyl tert-butyl ether	0.0020 mg/L	<0.0020	-	-	<0.0020	-	-
Methylene Chloride	0.0050 mg/L	<0.0050	-	-	<0.0050	-	-
Styrene	0.0005 mg/L	<0.0005	-	-	<0.0005	-	-
1,1,1,2-Tetrachloroethane	0.0005 mg/L	<0.0005	-	-	<0.0005	-	-
1,1,2,2-Tetrachloroethane	0.0005 mg/L	<0.0005	-	-	<0.0005	-	-
Tetrachloroethylene	0.0005 mg/L	<0.0005	-	-	<0.0005	-	-
Toluene	0.0005 mg/L	<0.0005	-	-	<0.0005	-	-
1,1,1-Trichloroethane	0.0005 mg/L	<0.0005	-	-	<0.0005	-	-
1,1,2-Trichloroethane	0.0005 mg/L	<0.0005	-	-	<0.0005	-	-
Trichloroethylene	0.0005 mg/L	<0.0005	-	-	<0.0005	-	-
Trichlorofluoromethane	0.0010 mg/L	<0.0010	-	-	<0.0010	-	-
1,3,5-Trimethylbenzene	0.0005 mg/L	<0.0005	-	-	<0.0005	-	-
Vinyl chloride	0.0005 mg/L	<0.0005	-	-	<0.0005	-	-
m,p-Xylenes	0.0005 mg/L	<0.0005	-	-	<0.0005	-	-
o-Xylene	0.0005 mg/L	<0.0005	-	-	<0.0005	-	-
Xylenes, total	0.0005 mg/L	<0.0005	-	-	<0.0005	-	-

	Client ID:	BH24-18	BH24-18 (Filtered)	BH24-04	BH24-10	-	-
	Sample Date:	10-Sep-24 11:40	10-Sep-24 11:40	10-Sep-24 12:25	10-Sep-24 13:25		
	Sample ID:	2437224-01	2437224-02	2437224-03	2437224-04		
	Matrix:	Ground Water	Ground Water	Ground Water	Ground Water		
	MDL/Units						
Volatiles							
Dibromofluoromethane	Surrogate	113%	-	-	112%	-	-
Toluene-d8	Surrogate	104%	-	-	104%	-	-
4-Bromofluorobenzene	Surrogate	86.9%	-	-	86.9%	-	-
Semi-Volatiles							
1-Methylnaphthalene	0.00005 mg/L	<0.00005	-	-	<0.00005	-	-
2-Methylnaphthalene	0.00005 mg/L	<0.00005	-	-	<0.00005	-	-
7H-Dibenzo[c,g]carbazole	0.00050 mg/L	<0.00050	-	-	<0.00050	-	-
Anthracene	0.00001 mg/L	<0.00001	-	-	<0.00001	-	-
Benzo [a] anthracene	0.00001 mg/L	<0.00001	-	-	<0.00001	-	-
Benzo [a] pyrene	0.00001 mg/L	<0.00001	-	-	<0.00001	-	-
Benzo [b&j] fluoranthene	0.00005 mg/L	<0.00005	-	-	<0.00005	-	-
Benzo [e] pyrene	0.00005 mg/L	<0.00005	-	-	<0.00005	-	-
Benzo [g,h,i] perylene	0.00005 mg/L	<0.00005	-	-	<0.00005	-	-
Benzo [k] fluoranthene	0.00005 mg/L	<0.00005	-	-	<0.00005	-	-
Benzylbutylphthalate	0.00050 mg/L	<0.00050	-	-	<0.00050	-	-
Biphenyl	0.00005 mg/L	<0.00005	-	-	<0.00005	-	-
Bis(2-chloroethoxy)methane	0.00100 mg/L	<0.00100	-	-	<0.00100	-	-
Bis(2-ethylhexyl)phthalate	0.00100 mg/L	<0.00100	-	-	<0.00100	-	-
Chrysene	0.00005 mg/L	<0.00005	-	-	<0.00005	-	-
Dibenzo [a,h] anthracene	0.00005 mg/L	<0.00005	-	-	<0.00005	-	-
Dibenzo [a,i] pyrene	0.00050 mg/L	<0.00050	-	-	<0.00050	-	-
Dibenzo [a,j] acridine	0.00050 mg/L	<0.00050	-	-	<0.00050	-	-
Diethylphthalate	0.00100 mg/L	<0.00100	-	-	<0.00100	-	-
Di-n-butylphthalate	0.00100 mg/L	<0.00100	-	-	<0.00100	-	-
Di-n-octylphthalate	0.00100 mg/L	<0.00100	-	-	<0.00100	-	-

Certificate of Analysis

Report Date: 17-Sep-2024

Client: **GEMTEC Consulting Engineers and Scientists Limited**

Order Date: 10-Sep-2024

Client PO:

Project Description: 100117.051

	Client ID:	BH24-18	BH24-18 (Filtered)	BH24-04	BH24-10	-	-
	Sample Date:	10-Sep-24 11:40	10-Sep-24 11:40	10-Sep-24 12:25	10-Sep-24 13:25		
	Sample ID:	2437224-01	2437224-02	2437224-03	2437224-04		
	Matrix:	Ground Water	Ground Water	Ground Water	Ground Water		
	MDL/Units						
Semi-Volatiles							
Fluoranthene	0.00001 mg/L	<0.00001	-	-	<0.00001	-	-
Fluorene	0.00005 mg/L	<0.00005	-	-	<0.00005	-	-
Indeno [1,2,3-cd] pyrene	0.00005 mg/L	<0.00005	-	-	<0.00005	-	-
Indole	0.00100 mg/L	<0.00100	-	-	<0.00100	-	-
Naphthalene	0.00005 mg/L	<0.00005	-	-	<0.00005	-	-
Phenanthrene	0.00005 mg/L	<0.00005	-	-	<0.00005	-	-
Perylene	0.00050 mg/L	<0.00050	-	-	<0.00050	-	-
Pyrene	0.00001 mg/L	<0.00001	-	-	<0.00001	-	-
2,4-Dichlorophenol	0.00100 mg/L	<0.00100	-	-	<0.00100	-	-
PAHs, Total	0.0025 mg/L	<0.0025	-	-	<0.0025	-	-
2-Fluorobiphenyl	Surrogate	81.0%	-	-	82.1%	-	-
Nitrobenzene-d5	Surrogate	89.8%	-	-	95.9%	-	-
Terphenyl-d14	Surrogate	99.0%	-	-	92.5%	-	-
2,4,6-Tribromophenol	Surrogate	109%	-	-	95.5%	-	-
2-Fluorophenol	Surrogate	17.4% [3]	-	-	27.3% [3]	-	-
Phenol-d6	Surrogate	25.5% [3]	-	-	38.1% [3]	-	-

	Client ID:	BH24-10 (Filtered)	BH24-16	BH24-16 (Filtered)		-	-
	Sample Date:	10-Sep-24 13:25	10-Sep-24 14:00	10-Sep-24 14:00			
	Sample ID:	2437224-05	2437224-06	2437224-07			
	Matrix:	Ground Water	Ground Water	Ground Water			
	MDL/Units						
General Inorganics							
pH	0.1 pH Units	-	6.5	-	-	-	-
Phosphorus, total	0.01 mg/L	-	0.07	-	-	-	-
Phosphorus, total dissolved	0.01 mg/L	0.01	-	<0.01	-	-	-
Total Suspended Solids	2 mg/L	-	142	-	-	-	-
Volatile Suspended Solids	2 mg/L	-	40	-	-	-	-
Total Kjeldahl Nitrogen	0.1 mg/L	-	5.0	-	-	-	-
Metals							
Aluminum	0.010 mg/L	0.010	-	0.094	-	-	-
Antimony	0.001 mg/L	<0.001	-	<0.001	-	-	-
Arsenic	0.010 mg/L	<0.010	-	<0.010	-	-	-
Bismuth	0.005 mg/L	<0.005	-	<0.005	-	-	-
Boron	0.050 mg/L	<0.050	-	<0.050	-	-	-
Cadmium	0.001 mg/L	<0.001	-	<0.001	-	-	-
Chromium	0.050 mg/L	<0.050	-	<0.050	-	-	-
Cobalt	0.001 mg/L	<0.001	-	0.015	-	-	-
Copper	0.005 mg/L	<0.005	-	<0.005	-	-	-
Lead	0.001 mg/L	<0.001	-	<0.001	-	-	-
Manganese	0.050 mg/L	<0.050	-	33.7	-	-	-
Mercury	0.0001 mg/L	<0.0001	-	<0.0001	-	-	-
Molybdenum	0.005 mg/L	<0.005	-	<0.005	-	-	-
Nickel	0.005 mg/L	<0.005	-	0.006	-	-	-
Selenium	0.005 mg/L	<0.005	-	<0.005	-	-	-
Silver	0.001 mg/L	<0.001	-	<0.001	-	-	-
Tin	0.010 mg/L	<0.010	-	<0.010	-	-	-
Titanium	0.010 mg/L	<0.010	-	<0.010	-	-	-

	Client ID:	BH24-10 (Filtered)	BH24-16	BH24-16 (Filtered)		-	-
	Sample Date:	10-Sep-24 13:25	10-Sep-24 14:00	10-Sep-24 14:00			
	Sample ID:	2437224-05	2437224-06	2437224-07			
	Matrix:	Ground Water	Ground Water	Ground Water			
	MDL/Units						
Metals							
Vanadium	0.001 mg/L	<0.001	-	0.006	-	-	-
Zinc	0.020 mg/L	<0.020	-	<0.020	-	-	-
Metals - Total							
Aluminum	0.01 mg/L	-	2.68	-	-	-	-
Antimony	0.001 mg/L	-	<0.001	-	-	-	-
Arsenic	0.01 mg/L	-	<0.01	-	-	-	-
Bismuth	0.005 mg/L	-	<0.005	-	-	-	-
Boron	0.05 mg/L	-	<0.05	-	-	-	-
Cadmium	0.001 mg/L	-	<0.001	-	-	-	-
Chromium	0.05 mg/L	-	<0.05	-	-	-	-
Cobalt	0.001 mg/L	-	0.017	-	-	-	-
Copper	0.005 mg/L	-	<0.005	-	-	-	-
Lead	0.001 mg/L	-	<0.001	-	-	-	-
Manganese	0.05 mg/L	-	33.1	-	-	-	-
Mercury	0.0001 mg/L	-	<0.0001	-	-	-	-
Molybdenum	0.005 mg/L	-	<0.005	-	-	-	-
Nickel	0.005 mg/L	-	0.009	-	-	-	-
Selenium	0.005 mg/L	-	<0.005	-	-	-	-
Silver	0.001 mg/L	-	<0.001	-	-	-	-
Tin	0.01 mg/L	-	<0.01	-	-	-	-
Titanium	0.01 mg/L	-	0.16	-	-	-	-
Vanadium	0.001 mg/L	-	0.019	-	-	-	-
Zinc	0.02 mg/L	-	<0.02	-	-	-	-
Volatiles							
Acetone	0.0050 mg/L	-	<0.0050	-	-	-	-

	Client ID:	BH24-10 (Filtered)	BH24-16	BH24-16 (Filtered)		-	-
	Sample Date:	10-Sep-24 13:25	10-Sep-24 14:00	10-Sep-24 14:00			
	Sample ID:	2437224-05	2437224-06	2437224-07			
	Matrix:	Ground Water	Ground Water	Ground Water			
	MDL/Units						
Volatiles							
Benzene	0.0005 mg/L	-	<0.0005	-	-	-	-
Bromodichloromethane	0.0005 mg/L	-	<0.0005	-	-	-	-
Bromoform	0.0005 mg/L	-	<0.0005	-	-	-	-
Bromomethane	0.0005 mg/L	-	<0.0005	-	-	-	-
Carbon Tetrachloride	0.0002 mg/L	-	<0.0002	-	-	-	-
Chlorobenzene	0.0005 mg/L	-	<0.0005	-	-	-	-
Chloroethane	0.0010 mg/L	-	<0.0010	-	-	-	-
Chloroform	0.0005 mg/L	-	<0.0005	-	-	-	-
Chloromethane	0.0030 mg/L	-	<0.0030	-	-	-	-
Dibromochloromethane	0.0005 mg/L	-	<0.0005	-	-	-	-
Dichlorodifluoromethane	0.0010 mg/L	-	<0.0010	-	-	-	-
1,2-Dibromoethane	0.0002 mg/L	-	<0.0002	-	-	-	-
1,2-Dichlorobenzene	0.0005 mg/L	-	<0.0005	-	-	-	-
1,3-Dichlorobenzene	0.0005 mg/L	-	<0.0005	-	-	-	-
1,4-Dichlorobenzene	0.0005 mg/L	-	<0.0005	-	-	-	-
1,1-Dichloroethane	0.0005 mg/L	-	<0.0005	-	-	-	-
1,2-Dichloroethane	0.0005 mg/L	-	<0.0005	-	-	-	-
1,1-Dichloroethylene	0.0005 mg/L	-	<0.0005	-	-	-	-
cis-1,2-Dichloroethylene	0.0005 mg/L	-	<0.0005	-	-	-	-
trans-1,2-Dichloroethylene	0.0005 mg/L	-	<0.0005	-	-	-	-
1,2-Dichloroethylene, total	0.0005 mg/L	-	<0.0005	-	-	-	-
1,2-Dichloropropane	0.0005 mg/L	-	<0.0005	-	-	-	-
cis-1,3-Dichloropropylene	0.0005 mg/L	-	<0.0005	-	-	-	-
trans-1,3-Dichloropropylene	0.0005 mg/L	-	<0.0005	-	-	-	-
1,3-Dichloropropene, total	0.0005 mg/L	-	<0.0005	-	-	-	-

	Client ID:	BH24-10 (Filtered)	BH24-16	BH24-16 (Filtered)		-	-
	Sample Date:	10-Sep-24 13:25	10-Sep-24 14:00	10-Sep-24 14:00			
	Sample ID:	2437224-05	2437224-06	2437224-07			
	Matrix:	Ground Water	Ground Water	Ground Water			
	MDL/Units						
Volatiles							
Ethylbenzene	0.0005 mg/L	-	<0.0005	-	-	-	-
Hexane	0.0010 mg/L	-	<0.0010	-	-	-	-
Methyl Ethyl Ketone (2-Butanone)	0.0050 mg/L	-	<0.0050	-	-	-	-
Methyl Butyl Ketone (2-Hexanone)	0.0100 mg/L	-	<0.0100	-	-	-	-
Methyl Isobutyl Ketone	0.0050 mg/L	-	<0.0050	-	-	-	-
Methyl tert-butyl ether	0.0020 mg/L	-	<0.0020	-	-	-	-
Methylene Chloride	0.0050 mg/L	-	<0.0050	-	-	-	-
Styrene	0.0005 mg/L	-	<0.0005	-	-	-	-
1,1,1,2-Tetrachloroethane	0.0005 mg/L	-	<0.0005	-	-	-	-
1,1,2,2-Tetrachloroethane	0.0005 mg/L	-	<0.0005	-	-	-	-
Tetrachloroethylene	0.0005 mg/L	-	<0.0005	-	-	-	-
Toluene	0.0005 mg/L	-	0.0183	-	-	-	-
1,1,1-Trichloroethane	0.0005 mg/L	-	<0.0005	-	-	-	-
1,1,2-Trichloroethane	0.0005 mg/L	-	<0.0005	-	-	-	-
Trichloroethylene	0.0005 mg/L	-	<0.0005	-	-	-	-
Trichlorofluoromethane	0.0010 mg/L	-	<0.0010	-	-	-	-
1,3,5-Trimethylbenzene	0.0005 mg/L	-	<0.0005	-	-	-	-
Vinyl chloride	0.0005 mg/L	-	<0.0005	-	-	-	-
m,p-Xylenes	0.0005 mg/L	-	<0.0005	-	-	-	-
o-Xylene	0.0005 mg/L	-	<0.0005	-	-	-	-
Xylenes, total	0.0005 mg/L	-	<0.0005	-	-	-	-
Dibromofluoromethane	Surrogate	-	111%	-	-	-	-
Toluene-d8	Surrogate	-	103%	-	-	-	-
4-Bromofluorobenzene	Surrogate	-	85.6%	-	-	-	-
Semi-Volatiles							

	Client ID:	BH24-10 (Filtered)	BH24-16	BH24-16 (Filtered)		-	-
	Sample Date:	10-Sep-24 13:25	10-Sep-24 14:00	10-Sep-24 14:00			
	Sample ID:	2437224-05	2437224-06	2437224-07			
	Matrix:	Ground Water	Ground Water	Ground Water			
	MDL/Units						
Semi-Volatiles							
1-Methylnaphthalene	0.00005 mg/L	-	<0.00005	-	-	-	-
2-Methylnaphthalene	0.00005 mg/L	-	<0.00005	-	-	-	-
7H-Dibenzo[c,g]carbazole	0.00050 mg/L	-	<0.00050	-	-	-	-
Anthracene	0.00001 mg/L	-	<0.00001	-	-	-	-
Benzo [a] anthracene	0.00001 mg/L	-	<0.00001	-	-	-	-
Benzo [a] pyrene	0.00001 mg/L	-	<0.00001	-	-	-	-
Benzo [b&j] fluoranthene	0.00005 mg/L	-	<0.00005	-	-	-	-
Benzo [e] pyrene	0.00005 mg/L	-	<0.00005	-	-	-	-
Benzo [g,h,i] perylene	0.00005 mg/L	-	<0.00005	-	-	-	-
Benzo [k] fluoranthene	0.00005 mg/L	-	<0.00005	-	-	-	-
Benzylbutylphthalate	0.00050 mg/L	-	<0.00050	-	-	-	-
Biphenyl	0.00005 mg/L	-	<0.00005	-	-	-	-
Bis(2-chloroethoxy)methane	0.00100 mg/L	-	<0.00100	-	-	-	-
Bis(2-ethylhexyl)phthalate	0.00100 mg/L	-	<0.00100	-	-	-	-
Chrysene	0.00005 mg/L	-	<0.00005	-	-	-	-
Dibenzo [a,h] anthracene	0.00005 mg/L	-	<0.00005	-	-	-	-
Dibenzo [a,i] pyrene	0.00050 mg/L	-	<0.00050	-	-	-	-
Dibenzo [a,j] acridine	0.00050 mg/L	-	<0.00050	-	-	-	-
Diethylphthalate	0.00100 mg/L	-	<0.00100	-	-	-	-
Di-n-butylphthalate	0.00100 mg/L	-	<0.00100	-	-	-	-
Di-n-octylphthalate	0.00100 mg/L	-	<0.00100	-	-	-	-
Fluoranthene	0.00001 mg/L	-	<0.00001	-	-	-	-
Fluorene	0.00005 mg/L	-	<0.00005	-	-	-	-
Indeno [1,2,3-cd] pyrene	0.00005 mg/L	-	<0.00005	-	-	-	-
Indole	0.00100 mg/L	-	<0.00100	-	-	-	-

	Client ID:	BH24-10 (Filtered)	BH24-16	BH24-16 (Filtered)		-	-
	Sample Date:	10-Sep-24 13:25	10-Sep-24 14:00	10-Sep-24 14:00			
	Sample ID:	2437224-05	2437224-06	2437224-07			
	Matrix:	Ground Water	Ground Water	Ground Water			
	MDL/Units						
Semi-Volatiles							
Naphthalene	0.00005 mg/L	-	<0.00005	-	-	-	-
Phenanthrene	0.00005 mg/L	-	<0.00005	-	-	-	-
Perylene	0.00050 mg/L	-	<0.00050	-	-	-	-
Pyrene	0.00001 mg/L	-	<0.00001	-	-	-	-
2,4-Dichlorophenol	0.00100 mg/L	-	<0.00100	-	-	-	-
PAHs, Total	0.0025 mg/L	-	<0.0025	-	-	-	-
2-Fluorobiphenyl	Surrogate	-	86.0%	-	-	-	-
Nitrobenzene-d5	Surrogate	-	107%	-	-	-	-
Terphenyl-d14	Surrogate	-	87.0%	-	-	-	-
2,4,6-Tribromophenol	Surrogate	-	107%	-	-	-	-
2-Fluorophenol	Surrogate	-	50.0%	-	-	-	-
Phenol-d6	Surrogate	-	67.8%	-	-	-	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions								
Chloride	ND	1	mg/L					
Sulphate	ND	1	mg/L					
General Inorganics								
Phosphorus, total	ND	0.01	mg/L					
Phosphorus, total dissolved	ND	0.01	mg/L					
Resistivity	ND	0.01	Ohm.m					
Total Suspended Solids	ND	2	mg/L					
Volatile Suspended Solids	ND	2	mg/L					
Total Kjeldahl Nitrogen	ND	0.1	mg/L					
Metals								
Aluminum	ND	0.010	mg/L					
Antimony	ND	0.001	mg/L					
Arsenic	ND	0.010	mg/L					
Bismuth	ND	0.005	mg/L					
Boron	ND	0.050	mg/L					
Cadmium	ND	0.001	mg/L					
Chromium	ND	0.050	mg/L					
Cobalt	ND	0.001	mg/L					
Copper	ND	0.005	mg/L					
Lead	ND	0.001	mg/L					
Mercury	ND	0.0001	mg/L					
Manganese	ND	0.050	mg/L					
Molybdenum	ND	0.005	mg/L					
Nickel	ND	0.005	mg/L					
Selenium	ND	0.005	mg/L					
Silver	ND	0.001	mg/L					
Tin	ND	0.010	mg/L					
Titanium	ND	0.010	mg/L					
Vanadium	ND	0.001	mg/L					
Zinc	ND	0.020	mg/L					
Metals - Total								
Aluminum	ND	0.01	mg/L					

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
Antimony	ND	0.001	mg/L					
Arsenic	ND	0.01	mg/L					
Bismuth	ND	0.005	mg/L					
Boron	ND	0.05	mg/L					
Cadmium	ND	0.001	mg/L					
Chromium	ND	0.05	mg/L					
Cobalt	ND	0.001	mg/L					
Copper	ND	0.005	mg/L					
Lead	ND	0.001	mg/L					
Mercury	ND	0.0001	mg/L					
Manganese	ND	0.05	mg/L					
Molybdenum	ND	0.005	mg/L					
Nickel	ND	0.005	mg/L					
Selenium	ND	0.005	mg/L					
Silver	ND	0.001	mg/L					
Tin	ND	0.01	mg/L					
Titanium	ND	0.01	mg/L					
Vanadium	ND	0.001	mg/L					
Zinc	ND	0.02	mg/L					
Semi-Volatiles								
1-Methylnaphthalene	ND	0.00005	mg/L					
2-Methylnaphthalene	ND	0.00005	mg/L					
7H-Dibenzo[c,g]carbazole	ND	0.00050	mg/L					
Anthracene	ND	0.00001	mg/L					
Benzo [a] anthracene	ND	0.00001	mg/L					
Benzo [a] pyrene	ND	0.00001	mg/L					
Benzo [b&j] fluoranthene	ND	0.00005	mg/L					
Benzo [e] pyrene	ND	0.00005	mg/L					
Benzo [g,h,i] perylene	ND	0.00005	mg/L					
Benzo [k] fluoranthene	ND	0.00005	mg/L					
Benzylbutylphthalate	ND	0.00050	mg/L					
Biphenyl	ND	0.00005	mg/L					
Bis(2-chloroethoxy)methane	ND	0.00100	mg/L					

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
Bis(2-ethylhexyl)phthalate	ND	0.00100	mg/L					
Chrysene	ND	0.00005	mg/L					
Dibenzo [a,h] anthracene	ND	0.00005	mg/L					
Dibenzo [a,i] pyrene	ND	0.00050	mg/L					
Dibenzo [a,j] acridine	ND	0.00050	mg/L					
Diethylphthalate	ND	0.00100	mg/L					
Di-n-butylphthalate	ND	0.00100	mg/L					
Di-n-octylphthalate	ND	0.00100	mg/L					
Fluoranthene	ND	0.00001	mg/L					
Fluorene	ND	0.00005	mg/L					
Indeno [1,2,3-cd] pyrene	ND	0.00005	mg/L					
Indole	ND	0.00100	mg/L					
Naphthalene	ND	0.00005	mg/L					
Phenanthrene	ND	0.00005	mg/L					
Perylene	ND	0.00050	mg/L					
Pyrene	ND	0.00001	mg/L					
2,4-Dichlorophenol	ND	0.00100	mg/L					
Surrogate: 2-Fluorobiphenyl	*0.0153*		*%*	*76.6*	*50-140*			
Surrogate: Nitrobenzene-d5	*0.0175*		*%*	*87.6*	*50-140*			
Surrogate: Terphenyl-d14	*0.0179*		*%*	*89.6*	*50-140*			
Surrogate: 2,4,6-Tribromophenol	*0.0343*		*%*	*85.8*	*50-140*			
Surrogate: 2-Fluorophenol	*0.00811*		*%*	*20.3*	*50-140*			S-GC
Surrogate: Phenol-d6	*0.0139*		*%*	*34.7*	*50-140*			S-GC
Volatiles								
Acetone	ND	0.0050	mg/L					
Benzene	ND	0.0005	mg/L					
Bromodichloromethane	ND	0.0005	mg/L					
Bromoform	ND	0.0005	mg/L					
Bromomethane	ND	0.0005	mg/L					
Carbon Tetrachloride	ND	0.0002	mg/L					
Chlorobenzene	ND	0.0005	mg/L					
Chloroethane	ND	0.0010	mg/L					

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
Chloroform	ND	0.0005	mg/L					
Chloromethane	ND	0.0030	mg/L					
Dibromochloromethane	ND	0.0005	mg/L					
Dichlorodifluoromethane	ND	0.0010	mg/L					
1,2-Dibromoethane	ND	0.0002	mg/L					
1,2-Dichlorobenzene	ND	0.0005	mg/L					
1,3-Dichlorobenzene	ND	0.0005	mg/L					
1,4-Dichlorobenzene	ND	0.0005	mg/L					
1,1-Dichloroethane	ND	0.0005	mg/L					
1,2-Dichloroethane	ND	0.0005	mg/L					
1,1-Dichloroethylene	ND	0.0005	mg/L					
cis-1,2-Dichloroethylene	ND	0.0005	mg/L					
trans-1,2-Dichloroethylene	ND	0.0005	mg/L					
1,2-Dichloroethylene, total	ND	0.0005	mg/L					
1,2-Dichloropropane	ND	0.0005	mg/L					
cis-1,3-Dichloropropylene	ND	0.0005	mg/L					
trans-1,3-Dichloropropylene	ND	0.0005	mg/L					
1,3-Dichloropropene, total	ND	0.0005	mg/L					
Ethylbenzene	ND	0.0005	mg/L					
Hexane	ND	0.0010	mg/L					
Methyl Ethyl Ketone (2-Butanone)	ND	0.0050	mg/L					
Methyl Butyl Ketone (2-Hexanone)	ND	0.0100	mg/L					
Methyl Isobutyl Ketone	ND	0.0050	mg/L					
Methyl tert-butyl ether	ND	0.0020	mg/L					
Methylene Chloride	ND	0.0050	mg/L					
Styrene	ND	0.0005	mg/L					
1,1,1,2-Tetrachloroethane	ND	0.0005	mg/L					
1,1,2,2-Tetrachloroethane	ND	0.0005	mg/L					
Tetrachloroethylene	ND	0.0005	mg/L					
Toluene	ND	0.0005	mg/L					
1,1,1-Trichloroethane	ND	0.0005	mg/L					
1,1,2-Trichloroethane	ND	0.0005	mg/L					
Trichloroethylene	ND	0.0005	mg/L					

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
Trichlorofluoromethane	ND	0.0010	mg/L					
1,3,5-Trimethylbenzene	ND	0.0005	mg/L					
Vinyl chloride	ND	0.0005	mg/L					
m,p-Xylenes	ND	0.0005	mg/L					
o-Xylene	ND	0.0005	mg/L					
Xylenes, total	ND	0.0005	mg/L					
Surrogate: 4-Bromofluorobenzene	*0.0708*		*%*	*88.5*	*50-140*			
Surrogate: Dibromofluoromethane	*0.0881*		*%*	*110*	*50-140*			
Surrogate: Toluene-d8	*0.0841*		*%*	*105*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	ND	1	mg/L	ND			NC	20	
Sulphate	ND	1	mg/L	ND			NC	10	
General Inorganics									
pH	8.0	0.1	pH Units	8.0			0.3	3.3	
Phosphorus, total	0.030	0.01	mg/L	0.027			9.1	15	
Phosphorus, total dissolved	ND	0.01	mg/L	ND			NC	10	
Resistivity	7.01	0.01	Ohm.m	6.95			0.7	20	
Total Suspended Solids	ND	2	mg/L	ND			NC	10	
Volatile Suspended Solids	38.0	4	mg/L	40.0			5.1	10	
Total Kjeldahl Nitrogen	0.50	0.1	mg/L	0.47			7.0	16	
Metals									
Aluminum	ND	0.010	mg/L	0.0161			NC	20	
Antimony	ND	0.001	mg/L	ND			NC	20	
Arsenic	ND	0.010	mg/L	ND			NC	20	
Bismuth	ND	0.005	mg/L	ND			NC	20	
Boron	0.0538	0.050	mg/L	0.0572			6.1	20	
Cadmium	ND	0.001	mg/L	ND			NC	20	
Chromium	ND	0.050	mg/L	ND			NC	20	
Cobalt	ND	0.001	mg/L	ND			NC	20	
Copper	ND	0.005	mg/L	ND			NC	20	
Lead	ND	0.001	mg/L	ND			NC	20	
Mercury	ND	0.0001	mg/L	ND			NC	20	
Manganese	0.591	0.050	mg/L	0.609			3.1	20	
Molybdenum	ND	0.005	mg/L	ND			NC	20	
Nickel	ND	0.005	mg/L	ND			NC	20	
Selenium	ND	0.005	mg/L	ND			NC	20	
Silver	ND	0.001	mg/L	ND			NC	20	
Tin	ND	0.010	mg/L	ND			NC	20	
Titanium	ND	0.010	mg/L	ND			NC	20	
Vanadium	ND	0.001	mg/L	ND			NC	20	

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Zinc	ND	0.020	mg/L	ND			NC	20	
Metals - Total									
Aluminum	0.23	0.01	mg/L	0.21			6.5	20	
Antimony	ND	0.001	mg/L	ND			NC	20	
Arsenic	ND	0.01	mg/L	ND			NC	20	
Bismuth	ND	0.005	mg/L	ND			NC	20	
Boron	0.06	0.05	mg/L	0.06			1.8	20	
Cadmium	ND	0.001	mg/L	ND			NC	20	
Chromium	ND	0.05	mg/L	ND			NC	20	
Cobalt	ND	0.001	mg/L	ND			NC	20	
Copper	ND	0.005	mg/L	ND			NC	20	
Lead	ND	0.001	mg/L	ND			NC	20	
Mercury	ND	0.0001	mg/L	ND			NC	20	
Manganese	0.622	0.05	mg/L	0.622			0.1	20	
Molybdenum	0.006	0.005	mg/L	ND			NC	20	
Nickel	ND	0.005	mg/L	ND			NC	20	
Selenium	ND	0.005	mg/L	ND			NC	20	
Silver	ND	0.001	mg/L	ND			NC	20	
Tin	ND	0.01	mg/L	ND			NC	20	
Titanium	0.011	0.01	mg/L	ND			NC	20	
Vanadium	ND	0.001	mg/L	ND			NC	20	
Zinc	ND	0.02	mg/L	ND			NC	20	
Volatiles									
Acetone	ND	0.0050	mg/L	ND			NC	30	
Benzene	ND	0.0005	mg/L	ND			NC	30	
Bromodichloromethane	ND	0.0005	mg/L	ND			NC	30	
Bromoform	ND	0.0005	mg/L	ND			NC	30	
Bromomethane	ND	0.0005	mg/L	ND			NC	30	
Carbon Tetrachloride	ND	0.0002	mg/L	ND			NC	30	
Chlorobenzene	ND	0.0005	mg/L	ND			NC	30	
Chloroethane	ND	0.0010	mg/L	ND			NC	30	

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Chloroform	ND	0.0005	mg/L	ND			NC	30	
Chloromethane	ND	0.0030	mg/L	ND			NC	30	
Dibromochloromethane	ND	0.0005	mg/L	ND			NC	30	
Dichlorodifluoromethane	ND	0.0010	mg/L	ND			NC	30	
1,2-Dibromoethane	ND	0.0002	mg/L	ND			NC	30	
1,2-Dichlorobenzene	ND	0.0005	mg/L	ND			NC	30	
1,3-Dichlorobenzene	ND	0.0005	mg/L	ND			NC	30	
1,4-Dichlorobenzene	ND	0.0005	mg/L	ND			NC	30	
1,1-Dichloroethane	ND	0.0005	mg/L	ND			NC	30	
1,2-Dichloroethane	ND	0.0005	mg/L	ND			NC	30	
1,1-Dichloroethylene	ND	0.0005	mg/L	ND			NC	30	
cis-1,2-Dichloroethylene	ND	0.0005	mg/L	ND			NC	30	
trans-1,2-Dichloroethylene	ND	0.0005	mg/L	ND			NC	30	
1,2-Dichloropropane	ND	0.0005	mg/L	ND			NC	30	
cis-1,3-Dichloropropylene	ND	0.0005	mg/L	ND			NC	30	
trans-1,3-Dichloropropylene	ND	0.0005	mg/L	ND			NC	30	
Ethylbenzene	ND	0.0005	mg/L	ND			NC	30	
Hexane	ND	0.0010	mg/L	ND			NC	30	
Methyl Ethyl Ketone (2-Butanone)	ND	0.0050	mg/L	ND			NC	30	
Methyl Butyl Ketone (2-Hexanone)	ND	0.0100	mg/L	ND			NC	30	
Methyl Isobutyl Ketone	ND	0.0050	mg/L	ND			NC	30	
Methyl tert-butyl ether	ND	0.0020	mg/L	ND			NC	30	
Methylene Chloride	ND	0.0050	mg/L	ND			NC	30	
Styrene	ND	0.0005	mg/L	ND			NC	30	
1,1,1,2-Tetrachloroethane	ND	0.0005	mg/L	ND			NC	30	
1,1,2,2-Tetrachloroethane	ND	0.0005	mg/L	ND			NC	30	
Tetrachloroethylene	ND	0.0005	mg/L	ND			NC	30	
Toluene	0.0156	0.0005	mg/L	0.0183			15.8	30	
1,1,1-Trichloroethane	ND	0.0005	mg/L	ND			NC	30	
1,1,2-Trichloroethane	ND	0.0005	mg/L	ND			NC	30	
Trichloroethylene	ND	0.0005	mg/L	ND			NC	30	

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Trichlorofluoromethane	ND	0.0010	mg/L	ND			NC	30	
1,3,5-Trimethylbenzene	ND	0.0005	mg/L	ND			NC	30	
Vinyl chloride	ND	0.0005	mg/L	ND			NC	30	
m,p-Xylenes	ND	0.0005	mg/L	ND			NC	30	
o-Xylene	ND	0.0005	mg/L	ND			NC	30	
Surrogate: 4-Bromofluorobenzene	*0.0699*		*%*		*87.3*	*50-140*			
Surrogate: Dibromofluoromethane	*0.0893*		*%*		*112*	*50-140*			
Surrogate: Toluene-d8	*0.0828*		*%*		*104*	*50-140*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	9.87	1	mg/L	ND	98.7	70-124			
Sulphate	9.56	1	mg/L	ND	95.6	74-126			
General Inorganics									
Phosphorus, total	0.947	0.01	mg/L	0.027	92.0	80-120			
Phosphorus, total dissolved	0.95	0.01	mg/L	ND	95.3	80-120			
Total Suspended Solids	20.0	2	mg/L	ND	93.0	75-125			
Total Kjeldahl Nitrogen	1.46	0.1	mg/L	0.47	98.7	81-126			
Metals									
Aluminum	58.6	0.010	mg/L	1.6	114	80-120			
Arsenic	51.5	0.010	mg/L	0.08	103	80-120			
Bismuth	40.3	0.005	mg/L	0.04	80.4	80-120			
Boron	60.9	0.050	mg/L	5.7	110	80-120			
Cadmium	52.4	0.001	mg/L	0.002	105	80-120			
Chromium	56.0	0.050	mg/L	ND	112	80-120			
Cobalt	54.4	0.001	mg/L	0.06	109	80-120			
Copper	52.5	0.005	mg/L	0.1	105	80-120			
Lead	50.9	0.001	mg/L	0.006	102	80-120			
Mercury	0.00290	0.0001	mg/L	ND	96.8	70-130			
Manganese	117	0.050	mg/L	60.9	112	80-120			
Molybdenum	50.7	0.005	mg/L	0.3	101	80-120			
Nickel	54.0	0.005	mg/L	0.2	108	80-120			
Selenium	50.9	0.005	mg/L	0.1	102	80-120			
Silver	48.6	0.001	mg/L	0.008	97.2	80-120			
Tin	51.4	0.010	mg/L	0.05	103	80-120			
Titanium	60.6	0.010	mg/L	0.04	121	80-120			QM-07
Vanadium	56.2	0.001	mg/L	0.05	112	80-120			
Zinc	50.8	0.020	mg/L	0.3	101	80-120			
Metals - Total									
Aluminum	76.1	0.01	mg/L	21.1	110	80-120			
Arsenic	47.3	0.01	mg/L	0.096	94.5	80-120			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Bismuth	46.2	0.005	mg/L	0.086	92.2	80-120			
Boron	59.2	0.05	mg/L	5.61	107	80-120			
Cadmium	49.1	0.001	mg/L	0.002	98.1	80-120			
Chromium	53.1	0.05	mg/L	0.060	106	80-120			
Cobalt	51.3	0.001	mg/L	0.064	102	80-120			
Copper	49.7	0.005	mg/L	0.150	99.0	80-120			
Lead	46.8	0.001	mg/L	0.035	93.5	80-120			
Mercury	0.0028	0.0001	mg/L	ND	93.1	70-130			
Manganese	111	0.05	mg/L	62.2	97.4	80-120			
Molybdenum	48.4	0.005	mg/L	0.367	96.0	80-120			
Nickel	51.2	0.005	mg/L	0.208	102	80-120			
Selenium	45.9	0.005	mg/L	0.131	91.5	80-120			
Silver	46.2	0.001	mg/L	0.007	92.5	80-120			
Tin	49.5	0.01	mg/L	0.074	98.9	80-120			
Titanium	59.2	0.01	mg/L	0.981	116	80-120			
Vanadium	52.1	0.001	mg/L	0.091	104	80-120			
Zinc	46.6	0.02	mg/L	0.380	92.4	80-120			
Semi-Volatiles									
1-Methylnaphthalene	0.00666	0.00005	mg/L	ND	66.6	50-140			
2-Methylnaphthalene	0.00850	0.00005	mg/L	ND	85.0	50-140			
7H-Dibenzo[c,g]carbazole	0.00622	0.00050	mg/L	ND	62.2	50-140			
Anthracene	0.00661	0.00001	mg/L	ND	66.1	50-140			
Benzo [a] anthracene	0.00700	0.00001	mg/L	ND	70.0	50-140			
Benzo [a] pyrene	0.00672	0.00001	mg/L	ND	67.2	50-140			
Benzo [b&j] fluoranthene	0.0110	0.00005	mg/L	ND	110	50-140			
Benzo [e] pyrene	0.00739	0.00005	mg/L	ND	73.9	50-140			
Benzo [g,h,i] perylene	0.00728	0.00005	mg/L	ND	72.8	50-140			
Benzo [k] fluoranthene	0.00803	0.00005	mg/L	ND	80.3	50-140			
Benzylbutylphthalate	0.00567	0.00050	mg/L	ND	56.7	50-140			
Biphenyl	0.00645	0.00005	mg/L	ND	64.5	50-140			
Bis(2-chloroethoxy)methane	0.00748	0.00100	mg/L	ND	74.8	50-140			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Bis(2-ethylhexyl)phthalate	0.00501	0.00100	mg/L	ND	50.1	50-140			
Chrysene	0.00739	0.00005	mg/L	ND	73.9	50-140			
Dibenzo [a,h] anthracene	0.00785	0.00005	mg/L	ND	78.5	50-140			
Dibenzo [a,i] pyrene	0.00696	0.00050	mg/L	ND	69.6	50-140			
Dibenzo [a,j] acridine	0.00582	0.00050	mg/L	ND	58.2	50-140			
Diethylphthalate	0.00642	0.00100	mg/L	ND	64.2	50-140			
Di-n-butylphthalate	0.00810	0.00100	mg/L	ND	81.0	50-140			
Di-n-octylphthalate	0.00587	0.00100	mg/L	ND	58.7	50-140			
Fluoranthene	0.00804	0.00001	mg/L	ND	80.4	50-140			
Fluorene	0.00702	0.00005	mg/L	ND	70.2	50-140			
Indeno [1,2,3-cd] pyrene	0.00719	0.00005	mg/L	ND	71.9	50-140			
Indole	0.00717	0.00100	mg/L	ND	71.7	50-140			
Naphthalene	0.00646	0.00005	mg/L	ND	64.6	50-140			
Phenanthrene	0.00750	0.00005	mg/L	ND	75.0	50-140			
Perylene	0.00698	0.00050	mg/L	ND	69.8	50-140			
Pyrene	0.00592	0.00001	mg/L	ND	59.2	50-140			
2,4-Dichlorophenol	0.00598	0.00100	mg/L	ND	59.8	50-140			
Surrogate: 2-Fluorobiphenyl	*0.0123*		*%*		*61.7*	*50-140*			
Surrogate: Nitrobenzene-d5	*0.0143*		*%*		*71.6*	*50-140*			
Surrogate: Terphenyl-d14	*0.0143*		*%*		*71.3*	*50-140*			
Surrogate: 2,4,6-Tribromophenol	*0.0281*		*%*		*70.2*	*50-140*			
Surrogate: 2-Fluorophenol	*0.00495*		*%*		*12.4*	*50-140*			*S-GC*
Surrogate: Phenol-d6	*0.00834*		*%*		*20.9*	*50-140*			*S-GC*
Volatiles									
Acetone	0.0953	0.0050	mg/L	ND	95.3	50-140			
Benzene	0.0376	0.0005	mg/L	ND	93.9	60-130			
Bromodichloromethane	0.0380	0.0005	mg/L	ND	94.9	60-130			
Bromoform	0.0317	0.0005	mg/L	ND	79.3	60-130			
Bromomethane	0.0340	0.0005	mg/L	ND	85.0	50-140			
Carbon Tetrachloride	0.0360	0.0002	mg/L	ND	89.9	60-130			
Chlorobenzene	0.0358	0.0005	mg/L	ND	89.4	60-130			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Chloroethane	0.0444	0.0010	mg/L	ND	111	50-140			
Chloroform	0.0382	0.0005	mg/L	ND	95.5	60-130			
Chloromethane	0.0377	0.0030	mg/L	ND	94.3	50-140			
Dibromochloromethane	0.0359	0.0005	mg/L	ND	89.7	60-130			
Dichlorodifluoromethane	0.0423	0.0010	mg/L	ND	106	50-140			
1,2-Dibromoethane	0.0382	0.0002	mg/L	ND	95.6	60-130			
1,2-Dichlorobenzene	0.0348	0.0005	mg/L	ND	86.9	60-130			
1,3-Dichlorobenzene	0.0371	0.0005	mg/L	ND	92.8	60-130			
1,4-Dichlorobenzene	0.0362	0.0005	mg/L	ND	90.5	60-130			
1,1-Dichloroethane	0.0412	0.0005	mg/L	ND	103	60-130			
1,2-Dichloroethane	0.0412	0.0005	mg/L	ND	103	60-130			
1,1-Dichloroethylene	0.0427	0.0005	mg/L	ND	107	60-130			
cis-1,2-Dichloroethylene	0.0371	0.0005	mg/L	ND	92.8	60-130			
trans-1,2-Dichloroethylene	0.0424	0.0005	mg/L	ND	106	60-130			
1,2-Dichloropropane	0.0363	0.0005	mg/L	ND	90.8	60-130			
cis-1,3-Dichloropropylene	0.0385	0.0005	mg/L	ND	96.2	60-130			
trans-1,3-Dichloropropylene	0.0382	0.0005	mg/L	ND	95.6	60-130			
Ethylbenzene	0.0339	0.0005	mg/L	ND	84.7	60-130			
Hexane	0.0324	0.0010	mg/L	ND	81.1	60-130			
Methyl Ethyl Ketone (2-Butanone)	0.0977	0.0050	mg/L	ND	97.7	50-140			
Methyl Butyl Ketone (2-Hexanone)	0.0970	0.0100	mg/L	ND	97.0	50-140			
Methyl Isobutyl Ketone	0.0977	0.0050	mg/L	ND	97.7	50-140			
Methyl tert-butyl ether	0.0833	0.0020	mg/L	ND	83.3	50-140			
Methylene Chloride	0.0440	0.0050	mg/L	ND	110	60-130			
Styrene	0.0322	0.0005	mg/L	ND	80.4	60-130			
1,1,1,2-Tetrachloroethane	0.0331	0.0005	mg/L	ND	82.7	60-130			
1,1,2,2-Tetrachloroethane	0.0373	0.0005	mg/L	ND	93.3	60-130			
Tetrachloroethylene	0.0310	0.0005	mg/L	ND	77.6	60-130			
Toluene	0.0362	0.0005	mg/L	ND	90.5	60-130			
1,1,1-Trichloroethane	0.0356	0.0005	mg/L	ND	89.0	60-130			
1,1,2-Trichloroethane	0.0404	0.0005	mg/L	ND	101	60-130			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Trichloroethylene	0.0335	0.0005	mg/L	ND	83.8	60-130			
Trichlorofluoromethane	0.0468	0.0010	mg/L	ND	117	60-130			
1,3,5-Trimethylbenzene	0.0327	0.0005	mg/L	ND	81.8	60-130			
Vinyl chloride	0.0293	0.0005	mg/L	ND	73.2	50-140			
m,p-Xylenes	0.0689	0.0005	mg/L	ND	86.1	60-130			
o-Xylene	0.0333	0.0005	mg/L	ND	83.3	60-130			
Surrogate: 4-Bromofluorobenzene	*0.0608*		*%*		*76.0*	*50-140*			
Surrogate: Dibromofluoromethane	*0.0896*		*%*		*112*	*50-140*			
Surrogate: Toluene-d8	*0.0811*		*%*		*101*	*50-140*			

Qualifier Notes:

Login Qualifiers :

Sample - Filtered and preserved by Paracel upon receipt at the laboratory - Metals by ICP-MS, and mercury; as directed by the client.

Applies to Samples: BH24-18 (Filtered), BH24-10 (Filtered), BH24-16 (Filtered)

Sample Qualifiers :

3: Surrogate recovery outside of control limits. The data was accepted based on valid recovery of the remaining surrogate.

QC Qualifiers:

QM-07 The spike recovery was outside acceptance limits for the MS and/or MSD. The batch was accepted based on other acceptable QC.

S-GC Surrogate recovery outside of control limits. The data was accepted based on valid recovery of the remaining surrogate.

Sample Data Revisions:

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable

ND: Not Detected

MDL: Method Detection Limit

Source Result: Data used as source for matrix and duplicate samples

%REC: Percent recovery.

RPD: Relative percent difference.

NC: Not Calculated

Any use of these results implies your agreement that our total liabilty in connection with this work, however arising, shall be limited to the amount paid by you for this work, and that our employees or agents shall not under any circumstances be liable to you in connection with this work.

APPENDIX F

Bedrock Core Photos

BOREHOLE: 24-2
BORING DATE: JULY 18, 2024
DEPTH: 2.81 to 4.40 mbgs



GEMTEC
Consulting Engineers and Scientists
32 Steacie Drive, Ottawa, ON K2K 2A9
T: (613) 836-1422 | www.gemtec.ca | ottawa@gemtec.ca

Project

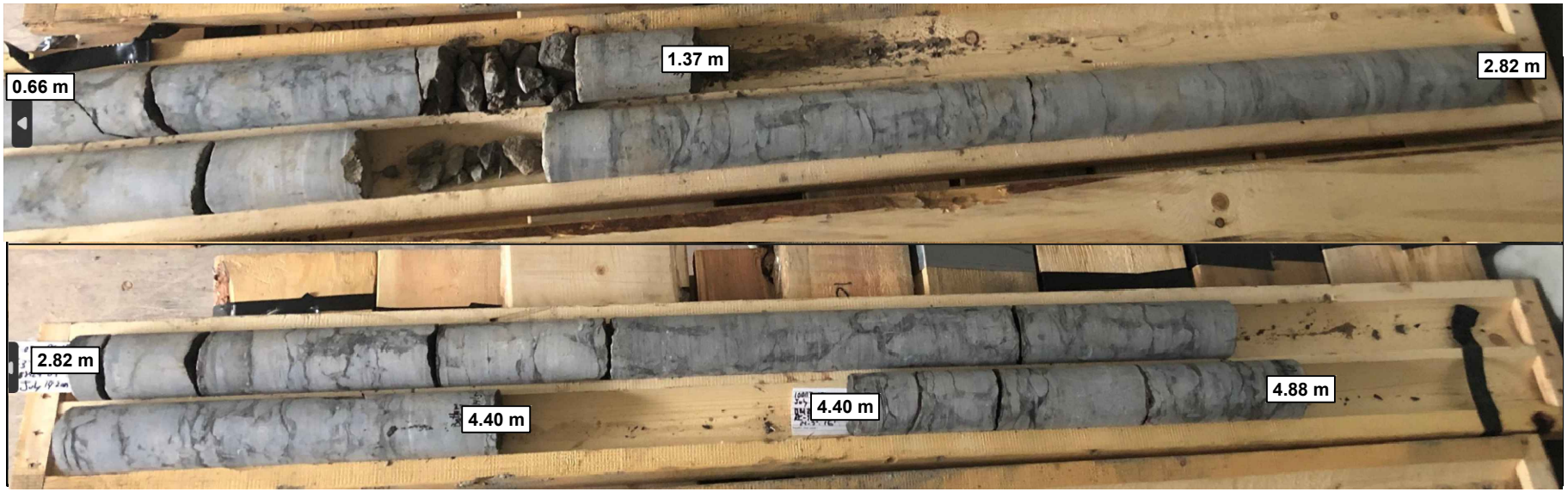
CASSELMAN
(MAIN SEWAGE PUMPING STATIONS (SPS))

FIGURE F1

File No.
100117.051

ROCKCORE PHOTOGRAPH
BOREHOLE 24-2

BOREHOLE: 24-4
BORING DATE: JULY 19, 2024
DEPTH: 0.66 to 4.88 mbgs



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(MAIN SEWAGE PUMPING STATIONS (SPS))

FIGURE F2

File No.
100117.051

ROCKCORE PHOTOGRAPH
BOREHOLE 24-4

BOREHOLE: 24-18 RC-8
BORING DATE: JULY 18, 2024
DEPTH: 4.62 to 5.92 mbgs



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FIGURE F3

File No.
100117.051

ROCKCORE PHOTOGRAPH
BOREHOLE 24-18 RC-8

BOREHOLE: 24-18 RC-9
BORING DATE: JULY 18, 2024
DEPTH: 5.92 to 7.39 mbgs



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FIGURE F4

File No.
100117.051

ROCKCORE PHOTOGRAPH
BOREHOLE 24-18 RC-9

BOREHOLE: 24-18 RC-10
BORING DATE: JULY 18, 2024
DEPTH: 7.39 to 8.79 mbgs



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FIGURE F5

File No.
100117.051

ROCKCORE PHOTOGRAPH
BOREHOLE 24-18 RC-10

BOREHOLE: 22-01
BORING DATE: DATE
DEPTH: D1 to D2 mbgs

D1 m	### m	### m	### m	### m	D2m



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Project

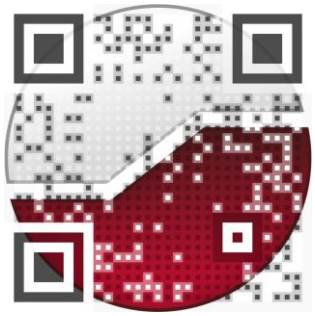
CASSELMAN
(MAIN SEWAGE PUMPING STATIONS (SPS))

FIGURE F

File No.
100117.051

ROCKCORE PHOTOGRAPH
BOREHOLE #####

experience • knowledge • integrity



civil	civil
geotechnical	géotechnique
environmental	environnementale
field services	surveillance de chantier
materials testing	service de laboratoire des matériaux

expérience • connaissance • intégrité

Appendix E

Cultural Heritage Resources Assessments

Appendix E1

Completed Checklist for Criteria for Evaluating Archaeological Potential

Ontario

Ministry of Tourism, Culture and Sport

Programs & Services Branch
401 Bay Street, Suite 1700
Toronto ON M7A 0A7

Criteria for Evaluating Archaeological Potential

A Checklist for the Non-Specialist

The **purpose of the checklist** is to determine:

- if a property(ies) or project area may contain archaeological resources i.e., have archaeological potential
- it includes all areas that may be impacted by project activities, including – but not limited to:
  - the main project area
  - temporary storage
  - staging and working areas
  - temporary roads and detours

Processes covered under this checklist, such as:

- *Planning Act*
- *Environmental Assessment Act*
- *Aggregates Resources Act*
- *Ontario Heritage Act* – Standards and Guidelines for Conservation of Provincial Heritage Properties

Archaeological assessment

If you are not sure how to answer one or more of the questions on the checklist, you may want to hire a licensed consultant archaeologist (see page 4 for definitions) to undertake an archaeological assessment.

The assessment will help you:

- identify, evaluate and protect archaeological resources on your property or project area
- reduce potential delays and risks to your project

Note: By law, archaeological assessments **must** be done by a licensed consultant archaeologist. Only a licensed archaeologist can assess – or alter – an archaeological site.

What to do if you:

- **find an archaeological resource**

  If you find something you think may be of archaeological value during project work, you must – by law – stop all activities immediately and contact a licensed consultant archaeologist

  The archaeologist will carry out the fieldwork in compliance with the *Ontario Heritage Act* [s.48(1)].

- **unearth a burial site**

  If you find a burial site containing human remains, you must immediately notify the appropriate authorities (i.e., police, coroner's office, and/or Registrar of Cemeteries) and comply with the *Funeral, Burial and Cremation Services Act*.

Other checklists

Please use a separate checklist for your project, if:

- you are seeking a Renewable Energy Approval under Ontario Regulation 359/09 – separate checklist
- your Parent Class EA document has an approved screening criteria (as referenced in Question 1)

Please refer to the Instructions pages when completing this form.

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Project or Property Name

Casselman Lagoon Expansion Schedule 'C' Class Environmental Assessment

Project or Property Location (upper and lower or single tier municipality)

Casselman

Proponent Name

Pierre-Paul Beauchamp

Proponent Contact Information

ppbeauchamp@casselman.ca

Screening Questions

	Yes	No
1. Is there a pre-approved screening checklist, methodology or process in place?	☐	☑

If Yes, please follow the pre-approved screening checklist, methodology or process.

If No, continue to Question 2.

	Yes	No
2. Has an archaeological assessment been prepared for the property (or project area) and been accepted by MTCS?	☐	☑

If Yes, do **not** complete the rest of the checklist. You are expected to follow the recommendations in the archaeological assessment report(s).

The proponent, property owner and/or approval authority will:

- summarize the previous assessment
- add this checklist to the project file, with the appropriate documents that demonstrate an archaeological assessment was undertaken e.g., MTCS letter stating acceptance of archaeological assessment report

The summary and appropriate documentation may be:

- submitted as part of a report requirement e.g., environmental assessment document
- maintained by the property owner, proponent or approval authority

If No, continue to Question 3.

	Yes	No
3. Are there known archaeological sites on or within 300 metres of the property (or the project area)?	☐	☑

	Yes	No
4. Is there Aboriginal or local knowledge of archaeological sites on or within 300 metres of the property (or project area)?	☐	☑

	Yes	No
5. Is there Aboriginal knowledge or historically documented evidence of past Aboriginal use on or within 300 metres of the property (or project area)?	☐	☑

	Yes	No
6. Is there a known burial site or cemetery on the property or adjacent to the property (or project area)?	☐	☑

	Yes	No
7. Has the property (or project area) been recognized for its cultural heritage value?	☐	☑

If Yes to any of the above questions (3 to 7), do **not** complete the checklist. Instead, you need to hire a licensed consultant archaeologist to undertake an archaeological assessment of your property or project area.

If No, continue to question 8.

	Yes	No
8. Has the entire property (or project area) been subjected to recent, extensive and intensive disturbance?	☑	☐

If Yes to the preceding question, do **not** complete the checklist. Instead, please keep and maintain a summary of documentation that provides evidence of the recent disturbance.

An archaeological assessment is not required.

If No, continue to question 9.

	Yes	No
9. Are there present or past water sources within 300 metres of the property (or project area)?	☐	☐

If Yes, an archaeological assessment is required.

If No, continue to question 10.

	Yes	No
10. Is there evidence of two or more of the following on the property (or project area)?	☐	☐

- elevated topography
- pockets of well-drained sandy soil
- distinctive land formations
- resource extraction areas
- early historic settlement
- early historic transportation routes

If Yes, an archaeological assessment is required.

If No, there is low potential for archaeological resources at the property (or project area).

The proponent, property owner and/or approval authority will:

- summarize the conclusion
- add this checklist with the appropriate documentation to the project file

The summary and appropriate documentation may be:

- submitted as part of a report requirement e.g., under the *Environmental Assessment Act, Planning Act* processes
- maintained by the property owner, proponent or approval authority

Instructions

Please have the following available, when requesting information related to the screening questions below:

- a clear map showing the location and boundary of the property or project area
  - large scale and small scale showing nearby township names for context purposes
- the municipal addresses of all properties within the project area
- the lot(s), concession(s), and parcel number(s) of all properties within a project area

In this context, the following definitions apply:

- **consultant archaeologist** means, as defined in Ontario regulation as an archaeologist who enters into an agreement with a client to carry out or supervise archaeological fieldwork on behalf of the client, produce reports for or on behalf of the client and provide technical advice to the client. In Ontario, these people also are required to hold a valid professional archaeological licence issued by the Ministry of Tourism, Culture and Sport.
- **proponent** means a person, agency, group or organization that carries out or proposes to carry out an undertaking or is the owner or person having charge, management or control of an undertaking.

1. Is there a pre-approved screening checklist, methodology or process in place?

An existing checklist, methodology or process may be already in place for identifying archaeological potential, including:

- one prepared and adopted by the municipality e.g., archaeological management plan
- an environmental assessment process e.g., screening checklist for municipal bridges
- one that is approved by the Ministry of Tourism, Culture and Sport under the Ontario government's Standards & Guidelines for Conservation of Provincial Heritage Properties [s. B.2.]

2. Has an archaeological assessment been prepared for the property (or project area) and been accepted by MTCS?

Respond 'yes' to this question, if all of the following are true:

- an archaeological assessment report has been prepared and is in compliance with MTCS requirements
  - a letter has been sent by MTCS to the licensed archaeologist confirming that MTCS has added the report to the Ontario Public Register of Archaeological Reports (Register)
- the report states that there are no concerns regarding impacts to archaeological sites

Otherwise, if an assessment has been completed and deemed compliant by the MTCS, and the ministry recommends further archaeological assessment work, this work will need to be completed.

For more information about archaeological assessments, contact:

- approval authority
- proponent
- consultant archaeologist
- Ministry of Tourism, Culture and Sport at archaeology@ontario.ca

3. Are there known archaeological sites on or within 300 metres of the property (or project area)?

MTCS maintains a database of archaeological sites reported to the ministry.

For more information, contact MTCS Archaeological Data Coordinator at archaeology@ontario.ca.

4. Is there Aboriginal or local knowledge of archaeological sites on or within 300 metres of the property?

Check with:

- Aboriginal communities in your area
- local municipal staff

They may have information about archaeological sites that are not included in MTCS' database.

Other sources of local knowledge may include:

- property owner
- local heritage organizations and historical societies
- local museums
- municipal heritage committee
- published local histories

5. Is there Aboriginal knowledge or historically documented evidence of past Aboriginal use on or within 300 metres of the property (or property area)?

Check with:

- Aboriginal communities in your area
- local municipal staff

Other sources of local knowledge may include:

- property owner
- local heritage organizations and historical societies
- local museums
- municipal heritage committee
- published local histories

6. Is there a known burial site or cemetery on the property or adjacent to the property (or project area)?

For more information on known cemeteries and/or burial sites, see:

- Cemeteries Regulation Unit, Ontario Ministry of Consumer Services – for database of registered cemeteries
- Ontario Genealogical Society (OGS) – to locate records of Ontario cemeteries, both currently and no longer in existence; cairns, family plots and burial registers
- Canadian County Atlas Digital Project – to locate early cemeteries

In this context, 'adjacent' means 'contiguous', or as otherwise defined in a municipal official plan.

7. Has the property (or project area) been recognized for its cultural heritage value?

There is a strong chance there may be archaeological resources on your property (or immediate area) if it has been listed, designated or otherwise identified as being of cultural heritage value by:

- your municipality
- Ontario government
- Canadian government

This includes a property that is:

- designated under *Ontario Heritage Act* (the OHA), including:
  - individual designation (Part IV)
  - part of a heritage conservation district (Part V)
  - an archaeological site (Part VI)
- subject to:
  - an agreement, covenant or easement entered into under the OHA (Parts II or IV)
  - a notice of intention to designate (Part IV)
  - a heritage conservation district study area by-law (Part V) of the OHA
- listed on:
  - a municipal register or inventory of heritage properties
  - Ontario government's list of provincial heritage properties
  - Federal government's list of federal heritage buildings
- part of a:
  - National Historic Site
  - UNESCO World Heritage Site
- designated under:
  - *Heritage Railway Station Protection Act*
  - *Heritage Lighthouse Protection Act*
- subject of a municipal, provincial or federal commemorative or interpretive plaque.

To determine if your property or project area is covered by any of the above, see:

- Part A of the MTCS Criteria for Evaluating Potential for Built Heritage and Cultural Heritage Landscapes

Part VI – Archaeological Sites

Includes five sites designated by the Minister under Regulation 875 of the Revised Regulation of Ontario, 1990 (Archaeological Sites) and 3 marine archaeological sites prescribed under Ontario Regulation 11/06.

For more information, check Regulation 875 and Ontario Regulation 11/06.

8. Has the entire property (or project area) been subjected to recent extensive and intensive ground disturbance?

Recent: after-1960

Extensive: over all or most of the area

Intensive: thorough or complete disturbance

Examples of ground disturbance include:

- quarrying
- major landscaping – involving grading below topsoil
- building footprints and associated construction area
  - where the building has deep foundations or a basement
- infrastructure development such as:
  - sewer lines
  - gas lines
  - underground hydro lines
  - roads
  - any associated trenches, ditches, interchanges. **Note**: this applies only to the excavated part of the right-of-way; the remainder of the right-of-way or corridor may not have been impacted.

A ground disturbance does **not** include:

- agricultural cultivation
- gardening
- landscaping

Site visits

You can typically get this information from a site visit. In that case, please document your visit in the process (e.g., report) with:

- photographs
- maps
- detailed descriptions

If a disturbance isn't clear from a site visit or other research, you need to hire a licensed consultant archaeologist to undertake an archaeological assessment.

9. Are there present or past water bodies within 300 metres of the property (or project area)?

Water bodies are associated with past human occupations and use of the land. About 80-90% of archaeological sites are found within 300 metres of water bodies.

Present

- Water bodies:
  - primary - lakes, rivers, streams, creeks
  - secondary - springs, marshes, swamps and intermittent streams and creeks
- accessible or inaccessible shoreline, for example:
  - high bluffs
  - swamps
  - marsh fields by the edge of a lake
  - sandbars stretching into marsh

Water bodies not included:

- man-made water bodies, for example:
  - temporary channels for surface drainage
  - rock chutes and spillways
  - temporarily ponded areas that are normally farmed
  - dugout ponds
- artificial bodies of water intended for storage, treatment or recirculation of:
  - runoff from farm animal yards
  - manure storage facilities
  - sites and outdoor confinement areas

Past

Features indicating past water bodies:

- raised sand or gravel beach ridges – can indicate glacial lake shorelines
- clear dip in the land – can indicate an old river or stream
- shorelines of drained lakes or marshes
- cobble beaches

You can get information about water bodies through:

- a site visit
- aerial photographs
- 1:10,000 scale Ontario Base Maps - or equally detailed and scaled maps.

10. Is there evidence of two or more of the following on the property (or project area)?

- elevated topography
- pockets of well-drained sandy soil
- distinctive land formations
- resource extraction areas
- early historic settlement
- early historic transportation routes

- **Elevated topography**

  Higher ground and elevated positions - surrounded by low or level topography - often indicate past settlement and land use.

  Features such as eskers, drumlins, sizeable knolls, plateaus next to lowlands, or other such features are a strong indication of archaeological potential.

  Find out if your property or project area has elevated topography, through:

  - site inspection
  - aerial photographs
  - topographical maps

- **Pockets of well-drained sandy soil, especially within areas of heavy soil or rocky ground**

  Sandy, well-drained soil - in areas characterized by heavy soil or rocky ground - may indicate archaeological potential

  Find out if your property or project area has sandy soil through:

  - site inspection
  - soil survey reports

- **Distinctive land formations**

  Distinctive land formations include – but are not limited to:

  - waterfalls
  - rock outcrops
  - rock faces
  - caverns
  - mounds, etc.

  They were often important to past inhabitants as special or sacred places. The following sites may be present – or close to – these formations:

  - burials
  - structures
  - offerings
  - rock paintings or carvings

  Find out if your property or project areas has a distinctive land formation through:

  - a site visit
  - aerial photographs
  - 1:10,000 scale Ontario Base Maps - or equally detailed and scaled maps.

- **Resource extraction areas**

  The following resources were collected in these extraction areas:

  - food or medicinal plants e.g., migratory routes, spawning areas, prairie
  - scarce raw materials e.g., quartz, copper, ochre or outcrops of chert
  - resources associated with early historic industry e.g., fur trade, logging, prospecting, mining

  Aboriginal communities may hold traditional knowledge about their past use or resources in the area.

- **Early historic settlement**

  Early Euro-Canadian settlement include – but are not limited to:

  - early military or pioneer settlement e.g., pioneer homesteads, isolated cabins, farmstead complexes
  - early wharf or dock complexes
  - pioneers churches and early cemeteries

  For more information, see below – under the early historic transportation routes.

- **Early historic transportation routes** - such as trails, passes, roads, railways, portage routes, canals.

  For more information, see:

  - historical maps and/or historical atlases
    - for information on early settlement patterns such as trails (including Aboriginal trails), monuments, structures, fences, mills, historic roads, rail corridors, canals, etc.
    - Archives of Ontario holds a large collection of historical maps and historical atlases
    - digital versions of historic atlases are available on the Canadian County Atlas Digital Project
  - commemorative markers or plaques such as local, provincial or federal agencies
  - municipal heritage committee or other local heritage organizations
    - for information on early historic settlements or landscape features (e.g., fences, mill races, etc.)
    - for information on commemorative markers or plaques

Appendix E2

Completed Checklist for Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes

Ontario

Ministry of Tourism, Culture and Sport

Programs & Services Branch
401 Bay Street, Suite 1700
Toronto ON M7A 0A7

Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes

A Checklist for the Non-Specialist

The **purpose of the checklist** is to determine:

- if a property(ies) or project area:
  - is a recognized heritage property
  - may be of cultural heritage value
- it includes all areas that may be impacted by project activities, including – but not limited to:
  - the main project area
  - temporary storage
  - staging and working areas
  - temporary roads and detours

Processes covered under this checklist, such as:

- *Planning Act*
- *Environmental Assessment Act*
- *Aggregates Resources Act*
- *Ontario Heritage Act* – Standards and Guidelines for Conservation of Provincial Heritage Properties

Cultural Heritage Evaluation Report (CHER)

If you are not sure how to answer one or more of the questions on the checklist, you may want to hire a qualified person(s) (see page 5 for definitions) to undertake a cultural heritage evaluation report (CHER).

The CHER will help you:

- identify, evaluate and protect cultural heritage resources on your property or project area
- reduce potential delays and risks to a project

Other checklists

Please use a separate checklist for your project, if:

- you are seeking a Renewable Energy Approval under Ontario Regulation 359/09 – separate checklist
- your Parent Class EA document has an approved screening criteria (as referenced in Question 1)

Please refer to the Instructions pages for more detailed information and when completing this form.

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Project or Property Name

Casselman Lagoon Expansion Schedule 'C' Class Environmental Assessment

Project or Property Location (upper and lower or single tier municipality)

Municipality of Casselman

Proponent Name

Pierre-Paul Beauchamp

Proponent Contact Information

ppbeauchamp@casselman.ca

Screening Questions

	Yes	No
1. Is there a pre-approved screening checklist, methodology or process in place?	☐	☑

If Yes, please follow the pre-approved screening checklist, methodology or process.

If No, continue to Question 2.

Part A: Screening for known (or recognized) Cultural Heritage Value

	Yes	No
2. Has the property (or project area) been evaluated before and found **not** to be of cultural heritage value?	☑	☐

If Yes, do **not** complete the rest of the checklist.

The proponent, property owner and/or approval authority will:

- summarize the previous evaluation and
- add this checklist to the project file, with the appropriate documents that demonstrate a cultural heritage evaluation was undertaken

The summary and appropriate documentation may be:

- submitted as part of a report requirement
- maintained by the property owner, proponent or approval authority

If No, continue to Question 3.

	Yes	No
3. Is the property (or project area):		
a. identified, designated or otherwise protected under the *Ontario Heritage Act* as being of cultural heritage value?	☐	☐
b. a National Historic Site (or part of)?	☐	☐
c. designated under the *Heritage Railway Stations Protection Act*?	☐	☐
d. designated under the *Heritage Lighthouse Protection Act*?	☐	☐
e. identified as a Federal Heritage Building by the Federal Heritage Buildings Review Office (FHBRO)?	☐	☐
f. located within a United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Site?	☐	☐

If Yes to any of the above questions, you need to hire a qualified person(s) to undertake:

- a Cultural Heritage Evaluation Report, if a Statement of Cultural Heritage Value has not previously been prepared or the statement needs to be updated

If a Statement of Cultural Heritage Value has been prepared previously and if alterations or development are proposed, you need to hire a qualified person(s) to undertake:

- a Heritage Impact Assessment (HIA) – the report will assess and avoid, eliminate or mitigate impacts

If No, continue to Question 4.

Part B: Screening for Potential Cultural Heritage Value

	Yes	No
4. Does the property (or project area) contain a parcel of land that:		
a. is the subject of a municipal, provincial or federal commemorative or interpretive plaque?	☐	☐
b. has or is adjacent to a known burial site and/or cemetery?	☐	☐
c. is in a Canadian Heritage River watershed?	☐	☐
d. contains buildings or structures that are 40 or more years old?	☐	☐

Part C: Other Considerations

	Yes	No
5. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area):		
a. is considered a landmark in the local community or contains any structures or sites that are important in defining the character of the area?	☐	☐
b. has a special association with a community, person or historical event?	☐	☐
c. contains or is part of a cultural heritage landscape?	☐	☐

If Yes to one or more of the above questions (Part B and C), there is potential for cultural heritage resources on the property or within the project area.

You need to hire a qualified person(s) to undertake:

- a Cultural Heritage Evaluation Report (CHER)

If the property is determined to be of cultural heritage value and alterations or development is proposed, you need to hire a qualified person(s) to undertake:

- a Heritage Impact Assessment (HIA) – the report will assess and avoid, eliminate or mitigate impacts

If No to all of the above questions, there is low potential for built heritage or cultural heritage landscape on the property.

The proponent, property owner and/or approval authority will:

- summarize the conclusion
- add this checklist with the appropriate documentation to the project file

The summary and appropriate documentation may be:

- submitted as part of a report requirement e.g. under the *Environmental Assessment Act, Planning Act* processes
- maintained by the property owner, proponent or approval authority

Instructions

Please have the following available, when requesting information related to the screening questions below:

- a clear map showing the location and boundary of the property or project area
  - large scale and small scale showing nearby township names for context purposes
- the municipal addresses of all properties within the project area
- the lot(s), concession(s), and parcel number(s) of all properties within a project area

For more information, see the Ministry of Tourism, Culture and Sport's Ontario Heritage Toolkit or Standards and Guidelines for Conservation of Provincial Heritage Properties.

In this context, the following definitions apply:

- **qualified person(s)** means individuals – professional engineers, architects, archaeologists, etc. – having relevant, recent experience in the conservation of cultural heritage resources.
- **proponent** means a person, agency, group or organization that carries out or proposes to carry out an undertaking or is the owner or person having charge, management or control of an undertaking.

1. Is there a pre-approved screening checklist, methodology or process in place?

An existing checklist, methodology or process may already be in place for identifying potential cultural heritage resources, including:

- one endorsed by a municipality
- an environmental assessment process e.g. screening checklist for municipal bridges
- one that is approved by the Ministry of Tourism, Culture and Sport (MTCS) under the Ontario government's Standards & Guidelines for Conservation of Provincial Heritage Properties [s.B.2.]

Part A: Screening for known (or recognized) Cultural Heritage Value

2. Has the property (or project area) been evaluated before and found not to be of cultural heritage value?

Respond 'yes' to this question, if all of the following are true:

A property can be considered not to be of cultural heritage value if:

- a Cultural Heritage Evaluation Report (CHER) - or equivalent - has been prepared for the property with the advice of a qualified person and it has been determined not to be of cultural heritage value and/or
- the municipal heritage committee has evaluated the property for its cultural heritage value or interest and determined that the property is not of cultural heritage value or interest

A property may need to be re-evaluated, if:

- there is evidence that its heritage attributes may have changed
- new information is available
- the existing Statement of Cultural Heritage Value does not provide the information necessary to manage the property
- the evaluation took place after 2005 and did not use the criteria in Regulations 9/06 and 10/06

Note: Ontario government ministries and public bodies [prescribed under Regulation 157/10] may continue to use their existing evaluation processes, until the evaluation process required under section B.2 of the Standards & Guidelines for Conservation of Provincial Heritage Properties has been developed and approved by MTCS.

To determine if your property or project area has been evaluated, contact:

- the approval authority
- the proponent
- the Ministry of Tourism, Culture and Sport

3a. Is the property (or project area) identified, designated or otherwise protected under the *Ontario Heritage Act* as being of cultural heritage value e.g.:

i. designated under the *Ontario Heritage Act*

- individual designation (Part IV)
- part of a heritage conservation district (Part V)

Individual Designation – Part IV

A property that is designated:

- by a municipal by-law as being of cultural heritage value or interest [s.29 of the *Ontario Heritage Act*]
- by order of the Minister of Tourism, Culture and Sport as being of cultural heritage value or interest of provincial significance [s.34.5]. **Note**: To date, no properties have been designated by the Minister.

Heritage Conservation District – Part V

A property or project area that is located within an area designated by a municipal by-law as a heritage conservation district [s. 41 of the *Ontario Heritage Act*].

For more information on Parts IV and V, contact:

- municipal clerk
- Ontario Heritage Trust
- local land registry office (for a title search)

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ii. subject of an agreement, covenant or easement entered into under Parts II or IV of the *Ontario Heritage Act*

An agreement, covenant or easement is usually between the owner of a property and a conservation body or level of government. It is usually registered on title.

The primary purpose of the agreement is to:

- preserve, conserve, and maintain a cultural heritage resource
- prevent its destruction, demolition or loss

For more information, contact:

- Ontario Heritage Trust - for an agreement, covenant or easement [clause 10 (1) (c) of the *Ontario Heritage Act*]
- municipal clerk – for a property that is the subject of an easement or a covenant [s.37 of the *Ontario Heritage Act*]
- local land registry office (for a title search)

---

iii. listed on a register of heritage properties maintained by the municipality

Municipal registers are the official lists - or record - of cultural heritage properties identified as being important to the community.

Registers include:

- all properties that are designated under the *Ontario Heritage Act* (Part IV or V)
- properties that have not been formally designated, but have been identified as having cultural heritage value or interest to the community

For more information, contact:

- municipal clerk
- municipal heritage planning staff
- municipal heritage committee

---

iv. subject to a notice of:

- intention to designate (under Part IV of the *Ontario Heritage Act*)
- a Heritage Conservation District study area bylaw (under Part V of the *Ontario Heritage Act*)

A property that is subject to a **notice of intention to designate** as a property of cultural heritage value or interest and the notice is in accordance with:

- section 29 of the *Ontario Heritage Act*
- section 34.6 of the *Ontario Heritage Act.* **Note**: To date, the only applicable property is Meldrum Bay Inn, Manitoulin Island. [s.34.6]

An area designated by a municipal by-law made under section 40.1 of the *Ontario Heritage Act* as a **heritage conservation district study area**.

For more information, contact:

- municipal clerk – for a property that is the subject of notice of intention [s. 29 and s. 40.1]
- Ontario Heritage Trust

---

v. included in the Ministry of Tourism, Culture and Sport's list of provincial heritage properties

Provincial heritage properties are properties the Government of Ontario owns or controls that have cultural heritage value or interest.

The Ministry of Tourism, Culture and Sport (MTCS) maintains a list of all provincial heritage properties based on information provided by ministries and prescribed public bodies. As they are identified, MTCS adds properties to the list of provincial heritage properties.

For more information, contact the MTCS Registrar at registrar@ontario.ca.

3b. Is the property (or project area) a National Historic Site (or part of)?

National Historic Sites are properties or districts of national historic significance that are designated by the Federal Minister of the Environment, under the *Canada National Parks Act*, based on the advice of the Historic Sites and Monuments Board of Canada.

For more information, see the National Historic Sites website.

3c. Is the property (or project area) designated under the *Heritage Railway Stations Protection Act*?

The *Heritage Railway Stations Protection Act* protects heritage railway stations that are owned by a railway company under federal jurisdiction. Designated railway stations that pass from federal ownership may continue to have cultural heritage value.

For more information, see the Directory of Designated Heritage Railway Stations.

3d. Is the property (or project area) designated under the *Heritage Lighthouse Protection Act*?

The *Heritage Lighthouse Protection Act* helps preserve historically significant Canadian lighthouses. The Act sets up a public nomination process and includes heritage building conservation standards for lighthouses which are officially designated.

For more information, see the Heritage Lighthouses of Canada website.

3e. Is the property (or project area) identified as a Federal Heritage Building by the Federal Heritage Buildings Review Office?

The role of the Federal Heritage Buildings Review Office (FHBRO) is to help the federal government protect the heritage buildings it owns. The policy applies to all federal government departments that administer real property, but not to federal Crown Corporations.

For more information, contact the Federal Heritage Buildings Review Office.

See a directory of all federal heritage designations.

3f. Is the property (or project area) located within a United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Site?

A UNESCO World Heritage Site is a place listed by UNESCO as having outstanding universal value to humanity under the Convention Concerning the Protection of the World Cultural and Natural Heritage. In order to retain the status of a World Heritage Site, each site must maintain its character defining features.

Currently, the Rideau Canal is the only World Heritage Site in Ontario.

For more information, see Parks Canada – World Heritage Site website.

Part B: Screening for potential Cultural Heritage Value

4a. Does the property (or project area) contain a parcel of land that has a municipal, provincial or federal commemorative or interpretive plaque?

Heritage resources are often recognized with formal plaques or markers.

Plaques are prepared by:

- municipalities
- provincial ministries or agencies
- federal ministries or agencies
- local non-government or non-profit organizations

For more information, contact:

- municipal heritage committees or local heritage organizations – for information on the location of plaques in their community
- Ontario Historical Society's Heritage directory – for a list of historical societies and heritage organizations
- Ontario Heritage Trust – for a list of plaques commemorating Ontario's history
- Historic Sites and Monuments Board of Canada – for a list of plaques commemorating Canada's history

4b. Does the property (or project area) contain a parcel of land that has or is adjacent to a known burial site and/or cemetery?

For more information on known cemeteries and/or burial sites, see:

- Cemeteries Regulations, Ontario Ministry of Consumer Services – for a database of registered cemeteries
- Ontario Genealogical Society (OGS) – to locate records of Ontario cemeteries, both currently and no longer in existence; cairns, family plots and burial registers
- Canadian County Atlas Digital Project – to locate early cemeteries

In this context, adjacent means contiguous or as otherwise defined in a municipal official plan.

4c. Does the property (or project area) contain a parcel of land that is in a Canadian Heritage River watershed?

The Canadian Heritage River System is a national river conservation program that promotes, protects and enhances the best examples of Canada's river heritage.

Canadian Heritage Rivers must have, and maintain, outstanding natural, cultural and/or recreational values, and a high level of public support.

For more information, contact the Canadian Heritage River System.

If you have questions regarding the boundaries of a watershed, please contact:

- your conservation authority
- municipal staff

4d. Does the property (or project area) contain a parcel of land that contains buildings or structures that are 40 or more years old?

A 40 year 'rule of thumb' is typically used to indicate the potential of a site to be of cultural heritage value. The approximate age of buildings and/or structures may be estimated based on:

- history of the development of the area
- fire insurance maps
- architectural style
- building methods

Property owners may have information on the age of any buildings or structures on their property. The municipality, local land registry office or library may also have background information on the property.

Note: 40+ year old buildings or structure do not necessarily hold cultural heritage value or interest; their age simply indicates a higher potential.

A building or structure can include:

- residential structure
- farm building or outbuilding
- industrial, commercial, or institutional building
- remnant or ruin
- engineering work such as a bridge, canal, dams, etc.

For more information on researching the age of buildings or properties, see the Ontario Heritage Tool Kit Guide Heritage Property Evaluation.

Part C: Other Considerations

5a. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area) is considered a landmark in the local community or contains any structures or sites that are important to defining the character of the area?

Local or Aboriginal knowledge may reveal that the project location is situated on a parcel of land that has potential landmarks or defining structures and sites, for instance:

- buildings or landscape features accessible to the public or readily noticeable and widely known
- complexes of buildings
- monuments
- ruins

5b. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area) has a special association with a community, person or historical event?

Local or Aboriginal knowledge may reveal that the project location is situated on a parcel of land that has a special association with a community, person or event of historic interest, for instance:

- Aboriginal sacred site
- traditional-use area
- battlefield
- birthplace of an individual of importance to the community

5c. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area) contains or is part of a cultural heritage landscape?

Landscapes (which may include a combination of archaeological resources, built heritage resources and landscape elements) may be of cultural heritage value or interest to a community.

For example, an Aboriginal trail, historic road or rail corridor may have been established as a key transportation or trade route and may have been important to the early settlement of an area. Parks, designed gardens or unique landforms such as waterfalls, rock faces, caverns, or mounds are areas that may have connections to a particular event, group or belief.

For more information on Questions 5.a., 5.b. and 5.c., contact:

- Elders in Aboriginal Communities or community researchers who may have information on potential cultural heritage resources. Please note that Aboriginal traditional knowledge may be considered sensitive.
- municipal heritage committees or local heritage organizations
- Ontario Historical Society's "Heritage Directory" - for a list of historical societies and heritage organizations in the province

An internet search may find helpful resources, including:

- historical maps
- historical walking tours
- municipal heritage management plans
- cultural heritage landscape studies
- municipal cultural plans

Information specific to trails may be obtained through Ontario Trails.

Appendix F

Class EA Stakeholder Consultation Summary

JLR No.: 16953-131
Revision: 0

June 15, 2026

Stakeholder Consultation Summary (Appendix F)

Casselman Sewage Treatment System Upgrade Schedule ‘C’ Class Environmental Assessment

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

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Stakeholder Consultation Summary (Appendix F)
Casselman Sewage Treatment System Upgrade Schedule 'C' Class Environmental Assessment

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1.0 Overview

The Municipality of Casselman (Municipality) initiated in 2024 a Schedule 'C' Class Environmental Assessment (Class EA), in accordance with the Municipal Engineers Association (MEA) Class EA process, to address capacity constraints with their existing sewage treatment system (STS). The Class EA follows the Master Plan process (Approach 1), which was initiated in 2022 and completed in 2024, to address treatment, capacity and condition limitations of its water treatment plant, elevated water storage tank, water distribution system, wastewater conveyance system, sewage pumping stations and STS. The Master Plan developed a strategy to accommodate future growth within the Municipality for the next 25 years that can be implemented in a prioritized fashion to improve the overall performance and reliability of the water and wastewater system. The completed Master Plan fulfilled Phase 1 and Phase 2 of the Class EA process for the expansion of the Casselman STS. This Class EA study will fulfill Phases 3 and 4, resulting in the development of a preferred design concept.

Stakeholder consultation is a key element of the Class EA process. During project initiation, a public consultation plan was developed to ensure that the public and other stakeholders would have numerous opportunities to be involved in the process and to provide comments throughout. The Stakeholder Consultation Plan is provided in Appendix F1.

A project mailing list was developed for the Class EA identifying review agency and indigenous community stakeholders, as well members of the public interested in receiving project updates (refer to Appendix F2 for project mailing list). The mailing list will be updated at various stages throughout the Class EA process. Appendix F2 includes the June 2025 mailing list, used to distribute the Notice of Completion.

2.0 Notice of Study Commencement

During Class EA initiation, a Notice of Study Commencement (refer to Appendix F3) was prepared. The Notice was issued in both French and English and included a link to the Municipality website and contact information of the main project contacts. The Notice of Study Commencement was issued to stakeholders on November 29, 2024.

3.0 Stakeholder Comments

Summaries of comments received during the Class EA from members of the public, agencies and Indigenous Communities are summarized in Section 7 of the Environmental Study Report. A record of correspondences is provided in Appendix F4.

4.0 Project Committee and Other Stakeholder Meetings

To facilitate the consultation process, the Project Management Team, including JLR members and Municipality staff, have met and/or called at regular intervals following the Notice of Commencement of Class EA.

A summary of key meetings is provided in Table 1. Minutes from each formal meeting held to date are provided in Appendix F5.

Table 1: Summary of Project Committee and Stakeholder Meetings

Meeting / Date	Topic of Meeting
Project Initiation Meeting *November 15, 2024*	Meeting to establish the groundwork for the initial stages of the Class EA.
Project Discussion with South Nation Conservation Authority (SNC)	SNC was mistakenly omitted from the notice of Public Information Centre (PIC) No. 2. Meeting was to provide SNC with an opportunity to discuss the project.

5.0 Public Information Centres

PIC No. 1 was held during the Water and Wastewater Infrastructure Master Plan on April 3, 2024, from 6pm to 8pm at the Casselman Community Hall, located at 758 Brébeuf St., Casselman, Ontario. PIC No. 1 notices were issued in both French and English and included a link to the project website and contact information of the main project contacts. The Notice of PIC No. 1 was issued to agencies and Indigenous Communities via email on March 13, 2024. One (1) member of the public and two (2) agency contacts attended the PIC. The PIC notices, presentation slides, template comment sheet and attendance sheet are provided in Appendix B2.

PIC No. 2 was held on July 10, 2025, from 6pm to 8pm at the Deguire Casselman Community Hall, located at 758 Brébeuf St., Casselman, Ontario. PIC No. 2 notices were issued in both French and English and included a link to the project website and contact information of the main project contacts. The Notice of PIC No. 2 was issued to agencies and Indigenous Communities via email on June 25, 2025. The Notice was also published in the Township's newspaper (La Reflet) on June 25, 2025, and July 2, 2025. Nine (9) members of the public, one (1) agency contact, and two (2) media outlets attended the PIC. The PIC notices, presentation slides, template comment sheet and attendance sheet are provided in Appendix F5.

6.0 Study Notice of Completion

In accordance with MCEA guidelines, a Notice of Completion was prepared by the consulting team following preparation of the Environmental Study Report (ESR). The Notice was issued on March 12, 2026 to all project stakeholders, including all members of the public who attend the PIC. The Notice will identify the preferred design concept and the locations for accessing the ESR for review. The Notice also provided information on the 30-day review period, 30-day waiting

period and 'Section 16 Orders'. Refer to Appendix F7 for the study Notice of Completion in both English and French.

Appendix F1

Stakeholder Consultation Plan

Stakeholder Consultation Plan

Casselman Lagoon Expansion Schedule 'C' Class Environmental Assessment

March 2025

Prepared for:

CORPORATION OF THE MUNICIPALITY OF CASSELMAN
751 St-Jean Street P.O. Box 710
Casselman, Ontario
K0A 1M0

Prepared by:

J.L. RICHARDS & ASSOCIATES LIMITED
343 Preston Street, Tower II, Suite 1000, Ottawa, ON K1S 1N4

JLR No.: 16953-131

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

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1.0 Introduction

The Corporation of the Municipality of Casselman (Municipality) is undertaking a Class Environmental Assessment (Class EA) to evaluate alternatives to expand and upgrade the sewage treatment system (STS) in Casselman, Ontario, to effectively service the anticipated future developments.

The Class EA is proceeding in accordance with the requirements of the Ontario Municipal Class EA, March 2023.

Stakeholder consultation is a key element of the Class EA process. As a result, this stakeholder consultation plan has been developed to ensure that the public and other stakeholders have numerous opportunities to be involved in the process and to provide comments throughout.

2.0 Key Considerations

Several considerations emerged that are likely to impact the implementation of the stakeholder consultation plan. They represent both opportunities and constraints for engagement and influence how this stakeholder consultation plan is structured. These considerations include the following:

- It will be essential to engage key stakeholders that govern the compliance and operation of the wastewater system (e.g., Ontario Clean Water Agency, Ministry of the Environment, Conservation and Parks) or may influence the outcome of the planning process (e.g., indigenous communities).
- There are several adjacent privately owned lands and residential properties neighbouring the existing treatment lagoon. In addition to public consultation, this consultation program will seek to meaningfully engage residents living adjacent to areas of potential work.
- There will be a requirement to inform the Municipality and the Ontario Clean Water Agency (OCWA) at key milestones to obtain approval prior to advancing to next phases.
- All public notices will be both English and French.

3.0 Consultation Objectives

The objectives for the Class EA consultation process are the following:

- Improve understanding and involvement through effective communications and consultation among residents and regulatory agencies.
- Ensure that feedback provided by the public and other stakeholders is reviewed and understood by the consulting team.
- Allow the public and other stakeholders to easily obtain information about the Class EA process using the Municipality website and provide project contact numbers for information.

- Encourage participation at PICs and other consultation activities so that the consulting team understands location concerns and issues.

4.0 Project Team

The project team for this Class EA will involve the following parties:

- **Corporation of the Municipality of Casselman (Municipality):** Proponent - Owner of Sewage Treatment System.
- **Ontario Clean Water Agency (OCWA):** Operator of the STS.
- **J.L. Richards & Associates Ltd. (JLR):** Consultant retained to complete the Class EA.

5.0 Target Groups for Consultation

The general public, including:

- Members of the public who reached out during the Master Plan process.
- Property owners adjacent to the STS site.
- Municipality residents and business owners.
- Neighbouring municipalities.
- Indigenous communities.

Government organizations and agencies, including:

- Municipality Council and Staff
- South Nation Conservation Authority (SNCA)
- The Municipality of the Nation
- Eastern Ontario Health Unit (EOHU)
- Ontario Ministry of the Environment, Conservation and Parks (MECP)
- Ontario Ministry of Natural Resources (MNR)
- Ontario Ministry of Aboriginal Affairs (IAO)
- Ontario Ministry of Citizenship and Multiculturalism (MCM)
- Other agencies consulted during the Master Plan process.

6.0 Accessibility Standard for Customer Service

It will be critical throughout the Class EA that services are provided in accordance with the Accessibility for Ontarians with Disabilities Act. This includes having respect for persons with a disability and using all reasonable efforts to ensure they have equal opportunity to obtain and provide input.

Throughout the Class EA, the consulting team will:

- Ensure that PICs and other consultation activities, when conducted in-person, are held in buildings with barrier-free access; and
- Work with the Municipality and OCWA in providing accessible formats and communications supports.

7.0 Key Messages

Consistent messages with the appropriate tone and content will improve understanding among target audiences. The message statements listed below are built on a current understanding of the existing audiences, constraints, opportunities, and environmental concerns surrounding the Class EA. These messages should be communicated throughout the Class EA and refined, as required, as it unfolds.

- The STS's rated capacity is anticipated to be reached by 2026 based on projected development. The expansion of the lagoon facility must reliably treat existing raw sewage flows as well as any additional flows from potential future developments.
- The existing ECA is dated April 2019 and provides effluent limits for $CBOD_5$, TSS, total phosphorous (TP), seasonal Total ammonia Nitrogen (TAN), E. coli and Hydrogen Sulphide. The E. coli component was an administrative error as the treatment system does not currently have a disinfection process. Any capacity expansion will require an Environmental Compliance Approval (ECA) amendment, which is highly likely to introduce more stringent effluent requirements that will need to be met. This parameter adds to the treatment complexity and may have the potential to increase size and scope of proposed work.
- Equipment redundancy (i.e. disc filter and disinfection) should be reviewed and discussed during the Class EA and confirmed with the MECP prior to commencement of detailed design.
- The Township, OCWA and JLR are committed to this Class EA and are placing an emphasis on a seamless, open, transparent, and traceable study process.

8.0 Recommended Community Consultation Activities

A variety of stakeholder consultation vehicles and mechanisms are recommended to achieve the objectives of this stakeholder consultation plan. Care has been taken in selecting activities that

recognize the needs of the local community and government organizations along with their specific information requirements.

8.1 Public Information Centre

Public Information Centres (PICs), either in-person or virtually, provide a good mechanism for the local community to be informed about and comment on the Class EA.

One (1) PIC will be conducted during this Class EA process, as PIC No. 1 was conducted on April 3, 2024, during the Master Plan process following the preparation of the Alternatives Report, which identified alternative solutions to address the problems and opportunities identified in Phase 1. Stakeholder input was considered in evaluating the alternatives and selecting a preferred solution that was documented in the Phase 2 Report. PIC No. 2 will be conducted following the preparation of an Alternative Designs Report (Phase 3), which will identify alternative design concepts for the preferred solution identified in Phase 2. Stakeholder input will be considered in evaluating the alternative design concepts and selecting a preferred design concept that will be documented in a Phase 3 Summary Report. Stakeholder consultation is a mandatory requirement for Phases 2 and 3 of a Class EA.

PIC No. 2 will be designed to be welcoming and provide opportunities for residents to speak directly with the consulting team, Municipality and OCWA. These can take a variety combination of forms (e.g., virtual or in-person formal presentations with a question-and-answer session and/or display boards with informal one-on-one discussions, etc.). The appropriate PIC formats will be dictated by the complexity of the alternatives, length of slides, accessibility requirements, and public health restrictions at the time of the PIC. Residents will be encouraged to fill out comment sheets to provide feedback to the consulting team.

8.2 Class EA Notices

To engage the public and other stakeholders, Class EA and PIC notices should be placed in the information pages of local newspapers and websites and posted at the Municipality office. Notices will also be direct mailed/e-mailed to identified stakeholders, agencies, and adjacent property owners. Class EA notices could also be provided to the Municipality Council to allow Councillors to inform their constituents about the Class EA.

8.3 Website

To assist the public in obtaining information about the Class EA and to provide an on-going mechanism for feedback to the consulting team, the Municipality should provide space on their website for Class EA documents and updates. Information for the website could include notices for PICs, reports/executive summaries, technical memos, and contact information.

8.4 Opportunities to Comment

At all public meetings, the public and other stakeholders should be encouraged to leave comments. Following each consultation activity, a report will be written to summarize and record the comments received from the participants, as well as actions taken by the project team.

At the beginning of the Class EA, email and voice mail feedback tools should also be established to provide the public and other stakeholders with additional avenues to provide input and ask questions. These feedback tools should be promoted on all communications materials.

8.5 Timing of Public Consultation

As noted above, a second PIC will be conducted during the Class EA process. It is anticipated to take place in the Spring of 2025 prior to confirming the preferred design concept.

9.0 Evaluation Mechanisms

The following activities should be undertaken to evaluate the effectiveness of the stakeholder consultation plan:

- Review attendance numbers at the PICs.
- Request formal and informal feedback on the consultation process at PICs, meetings and on the study website.
- Track the number of visits to the study website and evaluate changes in traffic that occur in response to consultation events (e.g., mailing or emailing out notices).
- Examine the number and content of emails received from the public versus other stakeholders.

10.0 Conclusions

The Municipality is undertaking an important project with the Casselman Lagoon Expansion Class EA. The activities contained in the stakeholder consultation plan reflect the need to engage the public and regulatory agencies throughout the Class EA process. The public consultation plan has been developed to ensure that the public and other stakeholders are important and significant participants in the Class EA process.

Maintaining a clear, transparent and inclusive consultation process will ensure meaningful dialogue, which in turn will enable the realization of an innovative and achievable wastewater treatment strategy.

This report has been prepared by J.L. Richards & Associates Limited for The Municipality of Casselman's exclusive use. Its discussions and conclusions are summary in nature and cannot properly be used, interpreted or extended to other purposes without a detailed understanding and discussions with the client as to its mandated purpose, scope and limitations. This report is based on information, drawings, data, or reports provided by the named client, its agents, and certain other suppliers or third parties, as applicable, and relies upon the accuracy and completeness of such information. Any inaccuracy or omissions in information provided, or changes to applications, designs, or materials may have a significant impact on the accuracy, reliability, findings, or conclusions of this report.

This report was prepared for the sole benefit and use of the named client and may not be used or relied on by any other party without the express written consent of J.L. Richards & Associates Limited, and anyone intending to rely upon this report is advised to contact J.L. Richards & Associates Limited in order to obtain permission and to ensure that the report is suitable for their purpose.

J.L. RICHARDS & ASSOCIATES LIMITED

Prepared by:



Kevin Cortez, EIT, M.Eng.
Environmental Engineering Graduate

Reviewed by:



Nicolas Bialik, P.Eng.
Environmental Engineer

Appendix F2

Stakeholder Mailing List

STAKEHOLDER REVIEW AGENCY LIST
MUNICIPALITY OF CASSELMAN SEWAGE TREATMENT SYSTEM UPGRADE SCHEDULE 'C' CLASS ENVIRONMENTAL ASSESSMENT

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

Agency	Name	Title	Email	Address	Delivery Preference
Algonquins of Ontario – Consultation Office			algonquins@tanakiwin.com	31 Riverside Drive, Suite 101	Email
Eastern Ontario Health Unit			info@eohu.ca	1000 Pitt Street Cornwall ON K6J 5T1	Email
Eastern Ontario Health Unit	Rami Basha	Program Manager, Safe Water, Food Safety and Rabies Control	rbasha@eohu.ca	1000 Pitt Street Cornwall ON K6J 5T1	Email
Eastern Ontario Health Unit	Caroline Kuate		ckuate@eohu.ca	1000 Pitt Street Cornwall ON K6J 5T1	Email
Fire Services	Alain Ménard	Fire Chief	amenard@casselman.ca	751 St-Jean St. P.O. Box 710 Casselman, ON K0A 1M0	Email
Ontario Provincial Police	Jennifer Chown		Jennifer.Chown@opp.ca	777 Memorial Avenue, 2nd Floor, Orillia ON L3V 7V3	Email
Ontario Provincial Police	Serena Davidson	Administrative Assistant	Serena.Davidson@opp.ca	777 Memorial Avenue, 2nd Floor, Orillia ON L3V 7V3	Email
Infrastructure Ontario	Katherine Hotrum	Director Environmental Projects	katherine.hotrum@infrastructureontario.ca	1 Dundas St. West, Suite 2000, Toronto ON M5G 2L5	Email
Infrastructure Ontario	Erica Anderson	Environmental Manager, Environmental Management Environmental Projects	erica.anderson@infrastructureontario.ca	1 Dundas St. West, Suite 2000, Toronto ON M5G 2L5	Email
Ministry of Agriculture, Food and Rural Affairs	Payton Hofstetter	Rural Planner, Land Use Policy & Stewardship Food Safety and Environmental Policy Branch	omafra.eanotices@ontario.ca payton.hofstetter@ontario.ca	1 Stone Road West, Guelph ON N1G 4Y2	Email
Ministry of Economic Development, Job Creation and Trade	Erin Thompson	Manager Corporate Policy Coordination Unit Policy	erin.thompson@ontario.ca	56 Wellesley St. W, 11th Flr Toronto ON M5S 2S3	Email
Ministry of Economic Development, Job Creation and Trade	Nathan Hammill	Team Lead Corporate Policy Coordination Unit Policy	nathan.hammill@ontario.ca	56 Wellesley St. W, 11th Flr Toronto ON M5S 2S3	Email
Ministry of Citizenship and Multiculturalism	Karla Barboza	Team Lead - Heritage(A), Heritage Planning Unit, Programs and Services Branch	karla.barboza@ontario.ca	400 University Ave, 5th Floor Toronto ON M7A 2R9	Email
Ministry of Citizenship and Multiculturalism	Anastasia Abrazhevich	Heritage Planner	Anastasia.Abrazhevich2@ontario.ca		Email
Ministry of Heritage, Sport, Tourism and Culture Industries - Tourism Policy and Research Branch	James (Jim) Antler	Policy Advisor, Tourism Policy Unit	james.antler@ontario.ca	447 McKeown Avenue, Suite 203 North Bay ON P1B 9S9	Email
Ministry of Indigenous Affairs				160 Bloor St E, 9th Floor Toronto ON M7A 2E6	Contact MECP to determine if the Ministry of Indigenous Affairs should be notified
Ministry of Municipal Affairs and Housing	Michael Elms	Manager, Community Planning and Development, Eastern Ontario Services Office	michael.elms@ontario.ca	8 Estate Lane (Rockwood House) Kingston ON K7M 9A8	Email
Ministry of Natural Resources and Forestry	Adam Worth	District Manager(A), Kemptville, Southern Region, Regional Operations Division	adam.worth@ontario.ca	Unit 1, 10 Campus Dr, Kemptville, ON K0G 1J0	Email
Ministry of Natural Resources and Forestry	Jessica Post	Land Use Planning and Strategic Issues Section Administrative Assistant	sr.planning@ontario.ca	300 Water Street, Box 7000, 4th Floor, South Tower, Peterborough, ON K9J 8MS	Email
Ministry of Natural Resources and Forestry			kemptville.inforequest@ontario.ca	300 Water Street, Box 7000, 4th Floor, South Tower, Peterborough, ON K9J 8MS	Email
Ministry of Natural Resources and Forestry	Jody Marks		Jody.Marks@ontario.ca		
Ministry of Mines	Tracey Burton	Manager(A) Strategic Support Unit, Mines and Minerals Division	tracey.burton@ontario.ca	Willet Green Miller Centre, 2nd Floor, 933 Ramsey Lake Road, Sudbury ON, P3E 6B5	Email
Ministry of Mines	Melanie Johnson	Senior Strategic Initiatives Lead Strategic Supporto Unit, Mines and Minerals Division	melanie.johnson@ontario.ca	Willet Green Miller Centre, 2nd Floor, 933 Ramsey Lake Road, Sudbury ON, P3E 6B5	Email
Ministry of the Environment, Conservation and Parks	Jon K. Orpana	Regional Environmental Planner, Environmental Assessment Branch	Jon.Orpana@ontario.ca	1259 Gardiners Road PO Box 22032 Kingston ON K7M 8S5	Email
Ministry of the Environment, Conservation and Parks		*Notices to be sent to the following email addresses:	eanotification.eregion@ontario.ca MEANoticesEAAB@ontario.ca		Email both
Mohawk Council of Akwesasne	Leslie Papineau	Director of DIHE, MCA	leslie.papineau@akwesasne.ca	101 Tewesateni Road, Akwesasne Ontario, K6H 5R7	Email
Ottawa Region Métis Council	Jacques Dalton	Interim President	president.ormc@gmail.com jacquesdalton@hotmail.com	214 Montreal Rd, Suite 400. Ottawa, ON, K1T 5H1	Email
South Nation Conservation	Jennifer Boyer	Managing Director, Approvals	Jboyer@nation.on.ca	38 Victoria Street PO Box 29 Finch ON K0C 1K0	Email
South Nation Conservation	Sandra Mancini		SMancini@nation.on.ca	38 Victoria Street PO Box 29 Finch ON K0C 1K0	Email
South Nation Conservation	Shahin Zand		szand@nation.on.ca	38 Victoria Street PO Box 29 Finch ON K0C 1K0	Email
South Nation Conservation	John Mesman		jmesman@nation.on.ca	38 Victoria Street PO Box 29 Finch ON K0C 1K0	Email
South Nation Conservation	Ronda Boutz		RBoutz@nation.on.ca	38 Victoria Street PO Box 29 Finch ON K0C 1K0	Email
South Nation Conservation	Carl Bickerdike		cbickerdike@nation.on.ca	38 Victoria Street PO Box 29 Finch ON K0C 1K0	Email
The Nation Municipality	Pierre Leroux	Chief Administrative Officer	pleroux@nationmun.ca	958 Route 500 West, Casselman ON K0A 1M0	Email
The Nation Municipality	Marc-Olivier Gratton		mogratton@nationmun.ca	958 Route 500 West, Casselman ON K0A 1M0	Email
The Nation Municipality	Nicholas Pigeon		npigeon@nationmun.ca	958 Route 500 West, Casselman ON K0A 1M0	Email
United Counties of Prescott-Russell - Planning and Forestry Department	Louis Prévost	Director of Planning and Forestry	louisprevost@prescott-russell.on.ca	59 Court Street, PO Box 304, L'Original ON K0B 1K0	Email
United Counties of Prescott-Russell - Planning and Forestry Department		Planning	planning@prescott-russell.on.ca	59 Court Street, PO Box 304, L'Original ON K0B 1K0	Email

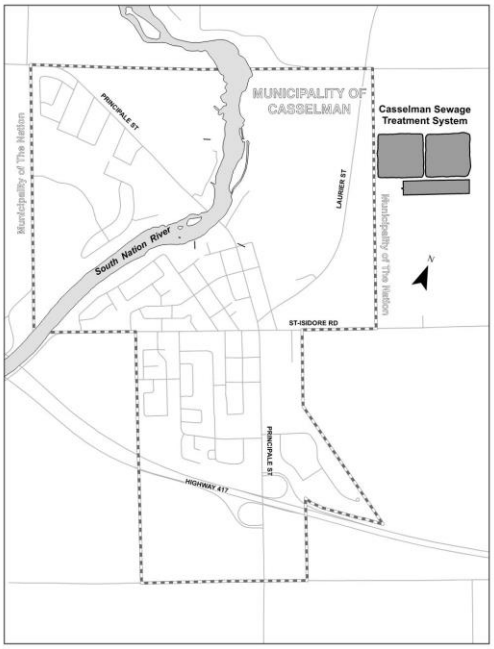
Appendix F3

Notice of Study Commencement

Notice of Study Commencement

Municipality of Casselman
Casselman Sewage Treatment System
Schedule 'C' Class Environmental Assessment

The Municipality of Casselman (Municipality) has initiated a Class Environmental Assessment (Class EA) to determine the preferred expansion design concept for the Casselman Sewage Treatment System (STS) to effectively treat wastewater generated from the existing and projected future development areas.



How Will This Affect Me?

The study is being undertaken following the completion of the Casselman Water and Wastewater Infrastructure Master Plan in July 2024, which recommended an increase of the existing STS's rated capacity from 2,110 m^3/day to 4,050 m^3/day via an increase of the discharge window (continuous discharge) and the implementation of an additional disc filter, additional chemical injection and new disinfection treatment. The Master Plan fulfilled Phases 1 and 2 of the Class EA process. This study will fulfill Phases 3 and 4, resulting in the development of a preferred design concept.

Public, agency and indigenous consultation is a key element of the Class EA process and will inform the development of alternative design concepts, the weight of each criterium in the evaluation process, and the scores given to each alternative in developing the preferred design concept.

How Do I Get More Information?

A Public Information Centre is intended to be conducted during the first quarter of 2025 prior to finalizing the preferred design concept. Prior to that time, the study team will be reviewing and compiling background information and identifying alternative design concepts. Updates will be provided throughout the study on the Municipality's website. If you have any questions regarding the study, please visit the website at www.casselman.ca. You are also invited to contact a member of the study team at anytime with questions or to provide input into the study.

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This study is being conducted according to the requirements of a Schedule 'C 'project under the Municipal Class Environmental Assessment process (October 2000, as amended in 2023).

This Notice issued November 28 2024.

Avis de Début D'Étude

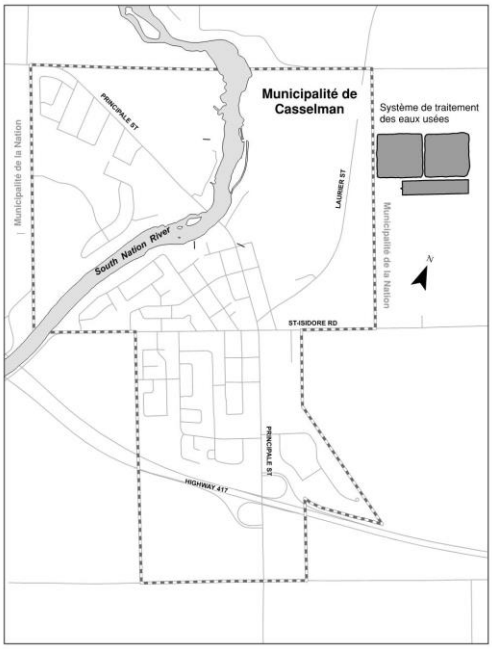
Municipalité de Casselman
Système de traitement d'eaux usées de Casselman
Étude environnementale de portée générale Annexe C

La municipalité de Casselman entreprend une étude environnementale de portée générale pour déterminer le concept d'expansion préféré pour le système de traitement d'eaux usées de Casselman.

En quoi cela vous concerne?

Cette étude fait suite à l'achèvement du plan directeur d'eau et d'eaux usées de Casselman en juillet 2024. Le plan directeur a recommandé une augmentation de la capacité du système d'une capacité actuel de 2,110 m^3/jour à une capacité future de 4,050 m^3/jour, complété par une augmentation de la période de décharge (décharge continuelle) et l'implémentation d'un filtre à disque supplémentaire et d'un nouveau traitement de désinfection. Le plan directeur a accompli la 1ère et 2ème phase du processus d'étude environnementale de portée générale. L'étude actuel accomplira la 3ème et 4ème phase et aboutira au concept d'expansion privilégié.

La consultation des partis prenants fait partie intégrante de l'étude et servira à l'élaboration de concepts alternatifs, à déterminé l'importance de chaque critère d'évaluation, et a attribué des scores à chaque concepts alternatif.



Vous voulez plus d'information?

Une séance d'information publique aura lieu au premier trimestre de 2025, avant de finaliser le concept privilégié. Entre temps, l'équipe d'étude examinera les données de fonds et identifiera les alternatives possibles. Vous êtes invités à contacter les membres de l'équipe d'études avec vos questions et demandes de renseignements. Des mises à jour régulières seront publiées au site web de la municipalité tout au long de l'étude. Si vous avez des questions au sujet de l'étude, veuillez consulter le site web www.casselman.com ou communiquer directement avec une des personnes ci-dessous.

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Tél.: 613-764-3139, poste 243

Cette étude est réalisée en vertu des dispositions de l'annexe C du processus d'évaluation environnementale municipale de portée générale (octobre 2000, modifiée en 2023).

Cet avis a été publié le 28 novembre 2024.

Appendix F4

Record of Stakeholder Correspondences

Ottawa Region Métis Council

Kevin Cortez

From: J. Dalton <jacquesdalton@hotmail.com>
Sent: December 1, 2024 11:16 PM
To: Kevin Cortez; president.ormc@gmail.com
Cc: Pierre-Paul Beauchamp; Jordan Morrissette; Nick Bialik
Subject: Re: Municipality of Casselman Sewage Treatment System Schedule 'C' Class EA - Notice of Commencement

Follow Up Flag: Follow up
Flag Status: Completed

[CAUTION] This email originated from outside JLR. Do not click links or open attachments unless you recognize the sender and know the content is safe. Do not forward suspicious emails, if you are unsure, please send a separate message to Helpdesk.

Hello Kevin et al.

Thank you for reaching out. In the future, reaching out by email as you have done is acceptable. The Ottawa Region Métis Council does not have issues with the proposal.

All best,

Jacques Dalton
President,
Ottawa Region Métis Council.

From: Kevin Cortez <kcortez@jlrichards.ca>
Sent: November 29, 2024 8:28 AM
To: president.ormc@gmail.com <president.ormc@gmail.com>; jacquesdalton@hotmail.com <jacquesdalton@hotmail.com>
Cc: Pierre-Paul Beauchamp <ppbeauchamp@casselman.ca>; Jordan Morrissette <jmorrissette@jlrichards.ca>; Nick Bialik <nbialik@jlrichards.ca>
Subject: Municipality of Casselman Sewage Treatment System Schedule 'C' Class EA - Notice of Commencement

Good morning,

You have been copied on this email because you were identified as a stakeholder for the Municipality of Casselman Sewage Treatment System (STS) Schedule ‘C’ Class Environmental Assessment (Class EA).

The Municipality of Casselman has initiated the Schedule ‘C’ Class EA process to determine the preferred expansion design concept for the Casselman STS to effectively treat wastewater generated from the existing and projected future development areas. This Class EA follows the Casselman Water and Wastewater Infrastructure Master Plan, which was completed in July 2024. More information on the current study is provided in the attached Notice, which we invite you to review.

Consultation with project stakeholders is a key part of the Class EA process. You are invited to share comments, feedback or suggestions to the project team by replying directly to this email, or by contacting the members of the project team listed in the attached notice.

Note that the next project notice is expected to be delivered in Winter 2025 in advance of a Public Information Centre. Should you no longer wish to receive these notices, please let us know and we will remove you from our mailing list.

Also note that delivery of the printed Notice of Commencement was attempted via courier on November 28, 2024, but was unsuccessful due to restricted access to the following address:

Ottawa Region Métis Council
214 Montreal Road, Suite 400
Ottawa, Ontario
K1T 5H1

We look forward to hearing from you.

Regards,

Kevin Cortez, M.Eng., B.Eng., EIT
Environmental Engineering Graduate

1000-343 Preston Street
Ottawa, ON, K1S 1N4
Work: 343-803-4074
kcortez@jlrichards.ca

Ministry of Environment Conservation
and Parks

Outlook

RE: Casselman Lagoon Expansion

From Baxter, Sarah (MECP) <Sarah.Baxter@ontario.ca>
Date Thu 2026-01-22 9:11 AM
To Nick Bialik <nbialik@jlrichards.ca>
Cc Castro, Victor (MECP) <Victor.Castro@ontario.ca>; Orpana, Jon (MECP) <Jon.Orpana@ontario.ca>; Jordan Morrissette <jmorrissette@jlrichards.ca>; Kevin Cortez <kcortez@jlrichards.ca>; ppbeauchamp@casselman.ca <ppbeauchamp@casselman.ca>

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Good morning Nick,

I reviewed the calculations below and all appear to be correct.

Thanks for your cooperation while working through this exercise together!

Sarah Baxter
Surface Water Specialist
Technical Support Section – Eastern Region
Ministry of the Environment, Conservation and Parks
1259 Gardiners Road, Unit 3, Kingston, ON
Sarah.baxter@ontario.ca

From: Nick Bialik <nbialik@jlrichards.ca>
Sent: January 19, 2026 10:25 AM
To: Baxter, Sarah (MECP) <Sarah.Baxter@ontario.ca>
Cc: Castro, Victor (MECP) <Victor.Castro@ontario.ca>; Orpana, Jon (MECP) <Jon.Orpana@ontario.ca>; Jordan Morrissette <jmorrissette@jlrichards.ca>; Kevin Cortez <kcortez@jlrichards.ca>; ppbeauchamp@casselman.ca
Subject: Re: Casselman Lagoon Expansion

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Good morning Sarah,

Thank you for the response. See below in blue.

With your latest comments, we will be finalizing the ESR and Class EA. You can expect to receive the ESR within the next couple weeks for MECP review.

If you have any questions during your review of the ESR, please feel free to reach out.

Thanks,

JLR Logo
Nick Bialik, P.Eng. (he/him)
Environmental Engineer
Website Logo LinkedIn Logo YouTube Logo
1000-343 Preston Street
Ottawa ON K1S 1N4
Best Managed Companies Logo
Work: 343-804-5346
nbialik@jlrichards.ca

From: Baxter, Sarah (MECP) <Sarah.Baxter@ontario.ca>
Sent: Monday, January 19, 2026 9:06 AM
To: Nick Bialik <nbialik@jlrichards.ca>
Cc: Castro, Victor (MECP) <Victor.Castro@ontario.ca>; Orpana, Jon (MECP) <Jon.Orpana@ontario.ca>; Jordan Morrissette <jmorrissette@jlrichards.ca>; Kevin Cortez <kcortez@jlrichards.ca>; ppbeauchamp@casselman.ca <ppbeauchamp@casselman.ca>; Baxter, Sarah (MECP) <Sarah.Baxter@ontario.ca>
Subject: RE: Casselman Lagoon Expansion

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safe. Do not forward suspicious emails, if you are unsure, please send a separate message to Helpdesk.

Good morning Nick,

I reviewed your text in blue below and offer the following comments:

1. For the calculation of permitted TP load, the rated capacity of the sewage works is used and rainwater is not included; this standardizes this exercise for lagoon and non-lagoon STPs and there is no dilution advantage for lagoons.

Noted. Blue Sky develops their ACSs based on what is actually discharged to the River (including net precipitation). It is understood that the ECA allowable loadings (if applied) will be based on the rated capacity of the system, excluding net precipitation. This has been noted in the ESR.

2. For the calculation of permitted TP load for the interim expansion, I have no objections to using the actual monthly flows and a weighted TP average; this is more advantageous for your client as it recognises the release of significantly more sewage when the TP limit is lower.
Noted.
3. I agree that paying into the TPM program will occur in two phases (interim expansion, ultimate expansion); the Township will not be "double charged" for offsetting for the interim expansion when it is time for the ultimate expansion. Noted.
4. When an application is submitted for the interim and/or ultimate expansion, we (JLR, Township, Ministry staff) will all work together to make sure the language regarding offsetting is accurate and acceptable to all parties. The ECA will include a TP effluent limit of 0.5 mg/L. Noted.

With these comments in mind, if you would like to resubmit your calculations, I would be happy to review them. Thanks Sarah. A summary of the calculations for TPM offsetting are below:

Phase 1 (Interim Phase) of 3,019 m3/day:

- Allowable TP loading:
  - October 1 to April 30: Total allowable flow of 1,066,250 m3 (78.52%).
  - May 1 to September 30: Total allowable flow of 291,750 m3 (21.48%).
  - Weighted average of TP limit based on flows = 0.3393 mg/L.
  - Loading permitted for the full year: 3,019,000 L/day x 0.3393 mg/L x 365 day/yr = **373.89 kg/yr.**
- Allowable TP loading in ECA:
  - 3,019,000 L/day x 0.50 mg/L x 365 day/yr = **550.97 kg/yr.**
- Loading to be Offset:
  - 550.97 kg/yr - 373.89 kg/yr = **177.08 kg/yr**
- TPM Program Loading Offset:
  - 177.08 kg/yr x 4:1 offsetting ratio = **708.32 kg**

Phase 2 (20-Year Upgrades) of 4,050 m3/day:

- Allowable TP loading:
  - Loading permitted for the full year: 4,050,000 L/day x 0.3 mg/L x 365 day/yr = **443.48 kg/yr.**
- Allowable TP loading in ECA:
  - 4,050,000 L/day x 0.50 mg/L x 365 day/yr = **739.13 kg/yr.**
- Loading to be Offset:
  - 739.13 kg/yr - 443.48 kg/yr = **295.65 kg/yr**
- Loading to be Offset (if following Phase 1):
  - 295.65 kg/yr - 177.08 kg/yr = **118.57 kg/yr**
- TPM Program Loading Offset:
  - Based on phased approach (with Phase 1 completed):
    - 118.57 kg/yr x 4:1 offsetting ratio = **474.28 kg**
  - Based on non-phased approach:
    - 295.65 kg/yr x 4:1 offsetting ratio = **1,182.60 kg**

Sarah Baxter

Surface Water Specialist

Technical Support Section – Eastern Region

Ministry of the Environment, Conservation and Parks

1259 Gardiners Road, Unit 3, Kingston, ON

Sarah.baxter@ontario.ca

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Kevin Cortez

From: Nick Bialik
Sent: January 7, 2026 12:18 PM
To: Baxter, Sarah (MECP)
Cc: Castro, Victor (MECP); Orpana, Jon (MECP); Jordan Morrissette; Kevin Cortez; ppbeauchamp@casselman.ca
Subject: Re: Casselman Lagoon Expansion

Hi Sarah,

Thanks for your response and for the calculation. See below our comments/proposed changes in blue.

Feel free to contact us directly if you would like to discuss.

Thanks,

Nick Bialik, P.Eng. (he/him)
Environmental Engineer

Ottawa ON
Work: 343-804-5346

From: Baxter, Sarah (MECP) <Sarah.Baxter@ontario.ca>
Sent: Monday, December 22, 2025 1:11 PM
To: Nick Bialik <nbialik@jlrichards.ca>
Cc: Castro, Victor (MECP) <Victor.Castro@ontario.ca>; Orpana, Jon (MECP) <Jon.Orpana@ontario.ca>; Jordan Morrissette <jmorrissette@jlrichards.ca>; Kevin Cortez <kcortez@jlrichards.ca>; ppbeauchamp@casselman.ca <ppbeauchamp@casselman.ca>; Baxter, Sarah (MECP) <Sarah.Baxter@ontario.ca>
Subject: RE: Casselman Lagoon Expansion

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Hi Nick,

Thanks for your email. I have provided additional comments in red text within the message below.

Sarah Baxter

Surface Water Specialist
Technical Support Section – Eastern Region
Ministry of the Environment, Conservation and Parks
1259 Gardiners Road, Unit 3, Kingston, ON
Sarah.baxter@ontario.ca

From: Nick Bialik <nbialik@jlrichards.ca>
Sent: December 15, 2025 11:34 AM
To: Baxter, Sarah (MECP) <Sarah.Baxter@ontario.ca>
Cc: Castro, Victor (MECP) <Victor.Castro@ontario.ca>; Orpana, Jon (MECP) <Jon.Orpana@ontario.ca>; Jordan Morrissette <jmorrissette@jlrichards.ca>; Kevin Cortez <kcortez@jlrichards.ca>; ppbeauchamp@casselman.ca
Subject: Re: Casselman Lagoon Expansion

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Hi Sarah,

Thanks for clarifying. I believe we have an understanding now of how the phosphorous offsetting will get implemented into the ECA. I've outlined our understanding below for the interim and 20-year upgrades.

Proposed Interim Upgrades (3,019 m3/day)

- Based on previous consultation, proposed interim upgrades (3,019 m3/day) are required to meet effluent TP of 0.20 mg/L / 0.30 mg/L (objective / limit) between May 1 and September 30 and 0.25 mg/L / 0.35 mg/L for all other months. Total allowable TP loading of 410 kg/year. No.
  Loading permitted for the summer period **(May-Sept)**: 3,019,000 L/d x 0.3 mg/L x 153 d/yr = 138,572,100 mg/yr = **138.57 kg/yr**
  Loading permitted for the winter/spring period **(Oct-Apr)**: 3,019,000 L/d x 0.35 mg/L x 212 d/yr = 224,009,800 mg/yr = **224.01 kg/yr**
  Loading permitted for the **full year**: 138.57 kg/yr + 224.01 kg/yr = **362.58 kg/yr**

  The 410 kg/year identified in the memo was developed based on a total discharge flow of 3,316 m3/day and actual allowable monthly flows. We agree this should have been based on the rated capacity of 3,019 m3/day, but we'd like to request that the method used by Blue Sky be kept. You calculation above assumes that each month has the same flow. We'd like to request that the baseline TP loading be based on actual allowable monthly flows, as per the below:
  - October 1 to April 30: Total allowable flow of 1,066,250 m3 (78.52%).
  - May 1 to September 30: Total allowable flow of 291,750 m3 (21.48%).
  - Weighted average of TP limit based on flows = 0.3393 mg/L.
  - Loading permitted for the full year: 3,019,000 L/day x 0.3393 mg/L x 365 day/yr = **373.89 kg/yr.**

- Phosphorous offsetting through TPM program explored to avoid costly upgrades to achieve these TP design objectives. Future system (without enhanced TP treatment) is expected to meet effluent limit of 0.5 mg/L, with a total expected TP loading of 550.97 kg. Correct.
- 140.97 kg of TP loading would therefore need to be offset through the program. No.
  Expected TP loading (550.97 kg/yr) - Permitted TP loading (362.58 kg/y) = **Offset loading (188.39 kg/yr)**
  Expected TP loading (550.97 kg/yr) - Permitted TP loading (373.89 kg/y) = Offset loading (177.08 kg/yr)
- Based on a review of historical data, MECP are in support of setting a 0.50 mg/L limit for TP in the ECA, if combined with phosphorous offsetting as described. Correct.

Proposed 20-year Upgrades (4,050 m3/day) (assuming this follows the interim upgrades)

- Based on previous consultation, proposed 20-year upgrades (4,050 m3/day) are required to meet effluent TP of 0.20 mg/L / 0.30 mg/L (objective / limit) for all months of the year. Total allowable TP loading of 443.48 kg/year. Correct.
- Phosphorous offsetting through TPM program explored to avoid costly upgrades to achieve these TP design objectives. Future system (without enhanced TP treatment) is expected to meet effluent limit of 0.5 mg/L, with a total expected TP loading of 739.13 kg. Correct.
- Note that following the interim upgrades, the existing allowable TP loadings would be 550.97 kg. 188.16 kg of additional TP loading would therefore need to be offset through the program. No.

  Expected TP loading (739.13 kg/yr) - Permitted TP loading (443.48 kg/yr) = **Offset loading (295.65 kg/yr)**

  We agree that this would be the offset loading amount if there was no interim construction phase. However, if the Client proceeds with going to the 20-year flow of 4,050 m3/day (739.13 kg TP total offset) through 2 or more phases of construction, the offsets purchased during each phase of construction should be considered since the TPM program is supposed to be a one-time cost that is put into programs/upgrades to reduce non-point source discharges of TP. These programs/upgrades are supposed to reduce TP loadings by 4x the amount annually in perpetuity.

  Assuming that a phased approach is followed for construction, what we are proposing is as follows:
  - Interim Upgrades (3,019 m3/d) - offset of 177.08 kg/year (see above)
  - 20-Year Upgrades (4,050 m3/d) – offset additional 118.57 kg/year
  - Total offset for both phases = 295.65 kg/year (as per above).

  We ask that the MECP review and consider the above scenario. We recommend that the ECA for the interim expansion include a note clearly identifying that payment into the TPM program has been initiated as part of the upgrade to 3,019 m3/d, and that 177.08 kg/year so far has been offset. A note should also be added to indicate that in order to achieve a flow of 4,050 m3/d, an additional 118.57 kg/year will need to be offset through the TPM program. We also expect that the ECAs for both interim and 20-year upgrades would show a 0.5 mg/L TP limit and annual maximum TP loading of 550.97 kg/yr (interim phase - 3,019 m3/day) and 739.13 kg/yr (4,050 m3/day).

  Note that if the Client decides not to proceed with an interim expansion and to proceed with upgrades directly to 4,050 m3/day, they would be expected to offset the full 295.65 kg/year.

- MECP are currently in support of setting a 0.50 mg/L limit for TP in the ECA, if combined with phosphorous offsetting as described. However, it is expected that more recent operational data would need to be reviewed at that time to confirm this TP limit. Correct.
- For future rated capacity upgrades to the system, an existing TP loading of 739.13 kg would be used when considering future phosphorous offsetting requirements. No.

  The permitted loading of 443.48 kg/yr would be expected to be maintained (and surplus loading offset). Future upgrades to be reviewed at that time.

If there are any misunderstandings, please let us know.

Thanks,

Sarah Baxter

Surface Water Specialist

Technical Support Section – Eastern Region
Ministry of the Environment, Conservation and Parks
1259 Gardiners Road, Unit 3, Kingston, ON
Sarah.baxter@ontario.ca

From: Nick Bialik <nbialik@jlrichards.ca>
Sent: December 15, 2025 11:34 AM
To: Baxter, Sarah (MECP) <Sarah.Baxter@ontario.ca>
Cc: Castro, Victor (MECP) <Victor.Castro@ontario.ca>; Orpana, Jon (MECP) <Jon.Orpana@ontario.ca>; Jordan Morrissette <jmorrissette@jlrichards.ca>; Kevin Cortez <kcortez@jlrichards.ca>; ppbeauchamp@casselman.ca
Subject: Re: Casselman Lagoon Expansion

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Hi Sarah,

Thanks for clarifying. I believe we have an understanding now of how the phosphorous offsetting will get implemented into the ECA. I've outlined our understanding below for the interim and 20-year upgrades.

Proposed Interim Upgrades (3,019 m3/day)

- Based on previous consultation, proposed interim upgrades (3,019 m3/day) are required to meet effluent TP of 0.20 mg/L / 0.30 mg/L (objective / limit) between May 1 and September 30 and 0.25 mg/L / 0.35 mg/L for all other months. Total allowable TP loading of 410 kg/year.

- Phosphorous offsetting through TPM program explored to avoid costly upgrades to achieve these TP design objectives. Future system (without enhanced TP treatment) is expected to meet effluent limit of 0.5 mg/L, with a total expected TP loading of 550.97 kg. 140.97 kg of TP loading would therefore need to be offset through the program.

- Based on a review of historical data, MECP are in support of setting a 0.50 mg/L limit for TP in the ECA, if combined with phosphorous offsetting as described.

Proposed 20-year Upgrades (4,050 m3/day) (assuming this follows the interim upgrades)

- Based on previous consultation, proposed 20-year upgrades (4,050 m3/day) are required to meet effluent TP of 0.20 mg/L / 0.30 mg/L (objective / limit) for all months of the year. Total allowable TP loading of 443.48 kg/year.

- Phosphorous offsetting through TPM program explored to avoid costly upgrades to achieve these TP design objectives. Future system (without enhanced TP treatment) is expected to meet effluent limit of 0.5 mg/L, with a total expected TP loading of 739.13 kg. Note that following the interim upgrades, the existing allowable TP loadings would be 550.97 kg. 188.16 kg of additional TP loading would therefore need to be offset through the program.

- MECP are currently in support of setting a 0.50 mg/L limit for TP in the ECA, if combined with phosphorous offsetting as described. However, it is expected that more recent operational data would need to be reviewed at that time to confirm this TP limit.

- For future rated capacity upgrades to the system, an existing TP loading of 739.13 kg would be used when considering future phosphorous offsetting requirements.

If there are any misunderstandings, please let us know.

Thanks,

Nick Bialik, P.Eng. (he/him)
Environmental Engineer

1000-343 Preston Street
Ottawa ON K1S 1N4
Work: 343-804-5346
nbialik@jlrichards.ca

From: Baxter, Sarah (MECP) <Sarah.Baxter@ontario.ca>
Sent: Friday, December 12, 2025 10:25 AM
To: Nick Bialik <nbialik@jlrichards.ca>
Cc: Castro, Victor (MECP) <Victor.Castro@ontario.ca>; Orpana, Jon (MECP) <Jon.Orpana@ontario.ca>; Jordan Morrissette <jmorrissette@jlrichards.ca>; Kevin Cortez <kcortez@jlrichards.ca>; ppbeauchamp@casselman.ca <ppbeauchamp@casselman.ca>; Baxter, Sarah (MECP) <Sarah.Baxter@ontario.ca>
Subject: RE: Casselman Lagoon Expansion

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Good morning Nick,

It is up to the Township to determine the amount of offsetting that they need for the expansion to 4,050 m^3/day; they will have to consider the financial balance between upgrades and offsetting.

The Township could pursue the proposed upgrades to the chemical dosage system and adds the filter cleaning system. Wayne's analysis confirmed that a TP limit of 0.5 mg/L would be achievable 95% of the time, so the Ministry is willing to support a TP effluent limit of 0.5 mg/L and an annual TP loading of 739.13 kg. As per your calculations below, this option would cost almost $700,000 in offsetting plus the investment in the proposed TP treatment upgrades. (Note that for these proposed upgrades, the Ministry will not support an effluent limit of 0.36 mg/L, as Wayne's analysis indicates the WWTP would likely be out of compliance with TP effluent limits at least half of the time).

The Township could invest more funds to upgrade the TP treatment process to achieve the recommended TP limit of 0.3 mg/L – this would result in a significant investment to infrastructure, but no offsetting.

Or the Township could pursue an option in between; upgrading the TP treatment system to achieve an effluent limit somewhere between 0.3 mg/L and 0.5 mg/L and having an offset cost between $0 and $700,000.

Ultimately, this is a budgetary and infrastructure choice for the Township to make and the ECA will reflect this accordingly.

Sarah Baxter

Surface Water Specialist

Technical Support Section – Eastern Region

Ministry of the Environment, Conservation and Parks

1259 Gardiners Road, Unit 3, Kingston, ON

Sarah.baxter@ontario.ca

From: Nick Bialik <nbialik@jlrichards.ca>
Sent: November 25, 2025 3:56 PM
To: Baxter, Sarah (MECP) <Sarah.Baxter@ontario.ca>
Cc: Castro, Victor (MECP) <Victor.Castro@ontario.ca>; Orpana, Jon (MECP) <Jon.Orpana@ontario.ca>; Jordan Morrissette <jmorrissette@jlrichards.ca>; Kevin Cortez <kcortez@jlrichards.ca>; ppbeauchamp@casselman.ca
Subject: Re: Casselman Lagoon Expansion

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Hi Sarah,

We received the attached letter establishing Phase 1 (Interim) effluent criteria.

We were wondering if you had a chance to review the below analysis completed by Wayne Simpson. The purpose of the analysis was to confirm the below items (updated in red per Wayne's analysis):

1. The TP treatment capacity of the system for the 20-year design horizon based on existing performance and proposed upgrades to the alum dosing system and lagoon cells (it is our assessment that a TP treatment level of 0.5 mg/L or lower can be achieved). It is Wayne's assessment that the proposed upgrades are "not expected to improve the plant's ability to reduce the phosphorus in the final effluent". Could you confirm the value that is to be used as the current treatment capacity of the system (for use in the TP offsetting calculation)?

2. ~~The required TP treatment level for the 20-year design horizon if offsetting TP as opposed to treating TP (we are proposing considering separate offsetting requirements for summer and non-summer months).~~ Understand this is not recommended. Effluent TP remains the same whether treating or offsetting.

3. Ultimately determine the TP loading that needs to be offset through the TPM program for the 20-year design horizon, based on the above.

- If using 0.36 mg/L, total annual loading is 532.17 kg. Loading to be offset is 532.17 kg - 443.48 kg (allowable) = 88.69 kg x 4:1 offsetting ratio = 354.76 kg x 585.00/kg TP = $207,534.60.
- If using 0.5 mg/L, total annual loading is 739.13 kg. Loading to be offset is 739.13 kg - 443.48 kg (allowable) = 295.65 kg x 4:1 offsetting ratio = 1,182.60 kg x 585.00/kg TP = $691,821.00

Based on the above, the value that is chosen as the current treatment capacity/ability of the system has a significant impact on the cost of the upgrades. This value needs to be confirmed in order for us to finalize the preferred design concept as part of the Class EA.

Let us know if you need any additional information to confirm this value.

Thanks,

Nick Bialik, P.Eng. (he/him)
Environmental Engineer

1000-343 Preston Street
Ottawa ON K1S 1N4

Kevin Cortez

From: Simpson, Wayne (MECP) <Wayne.Simpson@ontario.ca>
Sent: July 17, 2025 9:56 AM
To: Nick Bialik
Cc: Castro, Victor (MECP); Baxter, Sarah (MECP); Orpana, Jon (MECP); Jordan Morrissette; Kevin Cortez; ppbeauchamp@casselman.ca
Subject: Casselman Lagoon Expansion

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Hi Nick,

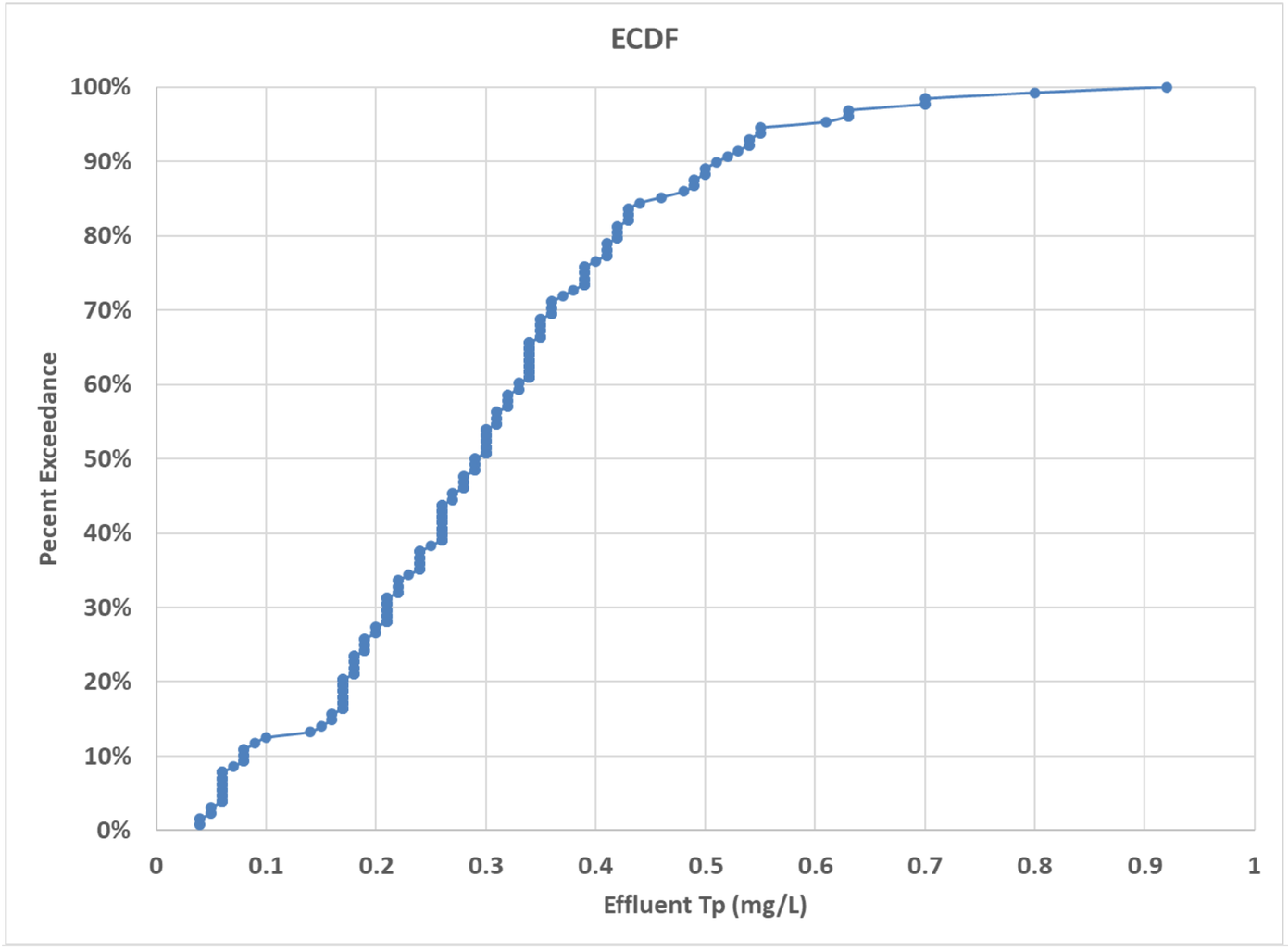
The expected performance of the Casselman treatment system based on the data provided is as follows:

1. The mean monthly average expected effluent will be 0.31 mg/L with a 95% confidence range of 0.27 to 0.36. This will generally be achieved 50% of the time and also exceeded 50% of the time based on the graph

2. The 95% monthly average expected effluent will be 0.50 mg/L with a 95% confidence range of 0.45 to 0.56. This will generally be achieved 95% of the time and will be exceeded 5% of the time based on the graph.

The existing and proposed works will consistently achieve 0.5 mg/l TP in the treated effluent 95% of the time. The proposed upgrades to chemical dosage system and the introduction of a filter cleaning system are not expected to improve the plant's ability to reduce the phosphorus in the final effluent. Based on the data the treatment system is expected to achieve a level of 0.3 mg/l TP 50% of the time in the final effluent. Finally, we would not recommend a summer vs non summer compliance scenario for the phosphorus loading.

The graph below plots percent exceedance (cumulative proportion of data points less than or equal to each value) on the y -axis vs final effluent in mg/l on the x-axis. Thanks for providing the raw and treated data points.



regards

Wayne

Wayne Simpson, PMP, P.Eng.
Senior Review Engineer
Municipal Water and Wastewater Permissions Section
EPB, EAPD
MECP - 135 St. Clair Ave. W.
wayne.simpson@ontario.ca
(437) 788-1808

From: Nick Bialik <nbialik@jlrichards.ca>
Sent: Tuesday, July 8, 2025 4:49 PM
To: Simpson, Wayne (MECP) <Wayne.Simpson@ontario.ca>
Cc: Castro, Victor (MECP) <Victor.Castro@ontario.ca>; Baxter, Sarah (MECP) <Sarah.Baxter@ontario.ca>; Orpana, Jon (MECP) <Jon.Orpana@ontario.ca>; Jordan Morrissette <jmorrissette@jlrichards.ca>; Kevin Cortez <kcortez@jlrichards.ca>; ppbeauchamp@casselman.ca
Subject: RE: 16953-131 Casselman Lagoon Expansion Class EA - Phase 1 & 2 Background Summary

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Hi Wayne,

I made a slight modification to the below wording. Please use this email for your analysis.

Thank you,

Nick Bialik, P.Eng. (he/him)
Environmental Engineer

1000-343 Preston Street
Ottawa ON K1S 1N4
Work: 343-804-5346
nbialik@jlrichards.ca

From: Nick Bialik <nbialik@jlrichards.ca>
Sent: Tuesday, July 8, 2025 2:15 PM
To: Wayne.Simpson@ontario.ca
Cc: Victor.Castro@ontario.ca; Baxter, Sarah (MECP) <sarah.baxter@ontario.ca>; Jon.Orpana@ontario.ca; Jordan Morrissette <jmorrissette@jlrichards.ca>; Kevin Cortez <kcortez@jlrichards.ca>; ppbeauchamp@casselman.ca
Subject: FW: 16953-131 Casselman Lagoon Expansion Class EA - Phase 1 & 2 Background Summary

Hi Wayne,

Please find attached and below remaining requested information to complete your analysis.

- Please find attached spreadsheet with all data points for TP for the raw sewage and treated effluent for the period between May 2021 and December 2024. Data was received from OCWA. The raw data is from composite sampling and the treated data is from grab sampling.

- Based on discussions with OCWA, the current disc filter was used starting in January 2021. As you can see in Table 3 copied further below in the email chain, effluent TP does not substantially change between 2018 to 2024. During this period, the alum dosing system remained the same.

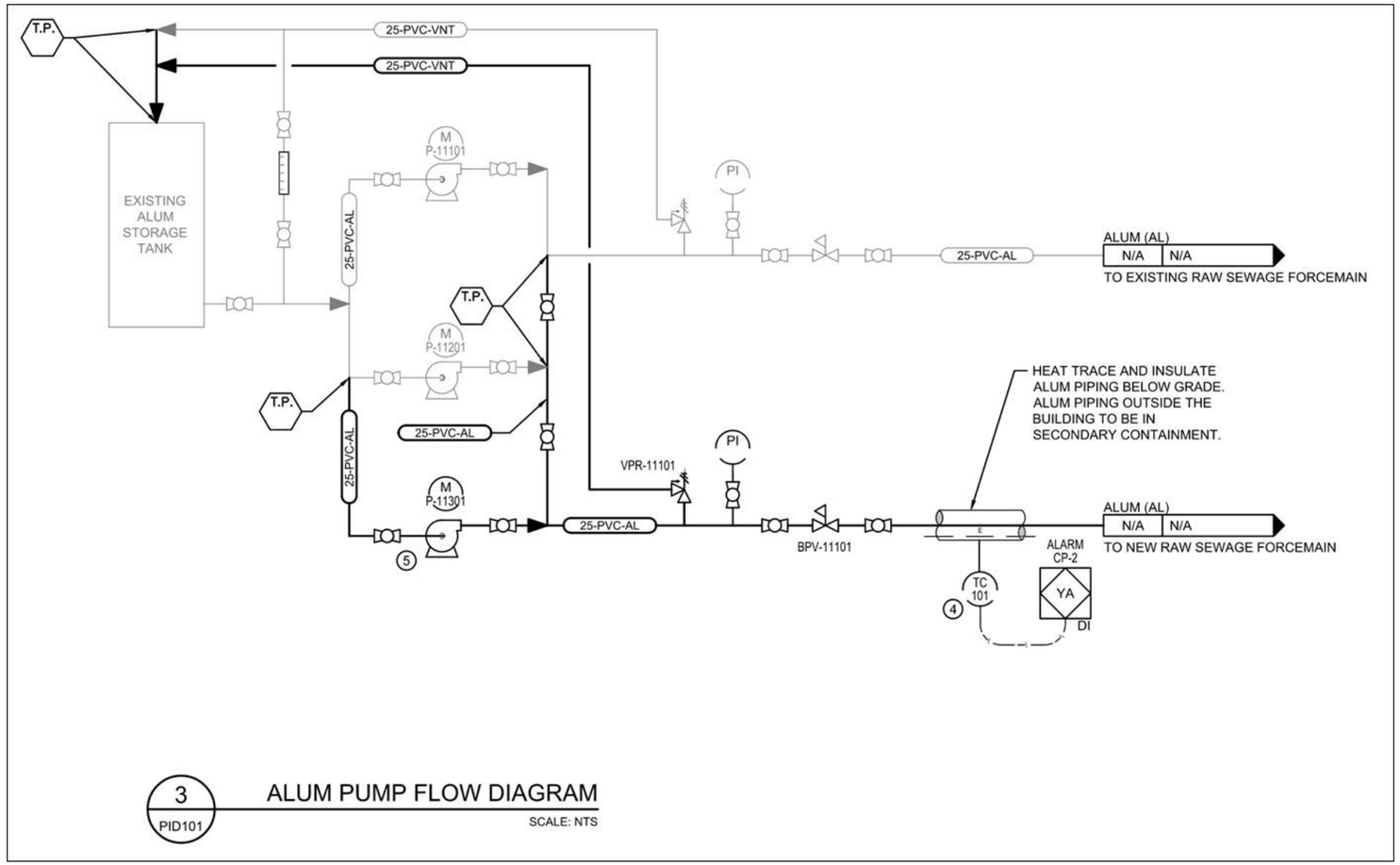
- Alum Dosing System Upgrade – Description of upgrades to the alum dosing system is provided below, accompanied with a screenshot of the PID for the new alum dosing system from the tender drawings. Alum dosing concentration is currently manually adjusted based on operator knowledge and the actual dosage rate is manually adjusted based on flow. The new system will also allow for Alum dosing concentration adjustment, but will have dosing pumps that modulate to more accurately adjust dosage based on flow rate so that dosing concentrations are more consistent.

  The existing raw sewage is pumped to the lagoon system. Prior to it entering the inlet chamber, alum is injected into the piping system. The existing alum injection system generally consists of a storage tank and two dosing pumps in a duty/standby configuration. The duty pump is currently energized when one of the pumps in the pump station is energized.

  As part of the Main SPS pumping station upgrades, the capacity is increasing to 236 L/s by adding a new sewage pump and twinned forcemain. As a result, an additional Alum injection pump and manhole is required maintain adequate dosing. Based on the expected peak flow rate of the SPS (236 L/s), the capacity of each Alum pump would be based off the peak flow rate within each individual forcemain (118 L/s). A new alum pump for the new forcemain will be provided matching the existing

model of pumps. It will be tied into the existing pumping system so that there is a backup dosing pump for either of duty chemical dosing pumps. Each sewage forcemain will have a dedicated duty chemical dosing pump, while a third pump will be standby and piped to be able to discharge into either forcemain.

The new sewage pumps will have VFDs and will operate at multiple speeds with a changing discharge flow rate. The alum pumps will need to be able to modulate their discharge flow rate to meet required alum concentration in the sewage. The dosing concentration is expected to be 22.4 L of alum per kg of phosphorus. This corresponds to a peak flow of 1.25 L/min of alum at maximum month phosphorus concentrations in the sewage, with a peak instantaneous sewage flow rate of 118 L/s (half of 236 L/s).



Let us know if you have any further questions or requests.

Thanks,

Nick Bialik, P.Eng. (he/him)
Environmental Engineer

1000-343 Preston Street
Ottawa ON K1S 1N4
Work: 343-804-5346
nbialik@jlrichards.ca

From: Nick Bialik <nbialik@jlrichards.ca>
Sent: Monday, July 7, 2025 10:06 AM
To: Simpson, Wayne (MECP) <Wayne.Simpson@ontario.ca>
Cc: Castro, Victor (MECP) <Victor.Castro@ontario.ca>; Baxter, Sarah (MECP) <Sarah.Baxter@ontario.ca>; Orpana, Jon (MECP) <Jon.Orpana@ontario.ca>; Jordan Morrissette <jmorrissette@jlrichards.ca>; Kevin Cortez <kcortez@jlrichards.ca>; Pierre-Paul Beauchamp <ppbeauchamp@casselman.ca>
Subject: RE: 16953-131 Casselman Lagoon Expansion Class EA - Phase 1 & 2 Background Summary

Hi Wayne,

Thanks for the response. We're currently waiting on receipt of all the information you have requested, but we can provide you with the following at this time:

- The existing disc filter is a HYDROTECH DISCFILTER from Veolia. Please refer to the attached specs and P&ID. Note that as part of the current upgrades, Veolia are proposing to install a high-pressure cleaning system on the existing disc filter to further enhance cleaning of the discs. This is described in the second attachment.
- The second attachment also provides information on the second disc filter proposed to be installed to accommodate the 20-year expansion of the system. It is a similarly-sized HYDROTECH DISCFILTER from Veolia.
- The baffle locations will be as proposed in the second attachment.

Thanks,

Nick Bialik, P.Eng. (he/him)
Environmental Engineer

1000-343 Preston Street
Ottawa ON K1S 1N4
Work: 343-804-5346
nbialik@jlrichards.ca

BEST MANAGED COMPANIES Platinum member

From: Simpson, Wayne (MECP) <Wayne.Simpson@ontario.ca>
Sent: Wednesday, July 2, 2025 6:14 PM
To: Nick Bialik <nbialik@jlrichards.ca>
Cc: Castro, Victor (MECP) <Victor.Castro@ontario.ca>; Baxter, Sarah (MECP) <Sarah.Baxter@ontario.ca>; Orpana, Jon (MECP) <Jon.Orpana@ontario.ca>; Jordan Morrissette <jmorrissette@jlrichards.ca>; Kevin Cortez <kcortez@jlrichards.ca>; Pierre-Paul Beauchamp <ppbeauchamp@casselman.ca>
Subject: RE: 16953-131 Casselman Lagoon Expansion Class EA - Phase 1 & 2 Background Summary

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Hi Nick,

Thanks for sending over the excel spreadsheet so quickly. We plan to undertake an analysis of the raw and treated phosphorus data. Please forward the weekly (as opposed to the monthly) phosphorus sampling (raw influent and treated effluent) data for the years already outlined in the spreadsheet. Please let us know whether the individual samples are grab or composite.

Your email states the existing alum dosing system, with or without the disc filter has consistently produced effluent that is below 0.5 mg/L. Can you please confirm whether or not disc filters were in use for previously provided sample data?

With respect to the Casselman Lagoon phosphorus removal infrastructure can you provide the following:

1) ~~The manufacturer and model the existing disc filters;~~
2) ~~The engineering detail of the proposed upgrades to the alum dosing system,~~ ~~the configuration of addition of baffles and engineering specifications for the new disc filter;~~
3) ~~The manufacturer of the proposed filter if known;~~

please forward your assumptions related to the process calculation for the proposed alum dosage system and the correlation with the removal of phosphorus from the lagoon effluent. I believe that if JLR could prepare a phosphorus removal system process schematic that would be helpful in better understanding the future treatment system. Thanks for your help.

regards

Wayne

Wayne Simpson, PMP, P.Eng.
Senior Review Engineer
Municipal Water and Wastewater Permissions Section
EPB, EAPD
MECP - 135 St. Clair Ave. W.
wayne.simpson@ontario.ca
(437) 788-1808

From: Nick Bialik <nbialik@jlrichards.ca>
Sent: Thursday, June 26, 2025 8:57 AM
To: Simpson, Wayne (MECP) <Wayne.Simpson@ontario.ca>
Cc: Castro, Victor (MECP) <Victor.Castro@ontario.ca>; Baxter, Sarah (MECP) <Sarah.Baxter@ontario.ca>; Orpana, Jon (MECP) <Jon.Orpana@ontario.ca>; Jordan Morrissette <jmorrissette@jlrichards.ca>; Kevin Cortez <kcortez@jlrichards.ca>; Pierre-Paul Beauchamp <ppbeauchamp@casselman.ca>
Subject: FW: 16953-131 Casselman Lagoon Expansion Class EA - Phase 1 & 2 Background Summary

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Hi Wayne,

I acknowledge receipt of your email this morning (attached), but wanted to respond on this email thread to ensure all correspondences and tables are included below.

The purpose of the assessment is to establish the following:

(A) The TP treatment capacity of the system for the 20-year design horizon based on existing performance and proposed upgrades to the alum dosing system and lagoon cells (it is our assessment that a TP treatment level of 0.5 mg/L or lower can be achieved);
(B) The required TP treatment level for the 20-year design horizon if offsetting TP as opposed to treating TP (we are proposing considering separate offsetting requirements for summer and non-summer months); and,
(C) Ultimately determine the TP loading that needs to be offset through the TPM program for the 20-year design horizon, based on the above.

The below email thread details our request for MECP review. I have re-added the images in the below email thread and also attached relevant spreadsheets for your review. First 2 tabs in the attached Excel workbook include the tables copied below. Hopefully all tables and spreadsheets are readable.

Let us know if you have any questions or require any additional information.

Please note that I will be on leave starting ~ mid-July; please ensure to copy Kevin and Jordan on any response or request.

Thanks,

Nick Bialik, P.Eng. (he/him)
Environmental Engineer

1000-343 Preston Street
Ottawa ON K1S 1N4
Work: 343-804-5346
nbialik@jlrichards.ca

From: Nick Bialik <nbialik@jlrichards.ca>
Sent: Thursday, June 19, 2025 2:29 PM
To: Baxter, Sarah (MECP) <Sarah.Baxter@ontario.ca>; Orpana, Jon (MECP) <Jon.Orpana@ontario.ca>; Kevin Cortez <kcortez@jlrichards.ca>; Castro, Victor (MECP) <Victor.Castro@ontario.ca>
Cc: Pierre-Paul Beauchamp <ppbeauchamp@casselman.ca>; Jordan Morrissette <jmorrissette@jlrichards.ca>; EA Notices to ERegion (MECP) <eanotification.eregion@ontario.ca>; Melody Johnson <melody@bskyeng.com>
Subject: RE: 16953-131 Casselman Lagoon Expansion Class EA - Phase 1 & 2 Background Summary

Hi Sarah,

That makes sense. Thank you for getting back to us. Noted about using the incoming flow rate for loading calculation.

Question 1 Answer: Understood. We would like to have an engineer from the Approvals Branch review, as the offsetting amount (and resulting cost) will impact the preferred design concept for TP removal. The cost for the TPM is highly variable on what is approved by the MECP. If possible, please forward the background information provided via email to a review engineer and have them setup a meeting if they have any questions.

Question 2 Answer: It is understood that if enhanced TP treatment is identified as the preferred design concept, a TP limit of 0.3 mg/L and TP objective of 0.2 mg/L will be used, resulting in a loading of 443.48 kg/year. Our question relates to the loading to be used for the TPM Offsetting program, which will likely need to be assessed by a review engineer, based on Question 1. Note that the TPM program applies a 4:1 offsetting ratio; therefore, for any additional loading that is sent to the river (compared to what is allowed to be discharged), 4x as much is being offset from non-point sources. Noted about the existing river quality. To clarify, we are proposing the following based on our assessment:

- During summer months, TP loadings based on TP limit of 0.3 mg/L, as established in the Assimilative Capacity Study.
- During non-summer months, maintain existing allowable loading, resulting in a decrease in TP concentration limit (calculated to be equivalent to 0.49 mg/L) due to increase in flow for these months.
- Under this scenario, overall TP loading would decrease from 770.15 kg/yr to less than 724.47 kg/year (current loading calculated based on outgoing flow; to be adjusted based on incoming flow as noted). We are not recommending an increase in TP loadings during the non-summer months.

Question 3 Answer: Understood.

Feel free to give me a call if you would like to discuss.

Thanks,

Nick Bialik, P.Eng. (he/him)
Environmental Engineer

Ottawa ON
Work: 343-804-5346

From: Baxter, Sarah (MECP) <Sarah.Baxter@ontario.ca>
Sent: Thursday, June 19, 2025 10:00 AM
To: Nick Bialik <nbialik@jlrichards.ca>; Orpana, Jon (MECP) <Jon.Orpana@ontario.ca>; Kevin Cortez <kcortez@jlrichards.ca>; Castro, Victor (MECP) <Victor.Castro@ontario.ca>
Cc: Pierre-Paul Beauchamp <ppbeauchamp@casselman.ca>; Jordan Morrissette <jmorrissette@jlrichards.ca>; EA Notices to ERegion (MECP) <eanotification.eregion@ontario.ca>; Melody Johnson <melody@bskyeng.com>
Subject: RE: 16953-131 Casselman Lagoon Expansion Class EA - Phase 1 & 2 Background Summary

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Hi Nick,

Thank you for your patience on this file. I have been away on leave but wanted to ensure that I was the one to review your latest emails to maintain file consistency.

Under the current Environmental Compliance Approval (ECA), the Casselman Lagoons are permitted to discharge 3.73 kg/d for winter/spring discharge window and 2.91 kg/d for the fall discharge window. This equates to an annual discharge of 770.15 kg/yr based on a TP limit of 1.0 mg/L and a rated capacity of 2,110 m^3/day:

$$1.0 \text{ mg/L} \times 2{,}110{,}000 \text{ L/d} \times 365 \text{ d/yr} = 770{,}150{,}000 \text{ mg/yr or } 770.15 \text{ kg/yr}$$

For the proposed expansion, the annual TP loading was substantially lowered based on the proposal to continuously discharge throughout the year and during the summer low-flow periods. This loading (and associated TP discharge limit of 0.3 mg/L) was determined by an Assimilative Capacity Assessment which considered the sensitivity and Policy 2 status of the South Nation River. Based on a TP limit of 0.3 mg/L and a rated capacity of 4,050 m^3/day (we wouldn't consider precipitation in this calculation), the calculated annual loading is 443.48 kg/yr:

$$0.3 \text{ mg/L} \times 4{,}050{,}000 \text{ L/d} \times 365 \text{ d/yr} = 443{,}475{,}000 \text{ mg/yr or } 443.48 \text{ kg/yr}$$

Question 1: I am not able to confirm the amount of TP offsetting necessary at this time, as I am not able to comment on the proposed ability of the treatment system to achieve a TP concentration of 0.5 mg/L (rather than the TP objective of 0.8 mg/L as listed in the existing ECA). This matter would need to be discussed and accepted by an engineer at our Approvals Branch . If this is a meeting you would like to pursue, please let me know and I can put you in touch with an appropriate engineer. Once this matter is settled, we can determine the offsetting that is required for the ultimate expansion.

Question 2: There is no opportunity to increase the future allowable loading for the ultimate expansion. This loading was determined by an assimilative capacity study (ACS) that has been reviewed and accepted by the Technical Support Section of the Ministry. Increasing the phosphorus loading during the non-summer months and allowing a summer discharge window is not considered an adequate level of improvement to this highly impaired river system. A phosphorus limit of 0.3 mg/L is considered a reasonable level of treatment but by no means is it even close to tertiary level removal, which could be argued is the level that point-source discharges in this watershed should be held to. The TPM program offers a unique ability to offset loadings at a cost which in many instances is lower than the capital costs of upgrading the treatment. The alternative is to improve the phosphorus removal technology.

Question 3: There is no opportunity to increase the TP limit from 0.3 mg/L to 0.49 mg/L during the non-summer months. The year-round TP limit of 0.3 mg/L was determined by the ACS completed by Blue Sky Engineering in 2024. I reviewed this study and accepted the proposed limits in February 2024.

I hope that I have answered all your questions. If not, please don't hesitate to reach out again and I will try my best to get back to you promptly.

Sarah Baxter
Surface Water Specialist
Technical Support Section – Eastern Region
Ministry of the Environment, Conservation and Parks
1259 Garinders Road, Unit 3, Kingston, ON
Sarah.baxter@ontario.ca

Kevin Cortez

From: Orpana, Jon (MECP) <Jon.Orpana@ontario.ca>
Sent: June 17, 2025 11:06 AM
To: Nick Bialik; Kevin Cortez; Castro, Victor (MECP)
Cc: Baxter, Sarah (MECP); Pierre-Paul Beauchamp; Jordan Morrissette; EA Notices to ERegion (MECP); Melody Johnson
Subject: RE: 16953-131 Casselman Lagoon Expansion Class EA - Phase 1 & 2 Background Summary

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Hello Nick,

Thanks for your email. I have chatted with Victor and we should be able to get to this by weeks end.

Thanks in advance for your patience.

Regards,

Jon

Jon K. Orpana
Regional Environmental Planner
Environmental Assessment Branch
Ministry of the Environment, Conservation and Parks
Kingston Regional Office
PO Box 22032, 1259 Gardiners Road
Kingston, Ontario
K7M 8S5

Phone: (613) 561 8250
Email: jon.orpana@ontario.ca

From: Nick Bialik <nbialik@jlrichards.ca>
Sent: Tuesday, June 17, 2025 8:41 AM
To: Orpana, Jon (MECP) <Jon.Orpana@ontario.ca>; Kevin Cortez <kcortez@jlrichards.ca>; Castro, Victor (MECP) <Victor.Castro@ontario.ca>
Cc: Baxter, Sarah (MECP) <Sarah.Baxter@ontario.ca>; Pierre-Paul Beauchamp <ppbeauchamp@casselman.ca>; Jordan Morrissette <jmorrissette@jlrichards.ca>; EA Notices to ERegion (MECP) <eanotification.eregion@ontario.ca>; Melody Johnson <melody@bskyeng.com>
Subject: RE: 16953-131 Casselman Lagoon Expansion Class EA - Phase 1 & 2 Background Summary

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Hi Jon,

Wanted to follow-up again. Is there a timeline by which you expect to complete this review?

Thanks,

Nick Bialik, P.Eng. (he/him)
Environmental Engineer

1000-343 Preston Street
Ottawa ON K1S 1N4
Work: 343-804-5346
nbialik@jlrichards.ca

From: Orpana, Jon (MECP) <Jon.Orpana@ontario.ca>
Sent: Wednesday, June 4, 2025 4:43 PM
To: Nick Bialik <nbialik@jlrichards.ca>; Kevin Cortez <kcortez@jlrichards.ca>; Castro, Victor (MECP) <Victor.Castro@ontario.ca>
Cc: Baxter, Sarah (MECP) <Sarah.Baxter@ontario.ca>; Pierre-Paul Beauchamp <ppbeauchamp@casselman.ca>; Jordan Morrissette <jmorrissette@jlrichards.ca>; EA Notices to ERegion (MECP) <eanotification.eregion@ontario.ca>; Melody Johnson <melody@bskyeng.com>
Subject: RE: 16953-131 Casselman Lagoon Expansion Class EA - Phase 1 & 2 Background Summary

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Hello Nick,

I just chatted with Victor and we should be getting back to you shortly regarding this and your short follow up should not take too long.

Regards,

Jon

Jon K. Orpana
Regional Environmental Planner
Environmental Assessment Branch
Ministry of the Environment, Conservation and Parks
Kingston Regional Office
PO Box 22032, 1259 Gardiners Road
Kingston, Ontario
K7M 8S5

Phone: (613) 561 8250

Email: jon.orpana@ontario.ca

From: Nick Bialik <nbialik@jlrichards.ca>
Sent: Wednesday, June 4, 2025 2:51 PM
To: Orpana, Jon (MECP) <Jon.Orpana@ontario.ca>; Kevin Cortez <kcortez@jlrichards.ca>; Castro, Victor (MECP) <Victor.Castro@ontario.ca>
Cc: Baxter, Sarah (MECP) <Sarah.Baxter@ontario.ca>; Pierre-Paul Beauchamp <ppbeauchamp@casselman.ca>; Jordan Morrissette <jmorrissette@jlrichards.ca>; EA Notices to ERegion (MECP) <eanotification.eregion@ontario.ca>; Melody Johnson <melody@bskyeng.com>
Subject: RE: 16953-131 Casselman Lagoon Expansion Class EA - Phase 1 & 2 Background Summary

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Hi Jon and Victor,

Just wanted to follow-up on the status of this request, and also request the review of one additional related component in the TPM offsetting calculations.

Given that the TP limit of 0.3 mg/L was established due to requiring a higher level of treatment during the summer months, would the MECP be amenable, **for the TPM offsetting calculation only**, to maintaining the existing allowable TP loading during the non-summer months (e.g., October 1 to April 30)? This would result in a maximum allowable annual loading of 724.47 kg, as calculated below. During the non-summer months, there would be an equivalent TP limit of 0.49 mg/L instead of 0.3 mg/L.

Months	Days	Existing ECA No. 8160-BAHPRF					Proposed 20-Year STS Expansion - TPM Program Offsetting ONLY						
		Maximum Allowable Discharge Flow (m3/day)	Average Rated Capacity / Discharge Capacity (m3/day)	TP Limit (mg/L)	Maximum Monthly TP Loading (kg)	Equalized Maximum Monthly TP Loading (kg)	Maximum Allowable Discharge Flow (m3/day)	Average Annual Discharge ADF (m3/day)	Equalized Discharge Flow (m3/day)	Equalized Monthly Discharge Flow (m3)	Equalized Maximum Monthly TP Loading based on Monthly Discharge Flow (kg)	TP Limit for TPM Offsetting (mg/L)	Maximum Monthly TP Loading for TPM Offsetting (kg)
January	31	5000		1.0	155.0	102.55	5750		5,575.0	172,826.1	83.89	0.49	83.89
February	28	5000		1.0	140.0	92.63	5600		5,429.6	152,028.8	73.79	0.49	73.79
March	31	5000		1.0	155.0	102.55	7250		7,029.4	217,911.2	105.77	0.49	105.77
April	30	7000		1.0	210.0	138.94	10000		9,695.7	290,871.4	141.19	0.49	141.19
May 1-15	15	7000		1.0	105.0	69.47	4500		4,363.1	65,446.1	31.77	0.30	19.63
May 16-31	16	0		N/A	-	-	2150		2,084.6	33,353.3	16.19	0.30	10.01
June	30	0	2110	N/A	-	-	2150	4347	2,084.6	62,537.4	30.36	0.30	18.76
July	31	0		N/A	-	-	1050		1,018.0	31,559.5	15.32	0.30	9.47
August	31	0		N/A	-	-	900		872.6	27,051.0	13.13	0.30	8.12
September	30	0		N/A	-	-	910		882.3	26,469.3	12.85	0.30	7.94
October	31	4000		1.0	124.0	82.04	2250		2,181.5	67,627.6	32.83	0.49	32.83
November	30	4000		1.0	120.0	79.40	6050		5,865.9	175,977.2	85.42	0.49	85.42
December	31	5000		1.0	155.0	102.55	8750		8,483.7	262,996.2	127.66	0.49	127.66
	365	-	-	-	1164.0	770.15	-	-	-	1,586,655.0	770.15	-	**724.47**
	Existing TP Loading (kg/year):		770.15		Annual discharge volume (m3):		1,636,450	1,586,655	1,586,655				Calculated
									Equivalent TP Limit at 20-Year ADF (mg/L):		0.49		

Let us know if you have any questions, or would like us to complete any additional analyses for the above.

Thank you,

Nick Bialik, P.Eng. (he/him)
Environmental Engineer

1000-343 Preston Street
Ottawa ON K1S 1N4
Work: 343-804-5346
nbialik@jlrichards.ca

From: Orpana, Jon (MECP) <Jon.Orpana@ontario.ca>
Sent: Friday, May 23, 2025 11:17 AM
To: Nick Bialik <nbialik@jlrichards.ca>; Kevin Cortez <kcortez@jlrichards.ca>; Castro, Victor (MECP) <Victor.Castro@ontario.ca>
Cc: Baxter, Sarah (MECP) <Sarah.Baxter@ontario.ca>; Pierre-Paul Beauchamp <ppbeauchamp@casselman.ca>; Jordan Morrissette <jmorrissette@jlrichards.ca>; EA Notices to ERegion (MECP) <eanotification.eregion@ontario.ca>; Melody Johnson <melody@bskyeng.com>
Subject: RE: 16953-131 Casselman Lagoon Expansion Class EA - Phase 1 & 2 Background Summary
Importance: High

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Hello Nick,

I acknowledge receipt of this and Victor has been copied as well. Sarah Baxter is currently on short term leave and Victor will assign this task to another surface water staff person for review and comment.

Regards,

Jon

Jon K. Orpana
Regional Environmental Planner
Environmental Assessment Branch
Ministry of the Environment, Conservation and Parks
Kingston Regional Office
PO Box 22032, 1259 Gardiners Road
Kingston, Ontario
K7M 8S5

Phone: (613) 561 8250
Email: jon.orpana@ontario.ca

From: Nick Bialik <nbialik@jlrichards.ca>
Sent: Friday, May 23, 2025 11:06 AM
To: Orpana, Jon (MECP) <Jon.Orpana@ontario.ca>; Kevin Cortez <kcortez@jlrichards.ca>
Cc: Baxter, Sarah (MECP) <Sarah.Baxter@ontario.ca>; Pierre-Paul Beauchamp <ppbeauchamp@casselman.ca>; Jordan Morrissette <jmorrissette@jlrichards.ca>; EA Notices to ERegion (MECP) <eanotification.eregion@ontario.ca>; Melody Johnson <melody@bskyeng.com>
Subject: RE: 16953-131 Casselman Lagoon Expansion Class EA - Phase 1 & 2 Background Summary

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Hi Jon,

Hope you're doing well. We would like to request MECP feedback on the below re: the SNC's TPM program and TP loading. Specific questions have been **bolded** below. Let us know if you have any questions.

As part of Phase 3 of the Class EA, we are reviewing alternative design concepts for TP removal for the 20-year upgrades to the Casselman STS. The following two (2) options have been developed:

1. Option TP1 – Participation in the Total Phosphorous Management Program
2. Option TP2 – Install and Coagulation/Flocculation System. Refer to the attached figure for a conceptual site plan of this option.

For Option TP1, we would like confirmation from the MECP on the amount of TP loading that would need to be offset from the system.

- The current system has a TP limit of 1.0 mg/L at a rated capacity of 2,110 m3/day, for a total annual loading of 770.15 kg.
- Correspondences during the Master Plan / ACS process identified that "extending the discharge period for the Casselman facility to the Summer months would require higher level treatment and more stringent effluent limits for TP. The resulting annual TP limit that was developed was 0.3 mg/L, which is equivalent to a total annual TP loading limit of 476 kg/year based on an average annual discharge volume of 4,347 m3/day (incl. net precipitation).
- Option TP1 would not include a new coagulation/flocculation system for enhanced TP removal. TP treatment would be similar to the existing treatment (alum dosing with disc filter polishing). An analysis was completed to assess TP treatment for the existing system. Based on this analysis, we suggest that the existing system can meet a TP concentration of 0.5 mg/L, and therefore, accordingly, less TP loading would need to be offset.
- **Please review the below analysis (part of the ESR) and confirm whether the MECP is in agreement with our proposed TP offsetting calculation. Can the MECP also identify if there is an opportunity to increase the allowable future annual loading (e.g., maintain 0.3 mg/L limit during summer months, but increase TP limits for other months of the year)?**

  As noted in Section 4.2.2, wastewater systems discharging to the South Nation River have the option to participate in the TPM program, which allows for the offset of TP, rather than the removal of TP. To determine the TP loading that is expected to be offset, a review was undertaken to assess the effluent TP that is being achieved by the current system.

  The current system relies on alum dosing (to the raw sewage forcemain via a precast alum injection maintenance hole) and a tertiary disc filter for TP removal. The alum dosing system consists of a 30,000 L alum storage tank and diaphragm pump with 290 L/hr capacity. The existing chemical feed system functions on a set speed and must be manually adjusted in accordance with flow rates pumped from the Main SPS. Refer to Table 15 for a review of the TP removal performance of the existing system based on alum dosage. Note that, as noted in Section 2.1.1.2, the Casselman STS only began operating normally in Spring 2022. Data highlighted in yellow indicates that data was calculated/estimated based on available data. Note that alum dosage was not tracked prior to June 2021 and in 2022.

  Table 15: Casselman STS - Historical (2021 - 2024) TP Removal Performance

	Influent	Influent	Influent			Effluent
Date	Raw Sewage / Raw Flow for PAR - m³/d	Raw Sewage / Mean Total Phosphorus (TP)	Raw Sewage / Mean Coagulant Dosage (Alum)			Treated Sewage / Mean Total Phosphorus (TP)
Month-Year		mg/L	mg/L	kg/day	L/day	mg/L
May-21	1222	6.40	-	-	-	0.20
Jun-21	1099	8.07	145.6	175.7	142.7	-
Jul-21	1282	8.71	140.0	188.5	151.7	-
Aug-21	1087	5.05	142.6	156.0	127.0	-
Sep-21	1153	4.57	132.9	175.7	143.4	-
Oct-21	1309	5.09	147.4	205.9	168.2	0.35
Nov-21	1509	5.31	150.3	239.7	197.2	0.27
Dec-21	1539	4.83	143.2	228.7	187.8	0.28
Jan-22	1088	8.86	-	-	-	0.23
Feb-22	1181	8.30	-	-	-	0.42
Mar-22	2099	3.11	-	-	-	0.48
Apr-22	2122	5.32	-	-	-	0.47
May-22	1570	8.18	-	-	-	0.25
Jun-22	1398	6.72	-	-	-	-
Jul-22	1204	7.79	-	-	-	-
Aug-22	1337	8.86	-	-	-	-
Sep-22	1359	7.97	-	-	-	-
Oct-22	1099	7.37	-	-	-	0.41
Nov-22	1173	11.30	-	-	-	0.38
Dec-22	1678	6.50	-	-	-	0.43
Jan-23	1557	4.10	175.4	273.0	222.9	0.36
Feb-23	1626	9.14	191.7	311.7	254.5	0.47
Mar-23	1976	8.29	187.7	370.9	302.8	0.38
Apr-23	2305	3.73	191.0	440.3	359.5	0.51
May-23	1546	6.42	162.6	251.4	205.3	0.44
Jun-23	1231	9.22	92.3	113.6	92.7	-
Jul-23	1554	7.24	126.8	197.1	160.9	-
Aug-23	1444	4.06	84.5	122.0	99.6	-
Sep-23	1201	5.17	84.8	101.9	83.2	-
Oct-23	1210	11.40	64.5	78.0	63.7	0.09
Nov-23	1282	9.95	73.1	93.7	76.5	0.08
Dec-23	1738	10.70	63.1	109.7	89.6	0.06
Jan-24	1477	6.21	128.14	189.3	154.5	0.10
Feb-24	1586	4.71	112.90	179.1	146.2	0.20
Mar-24	1937	5.45	86.81	168.2	137.3	0.21
Apr-24	1942	6.52	70.30	136.5	111.4	0.18
May-24	1645	7.40	57.16	94.0	76.8	0.40
Jun-24	1576	5.86	53.23	83.9	68.5	-
Jul-24	1882	5.74	58.81	109.1	89.1	-
Aug-24	1794	5.65	64.94	116.5	95.1	-
Sep-24	1328	6.34	77.10	102.4	83.6	-
Oct-24	1232	4.92	77.56	95.6	78.0	0.20
Nov-24	1159	5.70	78.21	90.6	74.0	0.18
Dec-24	1380	8.18	80.58	109.6	89.5	0.26
Average:	**1479**	**6.64**	**111.1**	**171.2**	**139.8**	**0.30**
Max:	**2305**	**11.40**	**191.7**	**440.3**	**359.5**	**0.51**
Min:	**1087**	**3.11**	**53.2**	**78.0**	**63.7**	**0.06**

Table 3: Effluent Wastewater Quality (2018-2022).

Parameter	Discharge Window	ECA Limit (1)	2018	2019	2020	2021	2022
$CBOD_5$ (mg/L)	Fall (Oct. 1 to Dec. 31)	15	5.8	3.8	3.0	3.2	6.3
	Winter/Spring (Jan. 1 to May 15)	25	8.2	3.2	5.6	3.0	4.9
Total Suspended Solids (mg/L)	Fall (Oct. 1 to Dec. 31)	25	36 (2)	14.8	3.9	9.7	10.6
	Winter/Spring (Jan. 1 to May 15)	25	15.8	10.0	14.0	3.0	13.3
Total Phosphorous (mg/L)	Fall (Oct. 1 to Dec. 31)	1	0.2	0.2	0.1	0.3	0.4
	Winter/Spring (Jan. 1 to May 15)	1	0.3	0.2	0.2	0.2	0.4
Total Ammonia Nitrogen (mg/L)	Fall (Oct.1 to Nov. 30)	5	0.1	5.3	0.1	1.5	1.2
	Fall (Dec.1 to 31)	12	-	-	1.0	4.9	7.7
	Winter (Jan.1 to Mar. 31)	12	-	-	-	-	9.8
	Spring (Apr.1 to May 15)	6	17 (2)	0.6	17	0.1	2.4
Hydrogen Sulphide (mg/L)	Fall (Oct.1 to Dec.31)	Not Detected	0	0	0	0	-
	Winter/Spring (Jan.1 to May 15)	0.1	0	0	0	0	-
pH	Fall (Oct.1 to Dec.31)	6.0 - 8.0	8.5 (3)	8.2	7.9	7.6	-
	Winter/Spring (Jan.1 to May 15)	6.0 - 8.0	7.8	7.8	7.8	7.6	-
E. Coli (CFU/100 mL)	Fall (Oct. 1 to Dec. 31)	200	-	-	1.4	28	60
	Winter/Spring (Jan. 1 to May 15)	200	-	-	36	67	126

(1) Per ECA No. 8160-BAHPRF (April 19, 2019)
(2) Non-Compliant per ECA No. 8225-B3HSD4 (October 3, 2018) / ECA No. 2712-6RVNRB (August 24, 2006): TSS (fall) = 25 mg/L and TAN (spring) = 16 mg/L.
(3) Compliant per ECA No. 8225-B3HSD4 (October 3, 2018) / ECA No. 2712-6RVNRB (August 24, 2006): pH limit fall and spring 6.0 to 9.5.

This table, along with Table 3, show that the existing alum dosing system, with or without the disc filter, has consistently produced an effluent that is below 0.5 mg/L, exceeding the treatment requirements for the existing system (1.0 mg/L limit and 0.8 mg/L objective).

As part of the Master Plan process, upgrades were also proposed for the Main SPS, which conveys all sewage from the municipality to the STS. Scheduled for Spring 2025 to late 2027, the SPS will undergo upgrades to increase its pumping capacity and conveyance to the STS, as well as improve the alum dosing system. Specifically related to the STS, the following upgrades will be completed:

- *New twin 400 mm forcemains will be installed along a new alignment, discharging to the existing splitter chamber.*
- *New alum dosing system will be installed with the same dosing capacity, but with additional instrumentation that will allow modulating of dosing pumps based on raw sewage flow. Note that no alum storage expansion is proposed as part of the upgrades.*

Based on the proposed upgrades to the Main SPS, it is expected that alum dosing will become more efficient and effective, likely increasing its effectiveness in removing TP and TSS. The implementation of baffles and an additional disc filter will also improve the effectiveness of TP removal and the resulting TP effluent concentration.

Based on a review of the existing TP removal performance, the planned upgrades to the alum dosing system, the addition of baffles and the addition of a new disc filter, we conclude that the STS should be able to consistently achieve an effluent TP concentration of 0.5 mg/L or lower. Without the disc filter, the system should also be able to achieve a TP limit of 0.5 mg/L or lower. Based on an average discharge flow of 4,347 m3/day (includes net precipitation) and a TP concentration limit of 0.5 mg/L, a total annual TP loading of 793.33 kg is expected to be discharged from the system at design build-out, only approx. 23.18 kg higher than the 770.15 kg that is currently allowed to be discharged to the South Nation River. Although 770.15 kg/year is the current annual allowable TP loading, as part of the Master Plan, a more stringent TP limit of 0.3 mg/L was established due to requiring a higher level of treatment due to discharge during the summer months. A resulting maximum allowable annual loading of 476 kg was established as part of the upgrades. Using the maximum allowable annual loading of 476 kg and a projected TP loading of 793.33 kg, 317.33 kg of TP would need to be offset. Applying the 4:1 offsetting ratio, approximately 1,270 kg of TP credits would need to be purchased to offset the exceedance in loading to the South Nation River. Pending approval from the MECP and the SNC of an updated STS TP limit of 0.5 mg/L and the proposed offsetting amounts, the estimated one-time cost of offsetting TP would be approximately $743,000, based on an offsetting unit cost of $585.00/kg TP.

This option is considered feasible and will be carried forward for further evaluation.

Note that the PIC will be scheduled shortly with notices being sent out in the coming weeks once timing is confirmed.

Thanks,

Nick Bialik, P.Eng. (he/him)
Environmental Engineer
J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS
1000-343 Preston Street
Ottawa ON K1S 1N4
Work: 343-804-5346
nbialik@jlrichards.ca
BEST MANAGED COMPANIES Platinum member

From: Nick Bialik <nbialik@jlrichards.ca>
Sent: Thursday, March 13, 2025 8:00 AM
To: Orpana, Jon (MECP) <Jon.Orpana@ontario.ca>; Kevin Cortez <kcortez@jlrichards.ca>
Cc: Baxter, Sarah (MECP) <Sarah.Baxter@ontario.ca>; Pierre-Paul Beauchamp <ppbeauchamp@casselman.ca>; Jordan Morrissette <jmorrissette@jlrichards.ca>; EA Notices to ERegion (MECP) <eanotification.eregion@ontario.ca>
Subject: RE: 16953-131 Casselman Lagoon Expansion Class EA - Phase 1 & 2 Background Summary

Hi Jon,

Not at this time. We will be working with Blue Sky to update the ACS within the next few weeks, at which point, we may reach out for feedback. We are working on the phasing approach / revised ACS as part of Phase 3 of the Class EA.

Thanks,

Nick Bialik, P.Eng. (he/him)
Environmental Engineer

1000-343 Preston Street
Ottawa ON K1S 1N4

Work: 343-804-5346
nbialik@jlrichards.ca

From: Orpana, Jon (MECP) <Jon.Orpana@ontario.ca>
Sent: Wednesday, March 12, 2025 4:00 PM
To: Kevin Cortez <kcortez@jlrichards.ca>
Cc: Baxter, Sarah (MECP) <Sarah.Baxter@ontario.ca>; Pierre-Paul Beauchamp <ppbeauchamp@casselman.ca>; Jordan Morrissette <jmorrissette@jlrichards.ca>; Nick Bialik <nbialik@jlrichards.ca>; EA Notices to ERegion (MECP) <eanotification.eregion@ontario.ca>
Subject: RE: 16953-131 Casselman Lagoon Expansion Class EA - Phase 1 & 2 Background Summary

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Thanks for this Kevin,

I acknowledge receipt and have added this to the file.

Is there any need to follow up with us regarding the ACS at this time?

Regards,

Jon

Jon K. Orpana
Regional Environmental Planner
Environmental Assessment Branch
Ministry of the Environment, Conservation and Parks
Kingston Regional Office
PO Box 22032, 1259 Gardiners Road
Kingston, Ontario
K7M 8S5

Phone: (613) 561 8250
Email: jon.orpana@ontario.ca

From: Kevin Cortez <kcortez@jlrichards.ca>
Sent: Friday, March 7, 2025 1:37 PM
To: Orpana, Jon (MECP) <Jon.Orpana@ontario.ca>
Cc: Baxter, Sarah (MECP) <Sarah.Baxter@ontario.ca>; Pierre-Paul Beauchamp <ppbeauchamp@casselman.ca>; Jordan Morrissette <jmorrissette@jlrichards.ca>; Nick Bialik <nbialik@jlrichards.ca>; EA Notices to ERegion (MECP) <eanotification.eregion@ontario.ca>
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Good afternoon Jon,

Please note that we have completed a summary document of Phase 1 and Phase 2 the Casselman Lagoon Expansion Schedule 'C' Class EA, based on the information compiled in the Master Plan process. Within this summary, we have provided additional information for the below noted areas based on the MECP's "Areas of Interest" document and following feedback received from the Ministry of Natural Resources and Ministry of Citizenship and Multiculturalism.

- Air Quality, Dust and Noise
- Source Water Protection
- Climate Change
- Natural Environment (including areas of natural scientific interest)
- Contaminated Sites and Soils Management
- Cultural Heritage
- Geotechnical and Hydrogeological Conditions

The Municipality is now proceeding with Phase 3 of the Class EA. Please refer to the attached file for your records and let us know if you have any questions or issues accessing the file.

Best,
Kevin

Kevin Cortez

From: Nick Bialik
Sent: March 13, 2025 8:00 AM
To: Orpana, Jon (MECP); Kevin Cortez
Cc: Baxter, Sarah (MECP); Pierre-Paul Beauchamp; Jordan Morrissette; EA Notices to ERegion (MECP)
Subject: RE: 16953-131 Casselman Lagoon Expansion Class EA - Phase 1 & 2 Background Summary

Hi Jon,

Not at this time. We will be working with Blue Sky to update the ACS within the next few weeks, at which point, we may reach out for feedback. We are working on the phasing approach / revised ACS as part of Phase 3 of the Class EA.

Thanks,

Nick Bialik, P.Eng. (he/him)
Environmental Engineer
Ottawa ON
Work: 343-804-5346

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Subject: RE: 16953-131 Casselman Lagoon Expansion Class EA - Phase 1 & 2 Background Summary

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Thanks for this Kevin,

I acknowledge receipt and have added this to the file.

Is there any need to follow up with us regarding the ACS at this time?

Regards,

Jon

Jon K. Orpana
Regional Environmental Planner

Environmental Assessment Branch
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PO Box 22032, 1259 Gardiners Road
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Phone: (613) 561 8250
Email: jon.orpana@ontario.ca

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To: Orpana, Jon (MECP) <Jon.Orpana@ontario.ca>
Cc: Baxter, Sarah (MECP) <Sarah.Baxter@ontario.ca>; Pierre-Paul Beauchamp <ppbeauchamp@casselman.ca>; Jordan Morrissette <jmorrissette@jlrichards.ca>; Nick Bialik <nbialik@jlrichards.ca>; EA Notices to ERegion (MECP) <eanotification.eregion@ontario.ca>
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- Air Quality, Dust and Noise
- Source Water Protection
- Climate Change
- Natural Environment (including areas of natural scientific interest)
- Contaminated Sites and Soils Management
- Cultural Heritage
- Geotechnical and Hydrogeological Conditions

The Municipality is now proceeding with Phase 3 of the Class EA. Please refer to the attached file for your records and let us know if you have any questions or issues accessing the file.

Best,
Kevin

Kevin Cortez

From: Nick Bialik
Sent: February 24, 2025 11:01 AM
To: Baxter, Sarah (MECP)
Cc: Orpana, Jon (MECP); Pierre-Paul Beauchamp; Jordan Morrissette; Kevin Cortez; Yves Morrissette; Melody Johnson
Subject: RE: Municipality of Casselman - Schedule 'C' Class Environmental Assessment Notice of Commencement - MECP

Hi Sarah,

Thank you for your response; we are in general agreement.

JLR/Municipality/Blue Sky will work on an amendment to the ACS.

At this point, we do not have any questions, but we will reach out if we want to setup a call.

Thank you again,

Nick Bialik, P.Eng. (he/him)
Environmental Engineer
Ottawa ON
Work: 343-804-5346

From: Baxter, Sarah (MECP) <Sarah.Baxter@ontario.ca>
Sent: Monday, February 24, 2025 9:50 AM
To: Nick Bialik <nbialik@jlrichards.ca>
Cc: Orpana, Jon (MECP) <Jon.Orpana@ontario.ca>; Pierre-Paul Beauchamp <ppbeauchamp@casselman.ca>; Jordan Morrissette <jmorrissette@jlrichards.ca>; Kevin Cortez <kcortez@jlrichards.ca>; Yves Morrissette <ymorrissette@casselman.ca>; Melody Johnson <melody@bskyeng.com>
Subject: RE: Municipality of Casselman - Schedule 'C' Class Environmental Assessment Notice of Commencement - MECP

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Hi Nick,

Thank you for your email – I appreciate you providing all the details for my consideration.

From a surface water perspective, I would be amenable to the interim capacity expansion. However, the Township/JLR would need to submit a revised Assimilative Capacity Study (ACS) to support the proposed interim effluent limits. This should not be too difficult of an endeavour, as the initial version of the ACS has already been completed; the updated version would simply adjust the effluent flow volumes and the effluent limits. I would also need to have something in writing from South Nation Conservation Authority (SNCA) indicating they are agreeable to the Township entering the Total Phosphorus Management (TPM) program.

Please note that the Region's position on the interim approach and effluent limits should not be considered as an endorsement of the engineering design. An Engineer from Approvals will also have to review the proposal to ensure the proposed modifications to the works can achieve the proposed interim effluent limits.

If you'd like to discuss this further with a call, please let me know and we can get that set up.

Sarah Baxter
Surface Water Specialist
Technical Support Section – Eastern Region
Ministry of the Environment, Conservation and Parks
1259 Garinders Road, Unit 3, Kingston, ON
Sarah.baxter@ontario.ca

From: Nick Bialik <nbialik@jlrichards.ca>
Sent: Friday, February 14, 2025 9:08 AM
To: Baxter, Sarah (MECP) <Sarah.Baxter@ontario.ca>
Cc: Orpana, Jon (MECP) <Jon.Orpana@ontario.ca>; Pierre-Paul Beauchamp <ppbeauchamp@casselman.ca>; Jordan Morrissette <jmorrissette@jlrichards.ca>; Kevin Cortez <kcortez@jlrichards.ca>; Yves Morrissette <ymorrissette@casselman.ca>; Melody Johnson <melody@bskyeng.com>
Subject: RE: Municipality of Casselman - Schedule 'C' Class Environmental Assessment Notice of Commencement - MECP

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Hi Sarah,

As per the below email to Jon, the Municipality is proceeding with Phases 3 and 4 of the Class EA for the Casselman Sewage Treatment System (STS) upgrades. As part of the Class EA, the Municipality requested that JLR review phasing of the upgrades due to funding constraints. Please see below information requesting input from the MECP on a proposed phasing strategy. I have attached final assimilative capacity assessment study memorandum for your reference.

The Municipality of Casselman is limited in their budget to upgrade their water and wastewater infrastructure to meet projected development. Based on the estimated cost of wastewater treatment upgrades to meet 25-year development projections, they would be unable to upgrade both their water and wastewater infrastructure without significant amounts of funding, hindering their ability to develop. To accommodate near-term development (0-10 years), the Municipality is requesting a phased approach to the upgrades at the Casselman STS, whereby an interim increase in STS rated capacity is provided through the

modification of the discharge window, the update of effluent criteria based on the assessment of the existing performance of the system, and potentially, some minor upgrades to the system. See below background information for the MECP's consideration:

- Based on discussions with operators, a review of storage volumes and a review of existing treatment infrastructure, the main factor limiting the rated capacity of the system is the inability to discharge between May 16 and September 30. As part of the Master Plan, an Assimilative Capacity Study (ACS) was completed for the 25-year rated capacity of 4,050 m^3/day which found that the South Nation River has the ability to accept a certain amount of discharge between May 16 and September 30. Any additional discharge that can occur during this period (with the existing infrastructure) would allow for an increase in the rated capacity of the system.

- The existing STS has been described in detail in the recently completed Master Plan. The Master Plan reviewed data from 2018 to 2022, but noted that data up to Spring 2022 was not reflective of the STS treatment performance due to troubleshooting of the MBBR and Disc Filter systems. For this reason, performance data from October 1, 2022, to December 31, 2024, has been summarized in the below tables, which reflect the true existing performance of the Casselman STS. In addition, the attached document includes a table that provides a detailed overview of the 2023 and 2024 performance of the existing system.

Years	Average Day (m3/d)	Maximum Day (m3/d)
2020	1468	2511
2021	1310	4457
2022	1442	3300
2023	1556	3316
2024	1575	2293
5-year average flow (m3/d)	1470	3175
5-year average flow (L/s)	17.0	36.8
Percent (%) of Operating Capacity Used	69.7%	N/A

Parameter	Discharge window	Compliance Limit	2022	2023	2024
CBOD5 (mg/L)	Fall (Oct 1 to Dec 31)	15	6.3	3.0	3.0
	Winter/Spring (Jan 1 to May 15)	25		4.7	3.7
TSS (mg/L)	Fall (Oct 1 to Dec 31)	25	10.6	4.3	6.5
	Winter/Spring (Jan 1 to May 15)	25		8.7	8.2
TP (mg/L)	Fall (Oct 1 to Dec 31)	1.0	0.41	0.08	0.22
	Winter/Spring (Jan 1 to May 15)	1.0		0.43	0.19
TAN (mg/L)	Fall (Oct 1 to Nov 30)	5.0	1.2	0.2	0.3
	Fall (Dec 1 to Dec 31)	12.0	7.7	0.3	2.5
	Winter (Jan 1 to Mar 31)	12.0		9.8	4.6
	Spring (Apr 1 to May 15)	6.0		0.5	0.1
Hydrogen Sulphide (mg/L)	Fall (Oct 1 to Dec 31)	Not Detected	-	N/A	N/A
	Winter/Spring (Jan 1 to May 15)	0.1		N/A	N/A
pH	Fall (Oct 1 to Dec 31)	6.0 - 8.0	-	7.68 - 8.00	7.22 - 7.92
	Winter/Spring (Jan 1 to May 15)	6.0 - 8.0		6.80 - 7.80	7.10 - 7.75
E. Coli (CFU/100mL)	Fall (Oct 1 to Dec 31)	200	59.9	4.7	10.8
	Winter/Spring (Jan 1 to May 15)	200		204.3	5.4

Note:
1. For the 2023 Spring Discharge, a week of effluent sampling (May 1) was skipped. It was assumed that the concentrations for this week would be equivalent to the average of the previous and subsequent week's concentrations.

- Based on discussions with Veolia, the supplier of the existing MBBR and disc filter systems, during the Master Plan process, the following was noted with regards to abilities of the existing Casselman STS:

    - MBBR – The MBBR is sufficiently-sized to accommodate the long-term upgrades proposed in the Master Plan. It would therefore be sufficiently-sized for any interim upgrades proposed. Minor upgrades such as adding an additional blower may be required, but will be dependent on the interim rated capacity determined.

- Disc Filter – As part of the Master Plan process, an additional disc filter was recommended by Veolia given the increase in maximum discharge rate from 7,000 m^3/day to 10,000 m^3/day and the increase in suspended solids from the addition of coagulation/flocculation pre-filtration to meet the new TP requirements. As part of the interim rated capacity increase, we would look to maintain a single Disc Filter by keeping the maximum discharge capacity of the system at 7,000 m^3/day and applying for the South Nation River's Total Phosphorous Management (TPM) to offset any TP loadings that could not be removed by the existing disc filter.

Based on the current system's treatment ability, and assuming discharge can occur between May 16 and September 30, we envision the following potential effluent criteria as part of an interim capacity expansion:

- Casselman STS Maximum Monthly Effluent Discharge Rates and Minimum Dilution Ratios:

Month	Current ECA (8160-BAHPRF)		Existing Operation (2023 - 2024)		Potential Interim Limits (Phase 1)		Approved Master Plan Limits (Phase 2)	
	Maximum Discharge Rate (m3/d)	Minimum Dilution Ratio	Avg Effluent Flow (m3/d)	Max Daily Effluent Flow (m3/d)	Maximum Discharge Rate (m3/d)	Minimum Dilution Ratio	Maximum Discharge Rate (m3/d)	Minimum Dilution Ratio
January	5000	10	3082	4906	5000	12.4	5750	12.4
February	5000	10	2119	2926	5000	12.4	5600	12.4
March	5000	40	2757	3904	5000	12.3	7250	12.3
April	7000	60	4105	4752	7000	72.9	10000	72.9
May 1 - 15	7000	60	4405	4977	4500	40.5	4500	40.5
May 16 - 31	N/A	N/A	N/A	N/A	4500	40.5	4500	40.5
June	N/A	N/A	N/A	N/A	2150	26.2	2150	26.2
July	N/A	N/A	N/A	N/A	1050	26.2	1050	26.2
August	N/A	N/A	N/A	N/A	900	26.3	900	26.3
September	N/A	N/A	N/A	N/A	910	26.2	910	26.2
October	4000	15	2162	2456	2250	13.1	2250	13.1
November	4000	10	2110	2406	4000	13.1	6050	13.1
December	5000	15	2130	2404	5000	12.4	8750	12.4
Jan 1 - May 15 Volume:	502,500		407,561		N/A	N/A	N/A	N/A
Oct 1 - Dec 31 Volume:	267,650		177,349		N/A	N/A	N/A	N/A

Compared to the existing ECA, between May 1 and October 31, the proposed new maximum discharge rates only increase the allowable discharge volume by ~ 23,000 m3. However, by allowing discharge over the summer months (when net precipitation is negative), the available storage capacity is better utilized and the MBBR system is also better equipped to maintain its treatment ability year-round. Based on the above and based on a review of the monthly storage utilization (see attached supporting document pages 2-5), a rated capacity increase from 2,110 m3/day to 3,000 m3/day can feasibly be achieved from a hydraulic perspective.

- Casselman STS Effluent Criteria:

Parameter	Discharge window	Current ECA (8160-BAHPRF)		Existing Operation (2022 - 2024)			Potential Interim Effluent Criteria (Phase 1)		Approved Master Plan Effluent Criteria (Phase 2)	
		Limit	Objective	2022	2023	2024	Limit	Objective	Limit	Objective
cBOD5 (mg/L)	Winter/Spring (Jan 1 to May 15)	25	15		4.7	3.7	15	10	12	10
	Summer (May 16 to Sep 30)	-	-							
	Fall (Oct 1 to Dec 31)	15	10	6.3	3.0	3.0				
TSS (mg/L)	Winter/Spring (Jan 1 to May 15)	25	15		8.7	8.2	15	10	12	10
	Summer (May 16 to Sep 30)	-	-							
	Fall (Oct 1 to Dec 31)	25	10	10.6	4.3	6.5				
TP (mg/L)	Winter/Spring (Jan 1 to May 15)	1.0	0.8		0.43	0.19	0.7 (Policy 2, 3,000 m3/day)	0.6 (Policy 2, 3,000 m3/day)	0.3	0.2
	Summer (May 16 to Sep 30)	-	-							
	Fall (Oct 1 to Dec 31)	1.0	0.8	0.41	0.08	0.22				
TAN (mg/L)	Winter (Jan 1 to Mar 31)	12.0	12.0		9.8	4.6	12	10	11.5	9.2
	Spring (Apr 1 to May 15)	6.0	6.0		0.5	0.1	6.0	5.0	6.0	4.8
	Spring (May 15 to May 31)	-	-				6.0	5.0	6.0	4.8
	Summer (Jun 1 to Sep 30)	-	-				1.3	1.0	1.3	1.0
	Fall (Oct 1 to Nov 30)	5.0	5.0	1.2	0.2	0.3	5.0	4.0	5.0	4.0
	Fall (Dec 1 to Dec 31)	12.0	12.0	7.7	0.3	2.5	12.0	10.0	11.5	9.2
Hydrogen Sulphide (mg/L)	Winter/Spring (Jan 1 to May 15)	0.1	0.1		N/A	N/A	N/A	N/A	N/A	N/A
	Summer (Jun 1 to Sep 30)	-	-							
	Fall (Oct 1 to Dec 31)	Not Detected	Not Detected	-	N/A	N/A				
pH	Winter/Spring (Jan 1 to May 15)	6.0 - 8.0	6.8 - 7.8		6.80 - 7.80	7.10 - 7.75	6.0 - 8.0	6.8 - 7.8	6.0 - 8.0	6.8 - 7.8
	Summer (Jun 1 to Sep 30)	-	-							
	Fall (Oct 1 to Dec 31)	6.0 - 8.0	6.8 - 7.8	-	7.68 - 8.00	7.22 - 7.92				
E. Coli (CFU/100mL)	Winter/Spring (Jan 1 to May 15)	200	100		204.3	5.4	200	150	200	150
	Summer (Jun 1 to Sep 30)	-	-							
	Fall (Oct 1 to Dec 31)	200	100	59.9	4.7	10.8				
	Exceeded Limit	**Important Note**: The above table is for illustrative purposes and does not represent how the current ECA assesses compliance (monthly average concentration, etc.). Refer to the detailed analysis table for a review of 2023 and 2024 compliance.								
	Exceeded Objective									

Proposed interim effluent criteria was added to the above table. Of all the criteria, TP and E. coli would be the most stringent criteria for the existing STS. As noted above, existing TP treatment capacity would need to be reviewed. If the existing system is found to be unable to meet the TP criteria, the South Nation River's TPM program will be explored. For E. coli, we propose that a disinfection system be implemented to meet the E. Coli limits, which are assumed to be year-round.

Based on the above information, we have the following questions for the MECP:

- Would the MECP be amenable to an interim capacity expansion of the Casselman STS, as described above?
- What additional information or analyses would the MECP need from the Municipality/JLR to grant such an expansion?
- Any other considerations?

Please let us know if the MECP would like to setup a meeting to discuss the above. We look forward to your response.

Thank you,

Nick Bialik, P.Eng. (he/him)
Environmental Engineer

1000-343 Preston Street
Ottawa ON K1S 1N4

Work: 343-804-5346
nbialik@jlrichards.ca

From: Orpana, Jon (MECP) <Jon.Orpana@ontario.ca>
Sent: Wednesday, December 18, 2024 2:08 PM
To: Kevin Cortez <kcortez@jlrichards.ca>; EA Notices to ERegion (MECP) <eanotification.eregion@ontario.ca>
Cc: Pierre-Paul Beauchamp <ppbeauchamp@casselman.ca>; Jordan Morrissette <jmorrissette@jlrichards.ca>; Nick Bialik <nbialik@jlrichards.ca>
Subject: RE: Municipality of Casselman - Schedule 'C' Class Environmental Assessment Notice of Commencement - MECP

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Hello Kevin,

Thanks for the Notice of the Commencement for the last 2 phases of this project. I can confirm that you are ok to proceed with notification of your project to the indigenous communities you consulted with for Phases 1 and 2.

I have also taken a look at the final email from Sarah Baxter to Melody Johnson of **BLUE SKY Energy Engineering & Consulting Inc. dated February 23rd, 2024** thanking her for their comments and the incorporation of a year – round E. Coli objective and limit and no objection to the proposed effluent loading limits in order to move forward with the Class EA phase of your project.

Regards,

Jon

Jon K. Orpana hear name
Regional Environmental Planner
Environmental Assessment Branch
Ministry of the Environment, Conservation and Parks
Kingston Regional Office
PO Box 22032, 1259 Gardiners Road
Kingston, Ontario
K7M 8S5

Phone: (613) 561 8250
Fax: (613) 548-6908
Email: jon.orpana@ontario.ca

From: Kevin Cortez <kcortez@jlrichards.ca>
Sent: Friday, November 29, 2024 8:21 AM
To: Orpana, Jon (MECP) <Jon.Orpana@ontario.ca>; EA Notices to ERegion (MECP) <eanotification.eregion@ontario.ca>; MEA Notices to Director EAAB (MECP) <MEANOTICESEAAB@ontario.ca>
Cc: Pierre-Paul Beauchamp <ppbeauchamp@casselman.ca>; Jordan Morrissette <jmorrissette@jlrichards.ca>; Nick Bialik <nbialik@jlrichards.ca>
Subject: Municipality of Casselman - Schedule 'C' Class Environmental Assessment Notice of Commencement - MECP

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Good afternoon,

The Municipality of Casselman has initiated a Schedule 'C' Class Environmental Assessment (EA) to determine the preferred expansion design concept for the Casselman Sewage Treatment System (STS) to effectively treat wastewater generated from the existing and projected future development areas. This Class EA follows the Casselman Water and Wastewater Infrastructure Master Plan, which was completed in July 2024. More information on the current study is provided in the attached Notice, which we invite you to review.

For your reference, we have identified below latest correspondences with the MECP relating to the expansion of the Casselman STS:

- *Master Plan – The latest round of comments from the MECP during the Master Plan were received on June 21, 2024, and consisted of an email response from Jon Orpana stating that consultation for the Master Plan appears complete.*

- *Assimilative Capacity Study (ACS) – On February 1, 2024, the MECP (Sarah Baxter, via Jon Orpana) provided a formal response via memorandum (Reference No. ECHO #1-278240452) with recommendations from their review of the ACS final report completed by Blue Sky Engineering & Consulting Inc. (Blue Sky) in January 11, 2024. Blue Sky responded via memorandum on February 16, 2024.*

Please let us know if you have any comments for the project team now that we have entered the Class EA phase of this project.

Regards,

Kevin Cortez, M.Eng., B.Eng., EIT
Environmental Engineering Graduate

1000-343 Preston Street
Ottawa, ON, K1S 1N4

Work: 343-803-4074
kcortez@jlrichards.ca

Ministry of Natural Resources

Kevin Cortez

From: Kemptville-Kingston MNRF <kemptville-kingston.mnrf@ontario.ca>
Sent: March 12, 2026 2:23 PM
To: Nick Bialik
Subject: Automatic reply: Municipality of Casselman Sewage Treatment System Schedule C Class EA - Notice of Completion

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Thank you for your request. / Merci pour votre demande. (le français suit)

This email inbox is being monitored regularly to ensure we provide responsive customer service. In accordance with our service standards, you will receive a reply from the staff member assigned to your file within 15 business days.

- Are you looking for more information on ministry programs and services?
    - Access the Natural Resources Information Portal at NRIP Portal to learn more about Fish & Wildlife, Lands and Water, Aggregates, Forestry and Petroleum and to apply for permits, licences or complete program submissions.
    - Visit our Crown Land Use Policy Atlas map to locate Crown land and check for permitted activities
    - Use Topographic maps | ontario.ca to make a topographic map for your next outdoor adventure or to support your work permit application or visit Geohub access Ontario's geospatial data.

If you have any further questions, please contact Kemptville-Kingston.MNRF@ontario.ca

Sincerely,

Kemptville - Kingston District
Ministry of Natural Resources
Kemptville-Kingston.MNRF@ontario.ca

Help Protect Our Natural Resources – To report natural resource abuse call the TIPS Reporting line at 1-877-847-7667

As part of providing accessible customer service, please let us know if you have any accommodation needs or require communication supports or alternate formats.

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Cette boîte de réception courriel est surveillé de façon régulière afin d'assurer un bon service à la clientèle. Conformément à nos normes de service, vous allez recevoir une réponse d'un membre de notre personnel assigné à votre dossier dans un délai de 15 jours ouvrables.

- Cherchez-vous plus d'informations sur les programmes et services offerts par notre ministère?
    - Veuillez accéder au Portail d'information sur les ressources naturelles au Portail PIRN pour en apprendre davantage sur poisson et faune, terres de la Couronne, agrégats, foresterie et pétrole, et pour faire demande pour des permis ou des soumissions complètes à un de nos programmes.
    - Veuillez visiter la carte de notre Atlas et politiques d'aménagement des terres de la Couronne afin de localiser des terres de la Couronne et de vérifier les activités permises
    - Veuillez utiliser Cartes topographiques – ontario.ca pour créer une carte topographique pour votre prochaine aventure plein air ou pour appuyer votre demande de permis ou veuillez visiter CarrefourGéo pour accéder aux données géospatiales de l'Ontario.

Si vous avez d'autres questions, veuillez contacter Kemptville-Kingston.MNRF@ontario.ca

Sincèrement,

District de Kemptville-Kingston
Ministère des Richesses naturelles
Kemptville-Kingston.MNRF@ontario.ca

Aidez-nous à protéger nos ressources naturelles – Pour signaler l'abus des ressources naturelles, téléphonez à la ligne de signalement du MRNF au 1-877-847-7667

Dans le cadre de la prestation d'un service à la clientèle accessible, veuillez nous aviser si vous avez besoin d'un aménagement particulier, de soutien à la communication ou de supports de substitution.

***Avis de recouvrement:** Les renseignements personnels sont recueillis en vertu de la Loi sur le ministère des Richesses naturelles et seront utilisés dans le but de répondre à votre demande auprès du ministère des Richesses naturelles, du District de Kemptville-Kingston. Si vous avez*

des questions sur la collecte et l'utilisation de vos renseignements personnels, veuillez communiquer avec la Spécialiste régionale de la gestion de l'information, 4e étage Sud, 300, rue Water, Peterborough, ON K9J 3C7, 705-761-3585, emily.hill@ontario.ca .

Kevin Cortez

From: Kemptville-Kingston MNRF <kemptville-kingston.mnrf@ontario.ca>
Sent: March 12, 2026 3:21 PM
To: Nick Bialik
Cc: Southern Region Planning Inbox (MNR)
Subject: FW: Municipality of Casselman Sewage Treatment System Schedule C Class EA - Notice of Completion
Attachments: 16953-131 Casselman Class EA_Notice of Completion_English.pdf; 16953-131 Casselman Class EA_Notice of Completion_French.pdf

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Hello,

Thank you for circulating our office. Please be aware that MNR districts are no longer the first point of contact regarding municipal land use planning files. To ensure your applications are reviewed in a timely manner, it is recommended that municipalities circulate digital copies of applications and documents to SR.Planning@ontario.ca. This inbox is monitored by MNR's Southern Region Planning Team, and they will respond to circulations as appropriate.

Please note that circulations where the Ministry of Municipal Affairs and Housing (MMAH) is the approval authority should be directed to the appropriate Municipal Services Office: Organization details | INFO-GO.

Thank you,

Jessica Wilson
Acting Resource Clerk | Kemptville Kingston District | Regional Operations Division
Ministry of Natural Resources | Ontario Public Service
613-484-3743 | jessica.wilson4@ontario.ca

Ontario

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Please note: As part of providing accessible customer service, if you have any accommodation needs, require communication supports, or alternate formats please let me know.

From: Nick Bialik <nbialik@jlrichards.ca>
Sent: March 12, 2026 2:19 PM

Cc: Jordan Morrissette <jmorrissette@jlrichards.ca>; Yves Morrissette <ymorrissette@casselman.ca>; Kevin Cortez <kcortez@jlrichards.ca>; Eric Gadoua <egadoua@casselman.ca>; Pierre-Paul Beauchamp <ppbeauchamp@casselman.ca>
Subject: Municipality of Casselman Sewage Treatment System Schedule C Class EA - Notice of Completion

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Hello,

You have been copied on this email because you were identified as a stakeholder for the Casselman Sewage Treatment System Upgrade Schedule 'C' Class Environmental Assessment.

Please find attached the Notice of Completion for this study. Through issuance of this notice, the Environmental Study Report is being place on public record for thirty (30) calendar days in accordance with the requirements of the Municipal Class EA process. Please refer to the attached notice for additional information, including where you can review the Environmental Study Report, and how you can provide comments or submit a Section 16 Order request.

Should you have any questions or feedback, please do not hesitate to respond to this email or contact the project contacts found in the attached notice.

Best,

Nick Bialik, P.Eng. (he/him)
Environmental Engineer

1000-343 Preston Street
Ottawa ON K1S 1N4
Work: 343-804-5346
nbialik@jlrichards.ca

Kevin Cortez

From: Kemptville-Kingston MNRF <kemptville-kingston.mnrf@ontario.ca>
Sent: June 25, 2025 3:55 PM
To: Kevin Cortez
Subject: Automatic reply: Casselman Lagoon Class EA - Notice of Public Open House (Information Centre) No. 2

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    - Use Topographic maps | ontario.ca to make a topographic map for your next outdoor adventure or to support your work permit application or visit Geohub access Ontario's geospatial data.

If you have any further questions, please contact Kemptville-Kingston.MNRF@ontario.ca

Sincerely,

Kemptville - Kingston District
Ministry of Natural Resources
Kemptville-Kingston.MNRF@ontario.ca

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    - Veuillez accéder au Portail d'information sur les ressources naturelles au Portail PIRN pour en apprendre davantage sur poisson et faune, terres de la Couronne, agrégats, foresterie et pétrole, et pour faire demande pour des permis ou des soumissions complètes à un de nos programmes.
    - Veuillez visiter la carte de notre Atlas et politiques d'aménagement des terres de la Couronne afin de localiser des terres de la Couronne et de vérifier les activités permises
    - Veuillez utiliser Cartes topographiques – ontario.ca pour créer une carte topographique pour votre prochaine aventure plein air ou pour appuyer votre demande de permis ou veuillez visiter CarrefourGéo pour accéder aux données géospatiales de l'Ontario.

Si vous avez d'autres questions, veuillez contacter Kemptville-Kingston.MNRF@ontario.ca

Sincèrement,

District de Kemptville-Kingston
Ministère des Richesses naturelles
Kemptville-Kingston.MNRF@ontario.ca

Aidez-nous à protéger nos ressources naturelles – Pour signaler l'abus des ressources naturelles, téléphonez à la ligne de signalement du MRNF au 1-877-847-7667

Dans le cadre de la prestation d'un service à la clientèle accessible, veuillez nous aviser si vous avez besoin d'un aménagement particulier, de soutien à la communication ou de supports de substitution.

Avis de recouvrement: *Les renseignements personnels sont recueillis en vertu de la Loi sur le ministère des Richesses naturelles et seront utilisés dans le but de répondre à votre demande auprès du ministère des Richesses naturelles, du District de Kemptville-Kingston. Si vous avez des questions sur la collecte et l'utilisation de vos renseignements personnels, veuillez communiquer avec la Spécialiste régionale de la gestion de l'information, 4e étage Sud, 300, rue Water, Peterborough, ON K9J 3C7, 705-761-3585, emily.hill@ontario.ca .*

Kevin Cortez

From: Marks, Jody (MNR) <Jody.Marks@ontario.ca>
Sent: December 2, 2024 5:01 PM
To: Kevin Cortez
Cc: ppbeauchamp@casselman.ca
Subject: RE: Municipality of Casselman - Schedule 'C' Class Environmental Assessment Notice of Commencement - MNRF
Attachments: MNR Southern Region Information Package – For External Proponent Environmental Assessments_Ver2.pdf

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Hello Kevin,

The Ministry of Natural Resources (MNR) received the Notice of Commencement for the Casselman Sewage Treatment System Schedule 'C' Class Environmental Assessment on November 29, 2024. Thank you for circulating this to our office.

MNR has prepared the attached **MNR Southern Region Information Package – For External Proponent Environmental Assessments** (Package) to help project proponents understand MNR's role as a commenting agency and interests related to environmental assessment within the Ministry's mandate. The Package also provides information on the Ministry's regulatory authority to issue authorizations, permits, licenses and/or approvals. The information provided is subject to change from time to time and it is the proponent's responsibility to ensure the information used to support project planning and compliance with *Environmental Assessment Act* requirements is current and accurate. It is the proponent's responsibility to be aware of, and comply with, all relevant federal or provincial legislation, municipal by-laws and/or other agency approvals.

Please note the ministry has not completed a screening of natural heritage or other resource values at this time. If no MNR interests are identified based on the information contained in this Package, there is no need to further circulate MNR as a commenting agency when undertaking consultation and review under the applicable EA process. If you have identified any MNR interests in your project planning and require additional technical information, or if you have questions about the content of this Package, please feel free to contact me, or SR.planning@ontario.ca.

Thank you,

Jody Marks *(she/her)*
Regional Planner | Land Use Planning and Strategic Issues Section, Southern Region
Ministry of Natural Resources | Ontario Public Service
(249) 733-1376 | jody.marks@ontario.ca

Ontario

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Please note: As part of providing accessible customer service, if you have any accommodation needs, require communication supports, or alternate formats please let me know.

From: Kevin Cortez <kcortez@jlrichards.ca>
Sent: Friday, November 29, 2024 8:24 AM
To: Worth, Adam (MNR) <Adam.Worth@ontario.ca>; Southern Region Planning Inbox (MNR) <SR.Planning@ontario.ca>; Kemptville-Kingston MNRF <kemptville-kingston.mnrf@ontario.ca>
Cc: Pierre-Paul Beauchamp <ppbeauchamp@casselman.ca>; Jordan Morrissette <jmorrissette@jlrichards.ca>; Nick Bialik <nbialik@jlrichards.ca>
Subject: Municipality of Casselman - Schedule 'C' Class Environmental Assessment Notice of Commencement - MNRF

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Good morning,

The Municipality of Casselman has initiated a Schedule 'C' Class Environmental Assessment (EA) to determine the preferred expansion design concept for the Casselman Sewage Treatment System (STS) to effectively treat wastewater generated from the existing and projected future development areas. This Class EA follows the Casselman Water and Wastewater Infrastructure Master Plan, which was completed in July 2024. More information on the current study is provided in the attached Notice, which we invite you to review.

For your reference, we have identified below latest correspondence with the MNRF relating to the expansion of the Casselman STS:

- *Master Plan – The latest round of comments from the MNRF during the Master Plan were received on June 29, 2022 following the Master Plan Notice of Commencement and noted that the local district office at Kemptville should be contacted for information on permits. No further comments were received.*

Please let us know if you have any comments for the project team now that we have entered the Class EA phase of this project.

Regards,

Kevin Cortez, M.Eng., B.Eng., EIT
Environmental Engineering Graduate

1000-343 Preston Street
Ottawa, ON, K1S 1N4

Work: 343-803-4074
kcortez@jlrichards.ca

MNR SOUTHERN REGION INFORMATION PACKAGE – FOR EXTERNAL PROPONENT ENVIRONMENTAL ASSESSMENTS

MNR – SOUTHERN REGION – LUPSI

October 2024

How to Use This Information Package

Environmental Assessment (EA) is a planning and decision-making process used to promote environmentally responsible decision-making. In Ontario, this process is defined and is required pursuant to the *Environmental Assessment Act (EAA)*. The Ministry of Environment, Conservation and Parks (MECP) administers the *EAA*.

The Ministry of Natural Resources (MNR) may be asked by a proponent of a project subject to an EA or Class EA to participate as a commenting agency to ensure provincial interests within MNR's mandate are considered by the proponent in the project planning process.

Use of this Information Package "Package" is intended to help project proponents understand MNR's:

- role as a commenting agency and interests related to environmental assessment within the Ministry's mandate (refer Sections 1 through 8 of this document)
- regulatory authority to issue authorizations, permits, licenses and/or approvals (refer Appendix A – MNR Regulatory Role)

The information provided by MNR and the sources listed in this Package should not be considered exhaustive nor a substitute for consultation with other agencies, site visits and appropriate field studies. The information provided is subject to change from time to time and it is the proponent's responsibility to ensure the information used to support project planning and compliance with *EAA* requirements is current and accurate.

If no MNR interests are identified based on the information contained in this Package there is no need to further circulate MNR as a commenting agency when undertaking consultation and review under the applicable EA process. MNR Southern Region (via sr.planning@ontario.ca) may be contacted if there are any questions about the content of this Package or if specific technical information is required.

This Package is intended for use within MNR's Southern Region (SR) regional boundary only. To view the MNR SR regional boundary please see Ministry of Natural Resources and Forestry work centres | ontario.ca.

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1. MNR Mandate

MNR has a mandate to protect Ontario's biodiversity while promoting economic opportunities in the resource sector and supporting outdoor recreation opportunities by:

- Sustainably managing Ontario's fish and wildlife resources.
- Leading the management of Ontario's public (also referred to as Crown) lands, including the beds of navigable waters, oil, gas, salt and aggregate resources, and access to Crown land for renewable energy projects.
- Ensuring the sustainable management of Ontario's Crown forests.
- Protecting people, property and communities from forest fires, floods, and droughts.
- Developing and applying geographic information to help manage the province's natural resources.

MNR's regulatory role is triggered when a project proponent seeks an approval under legislation administered by the Ministry. Information on the Ministry's regulatory role under applicable legislation can be found in Appendix A.

2. MNR Role as Commenting Agency

MNR's role as a commenting agency on projects subject to *EAA* requirements is to:

- Assist and enable project proponents to access relevant technical and scientific information within the scope of MNR's mandate.
- Provide legislative / regulatory / policy information and direction regarding interests within MNR's mandate.
- Support the identification and consideration of the potential effects of a project on matters within MNR's mandate.
- Identify where the project proponent may need to seek MNR approvals regarding the project.

3. Provincial Planning Policies

Provincial plans together with the *Provincial Policy Statement, 2024* (PPS) issued under section 3(1) of the *Planning Act,* provide policy direction on matters of provincial interest related to land use planning and development in Ontario. The PPS and provincial plans contain policies specific to infrastructure projects.

A summary of matters related to MNR's mandate within specific infrastructure-related provincial planning policies can be found below. Please note, this is not an exhaustive list of provincial policies that may apply to a project and other MNR mandated interests may be applicable. It is the project proponent's responsibility to review the provincial plans and PPS,

which may be amended from time to time, to determine policies applicable to the proposed project.

Provincial Plan Mapping

Mapping of provincial plan boundaries and natural heritage areas as defined in individual provincial plans is available to view or download through Make A Map: Natural Heritage Areas or Ontario GeoHub (GeoHub) - Natural Heritage System Area.

Greenbelt Plan, 2017

Section 4.2.1.2 of the Greenbelt Plan contains policies which are designed to direct infrastructure away from, or where not possible, to minimize the impacts on the Natural Heritage and Water Resource Systems. It requires that new or expanding infrastructure "shall avoid *key natural heritage features, key hydrologic features or key hydrologic areas* unless need has been demonstrated and it has been established that there is no other reasonable alternative."

Niagara Escarpment Plan (NEP), 2017

The NEP is administered by the Niagara Escarpment Commission, the government agency mandated to develop, interpret, and apply NEP policies that maintain and enhance the Niagara Escarpment's unique environmental and landscape features. In addition to Make A Map: Natural Heritage Areas, mapping of NEP Escarpment Natural Areas and Escarpment Protection Areas may be obtained from your local municipality or the Niagara Escarpment Commission.

Oak Ridges Moraine Conservation Plan (ORMCP), 2017

Section 41 of the ORMCP contains policies specific to the development of new or the upgrading/extension of existing infrastructure. This policy direction includes where development shall not be permitted unless specified criteria have been satisfied (including where applicable that there is no other reasonable alternative) and establishes required documentation to support infrastructure projects. Specific conditions apply to proposed infrastructure development within a natural core area and infrastructure crossings of key natural heritage features.

Lake Simcoe Protection Plan (LSPP), 2009

Policy 6.23-DP of the LSPP directs that development or site alteration in relation to infrastructure shall not be permitted within a key natural heritage feature, a key hydrologic feature or within a related vegetation protection zone unless the need for the project has been demonstrated through an Environmental Assessment or other similar environmental approval and it has been demonstrated there is no reasonable alternative. Some exceptions may apply.

4. Fish, Wildlife and Natural Heritage

MNR's natural heritage and natural resources geospatial data layers can be accessed through the ministry's GeoHub and Natural Resources Data Access Requests | Ontario GeoHub. Please note, these Geospatial Ontario (formerly known as Land Information Ontario) GIS data layers available from MNR and the sources listed and linked on this webpage should not be considered as a substitute for site visits and appropriate field surveys. Generally, information available from MNR can be regarded as a starting point from which to conduct further field studies, if needed. While this data represents MNR's best available current information, it is important to note that a lack of information for a site does not mean that additional features and values are not present. There are many areas where MNR does not currently have information. On-site assessments can better verify site conditions, identify natural features and values and confirm presence of species at risk and/or their habitats.

The information below provides an overview of MNR's mandated interests in natural heritage to consider within the project study area. A detailed list of provincial technical guidance material used to identify significant natural heritage features in different landscapes can be found in Appendix B.

Fisheries

All permanent and intermittent watercourses and waterbodies have potential to contain fish habitat or contribute to fisheries resources. MNR is responsible for administering and enforcing the Ontario Fishery Regulations under the *Fisheries Act*.

When agency approvals are required for a proposed project, it is the responsibility of the authorizing regulatory agency to set any in-water work timing windows in their authorizations. These timing windows may be based on the MNR's In-water Work Timing Window Guidelines.

Areas of Natural and Scientific Interest

The study area should be screened for the presence of Areas of Natural and Scientific Interest (ANSI). ANSIs are lands and waters containing features that are important for natural heritage protection, scientific study, and education. ANSIs are identified and confirmed by MNR based on their representation of Ontario's significant geological and natural heritage features and are categorized as either Earth Science or Life Science.

Wetlands

Study areas that contain unevaluated or unmapped wet features should be investigated for the presence of wetlands. Wetlands are lands that are seasonally or permanently covered by shallow water, as well as lands where the water table is close to the surface. Wetlands may

vary in their significance, and the four major types of wetlands are swamps, marshes, bogs, and fens.

As of January 1, 2023, MNR no longer reviews and confirms wetland evaluations. MNR's role with respect to wetland evaluation includes providing the provincial framework under which wetlands in Ontario are evaluated for significance (OWES), and uploading digital wetland boundary mapping and wetland status into the Geospatial Ontario database.

Significant Wildlife Habitat

Study areas which may contain significant wildlife habitat should be investigated for its presence or absence. Significant wildlife habitat may include features such as: seasonal concentration areas for wildlife species (e.g., snake hibernaculum), rare vegetation communities (e.g., tallgrass prairie), specialized habitats of wildlife (e.g., turtle nesting and over-wintering areas), habitats of species of conservation concern (e.g., Special Concern species as identified on the Species at Risk in Ontario list) and animal movement corridors (e.g., amphibian movement corridors). Provincially tracked species data (generalized to Natural Heritage Information Centre 1 km screening grid) can be viewed in Natural Heritage Make a Map. Detailed geospatial data may be obtained through GeoHub via a data sharing agreement.

Please note, relying on online mapping tools only may not accurately reflect the presence or absence of significant wildlife habitat within the project study area. Surveys or additional site level assessment are often required to confirm presence or absence of natural heritage features and values.

Significant Woodlands

Project study areas that contain wooded areas should be investigated for the presence of significant woodlands. Significant woodlands are areas that are ecologically important in terms of features such as species composition, age of trees and stand history; functionally important due to their contribution to the broader landscape; or economically important. Local planning authorities are responsible for identifying significant woodlands in accordance with criteria established by MNR.

Significant Valleylands

Project study areas that occur in a valley or other landform depression that has water for some period of the year should be investigated for the presence of significant valleylands. The identification of valleyland significance is the responsibility of the local planning authority. MNR recommends criteria for determination of valleyland significance.

5. Natural Hazards

In Ontario, development is generally directed away from areas impacted by natural hazards to prevent risks from inappropriate development on and around these lands and to ensure that the risks to public health and safety are minimized. Keeping people and property out of harm's way is a cost-effective, socially responsible, and proactive approach to addressing natural hazards. Various policies and programs direct people and development outside of natural hazard areas.

Responsibility for natural hazard management and implementation of programs and policies for most natural hazards has been delegated to municipalities and Conservation Authorities (CA) where they exist. MNR supports implementation of natural hazard policies by local municipalities and CAs by providing a series of natural hazard technical guidelines (see Appendix B).

Hazardous Lands (flooding, erosion and dynamic beach hazards)

The project location should be reviewed for the presence of hazardous lands. These may include lands subject to flooding and/or erosion and dynamic beaches. These lands become hazardous when people and property locate in these areas. The local municipality and CA should be contacted for further guidance where required.

Special Policy Areas

Some localized areas of the province may be subject to an approved Special Policy Area (SPA), as defined by the PPS. If the study area is located within or adjacent to a SPA, special consideration for any impacts to the flood plain and site-specific SPA policies may be necessary. Any proposed change or modification to the official plan policies, land use designations or boundaries applying to SPA lands, requires joint approval by the Ministers of the Ministry of Municipal Affairs and Housing (MMAH) and MNR.

Local official plans may be reviewed to identify the presence of SPAs within the study area. MNR may have additional information regarding SPAs which can be made available upon request.

Where applicable, information should be identified at the EA stage regarding any expected changes to the floodplain or potential modifications to the SPA subject to provincial approval.

Hazardous Sites (unstable soils and bedrock)

The project location should be reviewed for the presence of hazardous sites. These may include unstable soils (sensitive marine clays [leda], organic soils) or unstable bedrock (karst topography). General information and mapping tools available to assist in identifying the

potential presence of hazardous sites (e.g., karst and organic soils) include, but are not limited to:

- GeologyOntario (gov.on.ca) is maintained by the Ministry of Mines and provides access to all Ontario Geological Survey maps, reports and digital datasets.
- Wetland mapping
- Soil information and mapping maintained by the Ministry of Agriculture, Food and Rural Affairs is available at Soil Survey Complex (GeoON) or AgMaps

Hazardous Forest Types for Wildland Fire

Project study areas containing wooded areas should be screened for the presence of hazardous forest types for wildland fire. Data to identify potential areas that meet this definition can be found in GeoHub - Potential Hazardous Forest Types for Wildland Fire. Note that this data layer is based on forest type data at a coarse scale. Complete assessment of risk and determination of appropriate mitigation measures can only be done with confidence on a site-specific basis.

6. Oil, Gas and Salt Resources

Oil, gas or salt wells are regulated under the *Oil, Gas and Salt Resources Act*, and the supporting regulations and operating standards.

To help determine the presence of petroleum wells within the proposed project area, basic mapping information can be found through the GeoHub portal or the Ontario Oil, Gas and Salt Resources Library (www.ogsrlibrary.com). The 'Definitions and Terminology Guide' listed in the publications section on the library website may provide a better understanding of the well and resource information available.

The Ontario Petroleum Institute (OPI) is an industry association that can assist with retaining the services of a consultant who can provide information about the potential resources located below the property.

If any unanticipated petroleum wells or associated works are encountered during a project, the proponent should cease work immediately and contact MNR's Petroleum Operations Section (POS) to further understand the proponent's obligations under the *Oil, Gas and Salt Resources Act*. The POS may be contacted at POSRecords@ontario.ca or 519-873-4634. In the event of a spill, the project proponent should report it to the Spills Action Centre at 416-325-3000, 1-800-268-6060 (toll free), or 1-855-889-5775 (TTY).

7. Mineral Aggregate Resources

Mineral aggregate resources are usually sand, gravel, clay, earth and bedrock. They are used to make roads, subway tunnels, homes and other structures. Mineral aggregate resources are a non-renewable resource that exist in fixed locations.

MNR has an interest in protecting mineral aggregate resources from incompatible development so they may continue to be available for future extraction. Data to map known deposits of mineral aggregate resources is available from Geology Ontario at GeologyOntario (gov.on.ca).

Project proponents should consider mineral aggregate resources by screening for existing aggregate operations at Find Pits and Quarries | ontario.ca, and consider any potential to preclude or hinder operations and the use of aggregate resource deposits through incompatible development.

8. Crown Lands, Lakes, Rivers and Forests

MNR manages public lands including the beds of most lakes and rivers. Some activities on shore lands (both public and private) are also managed by the MNR.

Public land boundaries (mapping is representative only) and applicable Crown land use policies can be viewed at Crown Land Use Policy Atlas | ontario.ca. Provincial parks and conservation reserves are managed by MECP under the *Provincial Parks and Conservation Reserves Act*.

MNR manages the health of Crown forests so they may continue to provide ecological, economic, and social benefits. Most of Ontario's Crown forests are managed by forest companies under 20-year Sustainable Forest Licences. These companies are responsible for working with government and others to prepare and implement a forest management plan for their licence area, monitoring compliance with the plan and renewing the forest after harvesting trees.

9. Conclusion

The list of interests within MNR's mandate described in this document is not exhaustive. For additional information on legislation and programs the ministry administers see Ministry of Natural Resources | ontario.ca.

If you have identified any MNR interests in your project planning and require additional information, please direct your specific questions to the designated Regional Planner for the project, or to SR.planning@ontario.ca.

Appendix A – MNR Regulatory Role

MNR's regulatory role is triggered when a project proponent seeks an approval under legislation administered by the Ministry. This Appendix provides information about some of the more commonly applicable approvals issued by MNR. Please note, MNR may not be able to confirm the requirement for an approval until a detailed project and site plan have been provided to the Ministry.

A proposal for an MNR approval may engage the ministry's duty to consult Indigenous peoples.

Where MNR is considering an application, the ministry must also ensure its own obligations under the *EAA* are satisfied prior to a final decision. Where an approval would dispose of rights to Crown Resources for a project that has already completed *EAA* requirements under another process, MNR will require written documentation from the applicant setting out how *EAA* requirements for the project have been met prior to MNR issuing any requested approval.

Fish and Wildlife Conservation Act

The *Fish and Wildlife Conservation Act, 1997* regulates the relocation of fish and wildlife. Accordingly, should a project require:

- The relocation of fish outside of the work area, a Licence to Collect Fish for Scientific Purposes will be required.
- The relocation of wildlife outside of the work area (including amphibians, reptiles, and small mammals), will require a Wildlife Collector's Authorization.
- The destruction, taking or possession of any nests or eggs of species not protected by the *Migratory Birds Convention Act (*MBCA*)* or excluded under section 7(2) of the FWCA may also require a Wildlife Collector's Authorization.

To learn more about the management of Fish and Wildlife in Ontario, or to apply for permits or licenses, please visit the Natural Resources Information Portal.

Aggregate Resources Act

The *Aggregate Resources Act* (ARA) is the primary legislative framework for regulating aggregate resource extraction in Ontario. The MNR administers the *ARA* and issues licenses, permits and approves amendments to existing approvals. Information on existing pits and quarries and when an aggregate permit or license may be required can be accessed from MNR's Aggregates Section or GeoHub – Additional Resources

Lakes and Rivers Improvement Act

The *Lakes and Rivers Improvement Act* (LRIA) provides the MNR with regulatory authority over the design, construction, operation, maintenance and safety of dams in Ontario. For

information regarding when a MNR approval may be required and how the LRIA is administered by the Ministry visit Lakes and Rivers Improvement Act administrative guide | ontario.ca

Public Lands Act

The use of public land and shore lands are regulated under the *Public Lands Act*. A work permit must be obtained from MNR to undertake certain activities on public land and shore lands. To occupy public lands in Ontario, you must receive prior approval from MNR unless the use is permitted by regulation. Visit Natural Resources Information Portal for information on when a permit or approval is required and how to submit an application.

Crown Forest Sustainability Act

Any activities that involve a proposal to cut Crown forest resources (e.g., trees on Crown land) may require approval under the *Crown Forest Sustainability Act, 1994.*

Appendix B – Technical Guides

The following technical guides are the province's best available information to support identification of significant natural heritage features in different landscapes:

- Natural Heritage Reference Manual (2010)
- Greenbelt Technical Paper (2005)
- Oak Ridges Moraine Technical Paper 1 (Natural Heritage Features)
- Oak Ridges Moraine Technical Paper 2 (Significant Wildlife Habitat)
- Oak Ridges Moraine Technical Paper 7 (Significant Woodlands)
- Lake Simcoe Protection Plan Technical Paper
- Ontario Wetland Evaluation System (OWES)
- Significant Wildlife Habitat Technical Guide
    - Ecoregion Criterion Schedules for the identification of Significant Wildlife Habitat
        - Ecoregion 5E
        - Ecoregion 6E
        - Ecoregion 7E
    - Significant Wildlife Habitat Mitigation Support Tool (MiST)

Other supporting information may be found at Ontario GeoHub or Natural Resources Data Access Requests | Ontario GeoHub.

The following technical guides are the province's best available information to support implementation of MNR's interest in natural hazards (contact MNR to request pdf copies):

- Understanding Natural Hazards (2001)
- Special Policy Areas Procedures (2009)
- Technical Guide – River & Stream Systems: Flooding Hazard Limit (2002)
- Technical Guide – River & Stream Systems: Erosion Hazard Limit (2002)
- Great Lakes-St. Lawrence River Shorelines: Flooding, Erosion and Dynamic Beaches (2001)
- Technical Guide for Large Inland Lakes Shorelines: Flooding, Erosion and Dynamic Beaches (1996)
- Hazardous Sites Technical Guide (1996)
- Technical Bulletin: Flooding Hazards: Data Survey and Mapping Specifications (2023)
- Wildland Fire Risk Assessment and Mitigation Reference Manual (2017)

The following technical guide is the province's best available information supporting implementation of MNR's mandated interest in mineral aggregate resources (contact MNR to request pdf copy):

- Non-renewable Resources Training Manual (1997)

Ministry of Citizenship and
Multiculturalism

Kevin Cortez

From: Leclerc, Erika (MCM) <erika.leclerc@ontario.ca>
Sent: April 14, 2026 10:18 AM
To: Nick Bialik
Cc: Jordan Morrissette; Yves Morrissette; Kevin Cortez; Eric Gadoua; Pierre-Paul Beauchamp
Subject: MCM Response - Municipality of Casselman Sewage Treatment System Schedule C Class EA - Notice of Completion [MCM File 0022075]
Attachments: 2026-04-14 Casselman-STS-ESR-MCMComments.pdf

[CAUTION] This email originated from outside JLR. Do not click links or open attachments unless you recognize the sender and know the content is safe. Do not forward suspicious emails, if you are unsure, please send a separate message to Helpdesk.

Good morning,

Thank you for sending the Notice of Completion for the above-referenced project to MCM. My apologies for the delayed response. Our comments on the ESR are attached.

Please contact me if you have any questions.

Best regards,

Erika Leclerc
Heritage Planner | Heritage Operations Branch | Citizenship, Inclusion and Heritage Division
Ministry of Citizenship and Multiculturalism | Ontario Public Service
416-305-0757 | erika.leclerc@ontario.ca

Ontario

Taking pride in strengthening Ontario, its places and its people

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From: Nick Bialik <nbialik@jlrichards.ca>
Sent: March 12, 2026 2:19 PM
Cc: Jordan Morrissette <jmorrissette@jlrichards.ca>; Yves Morrissette <ymorrissette@casselman.ca>; Kevin Cortez <kcortez@jlrichards.ca>; Eric Gadoua <egadoua@casselman.ca>; Pierre-Paul Beauchamp <ppbeauchamp@casselman.ca>
Subject: Municipality of Casselman Sewage Treatment System Schedule C Class EA - Notice of Completion

CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Hello,

You have been copied on this email because you were identified as a stakeholder for the Casselman Sewage Treatment System Upgrade Schedule 'C' Class Environmental Assessment.

Please find attached the Notice of Completion for this study. Through issuance of this notice, the Environmental Study Report is being place on public record for thirty (30) calendar days in accordance with the requirements of the Municipal Class EA process. Please refer to the attached notice for additional information, including where you can review the Environmental Study Report, and how you can provide comments or submit a Section 16 Order request.

Should you have any questions or feedback, please do not hesitate to respond to this email or contact the project contacts found in the attached notice.

Best,

Nick Bialik, P.Eng. (he/him)
Environmental Engineer

1000-343 Preston Street
Ottawa ON K1S 1N4
Work: 343-804-5346
nbialik@jlrichards.ca

Ministry of Citizenship and Multiculturalism

Heritage Planning Unit
Heritage Operations Branch
Citizenship, Inclusion and Heritage Division
16th Flr, 56 Wellesley St W
Toronto, ON M5S 2S3
Tel.: 416-305-0757

Ministère des Affaires civiques et du Multiculturalisme

Planification relative au patrimoine
Opérations relatives au patrimoine
Division des affaires civiques, de l'inclusion et du patrimoine
16e étage, 56 rue Wellesley Ouest
Toronto, ON M5S 2S3
Tél.: 416-305-0757

Ontario

April 14, 2026 EMAIL ONLY

Nicolas Bialik, P.Eng.
Environmental Engineer
J.L. Richards & Associates Ltd.
nbialik@jlrichards.ca

MCM File	**:**	**0022075**
Proponent	**:**	**Municipality of Casselman**
Subject	**:**	**Municipal Class Environmental Assessment – Schedule C – Notice of Completion**
Project	**:**	**Casselman Sewage Treatment System**
Location	**:**	**Municipality of Casselman, United Counties of Prescott and Russell**

Dear Nicolas Bialik:

Thank you providing the Ministry of Citizenship and Multiculturalism (MCM) with the Environmental Study Report (ESR, dated March 2026 and prepared by J.L. Richards & Associates Limited) for the above-referenced project.

MCM's interest in this Environmental Assessment (EA) project relates to its mandate of conserving Ontario's cultural heritage.

Project Summary
The Municipality of Casselman has completed a Schedule 'C' Municipal Class EA for the Casselman Sewage Treatment System. The purpose of this Class EA was to provide recommendations on the preferred system upgrades to effectively treat wastewater generated from existing and projected future development areas. This study was conducted according to the requirements of Phases 1 to 4 of the Municipal Engineers Association Municipal Class EA process, which is an approved process under the *Environmental Assessment Act*.

The preferred design concept for the Casselman Sewage Treatment System, as outlined in the Environmental Study Report, includes increasing the rated capacity of the existing lagoon-based treatment system to 4,050 m3/day.

Comments
On May 1, 2025, MCM provided comments on the Draft ESR (Phase 1 & 2 Summary) (dated March 2025 and prepared by J.L. Richards & Associates Limited). In response to MCM's comments, the proponent provided clarifying information, via email, on May 2, 2025.

MCM understands that the March 2026 version of the ESR documents the following:

- The proponent completed the checklist *Criteria for Evaluating Archaeological Potential* (included in Appendix E1 of the ESR) and determined that there is low potential for archaeological resources within the study area and that an archaeological assessment is not required.
- The proponent completed the checklist *Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes* (included in Appendix E2 of the ESR) and determined that there is low potential for built heritage resources and cultural heritage landscapes within the study area and that no further technical cultural heritage studies are required.

The updated version of the ESR (dated March 2026) addresses some of MCM's comments, however, we have included a table with additional comments and recommended revisions to assist in clearly documenting cultural heritage due diligence and consistency with the legislative framework. This table also includes MCM's previous comments dated May 1, 2025.

Thank you for consulting MCM on this project. If you have any questions or require clarification, please do not hesitate to contact me.

Sincerely,

Erika Leclerc
Heritage Planner
Erika.leclerc@ontario.ca

Copied to: Yves Morrissette, Chief Administrative Officer, Municipality of Casselman
EA Notices to Eastern Region (MECP), eanotification.eregion@ontario.ca
Jon Orpana, EA Coordinator, MECP
Karla Barboza, Team Lead, Heritage Planning Unit, MCM

It is the sole responsibility of proponents to ensure that any information and documentation submitted as part of their EA report or file is accurate. The Ministry of Citizenship and Multiculturalism (MCM) makes no representation or warranty as to the completeness, accuracy or quality of the any checklists, reports or supporting documentation submitted as part of the EA process, and in no way shall MCM be liable for any harm, damages, costs, expenses, losses, claims or actions that may result if any checklists, reports or supporting documents are discovered to be inaccurate, incomplete, misleading or fraudulent.

Should previously undocumented archaeological resources be discovered, they may be a new archaeological site and therefore subject to Section 48(1) of the *Ontario Heritage Act*. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licensed consultant archaeologist to carry out an archaeological assessment, in compliance with Section 48(1) of the *Ontario Heritage Act*.

The *Funeral, Burial and Cremation Services Act, 2002, S.O. 2002, c.33* requires that any person discovering human remains must cease all activities immediately and notify the police or coroner. If the coroner does not suspect foul play in the disposition of the remains, in accordance with *Ontario Regulation 30/11* the coroner shall notify the Registrar, Ontario Ministry of Public and Business Service Delivery and Procurement, which administers provisions of that Act related to burial sites. In situations where human remains are associated with archaeological resources, the Ministry of Citizenship and Multiculturalism should also be notified (at archaeology@ontario.ca) to ensure that the archaeological site is not subject to unlicensed alterations which would be a contravention of the *Ontario Heritage Act*.

Comment #	Report Section	Comments (May 1, 2025)	Proposed Action / Solution (May 1, 2025)	Comments (April 14, 2026)
Comments on the Draft Environmental Study Report [ESR] (Phase 1 & 2 Summary) (dated March 2025)				
1.	2.1.1 Physical Description of the Casselman STS, Figure 2 (p.7)	See comments in the cover letter. The study area assessed by the Stage 1 AA and CHAR does not align with Figure 2.	Please revise the ESR accordingly.	MCM's previous comment has been addressed. Clarification was provided via email on May 2, 2025.
2.	2.1.8 Cultural Heritage Resources (p. 15-16)	This section should describe the existing conditions as it relates to cultural heritage resources, and we recommend that subsections are included to clearly articulate the existing conditions for the 3 types of cultural heritage resources. The Description of Existing Conditions as it relates to archaeological resources will be based on the archaeological assessment (AA) report(s) completed and include: • a brief overview of all the stages of archaeological assessment undertaken (e.g., Stage 1, 2) and the objective of the stage of assessment. • The outcomes (conclusions and recommendations) of the archaeological assessment(s) completed in support of this undertaking. • all associated PIF#s, AA report(s) and MCM letter(s) indicating that the report has been entered into	Recommended organization and text (*Replace the text as follows:)* Cultural heritage resources, which include archaeological resources, built heritage resources and cultural heritage landscapes, are an important aspect of the cultural environment and could be impacted by the proposed undertaking. The Ministry of Citizenship and Multiculturalism (MCM) **has developed screening checklists to assist municipalities, developers, consultants, and property owners (non heritage specialists) to determine if the study area has the potential for cultural heritage resources.** **2.1.8.1 Archaeological Resources** **The screening checklist *Criteria for Evaluating Archaeological Potential* was completed (see Appendix E1) and**	Please see comments #6-9 below on the ESR dated March 2026.

Comment #	Report Section	Comments (May 1, 2025)	Proposed Action / Solution (May 1, 2025)	Comments (April 14, 2026)
		the Ontario Public Register of Archaeological Reports. A sub-section on built heritage resources and cultural heritage landscapes should describe any known and potential built heritage resources and cultural heritage landscapes within the study area.	**concluded that the study area has archaeological potential.** **The following archaeological assessment(s) have been carried out to support this project:** • **Stage 1 AA (Project Information Form (PIF) xx)** • **[list all AAs and include the stage and PIF number]** **A Stage 1 AA consists of a review of geographic, land use and historical information for the property and the relevant surrounding area, a property visit to inspect its current condition and contacting MCM to find out whether, or not, there are any known archaeological sites on or near the property. Its purpose is to identify areas of archaeological potential and further archaeological assessment (e.g. Stage 2-4) as necessary. The Stage 1 AAs are included in Appendix X."** [*Then include the outcomes and recommendations of each report, as in the Executive Summary]* **The proposed works do not include any works within natural watercourses or waterbodies. Therefore, no marine**	

Comment #	Report Section	Comments (May 1, 2025)	Proposed Action / Solution (May 1, 2025)	Comments (April 14, 2026)
			archaeological assessment has been undertaken. 2.1.8.2 Built Heritage Resources and Cultural Heritage Landscapes The screening checklist *Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes* was completed (see Appendix E2) and concluded that the study area has potential for built heritage resources and cultural heritage landscapes. A Draft Cultural Heritage Assessment Report was completed on October 2024 (see Appendix E5) by Archaeological Research Associates Ltd. for the study area. The assessment for this report consisted of data collection, background historic research, review of secondary source material and field review. A total of 5 (known and potential) built heritage resources and cultural heritage landscapes were identified within or adjacent to the study area as listed below: • Rue Principale Street/ Paul Émile Lévesque Bridge • N. Coupal Dam and Casselman Hydroelectric Generating Station • South Nation River Corridor	

Comment #	Report Section	Comments (May 1, 2025)	Proposed Action / Solution (May 1, 2025)	Comments (April 14, 2026)
			• **Doran Park/High Falls Conservation Area** • **J. Brisson Farm Cemetery**"	
3.	Table 4: Water Supply and Treatment Evaluation Matrix (p. 13) & Table 12: Sewage Treatment Matrix (p. 27)	MCM recommends that the analysis of potential impacts on cultural heritage resources be further expanded and based on the technical cultural heritage studies completed and aligned with the current terminology. The evaluation of alternatives should consider impacts to the three types of cultural heritage resources (archaeological resources, built heritage resources and cultural heritage landscapes).	We recommend the separate bullets are included to address potential impacts on (1) archaeological resources and (2) built heritage resources and cultural heritage landscapes. These bullets should account for potential impacts to archaeological resources and areas of archaeological potential e.g., disturbance or destruction; and potential impacts to built heritage resources and cultural heritage landscapes e.g., displacement of resources by demolition or removal; disruption of resources by the introduction of physical, visual, audible, or atmospheric elements that are not in keeping with the character and setting of the resource.	Please see comment #10 below on the ESR dated March 2026.
4.	4.0 Consultation Summary (p. 28)	MCM recommends revising this section to include comments received on this specific project. It is not clear why the summary of the comments on the master plan were included here	The ESR document should be updated to include a section describing Stakeholder and Indigenous engagement as part of the MCEA Schedule C that is separate from the Master Plan process and references the appendices that are provided.	MCM's previous comment has been addressed. We understand that the updated version of the ESR includes both a summary of Master Plan and Class EA comments, and that only comments relevant to the Casselman STS upgrades are included in Tables 23 and 24 (Section 7.0 of the ESR dated March 2026).

Comment #	Report Section	Comments (May 1, 2025)	Proposed Action / Solution (May 1, 2025)	Comments (April 14, 2026)
Comments on Appendix E5 of the ESR dated March 2025: Draft Cultural Heritage Assessment Report, Casselman Main SPS Upgrades (ARA, October 23, 2024)				
5.	N/A	N/A - See MCM's letter dated May 1, 2025.	N/A – See MCM's letter dated May 1, 2025.	Clarification was provided via email on May 2, 2025. The report is no longer included in the appendix of the most recent version of the ESR (dated March 2026), and therefore these comments are no longer applicable.
Comments on the ESR (dated March 2026)				
6.	p.17 – "Cultural Heritage Resources" section (p.18)	N/A	N/A	It seems that there may be a formatting error in the ESR as this section title does not include a number. We recommend that this be revised.
7.	2.1.7.1 Archaeological Resources (p.18)	N/A	N/A	To document due diligence, we recommend elaborating on the results of MCM's checklist, as follows: "The screening checklist Criteria for Evaluating Archaeological Potential was completed (see Appendix E1) and concluded that the study area does not have archaeological potential **because the study area has been subjected to recent, extensive and intensive disturbance (see question 8 of checklist)**. **[We recommend clarifying/elaborating on how this was determined.]** The proposed works do not include any works within natural watercourses or waterbodies. Therefore, the checklist Criteria for Evaluating Marine

Comment #	Report Section	Comments (May 1, 2025)	Proposed Action / Solution (May 1, 2025)	Comments (April 14, 2026)
				Archaeological Potential was not completed."
8.	2.1.7.2 Built Heritage Resources and Cultural Heritage Landscapes (p.18)	N/A	N/A	We recommend elaborating on the results of MCM's checklist to clearly document cultural heritage due diligence. The proponent responded "yes" to question 2, indicating that the study area has been evaluated before and found not to be of cultural heritage value. It appears that this is based on the findings of the Draft Cultural Heritage Assessment Report, Casselman Main SPS Upgrades (ARA, October 23, 2024) – we recommend clarifying, as follows: "The screening checklist Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes was completed (see Appendix E2) and concluded that the area does not have potential for built heritage resources or cultural heritage landscapes. **The study area was previously evaluated by [XXX – please clarify] and found not to be of cultural heritage value or interest (see question 2 of the checklist). [Please specify/elaborate on the context of the previous evaluation, e.g., is this referring to the Cultural Heritage Assessment Report prepared for the Casselman Main SPS Design Project, as referenced in Section 2.1.7.3?]**"
9.	2.1.7.3 Studies Completed as	N/A	N/A	MCM recommends that this section be revised, as it may confuse the reader.

Comment #	Report Section	Comments (May 1, 2025)	Proposed Action / Solution (May 1, 2025)	Comments (April 14, 2026)
	part of the 2024 Casselman Main SPS Design Project (p.18)			The ESR indicates that the study areas for the Stage 1 AA and Cultural Heritage Assessment Report, conducted for the 2024 Casselman Main SPS Design Project, "partially overlap" with the study area for this EA. Furthermore, the ESR states that "These studies further confirm that there are no cultural heritage features within the Study Area. The study reports have not been appended to the ESR (per discussions with the MCM during the Class EA) but can be provided upon request." If the study areas for these technical studies only <u>partially</u> overlap with the EA study area, then the findings of these studies cannot confirm that there are no cultural heritage resources within the entirety of the EA study area. We recommend that this be clarified. Section 2.1.7.3 should also be revised for consistency with the terminology of the OHA – the term "cultural heritage features" should be replaced by "cultural heritage resources." The Project Information Form (PIF) number of the Stage 1 AA, as well as the status of the report, should also be clarified. We recommend the following revisions: "In addition to the screening checklists completed, **technical cultural heritage studies were previously completed** as part of the 2024 Casselman Main SPS upgrades design, which partially overlap with the lagoon system upgrades~~,~~**. The information below is**

Comment #	Report Section	Comments (May 1, 2025)	Proposed Action / Solution (May 1, 2025)	Comments (April 14, 2026)
				included in the ESR to further document that there is low potential for cultural heritage resources within the EA study area. ~~a~~ **A** Stage 1 Archaeological Assessment (ARA, 2025) **(under Project Information Form (PIF) number [XXX] for the [XXX areas. Please explain what areas overlap with the current EA]. The Stage 1 AA determined that [XXX – please describe the findings].** ~~and a~~ **A** Cultural heritage Assessment Report (ARA, 2024) ~~were~~ **was** completed **for [XXX area]**. ~~These studies further confirm that there are no cultural heritage features within the Study Area~~. **[Summarize the findings].** The study reports have not been appended to the ESR (per discussions with the MCM during the Class EA), but can be provided upon request."
10.	3.2.4 Evaluation of Alternative Solutions, Table 12 (p.28)	N/A	N/A	We recommend that the "Social and Cultural Environment" row of Table 12 be revised for consistency with the terminology of the legislative framework: • "Alternative 2a […]" column: "Increasing lagoon footprint would require cultural heritage resource screening **to determine potential for archaeological resources, built heritage resources, and cultural heritage landscapes** and **could result in** potential impacts ~~on~~ **to these resources** ~~undisturbed sites~~."

Comment #	Report Section	Comments (May 1, 2025)	Proposed Action / Solution (May 1, 2025)	Comments (April 14, 2026)
				• "Alternative 2b […]" column: "No impact anticipated with respect to land use planning, cultural heritage **resources (including archaeological resources, built heritage resources, cultural heritage landscapes)**, source water protection, ~~archaeological resources~~ as project is contained within the existing site boundary." • "Alternative 3 […]" column: See bullet above.
11.	4.4.3 Evaluation of Alternative Design Concepts, Table 18 (p.40)	N/A	N/A	We recommend that the "Social and Cultural Environment" row of Table 18 be revised for consistency with the terminology of the legislative framework: • "Alternative TP1" column: "No impacts to surrounding land use, cultural heritage **resources**, source water protection, or **areas of** archaeological potential." • "Alternative TP2" column: "[…] this option does not provide additional impacts to surrounding land use, cultural heritage **resources**, source water protection, or **areas of** archaeological ~~resources~~ **potential**."
12.	6.0 Potential Impacts and Mitigation	N/A	N/A	MCM recommends that the table in Section 6 be revised for consistency with the legislative framework. We recommend the following edits

Comment #	Report Section	Comments (May 1, 2025)	Proposed Action / Solution (May 1, 2025)	Comments (April 14, 2026)
	Measures (p.51)			to the "Cultural Heritage Resources" row: "~~There were no potential~~ **The proponent determined that that the study area has low potential for** archaeological **resources**, built heritage, or cultural heritage resources**, as** ~~identified~~ **described** in Section ~~9~~ **[See comment #6 regarding title formatting]**. […] If during design or construction, there is potential that a built heritage resource or cultural heritage landscape is impacted by the upgrades, a ~~licensed consultant archaeologist~~ **qualified person** will be retained to complete cultural heritage ~~assessment~~ report**: existing conditions and preliminary impact assessment**, which would include the following: • Identification of preliminary potential project-specific impacts on the known and potential built heritage resources and cultural heritage landscapes that have been identified, including a description of the anticipated impact to each known or potential built heritage resource or cultural heritage landscape that have been identified. • Recommended measures to avoid or mitigate potential negative impacts to known or potential built heritage resources and cultural heritage landscapes will be identified.

Comment #	Report Section	Comments (May 1, 2025)	Proposed Action / Solution (May 1, 2025)	Comments (April 14, 2026)
				The report will be completed prior to any ground disturbing activities. The proposed mitigation measures are to inform the next steps of project planning and design."

Kevin Cortez

From: Abrazhevich, Anastasia (MCM) <Anastasia.Abrazhevich@ontario.ca>
Sent: June 17, 2025 1:50 PM
To: Nick Bialik; Kevin Cortez
Cc: Pierre-Paul Beauchamp; Jordan Morrissette; Barboza, Karla (She/Her) (MCM); Leclerc, Erika (MCM); Hamilton, James (MCM); Orpana, Jon (MECP)
Subject: RE: MCM Response - Casselman Lagoon Expansion Class EA - Phase 1 & 2 Background Summary
Attachments: 2025-05-01-Casselman_ESR_MCM_Comments.pdf

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Hi Nick,

Apologies for the late response.

Thank you for the additional clarification and apologies for the delay in responding.

We concur with your approach – please remove all references and technical studies that are not relevant to the Lagoon Expansion EA project and include the completed screening checklists and associated supporting documentation in the Appendix.

The Existing Conditions section of the ESR should be revised, please remove the Archaeological Assessment, CHAR and any other studies that do not pertain to the Casselman Lagoon Expansion Class EA. For further revisions to the ESR, please refer to MCM's comments listed in the table (attached).

We look forward to reviewing the revised ESR to ensure due diligence related to cultural heritage has been appropriately addressed. Let us know if you have any questions.

Best regards,

Anastasia Abrazhevich
Heritage Planner | Citizenship, Inclusion and Heritage Division
Ministry of Citizenship and Multiculturalism | Ontario Public Service
437 240 2379 anastasia.abrazhevich@ontario.ca

Ontario

Taking pride in strengthening Ontario, its places and its people

From: Nick Bialik <nbialik@jlrichards.ca>
Sent: Friday, May 2, 2025 2:31 PM
To: Abrazhevich, Anastasia (MCM) <Anastasia.Abrazhevich@ontario.ca>; Kevin Cortez <kcortez@jlrichards.ca>
Cc: Pierre-Paul Beauchamp <ppbeauchamp@casselman.ca>; Jordan Morrissette <jmorrissette@jlrichards.ca>; Barboza, Karla (She/Her) (MCM) <Karla.Barboza@ontario.ca>; Leclerc, Erika (MCM) <erika.leclerc@ontario.ca>
Subject: RE: MCM Response - Casselman Lagoon Expansion Class EA - Phase 1 & 2 Background Summary

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Hi Anastasia,

Based upon a general review of the comments, I'd like to clarify the following:

- As per Section 2.1.8, screening checklists were completed for this project (Casselman Sewage Treatment System (STS) Upgrades), which identified that the undertaking does not have the potential to impact archaeological resources, built heritage resources or cultural heritage landscapes.
- The Stage 1 AA and CHAR included in the ESR as Appendix E4 and E5 were undertaken for a separate project, the Casselman Sewage Pumping Station (SPS) Upgrades; the study areas are not supposed to match. The reason these studies were added to the ESR is that, as described in 2.1.8, the study area for the Stage 1 AA and CHAR intercepted a section of the Casselman STS site. Reviewing that portion only, we find that there are no resources or potential resources identified.

We would like to request that the findings from the Stage 1 AA and CHAR study reports be addressed as part of the separate project: the **Casselman Main SPS Upgrades**, for which these studies were completed. For the **Casselman STS Upgrades**, the screening checklist and the reports have found that there is no potential to impact archaeological resources, built heritage resources or cultural heritage landscapes. Alternatively, we can remove all references to these reports, given that the screening checklists found that there is no potential to impact archaeological resources, built heritage resources or cultural heritage landscapes.

Let us know your recommended approach.

Note that we intend to address any comments relating to organization, text, etc.

Thanks,

Nick Bialik, P.Eng. (he/him)
Environmental Engineer

1000-343 Preston Street
Ottawa ON K1S 1N4
Work: 343-804-5346
nbialik@jlrichards.ca

From: Abrazhevich, Anastasia (MCM) <Anastasia.Abrazhevich@ontario.ca>
Sent: Thursday, May 1, 2025 4:07 PM
To: Kevin Cortez <kcortez@jlrichards.ca>
Cc: Nick Bialik <nbialik@jlrichards.ca>; Pierre-Paul Beauchamp <ppbeauchamp@casselman.ca>; Jordan Morrissette <jmorrissette@jlrichards.ca>; Barboza, Karla (She/Her) (MCM) <Karla.Barboza@ontario.ca>; Leclerc, Erika (MCM) <erika.leclerc@ontario.ca>
Subject: MCM Response - Casselman Lagoon Expansion Class EA - Phase 1 & 2 Background Summary

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Hi Kevin,

I apologize for the late response.

Please refer to comments on the Phase 1& 2 Report, including the Cultural Heritage Assessment Report.

If you have any questions or concerns do not hesitate to reach out.

Thank you,

Anastasia Abrazhevich
Heritage Planner | Citizenship, Inclusion and Heritage Division
Ministry of Citizenship and Multiculturalism | Ontario Public Service
437 240 2379 anastasia.abrazhevich@ontario.ca

Ontario

Taking pride in strengthening Ontario, its places and its people

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From: Kevin Cortez <kcortez@jlrichards.ca>
Sent: Friday, March 7, 2025 5:43 PM
To: Abrazhevich, Anastasia (MCM) <Anastasia.Abrazhevich@ontario.ca>
Cc: Nick Bialik <nbialik@jlrichards.ca>; Pierre-Paul Beauchamp <ppbeauchamp@casselman.ca>; Jordan Morrissette <jmorrissette@jlrichards.ca>
Subject: 16953-131 Casselman Lagoon Expansion Class EA - Phase 1 & 2 Background Summary

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Good evening Anastasia,

Please note that we have completed a summary document of Phase 1 and Phase 2 the Casselman Lagoon Expansion Schedule 'C' Class EA, based on the information compiled in the Master Plan process. Within this summary, we have provided additional information to address the comments outlined in the MCM's attached response letter from January 8, 2025. Please refer to **Section 2.1.8 Cultural Heritage Resources** of the report and also note that mitigation measures identified in the referenced background reports will be included in the final ESR.

The Municipality is now proceeding with Phase 3 of the Class EA.

Let us know if you have any questions or issues accessing the file.

Best,
Kevin

Ministry of Citizenship and Multiculturalism

Heritage Planning Unit
Heritage Operations Branch
Citizenship, Inclusion and Heritage Division
5th Flr, 400 University Ave
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Ministère des Affaires civiques et du Multiculturalisme

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Ontario

May 1, 2025

EMAIL ONLY

Nick Bialik
P. Eng, Environmental Engineer
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nbialik@jlrichards.ca

MCM File	**:**	**0022075**
Proponent	**:**	**Municipality of Casselman**
Subject	**:**	**Municipal Class Environmental Assessment – Schedule C – Draft Environmental Study Report (Phase 1 & 2 Summary)**
Project	**:**	**Casselman Sewage Treatment System**
Location	**:**	**Municipality of Casselman, County of Prescott and Russell**

Dear Nick Bialik

Thank you for providing the Ministry of Citizenship and Multiculturalism (MCM) with the draft *Environmental Study Report (Phase 1 & 2 Summary) – Casselman Sewage Treatment System Expansion – Schedule 'C' Class Environmental Assessment (*ESR, dated March 2025 and prepared by J.L. Richards & Associates Ltd.*)* for our review and comment.

MCM's interest in this project relates to its mandate of conserving Ontario's cultural heritage.

Project Summary
The Municipality of Casselman has initiated a Class Environmental Assessment (Class EA) to determine the preferred expansion design concept for the Casselman Sewage Treatment System (STS) to effectively treat wastewater generated from the existing and projected future development areas. This study is being conducted according to the requirements of a Schedule 'C 'project under the Municipal Class Environmental Assessment process (October 2000, as amended in 2023).

The study is being undertaken following the completion of the Casselman Water and Wastewater Infrastructure Master Plan in July 2024 which recommended an increase of the existing STS rated capacity from 2,110 m3/day to 4,050 m3 per day.

The ESR indicates that the upgrades consist of the installation of a new force main alignment beside the existing force main, modification to existing pumping infrastructure and equipment, and the installation of an emergency gravity bypass overflow to discharge to the South Nation River.

Comments

We have reviewed the above referenced Environmental Study Report and have the following comments and recommendations to ensure that due diligence related to cultural heritage is documented:

Archaeological Resources

Our records indicate that the following archaeological assessments have started but the licensed archaeologist has yet to submit the reports for MCM's review:

- Stage 1 Archaeological Assessment *(*AA, under Project Information Form number (PIF) # P1106-0051-2024 and included as Appendix E4 of the draft ESR).
- Stage 1 Archaeological Assessment *(*AA, under Project Information Form #P1106-0066-2025 and not included in the draft ESR).
- Stage 2 Archaeological Assessment (AA under Project PIF #P1106-0064-2024 and not included in the draft ESR).

We note that the archaeological assessments referenced above do not align with the study area depicted in the draft ESR (Figure 2). For example, Map 1 of the Stage 1 AA (PIF P1106-0066-2024) does not align with Figure 2 of the draft ESR. The draft ESR should be revised to clarify the study area and inform the relevant archaeological assessments.

Please note that archaeological concerns have not been fully addressed until reports have been entered into the Ontario Public Register of Archaeological Reports ('the Register') where those reports recommend that:

1. the archaeological assessment of the project area is complete and
2. all archaeological sites identified by the assessment are either of no further cultural heritage value or interest (as per Section 48(3) of the Ontario Heritage Act) or that mitigation of impacts has been accomplished through excavation or an avoidance and protection strategy.

Approval authorities and/or proponents should wait to receive the MCM's written confirmation that the archaeological assessment report(s) has been entered into the Register before issuing a decision or proceeding with any ground disturbing activities. The letter will also indicate either that there are no further concerns for impacts to archaeological resources or articulate next steps to mitigate any concerns.

Proponents must follow the recommendations of the archaeological assessment report(s). MCM recommends that further stages of archaeological assessment (if recommended) be undertaken as early as possible during detailed design and prior to any ground disturbing activities.

We may have additional comments on the ESR once it has been revised and the archaeological assessments have been submitted and, subsequently, entered into the Register.

Built Heritage Resources and Cultural Heritage Landscapes

A Cultural Heritage Assessment Report (dated October 23, 2024, prepared by Archaeological Research Associates Ltd., and included as Appendix E5) was prepared to identify any known or potential built heritage resources and cultural heritage landscapes (BHRs/CHLs) within and adjacent to the study area that may be directly or indirectly impacted by the proposed SPS upgrades and recommend mitigation measures for identified impacts.

The report concluded that five BHRs/CHLs were identified adjacent to the study area as having (potential) cultural heritage value or interest (CHVI) or potential CHVI, and recommended mitigation measures.

We have attached a table with more detailed comments.

Thank you for the opportunity to review the draft ESR. We look forward to reviewing the next version. If you have any questions or require clarification, please do not hesitate to contact me.

Sincerely,

Anastasia Abrazhevich
Sent on behalf of

Erika Leclerc
Heritage Planner
erika.leclerc@ontario.ca

Copied to:

Kevin Cortez, J.L. Richards & Associates Ltd.
Pierre-Paul Beauchamp, Municipality of Casselman
Jordan Morrissette, Municipality of Casselman
Erika Leclerc, Heritage Planner, Heritage Planning Unit, MCM
Karla Barboza, Team Lead, Heritage Planning Unit, MCM

It is the sole responsibility of proponents to ensure that any information and documentation submitted as part of their EA report or file is accurate. The Ministry of Citizenship and Multiculturalism (MCM) makes no representation or warranty as to the completeness, accuracy or quality of the any checklists, reports or supporting documentation submitted as part of the EA process, and in no way shall MCM be liable for any harm, damages, costs, expenses, losses, claims or actions that may result if any checklists, reports or supporting documents are discovered to be inaccurate, incomplete, misleading or fraudulent.

Should previously undocumented archaeological resources be discovered, they may be a new archaeological site and therefore subject to Section 48(1) of the *Ontario Heritage Act*. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licensed consultant archaeologist to carry out an archaeological assessment, in compliance with Section 48(1) of the *Ontario Heritage Act*.

The *Funeral, Burial and Cremation Services Act, 2002, S.O. 2002, c.33* requires that any person discovering human remains must cease all activities immediately and notify the police or coroner. If the coroner does not suspect foul play in the disposition of the remains, in accordance with *Ontario Regulation 30/11* the coroner shall notify the Registrar, Ontario Ministry of Public and Business Service Delivery and Procurement, which administers provisions of that Act related to burial sites. In situations where human remains are associated with archaeological resources, the Ministry of Citizenship and Multiculturalism should also be notified (at archaeology@ontario.ca) to ensure that the archaeological site is not subject to unlicensed alterations which would be a contravention of the *Ontario Heritage Act*.

Item #	Report Section	Comments/Concerns	Proposed Action/Solution
Draft Environmental Study Report (Phase 1 & 2 Summary) (J.L. Richards & Associates Ltd., March 2025)			
1.	2.1.1 Physical Description of the Casselman STS Figure 2 p. 7 [PDF 8]	See comments in the cover letter. The study area assessed by the Stage 1 AA and CHAR does not align with Figure 2.	Please revise the ESR accordingly.
2.	2.1.8 Cultural Heritage Resources p. 15-16 [PDF 16-17]	This section should describe the existing conditions as it relates to cultural heritage resources, and we recommend that subsections are included to clearly articulate the existing conditions for the 3 types of cultural heritage resources. The Description of Existing Conditions as it relates to archaeological resources will be based on the archaeological assessment (AA) report(s) completed and include: - a brief overview of all the stages of archaeological assessment undertaken (e.g., Stage 1, 2) and the objective of the stage of assessment. - The outcomes (conclusions and recommendations) of the archaeological assessment(s) completed in support of this undertaking. - all associated PIF#s, AA report(s) and MCM letter(s) indicating that the report has been entered into the Ontario Public Register of Archaeological Reports. A sub-section on built heritage resources and cultural heritage landscapes should describe any known and potential built heritage resources and cultural heritage landscapes within the study area.	Recommended organization and text (*Replace the text as follows:)* Cultural heritage resources, which include archaeological resources, built heritage resources and cultural heritage landscapes, are an important aspect of the cultural environment and could be impacted by the proposed undertaking. The Ministry of Citizenship and Multiculturalism (MCM) **has developed screening checklists to assist municipalities, developers, consultants, and property owners (non heritage specialists) to determine if the study area has the potential for cultural heritage resources.** **2.1.8.1 Archaeological Resources** **The screening checklist *Criteria for Evaluating Archaeological Potential* was completed (see Appendix E1) and concluded that the study area has archaeological potential.**

Item #	Report Section	Comments/Concerns	Proposed Action/Solution
		The findings of the *Cultural Heritage Assessment Report (2024)* be discussed and referenced within this section of the ESR.	**The following archaeological assessment(s) have been carried out to support this project:** - **Stage 1 AA (Project Information Form (PIF) xx)** - **[list all AAs and include the stage and PIF number]** **A Stage 1 AA consists of a review of geographic, land use and historical information for the property and the relevant surrounding area, a property visit to inspect its current condition and contacting MCM to find out whether, or not, there are any known archaeological sites on or near the property. Its purpose is to identify areas of archaeological potential and further archaeological assessment (e.g. Stage 2-4) as necessary. The Stage 1 AAs are included in Appendix X."** [*Then include the outcomes and recommendations of each report, as in the Executive Summary]* **The proposed works do not include any works within natural watercourses or waterbodies. Therefore, no marine archaeological assessment has been undertaken.** **2.1.8.2 Built Heritage Resources and Cultural Heritage Landscapes** **The screening checklist *Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes* was completed (see Appendix E2) and concluded that the study area has potential**

Item #	Report Section	Comments/Concerns	Proposed Action/Solution
			for built heritage resources and cultural heritage landscapes. **A Draft Cultural Heritage Assessment Report was completed on October 2024 (see Appendix E5) by Archaeological Research Associates Ltd. for the study area. The assessment for this report consisted of data collection, background historic research, review of secondary source material and field review. A total of 5 (known and potential) built heritage resources and cultural heritage landscapes were identified within or adjacent to the study area as listed below:** - **Rue Principale Street/ Paul Émile Lévesque Bridge** - **.N. Coupal Dam and Casselman Hydroelectric Generating Station** - **South Nation River Corridor** - **Doran Park/High Falls Conservation Area** - **J. Brisson Farm Cemetery**"
3.	Table 4: Water Supply and Treatment Evaluation Matrix p. 13 [PDF 136] & Table 12: Sewage Treatment Matrix p. 27	MCM recommends that the analysis of potential impacts on cultural heritage resources be further expanded and based on the technical cultural heritage studies completed and aligned with the current terminology. The evaluation of alternatives should consider impacts to the three types of cultural heritage resources (archaeological resources, built heritage resources and cultural heritage landscapes).	We recommend the separate bullets are included to address potential impacts on (1) archaeological resources and (2) built heritage resources and cultural heritage landscapes. These bullets should account for potential impacts to archaeological resources and areas of archaeological potential e.g., disturbance or destruction; and potential impacts to built heritage resources and cultural heritage landscapes e.g., displacement of resources by demolition or removal; disruption of resources by the introduction of physical, visual, audible, or atmospheric

Item #	Report Section	Comments/Concerns	Proposed Action/Solution
	[PDF 28]	The findings and recommendations of technical cultural heritage studies (including archaeological assessments) should inform this section.	elements that are not in keeping with the character and setting of the resource.
4.	4.0 Consultation Summary p. 28 [PDF 29]	MCM recommends revising this section to include comments received on this specific project. It is not clear why the summary of the comments on the master plan were included here.	The ESR document should be updated to include a section describing Stakeholder and Indigenous engagement as part of the MCEA Schedule C that is separate from the Master Plan process and references the appendices that are provided.
Appendix E5: Draft Cultural Heritage Assessment Report, Casselman Main SPS Upgrades (ARA, October 23, 2024)			
1.	Throughout the report	Please note that cultural heritage resources include all three types: archaeological resources, built heritage resources (BHRs), and cultural heritage resources (CHLs). Please use the correct terminology when referring to each type and the term “cultural heritage resources” when referring to all three.	Revision to report.
2.	Executive Summary p. ii-iii [PDF 911-912]	Consultation vs. information gathering – revise 5th paragraph based on the comment #6 below. MCM recommends removing information regarding archeological assessments within this report, as this report is focused on built heritage resources and cultural heritage landscapes. Preliminary impact assessment - 6th paragraph – We understand that alternative solutions and design concepts were not yet available, however the preliminary impact assessment (Section 7) should identify preliminary potential project-specific impacts on the known and potential BHRs and CHLs that have been identified and recommend measures to avoid or mitigate potential negative impacts once the preferred alternative(s) has been selected. The	Revision to report.

Item #	Report Section	Comments/Concerns	Proposed Action/Solution
		preliminary impact assessment and recommendations should be revised accordingly – see comment #10 below.	
6.	5.0 Consultation p. 27 [PDF 936]	MCM recommends that the title of this section be revised to 'Engagement'. Consultation and engagement are distinct processes, particularly when working with Indigenous communities. This section should also be revised to distinguish and include subsections on information gathering (data collection) and community engagement. It should provide a summary of the groups and individuals who were engaged, how and when community engagement was undertaken and the results of the engagement, and how those were considered (a detailed summary can be attached as an appendix). This section should clarify which Indigenous communities have been or will be contacted. We recommend that this CHAR be submitted to the municipality, Indigenous communities, and other interested parties for review and comment, if you haven't done already. We understand that the engagement may be coordinated with the EA process. We can also advise that we have no records of a provincial heritage property within or adjacent to the study area – see question 3.a.v of the *Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes.* Note that the ministry is not considered a community member, but rather a member of the Government Review Team under an environmental assessment process and the administrator of the Ontario Heritage Act.	Revision to report.

Item #	Report Section	Comments/Concerns	Proposed Action/Solution
7.	6.0 Existing Conditions p. 28 [PDF 937]	We recommend that photographs of the study area (Images 1 to 16) be included in this section.	Revision to report.
8.	7.0 Heritage Assessment p. 30 [PDF 939]	This section should be renamed to capture the purpose of this section – "Identification of Known and Potential Built Heritage Resources and Cultural Heritage Landscapes.	Revision to report.
9.	Table 3-CHRS with Known or Potential CHVI p. 31 [PDF 940-942]	The title of this table should be revised to "Inventory of the Known and Potential Built Heritage Resources and Cultural Heritage Landscapes within the Study Area". We also recommend that Map 8 be moved to this section.	Revision to report
10.	8.0 Proposed Development p. 34 [PDF 943]	This section should be revised to "Preliminary Impact Assessment". We also suggest that an introductory paragraph be included. For example, "The following sections provide more detailed information regarding the proposed project undertaking and analysis of the potential impacts on the identified BHRs and CHLs. Then, Section 8 would become Section 8.1 Description of Proposed Undertaking. This section should be revised to describe the preferred alternative. Please expand this section to include: a detailed written and visual description of the proposed activity, and the rationale, purpose and need for the proposed activity.	Revision to Report

Item #	Report Section	Comments/Concerns	Proposed Action/Solution
		Please also refer to our initial letter dated January 8, 2025: "Given that this project covers a large study area, MCM recommends that the Cultural Heritage Report is carried out so that step 1 described above is undertaken early in the planning process. Then, steps 2 and 3 can be undertaken once the preferred alternatives have been selected".	
	9.0 Analysis of Potential Impacts Page 36 [PDF 945]	See comment #10 above. This section would become Section 8.2	Revision to report.
	Table 4: Impacts and Mitigation Measures Page 37 [PDF 946]	The title of this section should be revised to "**Preliminary** Impact **Assessment** and **Recommended** Mitigation Measures". Please review this table against the preferred alternative and ensure the analysis is still valid.	Revision to report.
	10.0 Recommendations and Conclusions Page 39 [PDF 948]	This section may need to be revised based on the comments above. Please remove recommendation regarding archaeology and archaeological assessment.	Revision to Report, as required.
	Appendix A: Map 7	Map 7 should be deleted as it is a duplication of Map 1.	Revision to report.

Item #	Report Section	Comments/Concerns	Proposed Action/Solution
	p. 45 [PDF 954]		
	Appendix x Map 8 Page 46 [PDF 955]	See comment #9 above.	Revision to report.
	Appendix F Class EA Stakeholder Consultation Summary [PDF 965]	See comment #2 and #6 above regarding Community Engagement.	Revision to report.

Kevin Cortez

From: Abrazhevich, Anastasia (MCM) <Anastasia.Abrazhevich@ontario.ca>
Sent: March 17, 2025 1:24 PM
To: Nick Bialik; Kevin Cortez
Cc: Pierre-Paul Beauchamp; Jordan Morrissette; Barboza, Karla (She/Her) (MCM); Leclerc, Erika (MCM)
Subject: RE: 16953-131 Casselman Lagoon Expansion Class EA - Phase 1 & 2 Background Summary

Follow Up Flag: Follow up
Flag Status: Completed

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Hi Nick,

Much appreciated, thank you for providing this confirmation.

Best regards,

Anastasia Abrazhevich
Heritage Planner | Citizenship, Inclusion and Heritage Division
Ministry of Citizenship and Multiculturalism | Ontario Public Service
437 240 2379 anastasia.abrazhevich@ontario.ca

Ontario

Taking pride in strengthening Ontario, its places and its people

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From: Nick Bialik <nbialik@jlrichards.ca>
Sent: Monday, March 17, 2025 1:17 PM
To: Abrazhevich, Anastasia (MCM) <Anastasia.Abrazhevich@ontario.ca>; Kevin Cortez <kcortez@jlrichards.ca>
Cc: Pierre-Paul Beauchamp <ppbeauchamp@casselman.ca>; Jordan Morrissette <jmorrissette@jlrichards.ca>; Barboza, Karla (She/Her) (MCM) <Karla.Barboza@ontario.ca>; Leclerc, Erika (MCM) <erika.leclerc@ontario.ca>
Subject: RE: 16953-131 Casselman Lagoon Expansion Class EA - Phase 1 & 2 Background Summary

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Hi Anastasia,

A notice of completion has not been issued as the Class EA is still in progress. The document provided uses the same structure as an ESR but provides information only for Phases 1 and 2. We are currently in Phase 3 of the Class EA. We will provide an updated report at the end of Phase 3, which will be a “draft ESR”.

Thanks,

Nick Bialik, P.Eng. (he/him)
Environmental Engineer

1000-343 Preston Street
Ottawa ON K1S 1N4

Work: 343-804-5346
nbialik@jlrichards.ca

From: Abrazhevich, Anastasia (MCM) <Anastasia.Abrazhevich@ontario.ca>
Sent: Monday, March 17, 2025 11:16 AM
To: Kevin Cortez <kcortez@jlrichards.ca>
Cc: Nick Bialik <nbialik@jlrichards.ca>; Pierre-Paul Beauchamp <ppbeauchamp@casselman.ca>; Jordan Morrissette <jmorrissette@jlrichards.ca>; Barboza, Karla (She/Her) (MCM) <Karla.Barboza@ontario.ca>; Leclerc, Erika (MCM) <erika.leclerc@ontario.ca>
Subject: RE: 16953-131 Casselman Lagoon Expansion Class EA - Phase 1 & 2 Background Summary

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Good morning Kevin,

I hope you had a wonderful weekend.

Could you please confirm whether a notice of completion was issued for this project?

I am trying to determine whether the ESR provided is a draft or is a part of a notice of completion.

Thank you very much,

Anastasia Abrazhevich
Heritage Planner | Citizenship, Inclusion and Heritage Division
Ministry of Citizenship and Multiculturalism | Ontario Public Service
437 240 2379 anastasia.abrazhevich@ontario.ca

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From: Abrazhevich, Anastasia (MCM)
Sent: Monday, March 10, 2025 3:20 PM
To: Kevin Cortez <kcortez@jlrichards.ca>
Cc: Nick Bialik <nbialik@jlrichards.ca>; Pierre-Paul Beauchamp <ppbeauchamp@casselman.ca>; Jordan Morrissette <jmorrissette@jlrichards.ca>; Barboza, Karla (She/Her) (MCM) <Karla.Barboza@ontario.ca>; Leclerc, Erika (MCM) <erika.leclerc@ontario.ca>
Subject: RE: 16953-131 Casselman Lagoon Expansion Class EA - Phase 1 & 2 Background Summary

Good afternoon, Kevin,

I am confirming receipt of this email.

I am able to access the files and will review/provide comments on the report in the next few weeks.

Thank you,

Anastasia Abrazhevich
Heritage Planner | Citizenship, Inclusion and Heritage Division
Ministry of Citizenship and Multiculturalism | Ontario Public Service
437 240 2379 anastasia.abrazhevich@ontario.ca

Ontario

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From: Kevin Cortez <kcortez@jlrichards.ca>
Sent: Friday, March 7, 2025 5:43 PM
To: Abrazhevich, Anastasia (MCM) <Anastasia.Abrazhevich@ontario.ca>
Cc: Nick Bialik <nbialik@jlrichards.ca>; Pierre-Paul Beauchamp <ppbeauchamp@casselman.ca>; Jordan Morrissette <jmorrissette@jlrichards.ca>
Subject: 16953-131 Casselman Lagoon Expansion Class EA - Phase 1 & 2 Background Summary

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I'm using Mimecast to share large files with you. Please see the attached instructions.

Good evening Anastasia,

Please note that we have completed a summary document of Phase 1 and Phase 2 the Casselman Lagoon Expansion Schedule 'C' Class EA, based on the information compiled in the Master Plan process. Within this summary, we have

provided additional information to address the comments outlined in the MCM's attached response letter from January 8, 2025. Please refer to **Section 2.1.8 Cultural Heritage Resources** of the report and also note that mitigation measures identified in the referenced background reports will be included in the final ESR.

The Municipality is now proceeding with Phase 3 of the Class EA.

Let us know if you have any questions or issues accessing the file.

Best,
Kevin

Kevin Cortez

From: Abrazhevich, Anastasia (MCM) <Anastasia.Abrazhevich2@ontario.ca>
Sent: January 8, 2025 9:50 AM
To: Kevin Cortez; Barboza, Karla (She/Her) (MCM); Leclerc, Erika (MCM)
Cc: Pierre-Paul Beauchamp; Jordan Morrissette; Nick Bialik
Subject: RE: Municipality of Casselman - Schedule 'C' Class Environmental Assessment Notice of Commencement - MCM
Attachments: 2024-11-29 CasselmanLagoonEA_NOC_EN.pdf; 2025-01-08 _MCM_Comments_MCEA_Casselman_NotCommencement.pdf

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Dear Kevin Cortez,

Thanks for sending the Notice of Commencement for the above referenced project to the Ministry of Citizenship and Multiculturalism. Please find attached MCM's preliminary comments on this Addendum.

If you have any questions or require clarification, do not hesitate to contact us.

Kind regards,

Anastasia Abrazhevich
Heritage Planner | Citizenship, Inclusion and Heritage Division
Ministry of Citizenship and Multiculturalism | Ontario Public Service
437 240 2379 anastasia.abrazhevich2@ontario.ca

Ontario

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From: Kevin Cortez <kcortez@jlrichards.ca>
Sent: Friday, November 29, 2024 8:25 AM
To: Barboza, Karla (She/Her) (MCM) <Karla.Barboza@ontario.ca>
Cc: Pierre-Paul Beauchamp <ppbeauchamp@casselman.ca>; Jordan Morrissette <jmorrissette@jlrichards.ca>; Nick Bialik <nbialik@jlrichards.ca>
Subject: Municipality of Casselman - Schedule 'C' Class Environmental Assessment Notice of Commencement - MCM

CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Good morning,

The Municipality of Casselman has initiated a Schedule 'C' Class Environmental Assessment (EA) to determine the preferred expansion design concept for the Casselman Sewage Treatment System (STS) to effectively treat wastewater generated from the existing and projected future development areas. This Class EA follows the Casselman Water and Wastewater Infrastructure Master Plan, which was completed in July 2024. More information on the current study is provided in the attached Notice, which we invite you to review.

For your reference, we have identified below latest correspondence with the MCM relating to the expansion of the Casselman STS:

- *Master Plan – The latest round of comments from the MCM during the Master Plan were received on May 10, 2024, and consisted of a letter containing comments on the Master Plan Report. The comments were addressed in the Master Plan and MCM made aware of the changes on July 2, 2024. On July 4, 2024, an email was received from MCM (Liam Smythe) accepting the responses, no additional comments were provided.*

Please let us know if you have any comments for the project team now that we have entered the Class EA phase of this project.

Regards,

Kevin Cortez, M.Eng., B.Eng., EIT
Environmental Engineering Graduate

1000-343 Preston Street
Ottawa, ON, K1S 1N4

Work: 343-803-4074
kcortez@jlrichards.ca

Ministry of Citizenship and Multiculturalism

Heritage Planning Unit
Heritage Operations Branch
Citizenship, Inclusion and Heritage Division
5th Flr, 400 University Ave
Toronto, ON M5G 1S7
Tel.: 416-305-0757

Ministère des Affaires civiques et du Multiculturalisme

Planification relative au patrimoine
Opérations relatives au patrimoine
Division des affaires civiques, de l'inclusion et du patrimoine
5e étage, 400, av. University
Toronto, ON M5G 1S7
Tél.: 416-305-0757

Ontario

January 8, 2025 EMAIL ONLY

Pierre-Paul Beauchamp, Director of Public Works
Municipality of Casselman
751 St-Jean Street
P.O. Box 710, ON K0A 1M0
ppbeauchamp@casselman.ca

MCM File	**:**	**0022075**
Proponent	**:**	**Municipality of Casselman**
Subject	**:**	**Municipal Class Environmental Assessment –Schedule C– Notice of Study Commencement**
Project	**:**	**Casselman Sewage Treatment System**
Location	**:**	**Municipality of Casselman, County of Prescott and Russell, Ontario, ON K0A1M0**

Dear Pierre-Paul Beauchamp:

Thank you for providing the Ministry of Citizenship and Multiculturalism (MCM) with the Notice of Study Commencement for the above-referenced project.

MCM's interest in this project relates to its mandate of conserving Ontario's cultural heritage, which includes:

- archaeological resources, including land and marine;
- built heritage resources, including bridges and monuments; and
- cultural heritage landscapes.

Under the EA process, the proponent is required to determine a project's potential impact on known (previously recognized) and potential cultural heritage resources.

Project Summary
The Municipality of Casselman has initiated a Class Environmental Assessment (Class EA) to determine the preferred expansion design concept for the Casselman Sewage Treatment System (STS) to effectively treat wastewater generated from the existing and projected future development areas. This study is being conducted according to the requirements of a Schedule

'C 'project under the Municipal Class Environmental Assessment process (October 2000, as amended in 2023).

The study is being undertaken following the completion of the Casselman Water and Wastewater Infrastructure Master Plan in July 2024 which recommended an increase of the existing STS rated capacity from 2,110 m3/day to 4,050 m3 per day.

Identifying Cultural Heritage Resources
While some cultural heritage resources may have already been formally identified, others may be identified through screening and evaluation.

Archaeological Resources
Our records indicate that a Stage 1 archaeological assessment (under Project Information Form number P1106-0051-2024) and Stage 2 archeological assessment (under Project Information number P1106-0064-2024) have been initiated. We recommend that the licensed archaeologist submit the report to MCM prior to the issuance of the notice of completion.

Please note that archaeological concerns have not been fully addressed until reports have been entered into the Ontario Public Register of Archaeological Reports ('the Register') where those reports recommend that:

1. the archaeological assessment of the project area is complete and
2. all archaeological sites identified by the assessment are either of no further cultural heritage value or interest (as per Section 48(3) of the Ontario Heritage Act) or that mitigation of impacts has been accomplished through excavation or an avoidance and protection strategy.

Approval authorities and/or proponents should wait to receive the MCM's written confirmation that the archaeological assessment report(s) has been entered into the Register before issuing a decision or proceeding with any ground disturbing activities. The letter will also indicate either that there are no further concerns for impacts to archaeological resources or articulate next steps to mitigate those concerns.

Proponents must follow the recommendations of the archaeological assessment report(s). MCM recommends that further stages of archaeological assessment (if recommended) be undertaken as early as possible during detailed design and prior to any ground disturbing activities.

Built Heritage Resources and Cultural Heritage Landscapes
The Ministry's *Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes* should be completed to help determine whether this EA project may impact known or potential built heritage resources and/or cultural heritage landscapes.

If there is potential for built heritage resources and/or cultural heritage landscapes within the project area, then a Cultural Heritage Report: Existing Conditions and Preliminary Impact Assessment should be undertaken for the entire study area during the planning phase and will be summarized in the EA Report. This study will:

1. Describe the existing baseline cultural heritage conditions within the study area by identifying all known or potential built heritage resources and cultural heritage landscapes, including a historical summary of the study area. The Ministry has developed a screening checklist that may assist with this exercise: *Criteria for Evaluating for Potential Built Heritage Resources and Cultural Heritage Landscapes*.

2. Identify preliminary potential project-specific impacts on the known and potential built heritage resources and cultural heritage landscapes that have been identified. The report should include a description of the anticipated impact to each known or potential built heritage resource or cultural heritage landscape that has been identified.

3. Recommend measures to avoid or mitigate potential negative impacts to known or potential built heritage resources and cultural heritage landscapes. The proposed mitigation measures are to inform the next steps of project planning and design.

Given that this project covers a large study area, MCM recommends that the Cultural Heritage Report is carried out so that step 1 described above is undertaken early in the planning process. Then, steps 2 and 3 can be undertaken once the preferred alternatives have been selected.

Cultural Heritage Reports will be undertaken by a qualified person who has expertise, recent experience, and knowledge relevant to the type of cultural heritage resources being considered and the nature of the activity being proposed.

Community input should be sought to identify locally recognized and potential cultural heritage resources. Sources include, but are not limited to, municipal heritage committees, historical societies and other local heritage organizations.

Cultural heritage resources are often of critical importance to Indigenous communities. Indigenous communities may have knowledge that can contribute to the identification of cultural heritage resources, and we suggest that any engagement with Indigenous communities includes a discussion about known or potential cultural heritage resources that are of value to them.

Environmental Assessment Reporting
All technical cultural heritage studies and their recommendations are to be addressed and incorporated into EA projects. Please advise MCM whether any technical cultural heritage studies will be completed for this EA project and provide them to MCM before issuing a Notice of Completion or commencing any work on the site. If screening has identified no known or potential cultural heritage resources, or no impacts to these resources, please include the completed checklists and supporting documentation in the EA report or file.

Please note that the responsibility for administration of the *Ontario Heritage Act* and matters related to cultural heritage have been transferred from the Ministry of Tourism, Culture and Sport (MTCS) to the Ministry of Citizenship and Multiculturalism (MCM). Individual staff roles and contact information remain unchanged. Please continue to send any notices, report and/or documentation **via email only** to both Karla Barboza and Erika Leclerc.

- Karla Barboza, Team Lead - Heritage | Heritage Planning Unit (Citizenship and Multiculturalism) | 416-660-1027 | karla.barboza@ontario.ca
- Erika Leclerc- Heritage Planner | Heritage Planning Unit (Citizenship and Multiculturalism) |
- 416-305-0757 | erika.leclerc@ontario.ca

Thank you for consulting MCM on this project and please continue to do so throughout the EA process. If you have any questions or require clarification, please do not hesitate to contact me.

Sincerely,

Anastasia Abrazhevich
Sent on behalf of

Erika Leclerc
Heritage Planner
erika.leclerc@ontario.ca

Copied to: Karla Barboza, Team Lead, Heritage Planning Unit, MCM
Nicolas Bialik, P. Eng, Environmental Engineer, J.L. Richards & Associates Ltd.

It is the sole responsibility of proponents to ensure that any information and documentation submitted as part of their EA report or file is accurate. The Ministry of Citizenship and Multiculturalism (MCM) makes no representation or warranty as to the completeness, accuracy or quality of the any checklists, reports or supporting documentation submitted as part of the EA process, and in no way shall MCM be liable for any harm, damages, costs, expenses, losses, claims or actions that may result if any checklists, reports or supporting documents are discovered to be inaccurate, incomplete, misleading or fraudulent.

Should previously undocumented archaeological resources be discovered, they may be a new archaeological site and therefore subject to Section 48(1) of the *Ontario Heritage Act*. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licensed consultant archaeologist to carry out an archaeological assessment, in compliance with Section 48(1) of the *Ontario Heritage Act*.

The *Funeral, Burial and Cremation Services Act, 2002, S.O. 2002, c.33* requires that any person discovering human remains must cease all activities immediately and notify the police or coroner. If the coroner does not suspect foul play in the disposition of the remains, in accordance with *Ontario Regulation 30/11* the coroner shall notify the Registrar, Ontario Ministry of Public and Business Service Delivery and Procurement, which administers provisions of that Act related to burial sites. In situations where human remains are associated with archaeological resources, the Ministry of Citizenship and Multiculturalism should also be notified (at archaeology@ontario.ca) to ensure that the archaeological site is not subject to unlicensed alterations which would be a contravention of the *Ontario Heritage Act*.

South Nation Conservation Authority

Kevin Cortez

From: Kevin Cortez
Sent: June 16, 2026 5:31 PM
To: Jennifer Boyer
Cc: Claire Lemay; Jordan Morrissette; Nick Bialik
Subject: RE: SNC Comments - Municipality of Casselman Sewage Treatment System Schedule C Class EA - Notice of Completion
Attachments: 2024-09-20 Casselman Lagoon ECA #0246-CUXTCB.pdf; S.Nation Flow Proportioning Plantagenet to Casselman Dams.pdf; SNC flow measuring system - location.png; IMG_6330.JPEG; IMG_6323.JPEG; IMG_6327.JPEG; SNC Comments- Casselman Sewage Class EA 2026.04.15.pdf; 16953-131-MOM-EX-002_00.pdf; CofA WWTP Casselman (2006).pdf

Good afternoon Jennifer,

We've reviewed the comments provided by the South Nation Conservation Authority in the attached memorandum, received April 15, 2026. Please see below our responses in blue.

The proposed work is upgrade of the existing lagoon sewage treatment system to improve the performance of the lagoon sewage treatment system consisting of Modification to Existing Sewage Works; Installation of an MBBR treatment system; Installation of a Disc Filter System downstream of the MBBR; Sanitary Forcemain Upgrade; Sewage Pumping Station Upgrade; and Sewage Lagoon Expansion. We would like to clarify the proposed works:

- The Casselman Wastewater Treatment System (WWTS) already includes an MBBR and Disc Filter.
- The scope of this study does not include modifications to the forcemain or Main Sewage Pumping Station. This is being completed as part of a separate project.
- There is no expansion of the lagoon footprint proposed as part of this Class EA.
- The preferred solution developed as part of this Class EA is clarified in Item 2.2 of the attached minutes, issued April 16, 2026, shortly after receipt of this memorandum.

The Environmental Compliance Approval (ECA) defines the maximum effluent discharge rate based on a combination of fixed limits (5,000 to 7,000 m³/day) and dilution ratios related to the South Nation River (from SNR Flow/10 to SNR Flow/60, depending on the month). *Correct. This ECA was approved by the MECP as part of the 2019 upgrades to the Casselman WWTS. Note that OCWA has advised us that there was a recent update to the ECA, dated September 20, 2024. Please find attached latest version. The only major update in relation to SNC's comments relates to the addition of flow proportioning when SNR water levels are too low at the Casselman Dam. This is discussed further below. Other major notable ECA changes were the removal of E.Coli from the list of effluent parameters in Schedule A and administrative change in wording from the former construction approval (2019) to now an operating approval (2024).*

The ECA also indicates that river flow is estimated using a stage - discharge relationship at a weir, along with measurements related to flow conveyed to a hydro dam. In addition, the effluent discharge is assumed to occur downstream of the hydro dam. The effluent from the Casselman WWTS is downstream of the dam. The exact wording from the latest 2024 ECA is as follows (Page 4, Page 14 and Page 23):

PAGE 4

Final Effluent Disposal Facilities

- effluent flow measurement backup system consisting of a cast-in-place concrete Parshall flume equipped with an ultrasonic sensor with a measurement capacity of 23,000 m^3/day;

- South Nation River flow measurement system consisting of:

  a concrete weir with a notched section equipped with an ultrasonic depth sensor mounted above a stilling well upstream of the weir which is used in conjunction with a stage-discharge relationship developed for the South Nation River;

  a flow measurement system to measure the flow rate of river water conveyed into a hydro dam upstream of the concrete weir;

- a concrete flow control chamber equipped with a 450 mm by 450 mm sluice gate with a motorized actuator for the hydrographic controlled release (HRC) of effluent based on a preselected dilution ratio with the flow of South Nation River; and

- a plant effluent outfall sewer consisting of 500 mm and 525 mm diameter pipes, equipped with two (2) 525 mm diameter diffuser ports, discharging at approximately 75 m off shore into the South Nation River.

including all other mechanical system, electrical system, instrumentation and control system, standby power system, piping, pumps, valves and appurtenances essential for the proper, safe and reliable operation of the Works in accordance with this Approval, in the context of process performance and general principles of wastewater engineering only;

all in accordance with the submitted supporting documents listed in Schedule A.

PAGE 14

4. The Owner shall monitor and record the flow rate and daily quantity using flow measuring devices or other methods of measurement as approved below calibrated to an accuracy within plus or minus 15 per cent (+/- 15%) of the actual flowrate of the following:

   a. Influent flow to the Sewage Treatment Plant by continuous flow measuring devices and instrumentations/pumping rates/details of other methods (e.g. top water elevation of lagoons).

   b. Final Effluent discharged from the Sewage Treatment Plant by continuous flow measuring devices and instrumentations/pumping rates/details of other methods (e.g. level of lagoons), or in lieu of an actual installation of equipment, adopt the flow measurements of the Influent for the purpose of estimating Final Effluent flows if the Influent and Final Effluent streams are considered not significantly different in flow rates and quantities.

   c. In determining the Maximum Monthly Discharge Rate of the Casselman lagoons the Owner shall determine the flow rate of the South Nation River at Casselman except when the flow is too low, in which case the flow proportioning calculation may be used to determine the flow rate;

   d. The Owner shall on a semi-annual basis validate the flow proportioning calculation by comparing the actual measured flow rate of the South Nation River at Casselman to the actual measured flow rate of the South Nation River at the Plantagenet location. If there appears to a discrepancy the flow proportioning calculation (see Schedule B) shall be adjusted and the District Manager notified.

   e. The Owner shall continue to monitor the Plantagenet water level station (#02LB005) as part of the Federal HYDAT network.

PAGE 23

Maximum Monthly Effluent Discharge Rates

Discharge Period	Maximum Discharge Rate	Maximum Discharge Rate Based on Dilution Ratio
January 1 - 31	5,000 m^3/d	SNR Flow/10
February 1 - 28/29	5,000 m^3/d	SNR Flow/10
March 1 - 31	5,000 m^3/d	SNR Flow/40
April 1 -30	7,000 m^3/d	SNR Flow/60
May 1 -15	7,000 m^3/d	SNR Flow/60
October 1 -31	4,000 m^3/d	SNR Flow/15
November 1 - 30	4,000 m^3/d	SNR Flow/10
December 1 - 31	5,000 m^3/d	SNR Flow/15

Flow proportioning Plantagenet to Casselman Dams

The following is the calculation to determine the South Nation River flow rate at the Casselman Dam when it is too low to measure by their present instrumentation. The flow is calculated by using the flow rate from the Plantagenet proportioned by the drainage area.

Plantagenet drainage area = 3810

Casselman drainage area = 2410

2410/3810 = 0.6325459

Multiply the Plantagenet dam flow (provided by South Nation Conservation Authority) by 0.6325459 to obtain the flow at Casselman Dam

From correspondences with OCWA (the system operator):

- The attached figure shows the location of the concrete weir / notch in the weir / stilling well (circled in red). OCWA believes the equipment is stored at the building location enclosed in the orange circle, however they are unable to confirm this as they do not have access.
- Details on the stage-discharge relationship are currently unknown.
- Flow measurement details into the hydroelectric dam are currently unknown.
- Current System Operation:
  - South Nation River flows for the effluent outfall are regularly monitored. The daily flows from the South Nation River / dilution ratio is compared to effluent flows and the effluent flows are adjusted as needed to ensure compliance.
  - The old PLC HMI at the lagoon has the Casselman flows but they usually access the flows directly from the South Nation Conservation website. The Casselman flow measuring system for the South Nation River is not the most representative. When the river level is low and water doesn't flow over the weir; no flow is registered. To obtain the flow at the effluent outfall when the water level at the Casselman weir is too low, they calculate the Casselman flows using the Plantagenet flows and a flow proportioning ratio, per the latest ECA.
  - The flow meter chamber is calibrated regularly.
  - The motorized actuator within the flow control chamber for the hydrographic controlled release is not currently in use as it is impractical to use a motorized actuator for hydrographic controlled release when the Casselman river flow readings are not regularly reliable.

Items Reviewed:

• *AMENDED ENVIRONMENTAL COMPLIANCE APPROVAL, NUMBER 8160-BAHPRF, Issue Date: April 29, 2019.* Note that the purpose of this consultation is for SNC's review of the Environmental Study Report (ESR) (issued Notice of Completion on March 12, 2026) associated with the Schedule 'C' Class EA for the Casselman WWTS Expansion. As part of the proposed latest upgrades to the Casselman WWTS, the now 2024 ECA will need to be amended. Our response assumes that SNC also reviewed the ESR.

Technical Review Comments:

1- It is important to confirm that the river flow used for dilution calculations is representative of the actual conditions at the outfall location. Any difference between the measurement point and the discharge location may affect the real dilution capacity. This is especially important during winter (January to February), when discharge is allowed up to 5,000 m³/day with a dilution ratio of SNR Flow/10. During this period, flows are low and may be affected by ice and backwater conditions, which can reduce mixing. Note that the dilution ratios identified in the 2019/2024 ECA (see above screenshot) are proposed to be modified as follows:

- Phase 1 - Expansion of System from ADF of 2,110 m^3/day to 3,019 m^3/day

Table 22: Proposed Phase 1 Maximum Daily Discharge Rates.

MONTH	PROPOSED	
	MAXIMUM DAILY DISCHARGE RATE	MINIMUM DILUTION RATIO
January	5,000 m^3/d	14.3
February	5,000 m^3/d	13.9
March	5,000 m^3/d	17.9
April	7,000 m^3/d	104.2
May	4,500 m^3/d	40.5
June	2,150 m^3/d	26.2
July	1,050 m^3/d	26.2
August	900 m^3/d	26.3
September	910 m^3/d	26.2
October	2,250 m^3/d	13.1
November	6,050 m^3/d	13.1
December	5,000 m^3/d	27.0

- Phase 2 - Expansion of System from ADF of 3,019 m^3/day to 4,050 m^3/day

Table 14: Existing and Proposed Maximum Daily Discharge Rates.

MONTH	EXISTING (1)		PROPOSED	
	MAXIMUM DAILY DISCHARGE RATE	MINIMUM DILUTION RATIO	MAXIMUM DAILY DISCHARGE RATE	MINIMUM DILUTION RATIO
January	5,000 m^3/d	SNR Flow/10	5,750 m^3/d	SNR Flow/12.4
February	5,000 m^3/d	SNR Flow/10	5,600 m^3/d	SNR Flow/12.4
March	5,000 m^3/d	SNR Flow/40	7,250 m^3/d	SNR Flow/12.3
April	7,000 m^3/d	SNR Flow/60	10,000 m^3/d	SNR Flow/72.9
May 1-15	7,000 m^3/d	SNR Flow/60	4,500 m^3/d	SNR Flow/40.5
May 16-31	N/A	N/A	4,500 m^3/d	SNR Flow/40.5
June	N/A	N/A	2,150 m^3/d	SNR Flow/26.2
July	N/A	N/A	1,050 m^3/d	SNR Flow/26.2
August	N/A	N/A	900 m^3/d	SNR Flow/26.3
September	N/A	N/A	910 m^3/d	SNR Flow/26.2
October	4,000 m^3/d	SNR Flow/15	2,250 m^3/d	SNR Flow/13.1
November	4,000 m^3/d	SNR Flow/10	6,050 m^3/d	SNR Flow/13.1
December	5,000 m^3/d	SNR Flow/15	8,750 m^3/d	SNR Flow/12.4
Notes: (1) Per ECA No. 8160-BAHPRF (April 19, 2019).				

The modified dilution ratios are based on Assimilative Capacity Studies completed by Blue Sky Energy Engineering & Consulting. You can refer to their studies in Appendix B1 (Phase 2 ACS, issued January 11, 2024) and Appendix G1 (Phase 1 ACS, issued July 31, 2025) of the ESR, previously provided to SNC for review. The dilution ratios were developed based on 7Q20 flows to represent low-flow conditions. A full description is included in these study reports.

Dilution ratio-based effluent discharge volumes have been in place since at least 2006 (C of A 2712-6RVNRB is attached for reference; see Page 10). The SNR flow measurement is meant to represent the flow in the SNR around the outfall location. The Municipality or OCWA (past operators of system) have historically used flow in the South Nation River to establish the maximum flow allowed to be discharged to the river based on the established dilution ratios. As noted above, OCWA have recently used a combination of the following to establish the South Nation River flow in Casselman / discharge location:

- During Normal Conditions: Flow data directly from the South Nation Conservation Authority website; or
- During Low River Flow Conditions: Flow proportioning using Plantagenet flow.

2- During the spring period (April to May), the allowable discharge increases to 7,000 m³/day, while the dilution requirement becomes stricter (SNR Flow/60). This suggests that the dilution ratios are not only based on flow conditions, but also on environmental considerations. However, it is not clear how these ratios were developed. Refer to the ACS studies referenced above. Various factors are considered in developing these dilution ratios and effluent criteria, including mixing zones, level of treatment, dilution, acute toxicity at end of pipe, etc.

3- The total discharge volume during the winter/spring period is limited to 502,500 m³ (Page 22), which shows that the system depends on storage and controlled release. Correct. *In such systems, the timing of discharge is important, and it depends on reliable flow data. In this context, using fixed monthly dilution ratios may not fully reflect changes in river flow.* The dilution ratios are not necessarily fixed; they are minimum dilution ratios established based on 7Q20 flows. In a typical year, the discharge flows would be limited by the maximum allowable discharge rate and not the dilution ratio. *A flow duration curve (FDC) or seasonal low-flow analysis could provide a more reliable basis for setting discharge limits, especially in winter conditions.* The system has historically been designed and successfully operated on the above-noted basis. This type of system would also likely be difficult to implement and operate. If required, this could be explored as part of future studies.

4- The report indicates that no routine discharge is allowed during summer months, and discharge may only occur under emergency conditions such as overflow or bypass.

We cannot locate a reference to this in the ESR. To clarify, the current system (constructed in 2019) is designed to discharge between October 1 and May 15, in which case the above statement would apply. The current preferred solution developed through the Class EA process includes discharge during all months of the year based on monthly variable effluent criteria, in which case, the above statement would no longer apply.

In summary, it is recommended to clarify:

- *how river flow is measured and whether it represents the outfall location,*
- *whether winter conditions (such as ice) are considered, and*
- *whether the dilution ratios are supported by hydrologic analysis such as FDC or low-flow statistics.*

In response to these recommendations:

- Information has been provided in the above email to explain the current flow measurement system and what is currently used by OCWA for establishing the allowable discharge flow.
- During winter, flow conditions in the South Nation River are impacted by ice. 7Q20 flows would capture this impact. Please refer to the study reports completed by Blue Sky for 7Q20 flows used in the ACS.
- The dilution ratios were established based on 7Q20 low flows. Please refer to the studies completed by Blue Sky for analyses completed in developing these dilution ratios.

Given that SNC's comments relate to how the system has historically been designed, rather than the recommendations identified in the Class EA ESR, JLR and the Municipality will proceed with finalizing the ESR. If the SNC have additional comments or concerns regarding the above information, we would be review and discuss as part of the design / ECA approval process.

Best,
Kevin

Kevin Cortez, M.Eng., P.Eng.
Environmental Engineer

Ottawa ON
Work: 343-803-4074

From: Jennifer Boyer <Jboyer@nation.on.ca>
Sent: April 15, 2026 4:28 PM
To: Nick Bialik <nbialik@jlrichards.ca>; Kevin Cortez <kcortez@jlrichards.ca>
Cc: Claire Lemay <clemay@nation.on.ca>; Jordan Morrissette <jmorrissette@jlrichards.ca>
Subject: SNC Comments - Municipality of Casselman Sewage Treatment System Schedule C Class EA - Notice of Completion

[CAUTION] This email originated from outside JLR. Do not click links or open attachments unless you recognize the sender and know the content is safe. Do not forward suspicious emails, if you are unsure, please send a separate message to Helpdesk.

Good afternoon Nick

Please see the attached review comments on the Notice of Completion Environmental Study Report and the existing Environmental Compliance Approval document (April 2019).

In addition, Ronda has had a follow-up meeting with staff at Casselman regarding our discussion on March 30th, and the timing of the implementation of the TPM program.

If you have any questions or clarifications on the comments provided, please do not hesitate to follow up.

Thank you,
Jennifer

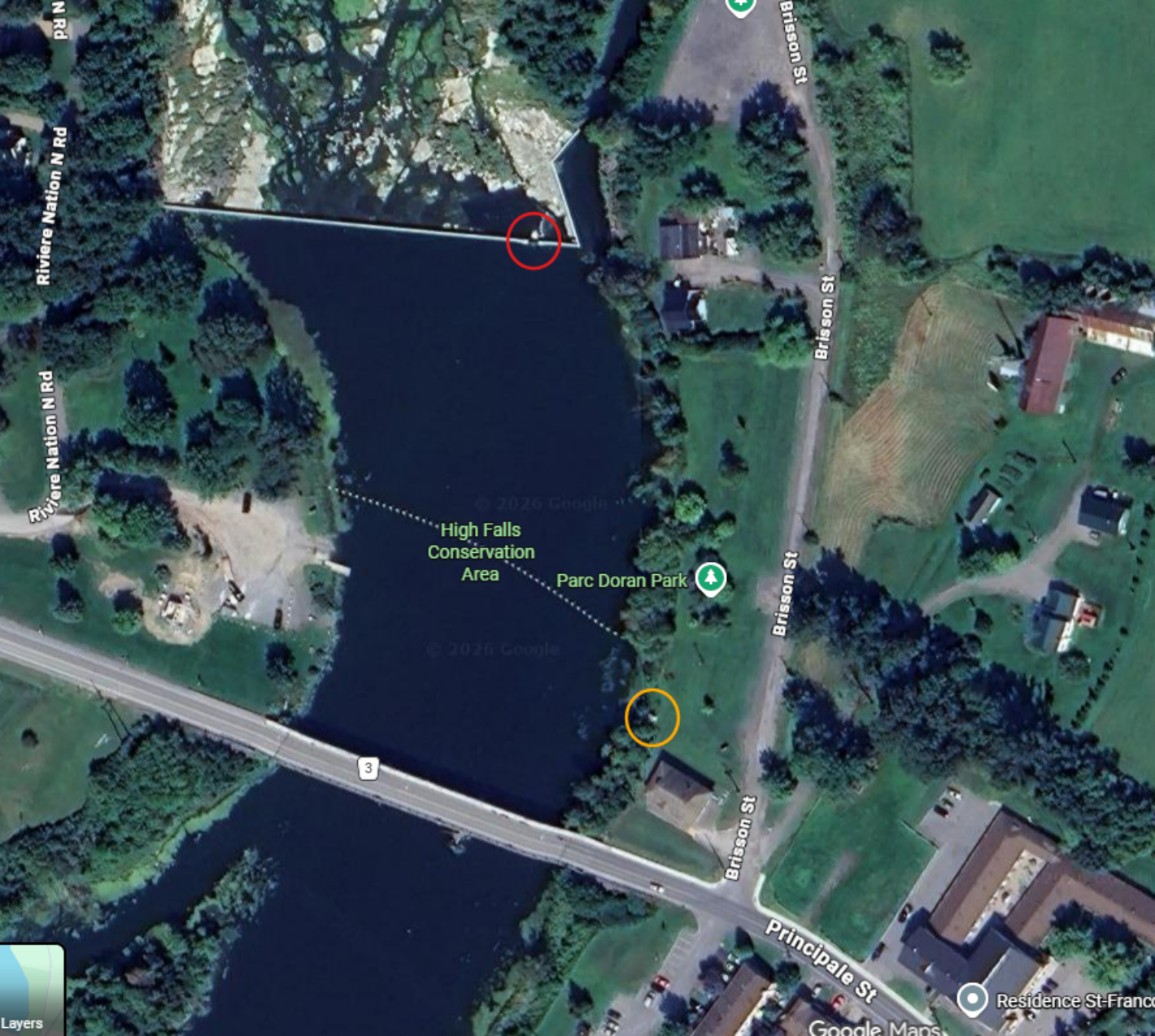
South Nation Conservation de la Nation Sud

Jennifer Boyer | BES, M.Sc., MCIP RPP
Managing Director, Planning & Approvals
38 Victoria Street, Box 29, Finch, ON K0C 1K0
Tel: 613-984-2948 or 1-877-984-2948 | Fax: 613-984-287

Our local environment, we're in it together.
Notre environnement local, protégeons-le ensemble.

From: Nick Bialik <nbialik@jlrichards.ca>
Sent: March 30, 2026 3:51 PM
To: Jennifer Boyer <Jboyer@nation.on.ca>; Kevin Cortez <kcortez@jlrichards.ca>
Cc: Sandra Mancini <SMancini@nation.on.ca>; Ronda Boutz <RBoutz@nation.on.ca>; Shahin Zand <szand@nation.on.ca>; Claire Lemay <clemay@nation.on.ca>; Jordan Morrissette <jmorrissette@jlrichards.ca>
Subject: Re: Municipality of Casselman Sewage Treatment System Schedule C Class EA - Notice of Completion

Hi Jennifer and SNC Team,


Rivière Nation N Rd
Rivière Nation N Rd
Brisson St
Brisson St
Brisson St
Brisson St
High Falls
Conservation
Area
Parc Doran Park
3
Principale St
Residence St-Franc
Google Maps
Layers







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Ontario

Ministry of the Environment **Ministère de l'Environnement**

AMENDED CERTIFICATE OF APPROVAL
MUNICIPAL AND PRIVATE SEWAGE WORKS
NUMBER 2712-6RVNRB
Issue Date: August 24, 2006

The Corporation of the Village of Casselman
751 St. Jean Street, P.O. Box 710
Casselman, Ontario
K0A 1M0

Site Location: Casselman Lagoons
Lot 7, 8, 9 & 10, Concession 6
Casselman Village, United Counties of Prescott and Russell

You have applied in accordance with Section 53 of the Ontario Water Resources Act for approval of:

Upgrade/expansion (Phase 2) of the existing Casselman Sewage Treatment Plant to a *Rated Capacity* of 2,110 m^3/day and *Peak Flow Rate* of 6,250 m^3/day comprising of an upgrade/expansion of the sewage lagoons, main sewage pumping station, and forcemain resulting in a sewage treatment plant consisting of:

EXISTING SANITARY SEWERS

STREET	FROM	TO
St. Albert	Approx. 150 m S. of Jeanne Mance	Approx. 90 m S.of St. Isidore St.
Joseph	Approx. 90 m S. of Jeanne Mance	Approx. 160 m N. of Dollard (Montcalm St. extension)
St. Anne	Jeanne Mance	St. Isidore
Jeanne Mance	St. Albert	Approx. 45 m E. of St. Anne
Duhamel	St. Albert	Approx. 30 m E. of St. Anne
St. Isidore	Approx. 60 m E. of St. Joseph	Approx. 180 m W. of Laval
Laval	Approx. 140 m N. of Dollard	Approx. 30 m N. of St. Isidore
Dollard	St. Joseph	Laval
Cartier	Approx. 40 m E. of St. Joseph	St. Joseph
Cartier	Approx. 70 m E. of St. Joseph	Laval
Station	Approx. 30 m E. of St. Joseph	St. Joseph
St. Isidore	Approx. 610 m E. of Breboeuf	St. Euphemie
Laurier	Approx. 350 m E. of Breboeuf	St. Euphemie
Arena	Approx./ 140 m E. of Breboeuf	Breboeuf
Dollard	Breboeuf	St. Euphemie
Dollard	Approx. 65 m E. of St. Jean	St. Jean
Breboeuf	St. Isidore	Montcalm
St. Euphemie	St. Isidore	Approx. 170 m N. of Montcalm
St. Jean	Cartier	Montcalm
Montcalm	Breboeuf	Approx. 90 m W. of St. Jean
Cartier	Approx. 60 m E. of St. Jean	St. Jean

Easement	St. Joseph	Approx. 90 m W. of St. Jean
St. Albert	Approx. 45 m S. of St. Isidore	St. Isidore

all in accordance with the final plans and specifications prepared by J. L. Richards & Associates Ltd., Consulting Engineers (1976) submitted for the issuance of Sewage Works Approval No. 1-0160-68 issued on May 5, 1976 and Sewage Works Approval No. 1-0160-68 issued on June 18, 1976.

SANITARY FORCEMAIN UPGRADE

- replacement of the existing sewage forcemain with a new 1,700 m long 400 mm diameter HDPE forcemain running along a new route extending from the sewage pumping station along Brisson Road, an easement between Brisson Road and Laurier Street, Laurier Street, and Lagoon Access Road to the existing Sewage Lagoons; and
- installation of one (1) air release valve and chamber on the 400 mm diameter HDPE forcemain at the easement crossing between Brisson Road and Laurier Street;

SEWAGE PUMPING STATION UPGRADE

Replacement of the existing sewage pumping station with a new sewage pumping station located at the same location, equipped with an office and laboratory, located at the northwest corner of Principale Street and Brisson Road including the following:

- two (2) self-priming centrifugal pumps each having a design capacity of 118 L/s @ 23 m TDH;
- one (1) mechanical bar screen having a design capacity of 118 L/s;
- one (1) screenings compactor having an inlet feed capacity of 1.5 m^3/hr;
- one(1) 525 mm diameter mechanical bar screen bypass pipe extending from the pumping station inlet manhole to the wet well;
- one (1) 160 kW emergency diesel-generator set; and
- including all controls and appurtenances; and

all in accordance with the Application for Approval of Municipal and Private Sewage Works submitted by Corporation of the Village of Casselman dated April 5, 2006 and the design specifications and drawings prepared by J. L. Richards & Associates Limited, Consulting Engineers, Architects & Planners, Ottawa, Ontario.

SEWAGE LAGOON EXPANSION

Modifications to the existing two facultative sewage lagoons (Cells 'A' and 'B') and addition of a new facultative lagoon (Cell 'C"), aeration system, phosphorus removal system, and flow measurement system, as follows:

- two (2) clay lined facultative lagoons (Cell 'A' and 'B'), each with dimensions of 290 m wide and 295 m long, operated in parallel and receiving influent raw sewage via an existing 250 mm diameter forcemain along Country Road No. 6 and splitter box, each cell having an area of 8.6 ha, a total depth of 2.5 m (including a 0.3 m sludge storage bottom zone and a 0.7 m freeboard) and an effective storage capacity of 115,000 m^3, both discharging through a 450 mm diameter transfer pipes into cell 'C';
- a clay lined facultative lagoon (Cell 'C'), with dimension of 115 m wide and 435 m long, that receives discharges from cell 'A' and cell 'B', having a total depth of 2.7 m (including a 0.3 m sludge storage bottom zone and a 0.7 m freeboard) and an effective storage capacity of 100,000 m^3, including 150 submerged aerators for diffusing air into the sewage;
- an aeration system consisting of two positive displacement air blowers, each rated at a capacity of 10.6 m^3/min (375 SCFM) at a discharge pressure of 41 kPa, and each equipped with a inlet air filter, inlet and outlet silencers, flexible connectors, pressure relief valve, discharge check valve, and isolation valves;
- a phosphorus removal system consisting of one (1) 27,000 L capacity alum storage tank equipped with spill

containment structure, two (2) (one duty and one standby) diaphragm type alum feed metering pumps each rated at 2.3 to 13.0 L/hr and a heat traced discharge pipe from the metering pumps to the sanitary forcemain;

- effluent flow measurement system consisting of a cast-in-place concrete Parshall flume equipped with an ultrasonic sensor with a measurement capacity of 23,000 m^3/day;
- South Nation River flow measurement system consisting of:
    1. a concrete weir with a notched section equipped with an ultrasonic depth sensor mounted above a stilling well upstream of the weir which is used in conjunction with a stage-discharge relationship developed for the South Nation River;
    2. a flow measurement system to measure the flow rate of river water conveyed into a hydro dam upstream of the concrete weir (Village of Casselman shall make the necessary arrangements with the owner of the hydro dam to install an appropriate flow measurement system);
- a concrete flow control chamber equipped with a 450 mm by 450 mm sluice gate with a motorized actuator for the hydrographic controlled release (HRC) of effluent based on a preselected dilution ratio with the flow of South Nation River; and
- a plant effluent outfall sewer consisting of 500 mm and 525 mm diameter pipes, equipped with two (2) 525 mm diameter diffuser ports, discharging at approximately 75 m off shore into the South Nation River.

and the Application for Approval of Municipal and Private Sewage Works submitted by the Village of Casselman dated June 26, 2001 and the following supporting documentation:

1. A report titled "Village of Casselman Environmental Study Report Expansion of the Sewage Treatment and Collection Facilities for the Village of Casselman", dated August 1995, revised July 1996, prepared by McNeely Engineering Consultants Ltd.
2. Preliminary design brief titled “Village of Casselman Preliminary Engineering Report for Expansion of the Sewage Treatment and Collection Facilities for the Village of Casselman", dated May 1997, prepared by McNeely Engineering Consultants Ltd.
3. A report titled "Long Term Plan for the Upgrade and Expansion of the Village of Casselman's Communal Sewage System" March 2001, prepared by J. L. Richards & Associates Limited, Ottawa, Ontario.
4. A design brief titled " Village of Casselman Wastewater Treatment Expansion, Design Brief Phase 1 Upgrade/Expansion" April 2001, prepared by CH2MHILL, North York, Ontario.
5. A table - "Casselman Lagoon Expansion, Summary of Basic Design Data" dated June 12, 2001, prepared by CH2MHILL, North York, Ontario.
6. A letter with technical description of the sewage treatment plant at the completion of Phase 1, dated July 10, 2001, from Andre Bourque, P. Eng., addressed to Stefanos Habtom, P. Eng., Ministry of the Environment, Environmental Assessment and Approvals Branch.
7. A letter from Victor Castro, MOE, Eastern Region to Mohamed Dhalla, MOE, EAAB, dated February 20, 2001, regarding Casselman Lagoon Facility Upgrade/Expansion, Proposed Amendment to Effluent Ammonia Criteria.
8. A letter from Andre Bouque, P. Eng. CH2MHILL to Director, Environmental Assessment and Approvals Branch, MOE requesting for an amendment to Condition 3.1 (c) of C of A No. 5103-4YHKL3.

For the purpose of this Certificate of Approval and the terms and conditions specified below, the following definitions apply:

“*Act*” means the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, as amended;

"*Average Daily Flow*" means the cumulative total sewage flow to the sewage works during a calendar year divided by the number of days during which sewage was flowing to the sewage works that year;

“*By-pass”* means any discharge from the *Works* that does not undergo any treatment before it is discharged to the environment;

"*CBOD5*" means five day carbonaceous (nitrification inhibited) biochemical oxygen demand measured in an unfiltered sample;

"*Certificate*" means this entire certificate of approval document, issued in accordance with Section 53 of the *Act*, and includes any schedules;

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"*Daily Concentration*" means the concentration of a contaminant in the effluent discharged over any single day, as measured by a composite or grab sample, whichever is required;

"*Director*" means any *Ministry* employee appointed by the Minister pursuant to section 5 of the *Act*;

"*District Manager*" means the District Manager of the Kingston District Office of the Ministry;

"*Ministry*" means the Ontario Ministry of the Environment;

"*Owner*" means The Corporation of the Village of Casselman and includes its successors and assignees;

"*Peak Flow Rate*" means the maximum rate of sewage flow for which the plant or process unit was designed;

"*Rated Capacity*" means the *Average Daily Flow* for which the *Works* are approved to handle;

"*Regional Director*" means the Regional Director of the Eastern Region of the Ministry;

"*Seasonal Average Concentration*" means the arithmetic mean of all the *Daily Concentrations* of a contaminant in the effluent calculated for a given discharge season (spring or fall);

"*Seasonal Flow Volume*" means the cumulative total sewage flow volume discharged from the sewage works during a discharge season (spring or fall);

"*Seasonal Loading*" means the value obtained by multiplying the *Seasonal Average Concentration* of a contaminant by the *Seasonal Flow Volume* over the same discharge season;

"Substantial Completion" has the same meaning as *"substantial performance*" in the Construction Lien Act;

"*Works*" means the sewage works described in the *Owner*'s application, this *Certificate* and in the supporting documentation referred to herein, to the extent approved by this *Certificate*.

You are hereby notified that this approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. GENERAL PROVISIONS

(1) The *Owner* shall ensure that any person authorized to carry out work on or operate any aspect of the *Works* is notified of this *Certificate* and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.

(2) Except as otherwise provided by these Conditions, the *Owner* shall design, build, install, operate and maintain the *Works* in accordance with the description given in this *Certificate*, the application for approval of the works and the submitted supporting documents and plans and specifications as listed in this *Certificate*.

(3) Where there is a conflict between a provision of any submitted document referred to in this *Certificate* and the Conditions of this *Certificate*, the Conditions in this *Certificate* shall take precedence, and where there is a conflict between the listed submitted documents, the document bearing the most recent date shall prevail.

(4) Where there is a conflict between the listed submitted documents, and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.

(5) The requirements of this *Certificate* are severable. If any requirement of this *Certificate*, or the application of any requirement of this *Certificate* to any circumstance, is held invalid or unenforceable, the application of such requirement to other circumstances and the remainder of this certificate shall not be affected thereby.

2. EXPIRY OF APPROVAL

The approval issued by this *Certificate* will cease to apply to those parts of the *Works* which have not been constructed within five (5) years of the date of this *Certificate*.

3. CHANGE OF OWNER

(1) The *Owner* shall notify the *District Manager* and the *Director*, in writing, of any of the following changes within 30 days of the change occurring:

(a) change of *Owner*;

(b) change of address of the *Owner*;

(c) change of partners where the *Owner* is or at any time becomes a partnership, and a copy of the most recent declaration filed under the Business Names Act, R.S.O. 1990, c.B17 shall be included in the notification to the *District Manager*;

(d) change of name of the corporation where the *Owner* is or at any time becomes a corporation, and a copy of the most current information filed under the Corporations Informations Act, R.S.O. 1990, c. C39 shall be included in the notification to the *District Manager*;

(2) In the event of any change in ownership of the *Works*, other than a change to a successor municipality, the *Owner* shall notify in writing the succeeding owner of the existence of this *Certificate*, and a copy of such notice shall be forwarded to the *District Manager* and the *Director*.

4. UPON THE SUBSTANTIAL COMPLETION OF THE WORKS

(1) Upon the *Substantial Completion* of the *Works*, the Owner shall prepare a statement, certified by a Professional Engineer, that the works are constructed in accordance with this *Certificate*, and upon request, shall make the written statement available for inspection by Ministry personnel.

(2) Within one (1) year of the *Substantial Completion* of the upgraded *Works*, a set of as-built drawings showing the works "as constructed" shall be prepared. These drawings shall be kept up to date through revisions undertaken from time to time and a copy shall be retained at the *Works* for the operational life of the *Works*.

5. BY-PASSES

(1) Any *By-pass* of sewage from any portion of the *Works* is prohibited, except where:

(a) it is necessary to avoid loss of life, personal injury, danger to public health or severe property damage;
(b) the *District Manager* agrees that it is necessary for the purpose of carrying out essential maintenance and the *District Manager* has given prior written acknowledgment of the *by-pass*; or
(c) the *Regional Director* has given prior written acknowledgment of the *By-pass*.

(2) The *Owner* shall maintain a logbook of all *By-pass* events which shall include, at a minimum, the time, location, duration, quantity of *By-pass*, the authority for *By-pass* pursuant to subsection (1), and the reasons for the occurrence.

6. EFFLUENT OBJECTIVES

(1) The *Owner* shall use best efforts to design, construct and operate the *Works* with the objective that the concentrations and total loadings of the materials named below as effluent parameters are not exceeded in the effluent from the *Works* as determined in accordance with Condition 7(2).

Spring: *Seasonal Flow Volume* = 502,500 m^3 discharged between March 7 and May 15

Table 1 - Spring Effluent Objectives		
Effluent Parameter	**Seasonal Average Concentration** (milligrams per litre unless otherwise indicated)	**Seasonal Loading*** (kilograms per season unless otherwise indicated)
Column 1	Column 2	Column 3
CBOD5	15	7,538
Total Suspended Solids	15	7,538
Total Phosphorus	0.8	402
Total Ammonia Nitrogen	12.0	6,030
Hydrogen Sulphide	Not Detected	-

Note* The *Seasonal Loading* is based on the *Season Flow Volume* of 502,500 m^3

Fall: *Seasonal Flow Volume* = 267,650 m^3 discharged between October 1 and December 19

Table 2 - Fall Effluent Objectives		
Effluent Parameter	**Seasonal Average Concentration** (milligrams per litre unless otherwise indicated)	**Seasonal Loading**** (kilograms per season unless otherwise indicated)
Column 1	Column 2	Column 3
CBOD5	10	2,677
Total Suspended Solids	10	2,677
Total Phosphorus	0.8	214
Total Ammonia Nitrogen	4.0	1,071
Hydrogen Sulphide	Not Detected	-

Note* The *Seasonal Loading* is based on the *Season Flow Volume* of 267,650 m^3.

(2) The *Owner* shall use best efforts to:

(a) maintain the pH of the effluent from the *Works* within the range of 6.5 and 8.5, inclusive, at all times;
(b) operate the works within the *Rated Capacity* of the *Works*;
(c) ensure that the effluent from the *Works* is essentially free of floating and settleable solids and does not contain oil or any other substance in amounts sufficient to create a visible film or sheen or foam or discolouration on the receiving waters.

(3) The *Owner* shall include in all reports submitted in accordance with Condition 10 a summary of the efforts made and results achieved under this Condition.

7. EFFLUENT LIMITS

(1) The *Owner* shall design, construct, operate and maintain the *Works* such that the concentrations and waste loadings of the materials named below as effluent parameters are not exceeded in the effluent from the *Work*s.

Spring: *Seasonal Flow Volume* = 502,500 m^3 discharged between March 7 and May 15

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Table 3 - Spring Effluent Limits		
Effluent Parameter	**Seasonal Average Concentration** (milligrams per litre unless otherwise indicated)	**Seasonal Loading*** (kilograms per season unless otherwise indicated)
Column 1	Column 2	Column 3
CBOD5	25	12,563
Total Suspended Solids	25	12,563
Total Phosphorus	1.0	503
Total Ammonia Nitrogen	16.0	8,040
Hydrogen Sulphide	0.1	50.3
pH of the effluent maintained between 6.0 to 9.5, inclusive, at all times		

Note* The *Seasonal Loading* is based on the *Season Flow Volume* of 502,500 m^3

Fall: *Seasonal Flow Volume* = 267,650 m^3 discharged between October 1 and December 19

Table 4 - Fall Effluent Limits		
Effluent Parameter	**Seasonal Average Concentration** (milligrams per litre unless otherwise indicated)	**Seasonal Loading**** (kilograms per season unless otherwise indicated)
Column 1	Column 2	Column 3
CBOD5	15	4,015
Total Suspended Solids	25	6,691
Total Phosphorus	1.0	268
Total Ammonia Nitrogen	5.0	1,338
Hydrogen Sulphide	Not Detected	-
pH of the effluent maintained between 6.0 to 9.5, inclusive, at all times		

Note* The *Seasonal Loading* is based on the *Season Flow Volume* of 267,650 m^3.

(2) For the purposes of determining compliance with and enforcing subsection (1):

(a) The *Seasonal Average Concentration* of a parameter named in Column 1 of Tables 3 and 4 of subsection (1) shall not exceed the corresponding maximum concentration set out in Column 2 of Tables 3 and 4 of subsection (1).

(b) The *Seasonal Loading* of a parameter named in Column 1 of Tables 3 and 4 of subsection (1) shall not exceed the corresponding maximum loading as set out in Column 3 of Tables 3 and 4 of subsection (1).

(c) The pH of the effluent shall be maintained within the limits outlined in Tables 3 and 4 of subsection (1), at all times.

(3) The effluent limit set out in subsection (1) shall come into effect upon the commencement of operation of the upgraded *Works*.

8. EFFLUENT MONITORING AND RECORDING

The *Owner* shall, upon commencement of operation of the upgraded *Works*, carry out the following monitoring program:

(1) All samples and measurements taken for the purposes of this *Certificate* are to be taken at a time and in a location characteristic of the quality and quantity of the effluent stream over the time period being monitored.

(2) The following lagoon effluent discharge parameters shall be measured, estimated or calculated and recorded:

(a) lagoon effluent discharge rate at the time of sampling undertaken pursuant to subsection (3),

(b) total volume of effluent discharged on the sampling day, and

(c) total volume of effluent discharged over each discharge season.

(3) Samples shall be collected at the following sampling points, at the frequency specified, by means of the specified sample type and analyzed for each parameter listed and all results recorded:

Table 5 - Raw Sewage Monitoring -
Sampling Point: Raw Sewage Inlet

Parameters	Sample Type	Frequency
CBOD5	grab	monthly
Total Suspended Solids	grab	monthly
Total Phosphorus	grab	monthly
Total Kjeldahl Nitrogen	grab	monthly

(4) Samples shall be collected at the following sampling points, at the frequency specified, by means of the specified sample type and analyzed for each parameter listed and all results recorded:

Table 6 - Final Effluent Monitoring -
Sampling Point: Effluent Outfall

Parameters	Sample Type	Frequency
CBOD5	grab	5 per discharge*
Total Suspended Solids	grab	5 per discharge*
Total Phosphorus	grab	5 per discharge*
Total Ammonia Nitrogen	grab	5 per discharge*

* Samples of final effluent from the sewage treatment plant shall be collected from the lagoon outlet structure at least five times during each seasonal discharge, namely, at the beginning of the discharge, at 25%, 50% and 75% drawdown in the lagoon, and at the end of the discharge.

(5) Samples shall be collected at the following sampling points, at the frequency specified, by means of the specified sample type and analyzed for each parameter listed and all results recorded:

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Table 7 - South Nation River Monitoring Sampling Point: Upstream of the Effluent Outfall and Downstream of the Effluent Outfall		
Parameters	**Sample Type**	**Frequency**
CBOD5	grab	weekly**
Total Suspended Solids	grab	weekly**
Total Phosphorus	grab	weekly**
Total Ammonia Nitrogen	grab	weekly**

** Minimum of two (2) sampling points in the South Nation River shall be employed:

1. one (1) upstream of the effluent outfall at the Casselman Water Treatment Plant intake; and
2. one (1) downstream of the effluent outfall and upstream of the Village's landfill from one of the shores of South Nation River on the outfall side.

(6) Modifications to the sampling program may be considered after the first year of operation and would be based on an assessment of the sampling results and the performance of the hydrographic controlled release.

(7) In addition to the above routine sampling program, prior to each seasonal discharge, the lagoon contents shall be grab sampled and analyzed for:

Total Phosphorus, Hydrogen Sulphide and E. Coli.

(8) The methods and protocols for sampling, analysis and recording shall conform, in order of precedence, to the methods and protocols specified in the following:

(a) the Ministry's Procedure F-10-1, “Procedures for Sampling and Analysis Requirements for Municipal and Private Sewage Treatment Works (Liquid Waste Streams Only), as amended from time to time by more recently published editions;

(b) the Ministry's publication "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater" (January 1999), ISBN 0-7778-1880-9, as amended from time to time by more recently published editions;

(9) The *Owner* shall install and maintain (a) continuous flow measuring device(s), to measure and record the quantity of sewage being conveyed to the *Works* with an accuracy to within plus or minus 15 per cent (+/- 15%) of the actual flowrate for the entire design range of the flow measuring device.

(10) The *Owner* shall retain for a minimum of three (3) years from the date of their creation, all records and information related to or resulting from the monitoring activities required by this *Certificate*.

9. OPERATION AND MAINTENANCE

(1) The *Owner* shall exercise due diligence in ensuring that, at all times, the *Works* and the related equipment and appurtenances used to achieve compliance with this *Certificate* are properly operated and maintained.

(2) The *Owner* shall prepare an operations manual within six (6) months of introducing sewage into the upgraded *Works*, that includes, but not necessarily limited to, the following information:

(a) operating procedures for routine operation of the *Works*;

(b) inspection programs, including frequency of inspection, for the *Works* and the methods or tests employed to detect when maintenance is necessary;

(c) repair and maintenance programs, including the frequency of repair and maintenance for the *Works*;

(d) procedures for the inspection and calibration of monitoring equipment;

(e) a spill prevention control and countermeasures plan, consisting of contingency plans and procedures for dealing with equipment breakdowns, potential spills and any other abnormal situations, including notification of the *District Manager*; and

(f) procedures for receiving, responding and recording public complaints, including recording any follow-up actions taken.

(3) The *Owner* shall maintain the operations manual current and retain a copy at the location of the *Works* for the operational life of the *Works*. Upon request, the *Owner* shall make the manual available to *Ministry* staff.

(4) The *Owner* shall provide for the overall operation of the *Works* with an operator who holds a licence that is applicable to that type of facility and that is of the same class as or higher than the class of the facility in accordance with Ontario Regulation 129/04.

(5) The Owner shall ensure that the sewage treatment plant is operated on a semi-annual discharge basis with the effluent discharge in spring and fall as follows:

Spring: Discharging a total volume of effluent not exceeding 502,500 m^3, at controlled rate, commencing not earlier than March 7 and terminating not later than May 15. The discharge shall commence after the liquid surface in the facultative lagoons has become free of ice cover. The rate of discharge is automatically controlled to provide an effluent dilution ratio (river flow rate to effluent discharge rate) vary between 110:1 to 120:1, based on a signal from a permanently installed river flow measuring device, and

Fall: Discharging a total volume of effluent not exceeding 267,650 m^3, at controlled rate, commencing not earlier than October 1 and terminating not later than December 19. The rate of discharge is automatically controlled to provide effluent dilution ratio (river flow to effluent discharge rate) vary between 10:1 to 13:1 , based on a signal from a permanently installed river flow measuring device,

Note: As a precautionary measure, the Owner shall calibrate the flow measuring equipment at least once during the commencement of each discharge season to ensure proper operation of the automatic hydrographic controlled release.

10. REPORTING

(1) One week prior to the start up of the operation of the upgraded *Works*, the *Owner* shall notify the *District Manager* (in writing) of the pending start up date.

(2) Ten (10) days prior to the date of a planned *By-pass* being conducted pursuant to Condition 5 and as soon as possible for an unplanned *By-pass*, the *Owner* shall notify the *District Manager* (in writing) of the pending start date, in addition to an assessment of the potential adverse effects on the environment and the duration of the *By-pass*.

(3) The *Owner* shall report to the *District Manager* or designate, any exceedance of any parameter specified in Condition 7 orally, as soon as reasonably possible, and in writing within seven (7) days of the exceedance.

(4) The *Owner* shall, upon request, make all manuals, plans, records, data, procedures and supporting documentation available to *Ministry* staff.

(5) The *Owner* shall prepare, and upon request, submit to the *District Manager* a performance report, on an annual basis, within ninety (90) days following the end of the period being reported upon. The first such report shall cover the first annual period following the commencement of operation of the upgraded *Works* and subsequent reports shall be submitted to cover successive annual periods following thereafter. The reports shall contain, but shall not be limited to, the following

information:

(a) a summary and interpretation of all monitoring data and a comparison to the effluent limits outlined in Condition 7, including an overview of the success and adequacy of the *Works*;

(b) a description of any operating problems encountered and corrective actions taken;

(c) a summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the *Works*;

(d) a summary of any effluent quality assurance or control measures undertaken in the reporting period;

(e) a summary of the calibration and maintenance carried out on all effluent monitoring equipment; and

(f) a description of efforts made and results achieved in meeting the Effluent Objectives of Condition 6.

(g) a summary of any complaints received during the reporting period and any steps taken to address the complaints; and

(h) a summary of all *By-pass*, spill or abnormal discharge events.

(6) The Owner shall prepare and submit to the District Manager annual reports on the funding contributions made to the South Nation Conservation Authority (SNCA) for the Total Phosphorus Management Program based on the "Memorandum of Understanding" signed between The South Nation Conservation Authority and The Corporation of the Village of Casselman on April 12, 2001. The annual report shall include details regarding the amount of funds contributed, name and location of projects funded, status of funded projects, estimation of phosphorus loading offset from non-point sources. The first such report shall cover the period from the commencement of operation of the sewage works to the end of the calendar year and shall be prepared within the following ninety (90) calendar days. Each subsequent annual report shall be prepared within ninety (90) calendar days following the completion of the calendar year being reported upon.

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is imposed to ensure that the *Works* are built and operated in the manner in which they were described for review and upon which approval was granted. This condition is also included to emphasize the precedence of Conditions in the *Certificate* and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review. The condition also advises the Owners their responsibility to notify any person they authorized to carry out work pursuant to this *Certificate* the existence of this *Certificate*.

2. Condition 2 is included to ensure that, when the *Works* are constructed, the *Works* will meet the standards that apply at the time of construction to ensure the ongoing protection of the environment.

3. Condition 3 is included to ensure that the *Ministry* records are kept accurate and current with respect to the approved works and to ensure that subsequent owners of the *Works* are made aware of the *Certificate* and continue to operate the *Works* in compliance with it.

4. Condition 4 is included to ensure that the *Works* are constructed in accordance with the approval and that record drawings of the *Works* “as constructed” are maintained for future references.

5. Condition 5 is included to indicate that by-passes of untreated sewage to the receiving watercourse is prohibited, save in certain limited circumstances where the failure to *By-pass* could result in greater injury to the public interest than the *By-pass* itself where a *By-pass* will not violate the approved effluent requirements, or where the *By-pass* can be limited or otherwise mitigated by handling it in accordance with an approved contingency plan. The notification and documentation requirements allow the *Ministry* to take action in an informed manner and will ensure the *Owner* is aware of the extent and frequency of *By-pass* events.

6. Condition 6 is imposed to establish non-enforceable effluent quality objectives which the *Owner* is obligated to use best efforts to strive towards on an ongoing basis. These objectives are to be used as a mechanism to trigger corrective action

proactively and voluntarily before environmental impairment occurs and before the compliance limits of Condition 6 are exceeded..

7. Condition 7 is imposed to ensure that the effluent discharged from the *Works* to the South Nation River meets the *Ministry*'s effluent quality requirements thus minimizing environmental impact on the receiver and to protect water quality, fish and other aquatic life in the receiving water body.

8. Condition 8 is included to enable the *Owner* to evaluate and demonstrate the performance of the *Works*, on a continual basis, so that the *Works* are properly operated and maintained at a level which is consistent with the design objectives and effluent limits specified in the *Certificate* and that the *Works* does not cause any impairment to the receiving watercourse.

9. Condition 9 is included to require that the *Works* be properly operated, maintained, funded, staffed and equipped such that the environment is protected and deterioration, loss, injury or damage to any person or property is prevented. As well, the inclusion of a comprehensive operations manual governing all significant areas of operation, maintenance and repair is prepared, implemented and kept up-to-date by the owner and made available to the *Ministry*. Such a manual is an integral part of the operation of the *Works*. Its compilation and use should assist the *Owner* in staff training, in proper plant operation and in identifying and planning for contingencies during possible abnormal conditions. The manual will also act as a benchmark for *Ministry* staff when reviewing the *Owner*'s operation of the work.

10. Condition 10 is included to provide a performance record for future references, to ensure that the *Ministry* is made aware of problems as they arise, and to provide a compliance record for all the terms and conditions outlined in this *Certificate,* so that the *Ministry* can work with the *Owner* in resolving any problems in a timely manner.

This Certificate of Approval revokes and replaces Certificate(s) of Approval No. 3717-6FENWL issued on November 9, 2005

In accordance with Section 100 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, as amended, you may by written notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 101 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, provides that the Notice requiring the hearing shall state:

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the works are located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
2300 Yonge St., Suite 1700
P.O. Box 2382
Toronto, Ontario
M4P 1E4

AND

The Director
Section 53, *Ontario Water Resources Act*
Ministry of the Environment
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca**

CONTENT COPY OF ORIGINAL

The above noted sewage works are approved under Section 53 of the Ontario Water Resources Act.

DATED AT TORONTO this 24th day of August, 2006

Mohamed Dhalla, P.Eng.
Director
Section 53, *Ontario Water Resources Act*

SH/
c: District Manager, MOE Cornwall
Ryan Ashford, P.Eng., J.L. Richards & Associates Limited
Water Standards Section, Standards Development Branch, MOE, Toronto

Ontario

Ministry of the Environment, Conservation and Parks
Ministère de l'Environnement, de la Protection de la nature et des Parcs

AMENDED ENVIRONMENTAL COMPLIANCE APPROVAL

NUMBER 0246-CUXTCB
Issue Date: September 20, 2024

The Corporation of the Village of Casselman
751 St. Jean St
Post Office Box, No. 710
Casselman, Ontario
K0A 1M0

Site Location: Casselman Lagoons
Lot 7, 8, 9 & 10, Concession 6
Village of Casselman, Ontario

You have applied under section 20.2 of Part II.1 of the Environmental Protection Act, R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:

usage and operation of existing municipal sewage works, for the treatment of sanitary sewage and disposal of effluent to South Nation River via the Casselman seasonal discharge lagoons and Final Effluent disposal facilities as follows:

Classification of Collection System: Separate Sewer System

Classification of Sewage Treatment Plant: Secondary

Design Capacity of Sewage Treatment Plant

Design Capacity with all Treatment Trains in Operation	Existing Works
Rated Capacity	2,110 m^3/d

Influent and Imported Sewage

Receiving Location	Types
In Collection System	Sanitary Sewage, Leachate
At Sewage Treatment Plant	Leachate

Existing Works:

Sanitary Forcemain

- a 1,700 m long 400 mm diameter HDPE forcemain running along a route extending from the sewage pumping station along Brisson Road, an easement between Brisson Road and Laurier Street, Laurier Street, and Lagoon Access Road to the existing Sewage Lagoons; and

- one (1) air release valve and chamber on the 400 mm diameter HDPE forcemain at the easement crossing between Brisson Road and Laurier Street;

Sewage Lagoon

three facultative sewage lagoons (Cells 'A' , 'B' and 'C') , aeration system, phosphorus removal system, and flow diversion/ measurement system, as follows:

- two (2) clay lined facultative lagoons (Cell 'A' and 'B'), each with dimensions of 290 m wide and 295 m long, operated in parallel and receiving influent raw sewage via an upgraded forcemain described above and splitter box, each cell having an area of 8.6 ha, a total depth of 2.5 m (including a 0.3 m sludge storage bottom zone and a 0.7 m freeboard) and an effective storage capacity of 115,000 m^3, both discharging through a 450 mm diameter transfer pipes into cell 'C';

- a clay lined facultative lagoon (Cell 'C'), with dimension of 115 m wide and 435 m long, that receives discharges from cell 'A' and cell 'B', having a total depth of 2.7 m (including a 0.3 m sludge storage bottom zone and a 0.7 m freeboard) and an effective storage capacity of 100,000 m^3, including 150 submerged aerators for diffusing air into the sewage;

- an aeration system consisting of two positive displacement air blowers, each rated at a capacity of 10.6 m^3/min (375 SCFM) at a discharge pressure of 41 kPa, and each equipped with a inlet air filter, inlet and outlet silencers, flexible connectors, pressure relief valve, discharge check valve, and isolation valves;

- a phosphorus removal system consisting of one (1) 27,000 L capacity alum storage tank equipped with spill containment structure, two (2) (one duty and one standby) diaphragm type alum feed metering pumps each rated at 2.3 to 13.0 L/hr and a heat traced discharge pipe from the metering pumps to the sanitary forcemain;

- one (1) 2,400 mm x 3,000 mm flow diversion chamber separated by a dividing wall. The first section of the chamber is 1,050 mm x 2,400 mm and connects the existing 600mm diameter effluent pipe to transfer effluent from Cell "C" to the Moving Bed Biofilm Reactor (MBBR) pumping station. The second section of the flow diversion chamber is 1,700 mm x 2,400 mm and connects the disc filter outlet pipe/bypass pipe discharging to the existing 600 mm

diameter effluent discharge pipe which outlets to the South Nation River.

Moving Bed Biofilm Reactor (MBBR) (LagoonGuard™)

MBBR treatment system each train having a Rated Capacity of 3,500 m^3/d and Peak Flow Rate of 5,000 m^3/d consisting of the following:

- two (2) influent flow meters;
- one (1) pumping station equipped with three (3) pumps each rated at 57.8 L/sec @ 8.1 m TDH conveying effluent from Cell "C" to the MBBR described below;
- an MBBR treatment system with two (2) trains, each having two (2) reactors cells downstream of Cell "C" consisting of the following:
    - cell #1 ($CBOD_5$ Reactor), having approximate dimensions of 6.5 m wide x 3.85 m long x 6.0 m deep, providing a maximum of 5.0 m operational depth, filled with 88 m^3 of disk shaped free-floating carrier media (AnoxKaldnes ™ free-floating media or equivalent (providing a total of 800 m^2/m^3 media carrier surface area), equipped with one (1) diffuser with an aeration surface area of 18.0 m^2;
    - cell #2 (TAN Reactor), having approximate dimensions of 6.5 m wide x 11.5 m long x 6.0 m deep, providing a maximum of 5.0 m operational depth, filled with 338 m^3 of disk shaped free-floating carrier media (AnoxKaldnes ™ free-floating media or equivalent (providing a total of 800 m^2/m^3 media carrier surface area), equipped with three (3) diffusers, each with an aeration surface area of 18.0 m^2;
    - three (3) 25 Hp air blowers each with rated capacity of 545 Nm^3/h, designed and operated to provide the following air supply to the MBBR sewage treatment system during each specified period: 573 Nm^3/h during fall period, 987 Nm^3/h during winter period, and 1141 Nm^3/h during spring period; and
    - one (1) 350 mm diameter outlet pipe from the MBBR cells discharging to a Disc Filter System.

Disc Filter System

a Disc Filter System downstream of the MBBR consisting of the following:

- one (1) steel tank disc filter system with approximate dimensions of 2,286 mm width x 6,580 mm length x 2,450 mm height, equipped with twenty one (21) 2,200 mm diameter filter disks with 10 micro-metre mesh size filters;

- one (1) 8.61 L/sec capacity backwash pump and 150 mm diameter pipe returning backwash to Lagoon Cell "A";

- one (1) 350 mm diameter outlet pipe discharging to a flow diversion chamber;

Final Effluent Disposal Facilities

- effluent flow measurement backup system consisting of a cast-in-place concrete Parshall flume equipped with an ultrasonic sensor with a measurement capacity of 23,000 m^3/day;

- South Nation River flow measurement system consisting of:

  a concrete weir with a notched section equipped with an ultrasonic depth sensor mounted above a stilling well upstream of the weir which is used in conjunction with a stage-discharge relationship developed for the South Nation River;

  a flow measurement system to measure the flow rate of river water conveyed into a hydro dam upstream of the concrete weir;

- a concrete flow control chamber equipped with a 450 mm by 450 mm sluice gate with a motorized actuator for the hydrographic controlled release (HRC) of effluent based on a preselected dilution ratio with the flow of South Nation River; and

- a plant effluent outfall sewer consisting of 500 mm and 525 mm diameter pipes, equipped with two (2) 525 mm diameter diffuser ports, discharging at approximately 75 m off shore into the South Nation River.

including all other mechanical system, electrical system, instrumentation and control system, standby power system, piping, pumps, valves and appurtenances essential for the proper, safe and reliable operation of the Works in accordance with this Approval, in the context of process performance and general principles of wastewater engineering only;

all in accordance with the submitted supporting documents listed in Schedule A.

For the purpose of this environmental compliance approval, the following definitions apply:

1. "Annual Average Effluent Concentration" is the mean of all Single Sample Results of the concentration of a contaminant in the Final Effluent sampled or measured during a calendar year, calculated and reported as per the methodology specified in Schedule E;

2. "Annual Average Daily Influent Flow" means the cumulative total sewage flow of Influent to the Sewage Treatment Plant during a calendar year divided by the number of days during which sewage was flowing

to the Sewage Treatment Plant that year;

3. "Approval" means this environmental compliance approval and any schedules attached to it, and the application;

4. "BOD5" (also known as TBOD5) means five day biochemical oxygen demand measured in an unfiltered sample and includes carbonaceous and nitrogenous oxygen demands;

5. "Bypass" means diversion of sewage around one or more treatment processes, excluding Preliminary Treatment System, within the Sewage Treatment Plant with the diverted sewage flows being returned to the Sewage Treatment Plant treatment train upstream of the Final Effluent sampling point(s) and discharged via the approved effluent disposal facilities;

6. "CBOD5" means five day carbonaceous (nitrification inhibited) biochemical oxygen demand measured in an unfiltered sample;

7. "Director" means a person appointed by the Minister pursuant to section 5 of the EPA for the purposes of Part II.1 of the EPA;

8. "District Manager" means the District Manager of the appropriate local district office of the Ministry where the Works is geographically located;

9. *E. coli* " refers to coliform bacteria that possess the enzyme beta-glucuronidase and are capable of cleaving a fluorogenic or chromogenic substrate with the corresponding release of a fluorogen or chromogen, that produces fluorescence under long wavelength (366 nm) UV light, or color development, respectively. Enumeration methods include tube, membrane filter, or multi-well procedures. Depending on the method selected, incubation temperatures include 35.5 $\pm$ 0.5 °C or 44.5 $\pm$ 0.2 °C (to enumerate thermotolerant species). Regardless of incubation temperature, the length of incubation is 24 $\pm$ 2 hours. Depending on the procedure used, data are reported as either colony forming units (CFU) per 100 mL (for membrane filtration methods) or as most probable number (MPN) per 100 mL (for tube methods);

10. "EPA" means the *Environmental Protection Act* , R.S.O. 1990, c.E.19, as amended;

11. "Equivalent Equipment" means alternate piece(s) of equipment that meets the design requirements and performance specifications of the piece(s) of equipment to be substituted;

12. "Event" means an action or occurrence, at a given location within the Works that causes a Bypass or Overflow. An Event ends when there is no recurrence of Bypass or Overflow in the 12-hour period following the last Bypass or Overflow. Overflows and Bypasses are separate Events even when they occur concurrently;

13. “Existing Works” means those portions of the Works included in the Approval that have been constructed previously;

14. "Final Effluent" means effluent that is discharged to the environment through the approved effluent disposal facilities, including all Bypasses, that are required to meet the compliance limits stipulated in the

Approval for the Sewage Treatment Plant at the Final Effluent sampling point(s);

15. "Imported Sewage" means sewage hauled to the Sewage Treatment Plant by licensed waste management system operators of the types and quantities approved for co-treatment in the Sewage Treatment Plant, including hauled sewage and leachate within the meaning of R.R.O. 1990, Regulation 347: General – Waste Management, as amended;

16. "Influent" means flows to the Sewage Treatment Plant from the collection system and Imported Sewage;

17. "Limited Operational Flexibility" (LOF) means the conditions that the Owner shall follow in order to undertake any modification that is pre-authorized as part of this Approval;

18. "Ministry" means the ministry of the government of Ontario responsible for the EPA and OWRA and includes all officials, employees or other persons acting on its behalf;

19. "Monthly Average Effluent Concentration" is the mean of all Single Sample Results of the concentration of a contaminant in the Final Effluent sampled or measured during a calendar month, calculated and reported as per the methodology specified in Schedule E;

20. "Monthly Geometric Mean Density" is the mean of all Single Sample Results of *E.coli* measurement in the samples taken during a calendar month, calculated and reported as per the methodology specified in Schedule E;

21. "Normal Operating Condition" means the condition when all unit process(es), excluding Preliminary Treatment System, in a treatment train is operating within its design capacity;

22. "Operating Agency" means the Owner or the entity that is authorized by the Owner for the management, operation, maintenance, or alteration of the Works in accordance with this Approval;

23. "Overflow" means a discharge to the environment from the Works at designed location(s) other than the approved effluent disposal facilities or via the effluent disposal facilities downstream of the Final Effluent sampling point;

24. "Owner" means The Corporation of the Village of Casselman and its successors and assignees;

25. "OWRA" means the *Ontario Water Resources Act* , R.S.O. 1990, c. O.40, as amended;

26. "Preliminary Treatment System" means all facilities in the Sewage Treatment Plant associated with screening and grit removal;

27. "Proposed Works" means those portions of the Works included in the Approval that are under construction or to be constructed;

28. "Rated Capacity" means the Annual Average Daily Influent Flow for which the Sewage Treatment Plant is designed to handle;

29. "Seasonal Average Effluent Concentration" means the arithmetic mean of all Single Sample Results of the concentration of a contaminant in the Final Effluent sampled or measured, or both, during a seasonal discharge period;

30. "Seasonal Average Daily Effluent Flow" means the cumulative total Final Effluent discharged during a seasonal discharge period divided by the number of days during the same seasonal discharge period;

31. "Seasonal Average Daily Effluent Loading" means the value obtained by multiplying the Seasonal Average Effluent Concentration of a contaminant by the Seasonal Average Daily Effluent Flow during the same seasonal discharge period;

32. "Seasonal Average Effluent Loading" means the value obtained by multiplying the Seasonal Average Effluent Concentration of a contaminant by the Total Flow over the same season of a calendar year;

33. “Sewage Treatment Plant" means all the facilities related to sewage treatment within the sewage treatment plant site excluding the Final Effluent disposal facilities;

34. “Single Sample Result" means the test result of a parameter in the effluent discharged on any day, as measured by a probe, analyser or in a composite or grab sample, as required;

35. "Works" means the approved sewage works, and includes Existing Works and modifications made under Limited Operational Flexibility.

You are hereby notified that this environmental compliance approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. GENERAL PROVISIONS

1. The Owner shall ensure that any person authorized to carry out work on or operate any aspect of the Works is notified of this Approval and the terms and conditions herein and shall take all reasonable measures to ensure any such person complies with the same.

2. The Owner shall design, construct, operate and maintain the Works in accordance with the conditions of this Approval.

3. Where there is a conflict between a provision of any document referred to in this Approval and the conditions of this Approval, the conditions in this Approval shall take precedence.

2. CHANGE OF OWNER AND OPERATING AGENCY

1. The Owner shall, within thirty (30) calendar days of issuance of this Approval, prepare/update and

submit to the District Manager the Municipal and Local Services Board Wastewater System Profile Information Form, as amended (Schedule F) under any of the following situations:

a. the form has not been previously submitted for the Works;

b. this Approval is issued for extension, re-rating or process treatment upgrade of the Works;

c. when a notification is provided to the District Manager in compliance with requirements of change of Owner or Operating Agency under this condition.

2. The Owner shall notify the District Manager and the Director, in writing, of any of the following changes within thirty (30) days of the change occurring:

   a. change of address of Owner;

   b. change of Owner, including address of new owner;

   c. change of partners where the Owner is or at any time becomes a partnership, and a copy of the most recent declaration filed under the *Business Names Act, R.S.O. 1990, c. B.17* , as amended, shall be included in the notification;

   d. change of name of the corporation where the Owner is or at any time becomes a corporation, and a copy of the most current information filed under the *Corporations Information Act, R.S.O. 1990, c. C.39* , as amended, shall be included in the notification.

3. The Owner shall notify the District Manager, in writing, of any of the following changes within thirty (30) days of the change occurring:

   a. change of address of Operating Agency;

   b. change of Operating Agency, including address of new Operating Agency.

4. In the event of any change in ownership of the Works, the Owner shall notify the succeeding owner in writing, of the existence of this Approval, and forward a copy of the notice to the District Manager.

5. The Owner shall ensure that all communications made pursuant to this condition refer to the environmental compliance approval number.

3. BYPASSES

1. Any Bypass is prohibited, except:

   a. an emergency Bypass when a structural, mechanical or electrical failure causes a temporary reduction in the capacity of a treatment process or when an unforeseen flow condition exceeds the design capacity of a treatment process that is likely to result in personal injury, loss of life, health hazard, basement flooding, severe property damage, equipment damage or treatment process upset,

if a portion of the flow is not bypassed;

b. a planned Bypass that is a direct and unavoidable result of a planned repair and maintenance procedure or other circumstance(s), the Owner having notified the District Manager in writing at least fifteen (15) days prior to the occurrence of Bypass, including an estimated quantity and duration of the Bypass, an assessment of the impact on the quality of the Final Effluent and the mitigation measures if necessary, and the District Manager has given written consent of the Bypass;

2. Notwithstanding the exceptions given in Paragraph 1, the Operating Agency shall undertake everything practicable to maximize the flow through the downstream treatment process(es) prior to bypassing.

3. At the beginning of a Bypass Event, the Owner shall immediately notify the Spills Action Centre (SAC) and the local Medical Officer of Health. This notice shall include, at a minimum, the following information:

   a. the type of the Bypass as indicated in Paragraph 1 and the reason(s) for the Bypass;

   b. the date and time of the beginning of the Bypass;

   c. the treatment process(es) gone through prior to the Bypass and the treatment process(es) bypassed;

   d. the effort(s) done to maximize the flow through the downstream treatment process(es) and the reason(s) why the Bypass was not avoided.

4. Upon confirmation of the end of a Bypass Event, the Owner shall immediately notify the Spills Action Centre (SAC) and the local Medical Officer of Health. This notice shall include, at a minimum, the following information:

   a. the date and time of the end of the Bypass;

   b. the estimated or measured volume of Bypass.

5. For any Bypass Event, the Owner shall collect daily sample(s) of the Final Effluent, inclusive of the Event and analyze for all effluent parameters outlined in Compliance Limits condition that require composite samples, following the same protocol specified in the Monitoring and Recording condition for the regular samples. The sample(s) shall be in addition to the regular Final Effluent samples required under the monitoring and recording condition. If the Event occurs on a scheduled monitoring day, the regular sampling requirements prevail. If representative sample for the effluent parameter(s) that require grab sample cannot be obtained, they shall be collected after the Event at the earliest time when situation returns to normal.

6. The Owner shall submit a summary report of the Bypass Event(s) to the District Manager on a quarterly basis, no later than each of the following dates for each calendar year: February 15, May 15, August 15, and November 15. The summary reports shall contain, at a minimum, the types of information set out in Paragraphs (3), (4) and (5) and either a statement of compliance or a summary of the non-compliance notifications submitted as required under Paragraph 1 of Condition 10. If there is no Bypass Event

during a quarter, a statement of no occurrence of Bypass is deemed sufficient.

7. The Owner shall develop a notification procedure in consultation with the District Manager and SAC and notify the public and downstream water users that may be adversely impacted by any Bypass Event.

4. OVERFLOWS

1. Any Overflow is prohibited, except:

   a. an emergency Overflow in an emergency situation when a structural, mechanical or electrical failure causes a temporary reduction in the capacity of the Works or when an unforeseen flow condition exceeds the design capacity of the Works that is likely to result in personal injury, loss of life, health hazard, basement flooding, severe property damage, equipment damage or treatment process upset, if a portion of the flow is not overflowed;

   b. a planned Overflow that is a direct and unavoidable result of a planned repair and maintenance procedure or other circumstance(s), the Owner having notified the District Manager in writing at least fifteen (15) days prior to the occurrence of Overflow, including an estimated quantity and duration of the Overflow, an assessment of the impact on the environment and the mitigation measures if necessary, and the District Manager has given written consent of the Overflow;

2. Notwithstanding the exceptions given in Paragraph 1, the Operating Agency shall undertake everything practicable to maximize the flow through the downstream treatment process(es) and Bypass(es) prior to overflowing.

3. At the beginning of an Overflow Event, the Owner shall immediately notify the Spills Action Centre (SAC) and the local Medical Officer of Health. This notice shall include, at a minimum, the following information:

   a. the type of the Overflow as indicated in Paragraph 1 and the reason(s) for the Overflow;

   b. the date and time of the beginning of the Overflow;

   c. the point of the Overflow from the Works, the treatment process(es) gone through prior to the Overflow, the disinfection status of the Overflow and whether the Overflow is discharged through the effluent disposal facilities or an alternate location;

   d. the effort(s) done to maximize the flow through the downstream treatment process(es) and Bypass(es) and the reason(s) why the Overflow was not avoided.

4. Upon confirmation of the end of an Overflow Event, the Owner shall immediately notify the Spills Action Centre (SAC) and the local Medical Officer of Health. This notice shall include, at a minimum, the following information:

   a. the date and time of the end of the Overflow;

b. the estimated or measured volume of the Overflow.

5. For any Overflow Event

   a. in the Sewage Treatment Plant, the Owner shall collect grab sample(s) of the Overflow, one near the beginning of the Event and one every eight (8) hours for the duration of the Event, and have them analyzed at least for CBOD5, total suspended solids, total phosphorus, and *E. coli* , except that raw sewage and primary treated effluent Overflow shall be analyzed for BOD5, total suspended solids, total phosphorus and total Kjeldahl nitrogen only.

6. The Owner shall submit a summary report of the Overflow Event(s) to the District Manager on a quarterly basis, no later than each of the following dates for each calendar year: February 15, May 15, August 15, and November 15. The summary report shall contain, at a minimum, the types of information set out in Paragraphs (3), (4) and (5). If there is no Overflow Event during a quarter, a statement of no occurrence of Overflow is deemed sufficient.

7. The Owner shall develop a notification procedure in consultation with the District Manager and SAC and notify the public and downstream water users that may be adversely impacted by any Overflow Event.

5. DESIGN OBJECTIVES

1. The Owner shall design and undertake everything practicable to operate the Sewage Treatment Plant in accordance with the following objectives:

   a. Final Effluent parameters design objectives listed in the table(s) included in Schedule B.

   b. Final Effluent is essentially free of floating and settleable solids and does not contain oil or any other substance in amounts sufficient to create a visible film or sheen or foam or discolouration on the receiving waters.

   c. Annual Average Daily Influent Flow is within the Rated Capacity of the Sewage Treatment Plant.

6. COMPLIANCE LIMITS

1. The Owner shall operate and maintain the Sewage Treatment Plant such that compliance limits for the Final Effluent parameters listed in the table(s) included in **Schedule B** are met.

2. The effluent limit set out in subsection (1) shall come into effect upon the commencement of operation of the Proposed Works.

7. OPERATION AND MAINTENANCE

1. The Owner shall ensure that, at all times, the Works and the related equipment and appurtenances used to achieve compliance with this Approval are properly operated and maintained. Proper operation and maintenance shall include effective performance, adequate funding, adequate staffing and training,

including training in all procedures and other requirements of this Approval and the OWRA and regulations, adequate laboratory facilities, process controls and alarms and the use of process chemicals and other substances used in the Works.

2. The Owner shall update/maintain the operations manual for the Works within six (6) months of the issuance date of this Approval, that includes, but not necessarily limited to, the following information:

   a. operating procedures for the Works under Normal Operating Conditions;

   b. inspection programs, including frequency of inspection, for the Works and the methods or tests employed to detect when maintenance is necessary;

   c. repair and maintenance programs, including the frequency of repair and maintenance for the Works;

   d. procedures for the inspection and calibration of monitoring equipment;

   e. operating procedures for the Works to handle situations outside Normal Operating Conditions and emergency situations such as a structural, mechanical or electrical failure, or an unforeseen flow condition, including procedures to minimize Bypasses and Overflows;

   f. a spill prevention and contingency plan, consisting of procedures and contingency plans, including notification to the District Manager, to reduce the risk of spills of pollutants and prevent, eliminate or ameliorate any adverse effects that result or may result from spills of pollutants;

   g. procedures for receiving, responding and recording public complaints, including recording any follow up actions taken.

3. The Owner shall maintain the operations manual up-to-date and make the manual readily accessible for reference at the Works.

4. The Owner shall ensure that the Operating Agency fulfills the requirements under O. Reg. 129/04, as amended for the Works, including the classification of facilities, licensing of operators and operating standards.

5. The Owner shall operate the Works such that Final Effluent is only discharged during the period(s) as follows:

   a. winter/spring: discharging a total volume of effluent not exceeding 502,500 m^3, at a controlled rate, discharge shall be conducted as long as the water surface of Cell "C" is partially free of ice cover, commencing not earlier than January 1st and terminating not later than May 15th;

   b. fall: discharging a total volume of effluent not exceeding 267,650 m^3, at a controlled rate, discharge commencing not earlier than October 1st and terminating not later than December 31st; and

   c. ensure that the **Maximum Monthly Effluent Discharge Rates** for each monthly period outlined in

Schedule B are complied with;

8. MONITORING AND RECORDING

1. The Owner shall, upon commencement of operation of the Works, carry out a scheduled monitoring program of collecting samples at the required sampling points, at the frequency specified or higher, by means of the specified sample type and analyzed for each parameter listed in the tables under the monitoring program included in **Schedule C** and record all results, as follows:

    a. all samples and measurements are to be taken at a time and in a location characteristic of the quality and quantity of the sewage stream over the time period being monitored.

    b. a schedule of the day of the week/month for the scheduled sampling shall be created. The sampling schedule shall be revised and updated every year through rotation of the day of the week/month for the scheduled sampling program, except when the actual scheduled monitoring frequency is three (3) or more times per week.

    c. definitions and preparation requirements for each sample type are included in document referenced in Paragraph 3.b.

    d. definitions for frequency:

        i. Daily means once every day;

        ii. Weekly means once every week;

        iii. Monthly means once every month;

        iv. Quarterly means once every three months; and

        v. Semi-annually means once every six months;

2. In addition to the scheduled monitoring program required in Paragraph 1, the Owner shall collect daily sample(s) of the Final Effluent, on any day when there is any situation outside Normal Operating Conditions, and analyze for all effluent parameters outlined in Compliance Limits condition that require composite samples, following the same protocol specified in this condition for the regular samples. If the Event occurs on a scheduled monitoring day, the regular sampling requirements prevail. If representative sample for the effluent parameter(s) that require grab sample cannot be obtained, they shall be collected after the Event at the earliest time when situation returns to normal.

3. The methods and protocols for sampling, analysis and recording shall conform, in order of precedence, to the methods and protocols specified in the following documents and all analysis shall be conducted by a laboratory accredited to the ISO/IEC:17025 standard or as directed by the District Manager:

    a. the Ministry's Procedure F-10-1, “Procedures for Sampling and Analysis Requirements for

Municipal and Private Sewage Treatment Works (Liquid Waste Streams Only), as amended;

b. the Ministry's publication "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater Version 2.0" (January 2016), PIBS 2724e02, as amended;

c. the publication "Standard Methods for the Examination of Water and Wastewater", as amended.

4. The Owner shall monitor and record the flow rate and daily quantity using flow measuring devices or other methods of measurement as approved below calibrated to an accuracy within plus or minus 15 per cent (+/- 15%) of the actual flowrate of the following:

   a. Influent flow to the Sewage Treatment Plant by continuous flow measuring devices and instrumentations/pumping rates/details of other methods (e.g. top water elevation of lagoons).

   b. Final Effluent discharged from the Sewage Treatment Plant by continuous flow measuring devices and instrumentations/pumping rates/details of other methods (e.g. level of lagoons), or in lieu of an actual installation of equipment, adopt the flow measurements of the Influent for the purpose of estimating Final Effluent flows if the Influent and Final Effluent streams are considered not significantly different in flow rates and quantities.

   c. In determining the Maximum Monthly Discharge Rate of the Casselman lagoons the Owner shall determine the flow rate of the South Nation River at Casselman except when the flow is too low, in which case the flow proportioning calculation may be used to determine the flow rate;

   d. The Owner shall on a semi-annual basis validate the flow proportioning calculation by comparing the actual measured flow rate of the South Nation River at Casselman to the actual measured flow rate of the South Nation River at the Plantagenet location. If there appears to a discrepancy the flow proportioning calculation (see Schedule B) shall be adjusted and the District Manager notified.

   e. The Owner shall continue to monitor the Plantagenet water level station (#02LB005) as part of the Federal HYDAT network.

5. The Owner shall measure the volume of sludge in the lagoon cells at least every five (5) years, but it may be estimated in the interim years.

6. The Owner shall retain for a minimum of five (5) years from the date of their creation, all records and information related to or resulting from the monitoring activities required by this Approval.

9. LIMITED OPERATIONAL FLEXIBILITY

1. The Owner may make pre-authorized modifications to the Sewage Treatment Plant in Works in accordance with the document “Limited Operational Flexibility - Protocol for Pre-Authorized Modifications to Municipal Sewage Works” (Schedule D), as amended, subject to the following:

   a. the modifications will not involve the addition of any new treatment process or the removal of an existing treatment process, including chemical systems, from the liquid or solids treatment trains as

originally designed and approved.

b. the scope and technical aspects of the modifications are in line with those delineated in Schedule D and conform with the Ministry's publication "Design Guidelines for Sewage Works 2008", as amended, Ministry's regulations, policies, guidelines, and industry engineering standards;

c. the modifications shall not negatively impact on the performance of any process or equipment in the Works or result in deterioration in the Final Effluent quality;

d. where the pre-authorized modification requires notification, a "Notice of Modifications to Sewage Works" (Schedule D), as amended shall be completed with declarations from a Professional Engineer and the Owner and retained on-site prior to the scheduled implementation date. All supporting information including technical memorandum, engineering plans and specifications, as applicable and appropriate to support the declarations that the modifications conform with LOF shall remain on-site for future inspection.

2. The following modifications are not pre-authorized under Limited Operational Flexibility:

a. Modifications that involve addition or extension of process structures, tankages or channels;

b. Modifications that involves relocation of the Final Effluent outfall or any other discharge location or that may require reassessment of the impact to the receiver or environment;

c. Modifications that involves addition of or change in technology of a treatment process or that may involve reassessment of the treatment train process design;

d. Modifications that requires changes to be made to the emergency response, spill prevention and contingency plan; or

e. Modifications that are required pursuant to an order issued by the Ministry.

10. REPORTING

1. The Owner shall report to the District Manager orally as soon as possible any non-compliance with the compliance limits, and in writing within seven (7) days of non-compliance.

2. The Owner shall, within fifteen (15) days of occurrence of a spill within the meaning of Part X of the EPA, submit a full written report of the occurrence to the District Manager describing the cause and discovery of the spill, clean-up and recovery measures taken, preventative measures to be taken and schedule of implementation, in addition to fulfilling the requirements under the EPA and O. Reg. 675/98 "Classification and Exemption of Spills and Reporting of Discharges".

3. The Owner shall, upon request, make all manuals, plans, records, data, procedures and supporting documentation available to Ministry staff.

4. The Owner shall prepare performance reports on a calendar year basis and submit to the District

Manager by March 31 of the calendar year following the period being reported upon. The reports shall contain, but shall not be limited to, the following information pertaining to the reporting period:

a. a summary and interpretation of all Influent, monitoring data, and a review of the historical trend of the sewage characteristics and flow rates;

b. a summary and interpretation of all Final Effluent monitoring data, including concentration, flow rates, loading and a comparison to the design objectives and compliance limits in this Approval, including an overview of the success and adequacy of the Works;

c. a summary of any deviation from the monitoring schedule and reasons for the current reporting year and a schedule for the next reporting year;

d. a summary of all operating issues encountered and corrective actions taken;

e. a summary of all normal and emergency repairs and maintenance activities carried out on any major structure, equipment, apparatus or mechanism forming part of the Works;

f. a summary of any effluent quality assurance or control measures undertaken;

g. a summary of the calibration and maintenance carried out on all Influent and Final Effluent monitoring equipment to ensure that the accuracy is within the tolerance of that equipment as required in this Approval or recommended by the manufacturer;

h. a summary of efforts made to achieve the design objectives in this Approval, including an assessment of the issues and recommendations for pro-active actions if any are required under the following situations:

    i. when any of the design objectives is not achieved more than 50% of the time in a year, or there is an increasing trend in deterioration of Final Effluent quality;

    ii. when the Annual Average Daily Influent Flow reaches 80% of the Rated Capacity;

i. an estimate of the sludge volumes in the lagoon cells. Sludge volume is to be measured every five (5) years, but may be estimated in the interim years. A summary of disposal locations and volumes of sludge disposed of must also be provided if sludge was disposed of during the reporting period;

j. a summary of any complaints received and any steps taken to address the complaints;

k. a summary of all Bypasses, Overflows, other situations outside Normal Operating Conditions and spills within the meaning of Part X of EPA and abnormal discharge events;

l. a summary of all Notice of Modifications to Sewage Works completed under Paragraph 1.d. of Condition 9, including a report on status of implementation of all modification.

m. a summary of efforts made to achieve conformance with Procedure F-5-1 including but not limited

to projects undertaken and completed in the sanitary sewer system that result in overall Bypass/Overflow elimination including expenditures and proposed projects to eliminate Bypass/Overflows with estimated budget forecast for the year following that for which the report is submitted.

n. any changes or updates to the schedule for the completion of construction and commissioning operation of major process(es) / equipment groups in the Proposed Works.

5. The Owner shall prepare and submit to the District Manager annual reports on the funding contributions made to the South Nation Conservation Authority (SNCA) for the Total Phosphorus Management Program based on the "Memorandum of Understanding" signed between The South Nation Conservation Authority and The Corporation of the Village of Casselman on April 12, 2001. The annual report shall include details regarding the amount of funds contributed, name and location of projects funded, status of funded projects, estimation of phosphorus loading offset from non-point sources. The first such report shall cover the period from the commencement of operation of the sewage works to the end of the calendar year and shall be prepared within the following ninety (90) calendar days. Each subsequent annual report shall be prepared within ninety (90) calendar days following the completion of the calendar year being reported upon.

Schedule A

1. Internal review of the ECA undertaken at the request Village of Casselman

2. Application for amendment of Environmental Compliance Approval submitted by Village of Casselman dated January 16, 2018 and request for the addition of the Limited Operational Condition (LOF) to allow for a pilot testing projec of an MBBR system prepared by J. L. Richards & Associates Limited, Ottawa, Ontario.

3. Application for amendment of Environmental Compliance Approval submitted by Village of Casselman dated November 15, 2018 for an upgrade of the existing sewage work with the installation of an MBBR treatment system prepared by J. L. Richards & Associates Limited, Ottawa, Ontario, sewage works design report, and engineering drawings.

Schedule B

Winter/Spring - Final Effluent Objectives

Winter/Spring (January 1 to May 15) - Seasonal Flow Volume = 502,500 m^3

Concentration Objectives of Works

Final Effluent Parameter	**Averaging Calculator**	**Limit** (maximum unless otherwise indicated)
CBOD5	Monthly Average Effluent Concentration	15 mg/L
Total Suspended Solids	Monthly Average Effluent Concentration	15 mg/L
Total Phosphorus	Monthly Average Effluent Concentration	0.8 mg/L
Total Ammonia Nitrogen January 1 to March 31 April 1 to May 15	Monthly Average Effluent Concentration	 12.0 mg/L 6.0 mg/L
Hydrogen Sulphide	Monthly Average Effluent Concentration	0.1 mg/L
pH of the effluent maintained between 6.8 to 7.8, inclusive, at all times		

Loading Objectives of Works

Final Effluent Parameter	**Averaging Calculator**	**Limit** (maximum unless otherwise indicated)
CBOD5	Seasonal Average Daily Effluent Loading	55.84 kg/d
Total Suspended Solids	Seasonal Average Daily Effluent Loading	55.84 kg/d
Total Phosphorus	Seasonal Average Daily Effluent Loading	2.98 kg/d
Total Ammonia Nitrogen January 1 to March 31 April 1 to May 15	Seasonal Average Daily Effluent Loading	 44.67 kg/d 22.33 kg/d
Hydrogen Sulphide	Seasonal Average Daily Effluent Loading	0.37 kg/d

Schedule B (cont.)

Fall - Final Effluent Objectives

Fall (October 1 to December 31) - Seasonal Flow Volume = 267,650 m^3

Concentration Objectives of Works

Final Effluent Parameter	Averaging Calculator	Limit (maximum unless otherwise indicated)
CBOD5	Monthly Average Effluent Concentration	10 mg/L
Total Suspended Solids	Monthly Average Effluent Concentration	10 mg/L
Total Phosphorus	Monthly Average Effluent Concentration	0.8 mg/L
Total Ammonia Nitrogen October 1 to November 30 December 1 to December 31	Monthly Average Effluent Concentration	 5.0 mg/L 12.0 mg/L
Hydrogen Sulphide	Monthly Average Effluent Concentration	Not Detected
pH of the effluent maintained between 6.8 to 7.8, inclusive, at all times		

Loading Objectives of Works

Final Effluent Parameter	Averaging Calculator	Limit (maximum unless otherwise indicated)
CBOD5	Seasonal Average Daily Effluent Loading	28.99 kg/d
Total Suspended Solids	Seasonal Average Daily Effluent Loading	28.99 kg/d
Total Phosphorus	Seasonal Average Daily Effluent Loading	2.33 kg/d
Total Ammonia Nitrogen October 1 to November 30 December 1 to December 31	Seasonal Average Daily Effluent Loading	 14.55 kg/d 34.89 kg/d
Hydrogen Sulphide	Seasonal Average Daily Effluent Loading	-

Schedule B (cont.)

Spring - Final Effluent Compliance Limits

Winter/Spring (January 1 to May 15) - Seasonal Flow Volume = 502,500 m^3

Concentration Limits of Works

Final Effluent Parameter	Averaging Calculator	Limit (maximum unless otherwise indicated)
CBOD5	Monthly Average Effluent Concentration	25
Total Suspended Solids	Monthly Average Effluent Concentration	25
Total Phosphorus	Monthly Average Effluent Concentration	1.0
Total Ammonia Nitrogen January 1 to March 31 April 1 to May 15	Monthly Average Effluent Concentration	 12.0 mg/L 6.0 mg/L
Hydrogen Sulphide	Monthly Average Effluent Concentration	0.1 mg/L
pH of the effluent maintained between 6.0 to 8.0, inclusive, at all times		

Loading Objectives of Works

Final Effluent Parameter	Averaging Calculator	Limit (maximum unless otherwise indicated)
CBOD5	Seasonal Average Daily Effluent Loading	93.06 kg/d
Total Suspended Solids	Seasonal Average Daily Effluent Loading	93.06 kg/d
Total Phosphorus	Seasonal Average Daily Effluent Loading	3.73 kg/d
Total Ammonia Nitrogen January 1 to March 31 April 1 to May 15	Seasonal Average Daily Effluent Loading	 44.67 kg/d 22.33 kg/d
Hydrogen Sulphide	Seasonal Average Daily Effluent Loading	0.37 kg/d

Schedule B (cont.)

Fall - Final Effluent Compliance Limits

Fall (October 1 to December 31) - Seasonal Flow Volume = 267,650 m^3

Concentration Limits of Works

Final Effluent Parameter	Averaging Calculator	Limit (maximum unless otherwise indicated)
CBOD5	Monthly Average Effluent Concentration	15
Total Suspended Solids	Monthly Average Effluent Concentration	25
Total Phosphorus	Monthly Average Effluent Concentration	1.0
Total Ammonia Nitrogen October 1 to November 30 December 1 to December 31	Monthly Average Effluent Concentration	 5.0 mg/L 12.0 mg/L
Hydrogen Sulphide	Monthly Average Effluent Concentration	Not Detected
pH of the effluent maintained between 6.0 to 8.0, inclusive, at all times		

Loading Limits of Works

Final Effluent Parameter	Averaging Calculator	Limit (maximum unless otherwise indicated)
CBOD5	Seasonal Average Daily Effluent Loading	43.64 kg/d
Total Suspended Solids	Seasonal Average Daily Effluent Loading	72.73 kg/d
Total Phosphorus	Seasonal Average Daily Effluent Loading	2.91 kg/d
Total Ammonia Nitrogen October 1 to November 30 December 1 to December 31	Seasonal Average Daily Effluent Loading	 14.55 kg/d 34.89 kg/d
Hydrogen Sulphide	Seasonal Average Daily Effluent Loading	-

Schedule B (cont.)

Maximum Monthly Effluent Discharge Rates

Discharge Period	Maximum Discharge Rate	Maximum Discharge Rate Based on Dilution Ratio
January 1 - 31	5,000 m^3/d	SNR Flow/10
February 1 - 28/29	5,000 m^3/d	SNR Flow/10
March 1 - 31	5,000 m^3/d	SNR Flow/40
April 1 -30	7,000 m^3/d	SNR Flow/60
May 1 -15	7,000 m^3/d	SNR Flow/60
October 1 -31	4,000 m^3/d	SNR Flow/15
November 1 - 30	4,000 m^3/d	SNR Flow/10
December 1 - 31	5,000 m^3/d	SNR Flow/15

Flow proportioning Plantagenet to Casselman Dams

The following is the calculation to determine the South Nation River flow rate at the Casselman Dam when it is too low to measure by their present instrumentation. The flow is calculated by using the flow rate from the Plantagenet proportioned by the drainage area.

Plantagenet drainage area = 3810

Casselman drainage area = 2410

2410/3810 = 0.6325459

Multiply the Plantagenet dam flow (provided by South Nation Conservation Authority) by 0.6325459 to obtain the flow at Casselman Dam

Schedule C

Monitoring Program

Influent - Sampling Point: Main Pumping Station

Parameters	Sample Type	Minimum Frequency
BOD5	24 hour composite	Monthly
Total Suspended Solids	24 hour composite	Monthly
Total Phosphorus	24 hour composite	Monthly
Total Kjeldahl Nitrogen	24 hour composite	Monthly

Lagoon Content Monitoring

Sampling Location: Cell "C" - At least seven days prior to a scheduled discharge

Parameters	Sample Type*	Minimum Frequency
CBOD5	Grab	Once
Total Suspended Solids	Grab	Once
Total Phosphorus	Grab	Once
Total Kjeldahl Nitrogen	Grab	Once
Total Ammonia Nitrogen (TAN)	Grab	Once
pH	Grab	Once
Hydrogen Sulphide (if odour is present)	Grab	Once
Dissolved Oxygen (if odour is present)	Grab	Once
* A minimum of three (3) grab samples from the surface, middle and bottom of the liquid portion at three (3) locations representative of the lagoon content, collected and composited as one (1) grab sample.		

Final Effluent Sampling Point

Sampling Location: MBBR/Disc Filter Treatment System Effluent Discharge Outlet

Sample Type	Grab
Minimum Frequency	Weekly during each seasonal discharge periods.
Parameters	CBOD5, Total Suspended Solids, Total Phosphorus, Total Ammonia Nitrogen, Total Kjeldahl Nitrogen, Nitrate as Nitrogen, Nitrite as Nitrogen, *E. coli,* Hydrogen Sulphide (if odour is present), Field pH, and Field Temperature

Schedule C (cont.)

South Nation River Monitoring

Sampling Point*: Upstream of the Effluent Outfall and Downstream of the Effluent Outfall

Parameters	Sample Type	Minimum Frequency
CBOD5	Grab	Weekly
Total Suspended Solids	Grab	Weekly
Total Phosphorus	Grab	Weekly
Total Ammonia Nitrogen (TAN)	Grab	Weekly

Notes:

* Minimum of two (2) sampling points in the South Nation River shall be employed:

1. one (1) upstream of the effluent outfall at the Casselman Water Treatment Plant intake, excluding the weeks when there is ice cover on the South Nation River (i.e. when sampling is not feasible); and

2. one (1) downstream of the effluent outfall and upstream of the Village's landfill from one of the shores of South Nation River on the outfall side, excluding the weeks when there is ice cover on the South Nation River (i.e. when sampling is not feasible).

Schedule D

Limited Operational Flexibility

Protocol for Pre-Authorized Modifications to Municipal Sewage Works

1. General

    1. Pre-authorized modifications are permitted only where Limited Operational Flexibility has already been granted in the Approval and only permitted to be made at the pumping stations and sewage treatment plant in the Works, subject to the conditions of the Approval.

    2. Where there is a conflict between the types and scope of pre-authorized modifications listed in this document, and the Approval where Limited Operational Flexibility has been granted, the Approval shall take precedence.

    3. The Owner shall consult the District Manager on any proposed modifications that may fall within the scope and intention of the Limited Operational Flexibility but is not listed explicitly or included as an example in this document.

    4. The Owner shall ensure that any pre-authorized modifications will not:

        a. adversely affect the hydraulic profile of the Sewage Treatment Plant or the performance of any upstream or downstream processes, both in terms of hydraulics and treatment performance;

        b. result in new Overflow or Bypass locations, or any potential increase in frequency or quantity of Overflow(s) or Bypass(es).

        c. result in a reduction in the required Peak Flow Rate of the treatment process or equipment as originally designed.

2. Modifications that do not require pre-authorization:

    1. Sewage works that are exempt from Ministry approval requirements;

    2. Modifications to the electrical system, instrumentation and control system.

3. Pre-authorized modifications that do not require preparation of “Notice of Modification to Sewage Works”

    1. Normal or emergency maintenance activities, such as repairs, renovations, refurbishments and replacements with Equivalent Equipment, or other improvements to an existing approved piece of equipment of a treatment process do not require pre-authorization. Examples of these activities are:

        a. Repairing a piece of equipment and putting it back into operation, including replacement of minor

components such as belts, gear boxes, seals, bearings;

b. Repairing a piece of equipment by replacing a major component of the equipment such as motor, with the same make and model or another with the same or very close power rating but the capacity of the pump or blower will still be essentially the same as originally designed and approved;

c. Replacing the entire piece of equipment with Equivalent Equipment.

2. Improvements to equipment efficiency or treatment process control do not require pre-authorization. Examples of these activities are:

a. Adding variable frequency drive to pumps;

b. Adding on-line analyzer, dissolved oxygen probe, ORP probe, flow measurement or other process control device.

4. Pre-Authorized Modifications that require preparation of "Notice of Modification to Sewage Works"

1. Pumping Stations

a. Replacement, realignment of existing sewers including manholes, valves, gates, weirs and associated appurtenances provided that the modifications will not add new influent source(s) or result in an increase in flow from existing sources as originally approved.

b. Extension or partition of wetwell to increase retention time for emergency response and improve station maintenance and pump operation;

c. Replacement or installation of inlet screens to the wetwell;

d. Replacement or installation of flowmeters, construction of station bypass;

e. Replacement, reconfiguration or addition of pumps and modifications to pump suctions and discharge pipings including valve, gates, motors, variable frequency drives and associated appurtenances to maintain firm pumping capacity or modulate the pump rate provided that the modifications will not result in a reduction in the firm pumping capacity or discharge head or an increase in the peak pumping rate of the pumping station as originally designed;

f. Replacement, realignment of existing forcemain(s) valves, gates, and associated appurtenances provided that the modifications will not reduce the flow capacity or increase the total dynamic head and transient in the forcemain.

2. Sewage Treatment Plant

1. Sewers and appurtenances

a. Replacement, realignment of existing sewers (including pipes and channels) or construction of new

sewers, including manholes, valves, gates, weirs and associated appurtenances within the a sewage treatment plant, provided that the modifications will not add new influent source(s) or result in an increase in flow from existing sources as originally approved and that the modifications will remove hydraulic bottlenecks or improve the conveyance of sewage into and through the Works.

2. Flow Distribution Chambers/Splitters

    a. Replacement or modification of existing flow distribution chamber/splitters or construction of new flow distribution chamber/splitters, including replacements or installation of sluice gates, weirs, valves for distribution of flows to the downstream process trains, provided that the modifications will not result in a change in flow distribution ratio to the downstream process trains as originally designed.

3. Imported Sewage Receiving Facility

    1. Replacement, relocation or installation of loading bays, connect/disconnect hook-up systems and unloading/transferring systems;

    2. Replacement, relocation or installation of screens, grit removal units and compactors;

    3. Replacement, relocation or installation of pumps, such as dosing pumps and transfer pumps, valves, piping and appurtenances;

    4. Replacement, relocation or installation of storage tanks/chambers and spill containment systems;

    5. Replacement, relocation or installation of flow measurement and sampling equipment;

    6. Changes to the source(s) or quantity from each source, provided that changes will not result in an increase in the total quantity and waste loading of each type of Imported Sewage already approved for co-treatment.

4. Preliminary Treatment System

    a. Replacement of existing screens and grit removal units with equipment of the same or higher process performance technology, including where necessary replacement or upgrading of existing screenings dewatering washing compactors, hydrocyclones, grit classifiers, grit pumps, air blowers conveyor system, disposal bins and other ancillary equipment to the screening and grit removal processes.

    b. Replacement or installation of channel aeration systems, including air blowers, air supply main, air headers, air laterals, air distribution grids and diffusers.

5. Primary Treatment System

    a. Replacement of existing sludge removal mechanism, including sludge chamber;

b. Replacement or installation of scum removal mechanism, including scum chamber;

c. Replacement or installation of primary sludge pumps, scum pumps, provided that:the modifications will not result in a reduction in the firm pumping capacity or discharge head that the primary sludge pump(s) and scum pump(s) are originally designed to handle.

6. Secondary Treatment System

1. Biological Treatment

a. Conversion of complete mix aeration tank to plug-flow multi-pass aeration tank, including modifications to internal structural configuration;

b. Addition of inlet gates in multi-pass aeration tank for step-feed operation mode;

c. Partitioning of an anoxic/flip zone in the inlet of the aeration tank, including installation of submersible mixer(s);

d. Replacement of aeration system including air blowers, air supply main, air headers, air laterals, air distribution grids and diffusers, provided that the modifications will not result in a reduction in the firm capacity or discharge pressure that the blowers are originally designed to supply or in the net oxygen transferred to the wastewater required for biological treatment as originally required.

2. Secondary Sedimentation

a. Replacement of sludge removal mechanism, including sludge chamber;

b. Replacement or installation of scum removal mechanism, including scum chamber;

c. Replacement or installation of return activated sludge pump(s), waste activated sludge pump(s), scum pump(s), provided that the modifications will not result in a reduction in the firm pumping capacity or discharge head that the activated sludge pump(s) and scum pump(s) are originally designed to handle.

7. Tertiary Treatment System

a. Replacement of filtration system with equipment of the same filtration technology, including feed pumps, backwash pumps, filter reject pumps, filtrate extract pumps, holding tanks associated with the pumping system, provided that the modifications will not result in a reduction in the capacity of the filtration system as originally designed.

8. Disinfection System

1. UV Irraditation

a. Replacement of UV Irraditation system, provided that the modifications will not result in a reduction in the design capacity of the disinfection system or the radiation level as originally designed.

2. Chlorination/Dechlorination and Ozonation Systems

a. Extension and reconfiguration of contact tank to increase retention time for effective disinfection and reduce dead zones and minimize short-circuiting;

b. Replacement or installation of chemical storage tanks, provided that the tanks are provided with effective spill containment.

9. Supplementary Treatment Systems

1. Chemical systems

a. Replacement, relocation or installation of chemical storage tanks for existing chemical systems only, provided that the tanks are sited with effective spill containment;

b. Replacement or installation of chemical dosing pumps provided that the modifications will not result in a reduction in the firm capacity that the dosing pumps are originally designed to handle.

c. Relocation and addition of chemical dosing point(s) including chemical feed pipes and valves and controls, to improve phosphorus removal efficiency;

d. Use of an alternate chemical provided that it is a non-proprietary product and is a commonly used alternative to the chemical approved in the Works, provided that the chemical storage tanks, chemical dosing pumps, feed pipes and controls are also upgraded, as necessary..

10. Sludge Management System

1. Sludge Holding and Thickening

a. Replacement or installation of sludge holding tanks, sludge handling pumps, such as transfer pumps, feed pumps, recirculation pumps, provided that modifications will not result in reduction in the solids storage or handling capacities;

2. Sludge Digestion

a. Replacement or installation of digesters, sludge handling pumps, such as transfer pumps, feed pumps, recirculation pumps, provided that modifications will not result in reduction in the solids storage or handling capacities;

b. replacement of sludge digester covers.

3. Sludge Dewatering and Disposal

    a. Replacement of sludge dewatering equipment, sludge handling pumps, such as transfer pumps, feed pumps, cake pumps, loading pumps, provided that modifications will not result in reduction in solids storage or handling capacities.

4. Processed Organic Waste

    a. Changes to the source(s) or quantity from each source, provided that changes will not result in an increase in the total quantity already approved for co-processing.

11. Standby Power System

    1. Replacement or installation of standby power system, including feed from alternate power grid, emergency power generator, fuel supply and storage systems, provided that the existing standby power generation capacity is not reduced.

12. Pilot Study

    1. Small side-stream pilot study for existing or new technologies, alternative treatment process or chemical, provided:

        i. all effluent from the pilot system is hauled off-site for proper disposal or returned back to the sewage treatment plant for at a point no further than immediately downstream of the location from where the side-stream is drawn;

        ii. no proprietary treatment process or propriety chemical is involved in the pilot study;

        iii. the effluent from the pilot system returned to the sewage treatment plant does not significantly alter the composition/concentration of or add any new contaminant/inhibiting substances to the sewage to be treated in the downstream process;

        iv. the pilot study will not have any negative impacts on the operation of the sewage treatment plant or cause a deterioration of effluent quality;

        v. the pilot study does not exceed a maximum of two years and a notification of completion shall be submitted to the District Manager within one month of completion of the pilot project.

13. Lagoons

    a. installing baffles in lagoon provided that the operating capacity of the lagoon system is not reduced;

    b. raise top elevation of lagoon berms to increase free-board;

    c. replace or install interconnecting pipes and chambers between cells, provided that the process design

operating sequence is not changed;

d. replace or install mechanical aerators, or replace mechanical aerators with diffused aeration system provided that the mixing and aeration capacity are not reduced;

e. removal of accumulated sludge and disposal to an approved location offsite.

3. Final Effluent Disposal Facilities

1. Replacement or realignment of the Final Effluent channel, sewer or forcemain, including manholes, valves and appurtenances from the end of the treatment train to the discharge outfall section, provided that the sewer conveys only effluent discharged from the Sewage Treatment Plant and that the replacement or re-aligned sewer has similar dimensions and performance criteria and is in the same or approximately the same location and that the hydraulic capacity will not be reduced.

This page contains an image of the form entitled "Notice of Modification to Sewage Works". A digital copy can be obtained from the District Manager.

Ontario
Ministry of
the Environment

Notice of Modification to Sewage Works

RETAIN COPY OF COMPLETED FORM AS PART OF THE ECA AND SEND A COPY TO THE WATER SUPERVISOR (FOR MUNICIPAL) OR DISTRICT MANAGER (FOR NON-MUNICIPAL SYSTEMS)

Part 1 – Environmental Compliance Approval (ECA) with Limited Operational Flexibility

(Insert the ECA's owner, number and issuance date and notice number, which should start with "01" and consecutive numbers thereafter)

ECA Number	Issuance Date (mm/dd/yy)	Notice number (if applicable)

ECA Owner	Municipality

Part 2: Description of the modifications as part of the Limited Operational Flexibility

(Attach a detailed description of the sewage works)

Description shall include:
1. A detail description of the modifications and/or operations to the sewage works (e.g. sewage work component, location, size, equipment type/model, material, process name, etc.)
2. Confirmation that the anticipated environmental effects are negligible.
3. List of updated versions of, or amendments to, all relevant technical documents that are affected by the modifications as applicable, i.e. submission of documentation is not required, but the listing of updated documents is (design brief, drawings, emergency plan, etc.)

Part 3 – Declaration by Professional Engineer

I hereby declare that I have verified the scope and technical aspects of this modification and confirm that the design:
1. Has been prepared or reviewed by a Professional Engineer who is licensed to practice in the Province of Ontario;
2. Has been designed in accordance with the Limited Operational Flexibility as described in the ECA;
3. Has been designed consistent with Ministry's Design Guidelines, adhering to engineering standards, industry's best management practices, and demonstrating ongoing compliance with s.53 of the Ontario Water Resources Act; and other appropriate regulations.

I hereby declare that to the best of my knowledge, information and belief the information contained in this form is complete and accurate

Name (Print)	PEO License Number

Signature	Date (mm/dd/yy)

Name of Employer

Part 4 – Declaration by Owner

I hereby declare that:
1. I am authorized by the Owner to complete this Declaration;
2. The Owner consents to the modification; and
3. This modifications to the sewage works are proposed in accordance with the Limited Operational Flexibility as described in the ECA.
4. The Owner has fulfilled all applicable requirements of the *Environmental Assessment Act*.

I hereby declare that to the best of my knowledge, information and belief the information contained in this form is complete and accurate

Name of Owner Representative (Print)	Owner representative's title (Print)

Owner Representative's Signature	Date (mm/dd/yy)

EAB Form December 2, 2013

Schedule E

Methodology for Calculating and Reporting Monthly Average Effluent Concentration, Annual Average Effluent Concentration and Monthly Geometric Mean Density

1. Monthly Average Effluent Concentration

Step 1: Calculate the arithmetic mean of all Single Sample Results of the concentration of a contaminant in the Final Effluent sampled or measured during a calendar month and proceed as follows depending on the result of the calculation:

a. If the arithmetic mean does not exceed the compliance limit for the contaminant, then report and use this arithmetic mean as the Monthly Average Effluent Concentration for this parameter where applicable in this Approval;

b. If the arithmetic mean exceeds the compliance limit for the contaminant and there was no Bypass Event during the calendar month, then report and use this arithmetic mean as the Monthly Average Effluent Concentration for this parameter where applicable in this Approval;

c. If the arithmetic mean exceeds the compliance limit for the contaminant and there was Bypass Event(s) during the calendar month, then proceed to Step 2;

d. If the arithmetic mean does not exceed the compliance limit for the contaminant and there was Bypass Event(s) during the calendar month, the Owner may still elect to proceed to Step 2 calculation of the flow-weighted arithmetic mean.

Step 2: Calculate the flow-weighted arithmetic mean of all Single Sample Results of the concentration of a contaminant in the Final Effluent sampled or measured during a calendar month and proceed depending on the result of the calculation:

a. Group No Bypass Days (**NBPD**) data and Bypass Days (**BPD**) data during a calendar month separately;

b. Calculate the arithmetic mean of all Single Sample Results of the concentration of a contaminant in the Final Effluent sampled or measured on all NBPD during a calendar month and record it as **Monthly Average NBPD Effluent Concentration**;

c. Obtain the "**Total Monthly NBPD Flow**" which is the total amount of Final Effluent discharged on all NBPD during the calendar month;

d. Calculate the arithmetic mean of all Single Sample Results of the concentration of a contaminant in the Final Effluent sampled or measured on all BPD during a calendar month and record it as **Monthly Average BPD Effluent Concentration**;

e. Obtain the "**Total Monthly BPD Flow**" which is the total amount of Final Effluent discharged on all BPD during the calendar month;

f. Calculate the flow-weighted arithmetic mean using the following formula:

[(Monthly Average NBPD Effluent Concentration × Total Monthly NBPD Flow) + (Monthly Average BPD Effluent Concentration × Total Monthly BPD Flow)] ÷ (Total Monthly NBPD Flow + Total Monthly BPD Flow)

It should be noted that in this method, if there are no Bypass Event for the month, the calculated result would be the same as the non-flow-weighted arithmetic mean method;

g. Report and use the lesser of the flow-weighted arithmetic mean obtained in Step 2 and the arithmetic mean obtained in Step 1 as the Monthly Average Effluent Concentration for this parameter where applicable in this Approval.

2. Annual Average Effluent Concentration

Step 1: Calculate the arithmetic mean of all Single Sample Results of the concentration of a contaminant in the Final Effluent sampled or measured during a calendar year and proceed as follows depending on the result of the calculation:

a. If the arithmetic mean does not exceed the compliance limit for the contaminant, then report and use this arithmetic mean as the Annual Average Effluent Concentration for this parameter where applicable in this Approval;

b. If the arithmetic mean exceeds the compliance limit for the contaminant and there was no Bypass Event during the calendar year, then report and use this arithmetic mean as the Annual Average Effluent Concentration for this parameter where applicable in this Approval;

c. If the arithmetic mean exceeds the compliance limit for the contaminant and there was Bypass Event(s) during the calendar year, then proceed to Step 2;

d. If the arithmetic mean does not exceed the compliance limit for the contaminant and there was Bypass Event(s) during the calendar year, the Owner may still elect to proceed to Step 2 calculation of the flow-weighted arithmetic mean.

Step 2: Calculate the flow-weighted arithmetic mean of all Single Sample Results of the concentration of a contaminant in the Final Effluent sampled or measured during a calendar year and proceed depending on the result of the calculation:

a. Group No Bypass Days (**NBPD**) data and Bypass Days (**BPD**) data during a calendar year separately;

b. Calculate the arithmetic mean of all Single Sample Results of the concentration of a contaminant in the Final Effluent sampled or measured on all NBPD during a calendar year

and record it as **Annual Average NBPD Effluent Concentration**;

c. Obtain the "**Total Annual NBPD Flow**" which is the total amount of Final Effluent discharged on all NBPD during the calendar year;

d. Calculate the arithmetic mean of all Single Sample Results of the concentration of a contaminant in the Final Effluent sampled or measured on all BPD during a calendar year and record it as **Annual Average BPD Effluent Concentration**;

e. Obtain the "**Total Annual BPD Flow**" which is the total amount of Final Effluent discharged on all BPD during the calendar year;

f. Calculate the flow-weighted arithmetic mean using the following formula:

[(Annual Average NBPD Effluent Concentration × Total Monthly NBPD Flow) + (Monthly Average BPD Effluent Concentration × Total Annual BPD Flow)] ÷ (Total Annual NBPD Flow + Total Annual BPD Flow)

It should be noted that in this method, if there are no Bypass Event for the calendar year, the calculated result would be the same as the non-flow-weighted arithmetic mean method;

g. Report and use the lesser of the flow-weighted arithmetic mean obtained in Step 2 and the arithmetic mean obtained in Step 1 as the Annual Average Effluent Concentration for this parameter where applicable in this Approval.

3. Monthly Geometric Mean Density

Geometric mean is defined as the n^{th} root of the product of n numbers. In the context of calculating Monthly Geometric Mean Density for *E. coli*, the following formula shall be used:

$$\sqrt[n]{x_1 x_2 x_3 \cdots x_n}$$

in which,

"n" is the number of samples collected during the calendar month; and

"x" is the value of each Single Sample Result.

For example, four weekly grab samples were collected and tested for *E. coli* during the calendar month. The *E. coli* densities in the Final Effluent were found below:

Sample Number	*E. coli* Densities* (CFU/100 mL)
1	10
2	100
3	300
4	50

The Geometric Mean Density for these data:

$$\sqrt[4]{10 \times 100 \times 300 \times 50} = 62$$

*If a particular result is zero (0), then a value of one (1) will be substituted into the calculation of the Monthly Geometric Mean Density. If the MPN method is utilized for E. coli analysis, values in the table shall be MPN/100 mL.

Schedule F

Municipal and Local Services Board Wastewater System

Profile Information Form

(For reference only, images of the form are attached on the next four pages. A digital copy can be obtained from the District Manger.)

Ontario

Ministry of the Environment and Climate Change

Municipal and Local Services Board Wastewater System Profile Information Form

The information in this form is necessary to administer the Ministry's approvals, compliance and enforcement programs with respect to wastewater treatment and collection systems owned by municipalities and local services boards. These programs are authorized under the *Ontario Water Resources Act*, the *Environmental Protection Act*, the *Nutrient Management Act* and their respective regulations.

Email the completed form to: waterforms@ontario.ca
For any questions call 1-866-793-2588.

[A] SYSTEM PROFILE INFORMATION

Wastewater System Number *(if assigned)*	☐ New Profile ☐ Update Existing Profile
Name of System	Level of Treatment (select one*) ☐ Primary ☐ Secondary ☐ Tertiary ☐ Secondary Equivalent ☐ Other (specify):
Name of Municipality or Local Services Board	**See Terms and Concepts on page 4*

Population Served	Population (Design)	Type of System
		☐ Treatment & Collection System ☐ Collection System Only

Design Rated Capacity (m^3/day)	Peak Flow Rate (m^3/day)	Current Environmental Compliance Approval (ECA) Number	Current ECA Issue Date (yyyy/mm/dd):

The treatment plant receives sewage from: (Check all that applies.* If you have checked more than one option below, indicate the approximate %)

☐ Sanitary Sewer ☐ Combined Sewer
☐ Nominally Separated Sewer ☐ Partially Separated Sewer **See Terms and Concepts on page 4*

[B] OWNER INFORMATION

Legal Name of Municipality or Local Services Board

Unit No	Street No.	Street Name.	Street Type (St, Rd, etc)	Street Direction (N,S,E,W)

PO Box	City/Town	Postal Code

☐ Dr ☐ Miss ☐ Mr ☐ Mrs ☐ Ms	Owner Contact First Name	Owner Contact Last Name	Owner Contact Job Title

Tel. No.	Fax Number	Email address
( ) - ext.	( ) -	

[C] OPERATING AUTHORITY ☐ Check if same as owner

Legal Name of Operator

Unit No	Street No.	Street Name.	Street Type (St, Rd, etc)	Street Direction (N,S,E,W)

PO Box	City/Town	Postal Code

☐ Dr ☐ Miss ☐ Mr ☐ Mrs ☐ Ms	Operator Contact First Name	Operator Contact Last Name	Operator Contact Job Title

Tel. No.	Fax Number	Email address
( ) - ext.	( ) -	

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 regarding general provisions is imposed to ensure that the Works are constructed and operated in the manner in which they were described and upon which approval was granted.

2. Condition 2 regarding change of Owner and Operating Agency is included to ensure that the Ministry records are kept accurate and current with respect to ownership and Operating Agency of the Works and to ensure that subsequent owners of the Works are made aware of the Approval and continue to operate the Works in compliance with it.

3. Condition 3 regarding Bypasses is included to indicate that Bypass is prohibited, except in circumstances where the failure to Bypass could result in greater damage to the environment than the Bypass itself. The notification and documentation requirements allow the Ministry to take action in an informed manner and will ensure the Owner is aware of the extent and frequency of Bypass Events.

4. Condition 4 regarding Overflows is included to indicate that Overflow of untreated or partially treated sewage to the receiver is prohibited, except in circumstances where the failure to Overflow could result in greater damage to the environment than the Overflow itself. The notification and documentation requirements allow the Ministry to take action in an informed manner and will ensure the Owner is aware of the extent and frequency of Overflow Events.

5. Condition 5 is imposed to establish non-enforceable effluent quality objectives which the Owner is obligated to use best efforts to strive towards on an ongoing basis. These objectives are to be used as a mechanism to trigger corrective action proactively and voluntarily before environmental impairment occurs and before the compliance limits of Condition 6 are exceeded.

6. Condition 6 regarding compliance limits is imposed to ensure that the Final Effluent discharged from the Works to the environment meets the Ministry's effluent quality requirements.

7. Condition 7 regarding operation and maintenance is included to require that the Works be properly operated, maintained, funded, staffed and equipped such that the environment is protected and deterioration, loss, injury or damage to any person or property is prevented. As well, the inclusion of a comprehensive operations manual governing all significant areas of operation, maintenance and repair is prepared, implemented and kept up-to-date by the Owner. Such a manual is an integral part of the operation of the Works. Its compilation and use should assist the Owner in staff training, in proper plant operation and in identifying and planning for contingencies during possible abnormal conditions. The manual will also act as a benchmark for Ministry staff when reviewing the Owner's operation of the Works. It is also included to ensure that the treated effluent is discharged to the receiver during periods and at rates that minimizes the environmental impact on the receiver.

8. Condition 8 regarding monitoring and recording is included to enable the Owner to evaluate and demonstrate the performance of the Works, on a continual basis, so that the Works are properly operated and maintained at a level which is consistent with the design objectives and compliance limits.

9. Condition 9 regarding Limited Operational Flexibility is included to ensure that the Works are constructed, maintained and operated in accordance with the Approval, and that any pre-approved modification will not negatively impact on the performance of the Works.

10. Condition 10 regarding reporting is included to provide a performance record for future references, to ensure that the Ministry is made aware of problems as they arise, and to provide a compliance record for this Approval.

Upon issuance of the environmental compliance approval, I hereby revoke Approval No(s). 8160-BAHPRF issued on April 29, 2019

In accordance with Section 139 of the *Environmental Protection Act,* you may by written notice served upon me and the Ontario Land Tribunal within 15 days after receipt of this notice, require a hearing by the Tribunal. Section 142 of the *Environmental Protection Act* provides that the notice requiring the hearing ("the Notice") shall state:

a. The portions of the environmental compliance approval or each term or condition in the environmental compliance approval in respect of which the hearing is required, and;
b. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

Pursuant to subsection 139(3) of the *Environmental Protection Act,* a hearing may not be required with respect to any terms and conditions in this environmental compliance approval, if the terms and conditions are substantially the same as those contained in an approval that is amended or revoked by this environmental compliance approval.

The Notice should also include:

1. The name of the appellant;
2. The address of the appellant;
3. The environmental compliance approval number;
4. The date of the environmental compliance approval;
5. The name of the Director, and;
6. The municipality or municipalities within which the project is to be engaged in.

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

Registrar*
Ontario Land Tribunal
655 Bay Street, Suite 1500
Toronto, Ontario
M5G 1E5
OLT.Registrar@ontario.ca

and

The Director appointed for the purposes of Part II.1 of the *Environmental Protection Act*
Ministry of the Environment, Conservation and Parks
135 St. Clair Avenue West, 1st Floor
Toronto, Ontario
M4V 1P5

*** Further information on the Ontario Land Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349 or 1 (866) 448-2248, or www.olt.gov.on.ca**

The above noted activity is approved under s.20.3 of Part II.1 of the *Environmental Protection Act.*

DATED AT TORONTO this 20th day of September, 2024



Aziz Ahmed, P.Eng.
Director
appointed for the purposes of Part II.1 of the
Environmental Protection Act

WS/
c: Area Manager, MECP Cornwall
c: District Manager, MECP Ottawa

South Nation River
Flow Proportioning Plantagenet to Casselman Dams

A provided by South Nation the following is the calculation to determine the flow at the Casselman Dam when it is too low to measure by their present instrumentation. The flow is calculated by using the flow rate from Plantaganet proportioned by the drainage area.

Plantaganet drainage area = 3810
Casselman drainage area = 2410

Divide the the Casselman area 2410 by Plantaganet area 3810 = 0.6325459

Mutliply the Plantagenet dam flow (provided by South Nation Conservation Authority) by the factor above (0.6325459) = the flow at Casselman Dam

CHESTERVILLE LAGOONS

PERMISSIBLE DISCHARGE RATES

HEIGHT MEASUREMENT AT CASSELMAN DAM (m)	CORRESPONDING FLOW RATE AT CASSELMAN DAM (m3/s)	DRAINAGE AREA-PROPORTIONAL FLOW AT CHESTERVILLE (m3/s)	ALLOWABLE DISCHARGE RATE AT CHESTERVILLE STP (L/s)
1.35	0.03	0.013	0
1.40	0.18	0.077	0
1.45	0.33	0.142	0
1.50	0.48	0.206	16
1.51	0.51	0.219	17
1.52	0.54	0.232	18
1.53	0.57	0.245	19
1.54	0.60	0.258	20
1.55	0.63	0.271	21
1.56	0.66	0.284	22
1.57	0.69	0.297	23
1.58	0.72	0.310	24
1.59	0.75	0.322	25
1.60	0.78	0.335	26
1.61	0.81	0.348	27
1.62	0.84	0.361	28
1.63	0.87	0.374	29
1.64	0.90	0.387	30
1.65	0.93	0.400	31
1.66	0.96	0.413	32
1.67	0.99	0.426	33
1.68	1.02	0.439	34
1.69	1.05	0.451	35
1.70	1.08	0.464	36
1.71	1.11	0.477	37
1.72	1.14	0.490	38
1.73	1.17	0.503	39
1.74	1.20	0.516	40
1.75	1.25	0.538	41
1.76	1.32	0.568	44
1.77	1.50	0.645	50
1.78	1.85	0.796	61
1.79	2.23	0.959	74
1.80	2.66	1.144	88
1.81	3.09	1.329	102
1.82	3.66	1.574	121
1.83	4.15	1.785	137
1.84	4.72	2.030	156
1.85	5.37	2.309	178
1.86	6.10	2.623	202

Kevin Cortez

From: Kevin Cortez
Sent: April 16, 2026 10:43 AM
To: 'RBoutz@nation.on.ca'; 'Jboyer@nation.on.ca'; 'SMancini@nation.on.ca'; 'clemay@nation.on.ca'; 'szand@nation.on.ca'
Cc: Yves Morrissette; Nick Bialik; Jordan Morrissette
Subject: 16953-131 - Municipality of Casselman Sewage Treatment System Schedule 'C' Class EA - Project Discussion with SNC (March 30, 2026) - Meeting Minutes
Attachments: 16953-131-MOM-EX-002_00.pdf

Good morning everyone,

Please find attached the meeting minutes for the Casselman Sewage Treatment System EA Project Discussion that took place on March 30, 2026. Please feel free to reach out with any questions.

Best,
Kevin

Kevin Cortez

From: Jennifer Boyer <Jboyer@nation.on.ca>
Sent: April 15, 2026 4:28 PM
To: Nick Bialik; Kevin Cortez
Cc: Claire Lemay; Jordan Morrissette
Subject: SNC Comments - Municipality of Casselman Sewage Treatment System Schedule C Class EA - Notice of Completion
Attachments: SNC Comments- Casselman Sewage Class EA 2026.04.15.pdf

[CAUTION] This email originated from outside JLR. Do not click links or open attachments unless you recognize the sender and know the content is safe. Do not forward suspicious emails, if you are unsure, please send a separate message to Helpdesk.

Good afternoon Nick

Please see the attached review comments on the Notice of Completion Environmental Study Report and the existing Environmental Compliance Approval document (April 2019).

In addition, Ronda has had a follow-up meeting with staff at Casselman regarding our discussion on March 30th, and the timing of the implementation of the TPM program.

If you have any questions or clarifications on the comments provided, please do not hesitate to follow up.

Thank you,
Jennifer

South Nation Conservation
de la Nation Sud

Jennifer Boyer | BES, M.Sc., MCIP RPP
Managing Director, Planning & Approvals
38 Victoria Street, Box 29, Finch, ON K0C 1K0
Tel: 613-984-2948 or 1-877-984-2948 | Fax: 613-984-287

Our local environment, we're in it together.
Notre environnement local, protégeons-le ensemble.

From: Nick Bialik <nbialik@jlrichards.ca>
Sent: March 30, 2026 3:51 PM
To: Jennifer Boyer <Jboyer@nation.on.ca>; Kevin Cortez <kcortez@jlrichards.ca>
Cc: Sandra Mancini <SMancini@nation.on.ca>; Ronda Boutz <RBoutz@nation.on.ca>; Shahin Zand <szand@nation.on.ca>; Claire Lemay <clemay@nation.on.ca>; Jordan Morrissette <jmorrissette@jlrichards.ca>
Subject: Re: Municipality of Casselman Sewage Treatment System Schedule C Class EA - Notice of Completion

Hi Jennifer and SNC Team,

As a follow-up to our meeting this afternoon, please find attached the existing Environmental Compliance Approval document (April 2019). I have located in the document the South Nation flow measurement system description, extracted below for your reference. I can also follow-up with OCWA (system operator) if you need more information.

South Nation Conservation
de la Nation Sud

38 rue Victoria Street, Finch, ON K0C 1K0 Tel: 613-984-2948 Fax: 613-984-2872 Toll Free: 1-877-984-2948 www.nation.on.ca

MEMORANDUM

Permit / File No: 8160-BAHPRF

Site Location: Casselman Lagoons Lot 7, 8, 9 & 10, Concession 6 , Casselman Village, United Counties of Prescott and Russell

Planner:

Review Date: April 04, 2026

Submission: ☐ Pre-Consultation ☒1st ☐2nd ☐3rd ☐4th ☐__

Stage in Process:	☐ Pre-Consultation	☐ Verifying Completion Status
	☒ Technical Review in Progress	☐ Review Complete

The proposed work is upgrade of the existing lagoon sewage treatment system to improve the performance of the lagoon sewage treatment system consisting of Modification to Existing Sewage Works; Installation of an MBBR treatment system; Installation of a Disc Filter System downstream of the MBBR; Sanitary Forcemain Upgrade; Sewage Pumping Station Upgrade; and Sewage Lagoon Expansion.

The Environmental Compliance Approval (ECA) defines the maximum effluent discharge rate based on a combination of fixed limits (5,000 to 7,000 m³/day) and dilution ratios related to the South Nation River (from SNR Flow/10 to SNR Flow/60, depending on the month).

The ECA also indicates that river flow is estimated using a stage - discharge relationship at a weir, along with measurements related to flow conveyed to a hydro dam. In addition, the effluent discharge is assumed to occur downstream of the hydro dam.

Items Reviewed:

- AMENDED ENVIRONMENTAL COMPLIANCE APPROVAL, NUMBER 8160-BAHPRF, Issue Date: April 29, 2019

Technical Review Comments:

1- It is important to confirm that the river flow used for dilution calculations is representative of the actual conditions at the outfall location. Any difference between the measurement point and the discharge location may affect the real dilution capacity. This is especially important during winter (January to February), when discharge is allowed up to 5,000 m^3/day with a dilution ratio of SNR Flow/10. During this period, flows are low and may be affected by ice and backwater conditions, which can reduce mixing.

DRAFT

38 rue Victoria Street, Finch, ON K0C 1K0 Tel: 613-984-2948 Fax: 613-984-2872 Toll Free: 1-877-984-2948 www.nation.on.ca

2- During the spring period (April to May), the allowable discharge increases to 7,000 m^3/day, while the dilution requirement becomes stricter (SNR Flow/60). This suggests that the dilution ratios are not only based on flow conditions, but also on environmental considerations. However, it is not clear how these ratios were developed.
3- The total discharge volume during the winter/spring period is limited to 502,500 m^3 (Page 22), which shows that the system depends on storage and controlled release. In such systems, the timing of discharge is important, and it depends on reliable flow data.
In this context, using fixed monthly dilution ratios may not fully reflect changes in river flow. A flow duration curve (FDC) or seasonal low-flow analysis could provide a more reliable basis for setting discharge limits, especially in winter conditions.
4- The report indicates that no routine discharge is allowed during summer months, and discharge may only occur under emergency conditions such as overflow or bypass.

In summary, it is recommended to clarify:

- how river flow is measured and whether it represents the outfall location,
- whether winter conditions (such as ice) are considered, and
- whether the dilution ratios are supported by hydrologic analysis such as FDC or low-flow statistics.

Prepared by: Reza Fallah

DRAFT

Kevin Cortez

From: Nick Bialik
Sent: March 30, 2026 3:51 PM
To: Jennifer Boyer; Kevin Cortez
Cc: Sandra Mancini; Ronda Boutz; Shahin Zand; Claire Lemay; Jordan Morrissette
Subject: Re: Municipality of Casselman Sewage Treatment System Schedule C Class EA - Notice of Completion
Attachments: Casselman Lagoons - Amended ECA No. 8160-BAHPRF.pdf

Hi Jennifer and SNC Team,

As a follow-up to our meeting this afternoon, please find attached the existing Environmental Compliance Approval document (April 2019). I have located in the document the South Nation flow measurement system description, extracted below for your reference. I can also follow-up with OCWA (system operator) if you need more information.

- South Nation River flow measurement system consisting of:

    1. a concrete weir with a notched section equipped with an ultrasonic depth sensor mounted above a stilling well upstream of the weir which is used in conjunction with a stage-discharge relationship developed for the South Nation River;

    2. a flow measurement system to measure the flow rate of river water conveyed into a hydro dam upstream of the concrete weir (Village of Casselman shall make the necessary arrangements with the owner of the hydro dam to install an appropriate flow measurement system);

In terms of the TPM program, we would be interested in receiving any information you may have on the original purchase of TP offset credits by the Municipality through the TPM program in ~ 2003. This will help us confirm the applicable amount of TP loading to be offset as part of the upcoming Phase 1 upgrades.

Other items to note:

- As discussed during the meeting, the appendices in the Environmental Study Report are bookmarked for easier navigation. The assimilative capacity assessments are attached in Appendix B1 and G1. Correspondences with the MECP and SNC are found in Appendix F4.
- Following our meeting, I spoke with Jordan Morrissette, who is the project manager for the Main Sewage Pumping Station Upgrades (design/construction currently ongoing). He mentioned that, as part of that project, in addition to certain SNC permits being required for the new force main installation, there is an emergency overflow being proposed at the SPS, and that consultation with SNC is required for that scope of work. He will be reaching out separately on this topic.

Note that we will prepare formal minutes from the meeting to be included in the Class EA project record.

Any questions, feel free to reach out.

Thanks,

Nick Bialik, P.Eng. (he/him)
Environmental Engineer

Ottawa ON
Work: 343-804-5346

From: Jennifer Boyer <Jboyer@nation.on.ca>
Sent: Thursday, March 19, 2026 9:44 AM
To: Nick Bialik <nbialik@jlrichards.ca>; Kevin Cortez <kcortez@jlrichards.ca>
Cc: Sandra Mancini <SMancini@nation.on.ca>; Ronda Boutz <RBoutz@nation.on.ca>; Shahin Zand <szand@nation.on.ca>; Claire Lemay <clemay@nation.on.ca>
Subject: RE: Municipality of Casselman Sewage Treatment System Schedule C Class EA - Notice of Completion

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Hi Nick,

Thank you for taking the time to discuss the preferred design concept.

I will send out a meeting invite to you and Kevin for Monday, March 30th. Thank you for providing your availability.
Once received, please forward the invite to anyone that you feel should be included.

Thanks,
Jennifer

From: Nick Bialik <nbialik@jlrichards.ca>
Sent: March 19, 2026 8:09 AM
To: Jennifer Boyer <Jboyer@nation.on.ca>; Kevin Cortez <kcortez@jlrichards.ca>
Cc: Sandra Mancini <SMancini@nation.on.ca>; Ronda Boutz <RBoutz@nation.on.ca>; Shahin Zand <szand@nation.on.ca>
Subject: Re: Municipality of Casselman Sewage Treatment System Schedule C Class EA - Notice of Completion

Hi Jennifer,

We'd be happy to have a call to discuss the preferred design concept (including phased approach), as well as participation in the TPM program. Our team is available from 9-11:30AM and 1-4pm on March 30th. Feel free to send through an invitation at the time that works best for SNC staff.

Thanks,

Nick Bialik, P.Eng. (he/him)
Environmental Engineer

1000-343 Preston Street
Ottawa ON K1S 1N4
Work: 343-804-5346
nbialik@jlrichards.ca

From: Jennifer Boyer <Jboyer@nation.on.ca>
Sent: March 18, 2026 4:33 PM
To: Nick Bialik <nbialik@jlrichards.ca>; Kevin Cortez <kcortez@jlrichards.ca>
Cc: Sandra Mancini <SMancini@nation.on.ca>; Ronda Boutz <RBoutz@nation.on.ca>; Shahin Zand <szand@nation.on.ca>
Subject: RE: Municipality of Casselman Sewage Treatment System Schedule C Class EA - Notice of Completion

Good afternoon Nick,

Thank you for providing SNC the Notice of Completion for the Municipality of Casselman Sewage Treatment System Schedule C Class EA, along with the finalized Environmental Study Report (link).

As we did not receive notification of the PIC in July 2025, would it be possible if you meet with some of us here at SNC to give an overview of the ESR as offered, to go through the study, including the preferred design concept and phasing approach.

The Municipality of Casselman did reach out to staff here already regarding the preferred design concept included participation in the TPM program; and a meeting next week has been scheduled.

Please let us know your availability the week of March 30th to April 2nd for a Teams call. Monday, March 30th has the best availability for our staff.

Thank you,
Jennifer

Jennifer Boyer | BES, M.Sc., MCIP RPP
Managing Director, Approvals
38 Victoria Street, Box 29, Finch, ON K0C 1K0
Tel: 613-984-2948 or 1-877-984-2948 | Fax: 613-984-2872
nation.on.ca | make a donation
Our local environment, we're in it together.
Notre environnement local, protégeons-le ensemble.

AMENDED ENVIRONMENTAL COMPLIANCE APPROVAL

NUMBER 8160-BAHPRF
Issue Date: April 29, 2019

The Corporation of the Village of Casselman
751 St. Jean St
Post Office Box, No. 710
Casselman, Ontario
K0A 1M0

Site Location: Casselman Lagoons
Lot 7, 8, 9 & 10, Concession 6
Casselman Village, United Counties of Prescott and Russell

You have applied under section 20.2 of Part II.1 of the Environmental Protection Act, R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:

upgrade/expansion (Phase 2) of the existing municipal sewage work for the treatment of sanitary sewage and disposal of effluent to South Nation River via a Sewage Treatment Plant (Casselman Sewage Treatment - a seasonal discharge lagoon) and Final Effluent disposal facilities as follows:

Classification of Collection System: Separate Sewer System

Classification of Sewage Treatment Plant: Secondary

Design Capacity of Sewage Treatment Plant

Design Capacity with all Treatment Trains in Operation	**Existing Works**
Rated Capacity	2,110 m^3/d

Influent, Imported Sewage and Processed Organic Waste

Receiving Location	**Types**
In Collection System	Sanitary Sewage

Proposed Works:

Upgrade of the existing lagoon sewage treatment system to improve the performance of the lagoon sewage treatment system consisting of the following:

Modification to Existing Sewage Works

- Construction of an emergency overflow at the existing Sewage Pumping Station described below; and

- Installation of one (1) 2,400 mm x 3,000 mm flow diversion chamber separated by a dividing wall. The first section of the chamber is 1,050 mm x 2,400 mm and connects the existing 600mm diameter effluent pipe to transfer effluent from Cell "C" to the Moving Bed Biofilm Reactor (MBBR) pumping station described below. The second section of the flow diversion chamber is 1,700 mm x 2,400 mm and connects the Disc Filter outlet pipe/bypass pipe (as described below) discharging to the existing 600 mm diameter effluent discharge pipe which outlets to the South Nation River.

Moving Bed Biofilm Reactor (MBBR) (LagoonGuard™)

Installation of an MBBR treatment system each train having a Rated Capacity of 3,500 m^3/d and Peak Flow Rate of 5,000 m^3/d consisting of the following:

- Installation of one (1) pumping station equipped with three (3) pumps each rated at 57.8 L/sec @ 8.1 m TDH conveying effluent from Cell "C" to the MBBR described below;

- Installation of an MBBR treatment system with two (2) trains, each having two (2) reactors cells downstream of Cell "C" consisting of the following:

    - Cell #1 ($CBOD_5$ Reactor), having approximate dimensions of 6.5 m wide x 3.85 m long x 6.0 m deep, providing a maximum of 5.0 m operational depth, filled with 88 m^3 of disk shaped free-floating carrier media (AnoxKaldnes™ free-floating media or equivalent (providing a total of 800 m^2/m^3 media carrier surface area), equipped with one (1) diffuser with an aeration surface area of 18.0 m^2;

    - Cell #2 (TAN Reactor), having approximate dimensions of 6.5 m wide x 11.5 m long x 6.0 m deep, providing a maximum of 5.0 m operational depth, filled with 338 m^3 of disk shaped free-floating carrier media (AnoxKaldnes™ free-floating media or equivalent (providing a total of 800 m^2/m^3 media carrier surface area), equipped with three (3) diffusers, each with an aeration surface area of 18.0 m^2;

    - Three (3) 25 Hp air blowers each with rated capacity of 545 Nm^3/h, designed and operated to provide the following air supply to the MBBR sewage treatment system during each specified

period: 573 Nm^3/h during fall period, 987 Nm^3/h during winter period, and 1141 Nm^3/h during spring period; and

- One (1) 350 mm diameter outlet pipe from the MBBR cells discharging to a Disc Filter System described below.

Disc Filter System

Installation of a Disc Filter System downstream of the MBBR consisting of the following:

- One (1) steel tank Disc Filter System with approximate dimensions of 2,286 mm width x 6,580 mm length x 2,450 mm height, equipped with twenty one (21) 2,200 mm diameter filter disks with 10 micro-metre mesh size filters;

- One (1) 8.61 L/sec capacity backwash pump and 150 mm diameter pipe returning backwash to Lagoon Cell "A";

- One (1) 350 mm diameter outlet pipe discharging to a flow diversion chamber described below; and

- Including all controls and appurtenances.

All in accordance with the documents listed in Schedule 'A'.

Existing Works:

Influent Sewers

STREET	FROM	TO
St. Albert	Approx. 150 m S. of Jeanne Mance	Approx. 90 m S.of St. Isidore St.
Joseph	Approx. 90 m S. of Jeanne Mance	Approx. 160 m N. of Dollard (Montcalm St. extension)
St. Anne	Jeanne Mance	St. Isidore
Jeanne Mance	St. Albert	Approx. 45 m E. of St. Anne
Duhamel	St. Albert	Approx. 30 m E. of St. Anne
St. Isidore	Approx. 60 m E. of St. Joseph	Approx. 180 m W. of Laval
Laval	Approx. 140 m N. of Dollard	Approx. 30 m N. of St. Isidore
Dollard	St. Joseph	Laval
Cartier	Approx. 40 m E. of St. Joseph	St. Joseph
Cartier	Approx. 70 m E. of St. Joseph	Laval
Station	Approx. 30 m E. of St. Joseph	St. Joseph
St. Isidore	Approx. 610 m E. of Breboeuf	St. Euphemie
Laurier	Approx. 350 m E. of Breboeuf	St. Euphemie
Arena	Approx./ 140 m E. of Breboeuf	Breboeuf
Dollard	Breboeuf	St. Euphemie
Dollard	Approx. 65 m E. of St. Jean	St. Jean
Breboeuf	St. Isidore	Montcalm
St. Euphemie	St. Isidore	Approx. 170 m N. of Montcalm
St. Jean	Cartier	Montcalm
Montcalm	Breboeuf	Approx. 90 m W. of St. Jean
Cartier	Approx. 60 m E. of St. Jean	St. Jean
Easement	St. Joseph	Approx. 90 m W. of St. Jean
St. Albert	Approx. 45 m S. of St. Isidore	St. Isidore

Sanitary Forcemain Upgrade

- replacement of the existing sewage forcemain with a new 1,700 m long 400 mm diameter HDPE forcemain running along a new route extending from the sewage pumping station along Brisson Road, an easement between Brisson Road and Laurier Street, Laurier Street, and Lagoon Access Road to the existing Sewage Lagoons; and

- installation of one (1) air release valve and chamber on the 400 mm diameter HDPE forcemain at the easement crossing between Brisson Road and Laurier Street;

Sewage Pumping Station Upgrade

Replacement of the existing sewage pumping station with a new sewage pumping station located at the same location, equipped with an office and laboratory, located at the northwest corner of Principale Street and Brisson Road including the following:

- two (2) self-priming centrifugal pumps each having a design capacity of 118 L/s @ 23 m TDH;
- one (1) mechanical bar screen having a design capacity of 118 L/s;
- one (1) screenings compactor having an inlet feed capacity of 1.5 m^3/hr;
- one(1) 525 mm diameter mechanical bar screen bypass pipe extending from the pumping station inlet manhole to the wet well;
- one (1) 160 kW emergency diesel-generator set; and
- including all controls and appurtenances;

Sewage Lagoon Expansion

Modifications to the existing two facultative sewage lagoons (Cells 'A' and 'B') and addition of a new facultative lagoon (Cell 'C"), aeration system, phosphorus removal system, and flow measurement system, as follows:

- two (2) clay lined facultative lagoons (Cell 'A' and 'B'), each with dimensions of 290 m wide and 295 m long, operated in parallel and receiving influent raw sewage via an upgraded forcemain described above and splitter box, each cell having an area of 8.6 ha, a total depth of 2.5 m (including a 0.3 m sludge storage bottom zone and a 0.7 m freeboard) and an effective storage capacity of 115,000 m^3, both discharging through a 450 mm diameter transfer pipes into cell 'C';
- a clay lined facultative lagoon (Cell 'C'), with dimension of 115 m wide and 435 m long, that receives discharges from cell 'A' and cell 'B', having a total depth of 2.7 m (including a 0.3 m sludge storage bottom zone and a 0.7 m freeboard) and an effective storage capacity of 100,000 m^3, including 150 submerged aerators for diffusing air into the sewage;
- an aeration system consisting of two positive displacement air blowers, each rated at a capacity of 10.6 m^3/min (375 SCFM) at a discharge pressure of 41 kPa, and each equipped with a inlet air filter, inlet and outlet silencers, flexible connectors, pressure relief valve, discharge check valve, and isolation valves;
- a phosphorus removal system consisting of one (1) 27,000 L capacity alum storage tank equipped with spill containment structure, two (2) (one duty and one standby) diaphragm type alum feed metering pumps each rated at 2.3 to 13.0 L/hr and a heat traced discharge pipe from the metering

pumps to the sanitary forcemain;

- effluent flow measurement system consisting of a cast-in-place concrete Parshall flume equipped with an ultrasonic sensor with a measurement capacity of 23,000 m^3/day;

- South Nation River flow measurement system consisting of:

    1. a concrete weir with a notched section equipped with an ultrasonic depth sensor mounted above a stilling well upstream of the weir which is used in conjunction with a stage-discharge relationship developed for the South Nation River;

    2. a flow measurement system to measure the flow rate of river water conveyed into a hydro dam upstream of the concrete weir (Village of Casselman shall make the necessary arrangements with the owner of the hydro dam to install an appropriate flow measurement system);

- a concrete flow control chamber equipped with a 450 mm by 450 mm sluice gate with a motorized actuator for the hydrographic controlled release (HRC) of effluent based on a preselected dilution ratio with the flow of South Nation River; and

- a plant effluent outfall sewer consisting of 500 mm and 525 mm diameter pipes, equipped with two (2) 525 mm diameter diffuser ports, discharging at approximately 75 m off shore into the South Nation River.

All in accordance with the submitted supporting documents listed in Schedule A.

For the purpose of this environmental compliance approval, the following definitions apply:

1. "Annual Average Effluent Concentration" is the mean of all Single Sample Results of the concentration of a contaminant in the Final Effluent sampled or measured during a calendar year, calculated and reported as per the methodology specified in Schedule E;

2. "Annual Average Daily Influent Flow" means the cumulative total sewage flow of Influent to the Sewage Treatment Plant during a calendar year divided by the number of days during which sewage was flowing to the Sewage Treatment Plant that year;

3. "Approval" means this environmental compliance approval and any schedules attached to it, and the application;

4. "BOD5" (also known as TBOD5) means five day biochemical oxygen demand measured in an unfiltered sample and includes carbonaceous and nitrogenous oxygen demands;

5. "Bypass" means diversion of sewage around one or more treatment processes, excluding Preliminary Treatment System, within the Sewage Treatment Plant with the diverted sewage flows being returned to the Sewage Treatment Plant treatment train upstream of the Final Effluent sampling point(s) and

discharged via the approved effluent disposal facilities;

6. "CBOD5" means five day carbonaceous (nitrification inhibited) biochemical oxygen demand measured in an unfiltered sample;

7. "Director" means a person appointed by the Minister pursuant to section 5 of the EPA for the purposes of Part II.1 of the EPA;

8. "District Manager" means the District Manager of the appropriate local district office of the Ministry where the Works is geographically located;

9. *E. coli* " refers to coliform bacteria that possess the enzyme beta-glucuronidase and are capable of cleaving a fluorogenic or chromogenic substrate with the corresponding release of a fluorogen or chromogen, that produces fluorescence under long wavelength (366 nm) UV light, or color development, respectively. Enumeration methods include tube, membrane filter, or multi-well procedures. Depending on the method selected, incubation temperatures include 35.5 $\pm$ 0.5 °C or 44.5 $\pm$ 0.2 °C (to enumerate thermotolerant species). Regardless of incubation temperature, the length of incubation is 24 $\pm$ 2 hours. Depending on the procedure used, data are reported as either colony forming units (CFU) per 100 mL (for membrane filtration methods) or as most probable number (MPN) per 100 mL (for tube methods);

10. "EPA" means the *Environmental Protection Act* , R.S.O. 1990, c.E.19, as amended;

11. "Equivalent Equipment" means alternate piece(s) of equipment that meets the design requirements and performance specifications of the piece(s) of equipment to be substituted;

12. "Event" means an action or occurrence, at a given location within the Works that causes a Bypass or Overflow. An Event ends when there is no recurrence of Bypass or Overflow in the 12-hour period following the last Bypass or Overflow. Overflows and Bypasses are separate Events even when they occur concurrently;

13. “Existing Works” means those portions of the Works included in the Approval that have been constructed previously;

14. "Final Effluent" means effluent that is discharged to the environment through the approved effluent disposal facilities, including all Bypasses, that are required to meet the compliance limits stipulated in the Approval for the Sewage Treatment Plant at the Final Effluent sampling point(s);

15. "Influent" means flows to the Sewage Treatment Plant from the collection system and Imported Sewage;

16. "Limited Operational Flexibility” (LOF) means the conditions that the Owner shall follow in order to undertake any modification that is pre-authorized as part of this Approval;

17. "Ministry" means the ministry of the government of Ontario responsible for the EPA and OWRA and includes all officials, employees or other persons acting on its behalf;

18. "Monthly Average Effluent Concentration" is the mean of all Single Sample Results of the concentration of a contaminant in the Final Effluent sampled or measured during a calendar month, calculated and reported as per the methodology specified in Schedule E;

19. "Monthly Geometric Mean Density" is the mean of all Single Sample Results of *E.coli* measurement in the samples taken during a calendar month, calculated and reported as per the methodology specified in Schedule E;

20. “Normal Operating Condition” means the condition when all unit process(es), excluding Preliminary Treatment System, in a treatment train is operating within its design capacity;

21. “Operating Agency” means the Owner or the entity that is authorized by the Owner for the management, operation, maintenance, or alteration of the Works in accordance with this Approval;

22. "Overflow" means a discharge to the environment from the Works at designed location(s) other than the approved effluent disposal facilities or via the effluent disposal facilities downstream of the Final Effluent sampling point;

23. "Owner" means The Corporation of the Village of Casselman and its successors and assignees;

24. "OWRA" means the *Ontario Water Resources Act* , R.S.O. 1990, c. O.40, as amended;

25. “Preliminary Treatment System” means all facilities in the Sewage Treatment Plant associated with screening and grit removal;

26. "Proposed Works" means those portions of the Works included in the Approval that are under construction or to be constructed;

27. "Rated Capacity" means the Annual Average Daily Influent Flow for which the Sewage Treatment Plant is designed to handle;

28. "Seasonal Average Effluent Concentration" means the arithmetic mean of all Single Sample Results of the concentration of a contaminant in the Final Effluent sampled or measured, or both, during a seasonal discharge period;

29. "Seasonal Average Daily Effluent Flow" means the cumulative total Final Effluent discharged during a seasonal discharge period divided by the number of days during the same seasonal discharge period;

30. "Seasonal Average Daily Effluent Loading" means the value obtained by multiplying the Seasonal Average Effluent Concentration of a contaminant by the Seasonal Average Daily Effluent Flow during the same seasonal discharge period;

31. "Seasonal Average Effluent Loading" means the value obtained by multiplying the Seasonal Average Effluent Concentration of a contaminant by the Total Flow over the same season of a calendar year;

32. “Sewage Treatment Plant" means all the facilities related to sewage treatment within the sewage treatment plant site excluding the Final Effluent disposal facilities;

33. “Single Sample Result" means the test result of a parameter in the effluent discharged on any day, as measured by a probe, analyser or in a composite or grab sample, as required;

34. "Works" means the approved sewage works, and includes Existing Works and modifications made under Limited Operational Flexibility.

You are hereby notified that this environmental compliance approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. GENERAL PROVISIONS

1. The Owner shall ensure that any person authorized to carry out work on or operate any aspect of the Works is notified of this Approval and the terms and conditions herein and shall take all reasonable measures to ensure any such person complies with the same.

2. The Owner shall design, construct, operate and maintain the Works in accordance with the conditions of this Approval.

3. Where there is a conflict between a provision of any document referred to in this Approval and the conditions of this Approval, the conditions in this Approval shall take precedence.

2. CHANGE OF OWNER AND OPERATING AGENCY

1. The Owner shall, within thirty (30) calendar days of issuance of this Approval, prepare/update and submit to the District Manager the Municipal and Local Services Board Wastewater System Profile Information Form, as amended (Schedule F) under any of the following situations:

    a. the form has not been previously submitted for the Works;

    b. this Approval is issued for extension, re-rating or process treatment upgrade of the Works;

    c. when a notification is provided to the District Manager in compliance with requirements of change of Owner or Operating Agency under this condition.

2. The Owner shall notify the District Manager and the Director, in writing, of any of the following changes within thirty (30) days of the change occurring:

    a. change of address of Owner;

b. change of Owner, including address of new owner;

c. change of partners where the Owner is or at any time becomes a partnership, and a copy of the most recent declaration filed under the *Business Names Act, R.S.O. 1990, c. B.17* , as amended, shall be included in the notification;

d. change of name of the corporation where the Owner is or at any time becomes a corporation, and a copy of the most current information filed under the *Corporations Information Act, R.S.O. 1990, c. C.39* , as amended, shall be included in the notification.

3. The Owner shall notify the District Manager, in writing, of any of the following changes within thirty (30) days of the change occurring:

   a. change of address of Operating Agency;

   b. change of Operating Agency, including address of new Operating Agency.

4. In the event of any change in ownership of the Works, the Owner shall notify the succeeding owner in writing, of the existence of this Approval, and forward a copy of the notice to the District Manager.

5. The Owner shall ensure that all communications made pursuant to this condition refer to the environmental compliance approval number.

3. BYPASSES

1. Any Bypass is prohibited, except:

   a. an emergency Bypass when a structural, mechanical or electrical failure causes a temporary reduction in the capacity of a treatment process or when an unforeseen flow condition exceeds the design capacity of a treatment process that is likely to result in personal injury, loss of life, health hazard, basement flooding, severe property damage, equipment damage or treatment process upset, if a portion of the flow is not bypassed;

   b. a planned Bypass that is a direct and unavoidable result of a planned repair and maintenance procedure or other circumstance(s), the Owner having notified the District Manager in writing at least fifteen (15) days prior to the occurrence of Bypass, including an estimated quantity and duration of the Bypass, an assessment of the impact on the quality of the Final Effluent and the mitigation measures if necessary, and the District Manager has given written consent of the Bypass;

2. Notwithstanding the exceptions given in Paragraph 1, the Operating Agency shall undertake everything practicable to maximize the flow through the downstream treatment process(es) prior to bypassing.

3. At the beginning of a Bypass Event, the Owner shall immediately notify the Spills Action Centre (SAC) and the local Medical Officer of Health. This notice shall include, at a minimum, the following

information:

a. the type of the Bypass as indicated in Paragraph 1 and the reason(s) for the Bypass;

b. the date and time of the beginning of the Bypass;

c. the treatment process(es) gone through prior to the Bypass and the treatment process(es) bypassed;

d. the effort(s) done to maximize the flow through the downstream treatment process(es) and the reason(s) why the Bypass was not avoided.

4. Upon confirmation of the end of a Bypass Event, the Owner shall immediately notify the Spills Action Centre (SAC) and the local Medical Officer of Health. This notice shall include, at a minimum, the following information:

   a. the date and time of the end of the Bypass;

   b. the estimated or measured volume of Bypass.

5. For any Bypass Event, the Owner shall collect daily sample(s) of the Final Effluent, inclusive of the Event and analyze for all effluent parameters outlined in Compliance Limits condition that require composite samples, following the same protocol specified in the Monitoring and Recording condition for the regular samples. The sample(s) shall be in addition to the regular Final Effluent samples required under the monitoring and recording condition. If the Event occurs on a scheduled monitoring day, the regular sampling requirements prevail. If representative sample for the effluent parameter(s) that require grab sample cannot be obtained, they shall be collected after the Event at the earliest time when situation returns to normal.

6. The Owner shall submit a summary report of the Bypass Event(s) to the District Manager on a quarterly basis, no later than each of the following dates for each calendar year: February 15, May 15, August 15, and November 15. The summary reports shall contain, at a minimum, the types of information set out in Paragraphs (3), (4) and (5) and either a statement of compliance or a summary of the non-compliance notifications submitted as required under Paragraph 1 of Condition 10. If there is no Bypass Event during a quarter, a statement of no occurrence of Bypass is deemed sufficient.

7. The Owner shall develop a notification procedure in consultation with the District Manager and SAC and notify the public and downstream water users that may be adversely impacted by any Bypass Event.

4. OVERFLOWS

1. Any Overflow is prohibited, except:

   a. an emergency Overflow in an emergency situation when a structural, mechanical or electrical failure causes a temporary reduction in the capacity of the Works or when an unforeseen flow condition exceeds the design capacity of the Works that is likely to result in personal injury, loss of life, health

hazard, basement flooding, severe property damage, equipment damage or treatment process upset, if a portion of the flow is not overflowed;

b. a planned Overflow that is a direct and unavoidable result of a planned repair and maintenance procedure or other circumstance(s), the Owner having notified the District Manager in writing at least fifteen (15) days prior to the occurrence of Overflow, including an estimated quantity and duration of the Overflow, an assessment of the impact on the environment and the mitigation measures if necessary, and the District Manager has given written consent of the Overflow;

2. Notwithstanding the exceptions given in Paragraph 1, the Operating Agency shall undertake everything practicable to maximize the flow through the downstream treatment process(es) and Bypass(es) prior to overflowing.

3. At the beginning of an Overflow Event, the Owner shall immediately notify the Spills Action Centre (SAC) and the local Medical Officer of Health. This notice shall include, at a minimum, the following information:

   a. the type of the Overflow as indicated in Paragraph 1 and the reason(s) for the Overflow;

   b. the date and time of the beginning of the Overflow;

   c. the point of the Overflow from the Works, the treatment process(es) gone through prior to the Overflow, the disinfection status of the Overflow and whether the Overflow is discharged through the effluent disposal facilities or an alternate location;

   d. the effort(s) done to maximize the flow through the downstream treatment process(es) and Bypass(es) and the reason(s) why the Overflow was not avoided.

4. Upon confirmation of the end of an Overflow Event, the Owner shall immediately notify the Spills Action Centre (SAC) and the local Medical Officer of Health. This notice shall include, at a minimum, the following information:

   a. the date and time of the end of the Overflow;

   b. the estimated or measured volume of the Overflow.

5. For any Overflow Event

   a. in the Sewage Treatment Plant, the Owner shall collect grab sample(s) of the Overflow, one near the beginning of the Event and one every eight (8) hours for the duration of the Event, and have them analyzed at least for CBOD5, total suspended solids, total phosphorus, and *E. coli* , except that raw sewage and primary treated effluent Overflow shall be analyzed for BOD5, total suspended solids, total phosphorus and total Kjeldahl nitrogen only.

6. The Owner shall submit a summary report of the Overflow Event(s) to the District Manager on a

quarterly basis, no later than each of the following dates for each calendar year: February 15, May 15, August 15, and November 15. The summary report shall contain, at a minimum, the types of information set out in Paragraphs (3), (4) and (5). If there is no Overflow Event during a quarter, a statement of no occurrence of Overflow is deemed sufficient.

7. The Owner shall develop a notification procedure in consultation with the District Manager and SAC and notify the public and downstream water users that may be adversely impacted by any Overflow Event.

5. DESIGN OBJECTIVES

1. The Owner shall design and undertake everything practicable to operate the Sewage Treatment Plant in accordance with the following objectives:

   a. Final Effluent parameters design objectives listed in the table(s) included in Schedule B.

   b. Final Effluent is essentially free of floating and settleable solids and does not contain oil or any other substance in amounts sufficient to create a visible film or sheen or foam or discolouration on the receiving waters.

   c. Annual Average Daily Influent Flow is within the Rated Capacity of the Sewage Treatment Plant.

6. COMPLIANCE LIMITS

1. The Owner shall operate and maintain the Sewage Treatment Plant such that compliance limits for the Final Effluent parameters listed in the table(s) included in **Schedule B** are met.

2. The effluent limit set out in subsection (1) shall come into effect upon the commencement of operation of the Proposed Works.

7. OPERATION AND MAINTENANCE

1. The Owner shall ensure that, at all times, the Works and the related equipment and appurtenances used to achieve compliance with this Approval are properly operated and maintained. Proper operation and maintenance shall include effective performance, adequate funding, adequate staffing and training, including training in all procedures and other requirements of this Approval and the OWRA and regulations, adequate laboratory facilities, process controls and alarms and the use of process chemicals and other substances used in the Works.

2. The Owner shall update/maintain the operations manual for the Works within six (6) months of the issuance date of this Approval, that includes, but not necessarily limited to, the following information:

   a. operating procedures for the Works under Normal Operating Conditions;

   b. inspection programs, including frequency of inspection, for the Works and the methods or tests

employed to detect when maintenance is necessary;

c. repair and maintenance programs, including the frequency of repair and maintenance for the Works;

d. procedures for the inspection and calibration of monitoring equipment;

e. operating procedures for the Works to handle situations outside Normal Operating Conditions and emergency situations such as a structural, mechanical or electrical failure, or an unforeseen flow condition, including procedures to minimize Bypasses and Overflows;

f. a spill prevention and contingency plan, consisting of procedures and contingency plans, including notification to the District Manager, to reduce the risk of spills of pollutants and prevent, eliminate or ameliorate any adverse effects that result or may result from spills of pollutants;

g. procedures for receiving, responding and recording public complaints, including recording any follow up actions taken.

3. The Owner shall maintain the operations manual up-to-date and make the manual readily accessible for reference at the Works.

4. The Owner shall ensure that the Operating Agency fulfills the requirements under O. Reg. 129/04, as amended for the Works, including the classification of facilities, licensing of operators and operating standards.

5. The Owner shall operate the Works such that Final Effluent is only discharged during the period(s) as follows:

a. winter/spring: discharging a total volume of effluent not exceeding 502,500 m^3, at a controlled rate, discharge shall be conducted as long as the water surface of Cell "C" is partially free of ice cover, commencing not earlier than January 1st and terminating not later than May 15th;

b. fall: discharging a total volume of effluent not exceeding 267,650 m^3, at a controlled rate, discharge commencing not earlier than October 1st and terminating not later than December 31st; and

c. ensure that the **Maximum Monthly Effluent Discharge Rates** for each monthly period outlined in **Schedule B** are complied with;

8. MONITORING AND RECORDING

1. The Owner shall, upon commencement of operation of the Works, carry out a scheduled monitoring program of collecting samples at the required sampling points, at the frequency specified or higher, by means of the specified sample type and analyzed for each parameter listed in the tables under the monitoring program included in **Schedule C** and record all results, as follows:

a. all samples and measurements are to be taken at a time and in a location characteristic of the quality and quantity of the sewage stream over the time period being monitored.

b. a schedule of the day of the week/month for the scheduled sampling shall be created. The sampling schedule shall be revised and updated every year through rotation of the day of the week/month for the scheduled sampling program, except when the actual scheduled monitoring frequency is three (3) or more times per week.

c. definitions and preparation requirements for each sample type are included in document referenced in Paragraph 3.b.

d. definitions for frequency:

i. Daily means once every day;

ii. Weekly means once every week;

iii. Monthly means once every month;

iv. Quarterly means once every three months; and

v. Five (5) times during each seasonal discharge period means once each at the beginning of the seasonal discharge period, at 25%, 50% and 75% drawdown and at the end of the seasonal discharge period;

2. In addition to the scheduled monitoring program required in Paragraph 1, the Owner shall collect daily sample(s) of the Final Effluent, on any day when there is any situation outside Normal Operating Conditions, and analyze for all effluent parameters outlined in Compliance Limits condition that require composite samples, following the same protocol specified in this condition for the regular samples. If the Event occurs on a scheduled monitoring day, the regular sampling requirements prevail. If representative sample for the effluent parameter(s) that require grab sample cannot be obtained, they shall be collected after the Event at the earliest time when situation returns to normal.

3. The methods and protocols for sampling, analysis and recording shall conform, in order of precedence, to the methods and protocols specified in the following documents and all analysis shall be conducted by a laboratory accredited to the ISO/IEC:17025 standard or as directed by the District Manager:

a. the Ministry's Procedure F-10-1, “Procedures for Sampling and Analysis Requirements for Municipal and Private Sewage Treatment Works (Liquid Waste Streams Only), as amended;

b. the Ministry's publication "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater Version 2.0" (January 2016), PIBS 2724e02, as amended;

c. the publication "Standard Methods for the Examination of Water and Wastewater", as amended.

4. The Owner shall monitor and record the flow rate and daily quantity using flow measuring devices or other methods of measurement as approved below calibrated to an accuracy within plus or minus 15 per

cent (+/- 15%) of the actual flowrate of the following:

a. Influent flow to the Sewage Treatment Plant by continuous flow measuring devices and instrumentations/pumping rates/details of other methods (e.g. top water elevation of lagoons).

b. Final Effluent discharged from the Sewage Treatment Plant to be calculated based on area-drawdown method.

5. The Owner shall measure the volume of sludge in the lagoon cells at least every five (5) years, but it may be estimated in the interim years.

6. The Owner shall retain for a minimum of five (5) years from the date of their creation, all records and information related to or resulting from the monitoring activities required by this Approval.

9. LIMITED OPERATIONAL FLEXIBILITY

1. The Owner may make pre-authorized modifications to the Sewage Treatment Plant in Works in accordance with the document “Limited Operational Flexibility - Protocol for Pre-Authorized Modifications to Municipal Sewage Works” (Schedule D), as amended, subject to the following:

   a. the modifications will not involve the addition of any new treatment process or the removal of an existing treatment process, including chemical systems, from the liquid or solids treatment trains as originally designed and approved.

   b. the scope and technical aspects of the modifications are in line with those delineated in Schedule D and conform with the Ministry’s publication “Design Guidelines for Sewage Works 2008”, as amended, Ministry’s regulations, policies, guidelines, and industry engineering standards;

   c. the modifications shall not negatively impact on the performance of any process or equipment in the Works or result in deterioration in the Final Effluent quality;

   d. where the pre-authorized modification requires notification, a "Notice of Modifications to Sewage Works" (Schedule D), as amended shall be completed with declarations from a Professional Engineer and the Owner and retained on-site prior to the scheduled implementation date. All supporting information including technical memorandum, engineering plans and specifications, as applicable and appropriate to support the declarations that the modifications conform with LOF shall remain on-site for future inspection.

2. The following modifications are not pre-authorized under Limited Operational Flexibility:

   a. Modifications that involve addition or extension of process structures, tankages or channels;

   b. Modifications that involves relocation of the Final Effluent outfall or any other discharge location or that may require reassessment of the impact to the receiver or environment;

c. Modifications that involves addition of or change in technology of a treatment process or that may involve reassessment of the treatment train process design;

d. Modifications that requires changes to be made to the emergency response, spill prevention and contingency plan; or

e. Modifications that are required pursuant to an order issued by the Ministry.

10. REPORTING

1. The Owner shall report to the District Manager orally as soon as possible any non-compliance with the compliance limits, and in writing within seven (7) days of non-compliance.

2. The Owner shall, within fifteen (15) days of occurrence of a spill within the meaning of Part X of the EPA, submit a full written report of the occurrence to the District Manager describing the cause and discovery of the spill, clean-up and recovery measures taken, preventative measures to be taken and schedule of implementation, in addition to fulfilling the requirements under the EPA and O. Reg. 675/98 "Classification and Exemption of Spills and Reporting of Discharges".

3. The Owner shall, upon request, make all manuals, plans, records, data, procedures and supporting documentation available to Ministry staff.

4. The Owner shall prepare performance reports on a calendar year basis and submit to the District Manager by March 31 of the calendar year following the period being reported upon. The reports shall contain, but shall not be limited to, the following information pertaining to the reporting period:

   a. a summary and interpretation of all Influent, monitoring data, and a review of the historical trend of the sewage characteristics and flow rates;

   b. a summary and interpretation of all Final Effluent monitoring data, including concentration, flow rates, loading and a comparison to the design objectives and compliance limits in this Approval, including an overview of the success and adequacy of the Works;

   c. a summary of any deviation from the monitoring schedule and reasons for the current reporting year and a schedule for the next reporting year;

   d. a summary of all operating issues encountered and corrective actions taken;

   e. a summary of all normal and emergency repairs and maintenance activities carried out on any major structure, equipment, apparatus or mechanism forming part of the Works;

   f. a summary of any effluent quality assurance or control measures undertaken;

   g. a summary of the calibration and maintenance carried out on all Influent and Final Effluent monitoring equipment to ensure that the accuracy is within the tolerance of that equipment as

required in this Approval or recommended by the manufacturer;

h. a summary of efforts made to achieve the design objectives in this Approval, including an assessment of the issues and recommendations for pro-active actions if any are required under the following situations:

   i. when any of the design objectives is not achieved more than 50% of the time in a year, or there is an increasing trend in deterioration of Final Effluent quality;

   ii. when the Annual Average Daily Influent Flow reaches 80% of the Rated Capacity;

i. an estimate of the sludge volumes in the lagoon cells. Sludge volume is to be measured every five (5) years, but may be estimated in the interim years. A summary of disposal locations and volumes of sludge disposed of must also be provided if sludge was disposed of during the reporting period;

j. a summary of any complaints received and any steps taken to address the complaints;

k. a summary of all Bypasses, Overflows, other situations outside Normal Operating Conditions and spills within the meaning of Part X of EPA and abnormal discharge events;

l. a summary of all Notice of Modifications to Sewage Works completed under Paragraph 1.d. of Condition 9, including a report on status of implementation of all modification.

m. a summary of efforts made to achieve conformance with Procedure F-5-1 including but not limited to projects undertaken and completed in the sanitary sewer system that result in overall Bypass/Overflow elimination including expenditures and proposed projects to eliminate Bypass/Overflows with estimated budget forecast for the year following that for which the report is submitted.

n. any changes or updates to the schedule for the completion of construction and commissioning operation of major process(es) / equipment groups in the Proposed Works.

5. The Owner shall prepare and submit to the District Manager annual reports on the funding contributions made to the South Nation Conservation Authority (SNCA) for the Total Phosphorus Management Program based on the "Memorandum of Understanding" signed between The South Nation Conservation Authority and The Corporation of the Village of Casselman on April 12, 2001. The annual report shall include details regarding the amount of funds contributed, name and location of projects funded, status of funded projects, estimation of phosphorus loading offset from non-point sources. The first such report shall cover the period from the commencement of operation of the sewage works to the end of the calendar year and shall be prepared within the following ninety (90) calendar days. Each subsequent annual report shall be prepared within ninety (90) calendar days following the completion of the calendar year being reported upon.

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 regarding general provisions is imposed to ensure that the Works are constructed and operated in the manner in which they were described and upon which approval was granted.

2. Condition 2 regarding change of Owner and Operating Agency is included to ensure that the Ministry records are kept accurate and current with respect to ownership and Operating Agency of the Works and to ensure that subsequent owners of the Works are made aware of the Approval and continue to operate the Works in compliance with it.

3. Condition 3 regarding Bypasses is included to indicate that Bypass is prohibited, except in circumstances where the failure to Bypass could result in greater damage to the environment than the Bypass itself. The notification and documentation requirements allow the Ministry to take action in an informed manner and will ensure the Owner is aware of the extent and frequency of Bypass Events.

4. Condition 4 regarding Overflows is included to indicate that Overflow of untreated or partially treated sewage to the receiver is prohibited, except in circumstances where the failure to Overflow could result in greater damage to the environment than the Overflow itself. The notification and documentation requirements allow the Ministry to take action in an informed manner and will ensure the Owner is aware of the extent and frequency of Overflow Events.

5. Condition 5 is imposed to establish non-enforceable effluent quality objectives which the Owner is obligated to use best efforts to strive towards on an ongoing basis. These objectives are to be used as a mechanism to trigger corrective action proactively and voluntarily before environmental impairment occurs and before the compliance limits of Condition 6 are exceeded.

6. Condition 6 regarding compliance limits is imposed to ensure that the Final Effluent discharged from the Works to the environment meets the Ministry's effluent quality requirements.

7. Condition 7 regarding operation and maintenance is included to require that the Works be properly operated, maintained, funded, staffed and equipped such that the environment is protected and deterioration, loss, injury or damage to any person or property is prevented. As well, the inclusion of a comprehensive operations manual governing all significant areas of operation, maintenance and repair is prepared, implemented and kept up-to-date by the Owner. Such a manual is an integral part of the operation of the Works. Its compilation and use should assist the Owner in staff training, in proper plant operation and in identifying and planning for contingencies during possible abnormal conditions. The manual will also act as a benchmark for Ministry staff when reviewing the Owner's operation of the Works. It is also included to ensure that the treated effluent is discharged to the receiver during periods and at rates that minimizes the environmental impact on the receiver.

8. Condition 8 regarding monitoring and recording is included to enable the Owner to evaluate and demonstrate the performance of the Works, on a continual basis, so that the Works are properly operated and maintained at a level which is consistent with the design objectives and compliance limits.

9. Condition 9 regarding Limited Operational Flexibility is included to ensure that the Works are constructed, maintained and operated in accordance with the Approval, and that any pre-approved modification will not negatively impact on the performance of the Works.

10. Condition 10 regarding reporting is included to provide a performance record for future references, to ensure that the Ministry is made aware of problems as they arise, and to provide a compliance record for this Approval.

Schedule A

1. Final plans and specifications prepared by J. L. Richards & Associates Ltd., Consulting Engineers (1976) submitted for the issuance of Sewage Works Approval No. 1-0160-68 issued on May 5, 1976 and Sewage Works Approval No. 1-0160-68 issued on June 18, 1976.

2. Application for Approval of Municipal and Private Sewage Works submitted by Corporation of the Village of Casselman dated April 5, 2006 and the design specifications and drawings prepared by J. L. Richards & Associates Limited, Consulting Engineers, Architects & Planners, Ottawa, Ontario.

3. Application for Approval of Municipal and Private Sewage Works submitted by the Village of Casselman dated June 26, 2001 and the following supporting documentation:A report titled "Village of Casselman Environmental Study Report Expansion of the Sewage Treatment and Collection Facilities for the Village of Casselman", dated August 1995, revised July 1996, prepared by McNeely Engineering Consultants Ltd.

    - Preliminary design brief titled “Village of Casselman Preliminary Engineering Report for Expansion of the Sewage Treatment and Collection Facilities for the Village of Casselman", dated May 1997, prepared by McNeely Engineering Consultants Ltd.

    - A report titled "Long Term Plan for the Upgrade and Expansion of the Village of Casselman's Communal Sewage System" March 2001, prepared by J. L. Richards & Associates Limited, Ottawa, Ontario.

    - A design brief titled " Village of Casselman Wastewater Treatment Expansion, Design Brief Phase 1 Upgrade/Expansion" April 2001, prepared by CH2MHILL, North York, Ontario.

    - A table - "Casselman Lagoon Expansion, Summary of Basic Design Data" dated June 12, 2001, prepared by CH2MHILL, North York, Ontario.

    - A letter with technical description of the sewage treatment plant at the completion of Phase 1, dated July 10, 2001, from Andre Bourque, P. Eng., addressed to Stefanos Habtom, P. Eng., Ministry of the Environment, Environmental Assessment and Approvals Branch.

    - A letter from Victor Castro, MOE, Eastern Region to Mohamed Dhalla, MOE, EAAB, dated February 20, 2001, regarding Casselman Lagoon Facility Upgrade/Expansion, Proposed Amendment to Effluent Ammonia Criteria.

    - A letter from Andre Bouque, P. Eng. CH2MHILL to Director, Environmental Assessment and Approvals Branch, MOE requesting for an amendment to Condition 3.1 (c) of C of A No. 5103-4YHKL3.

4. Application for amendment of Environmental Compliance Approval submitted by Village of Casselman dated January 16, 2018 and request for the addition of the Limited Operational Condition (LOF) to allow for a pilot testing projec of an MBBR system prepared by J. L. Richards & Associates Limited, Ottawa, Ontario.

5. Application for amendment of Environmental Compliance Approval submitted by Village of Casselman dated November 15, 2018 for an upgrade of the existing sewage work with the installation of an MBBR treatment system prepared by J. L. Richards & Associates Limited, Ottawa, Ontario, sewage works design report, and engineering drawings.

Schedule B

Winter/Spring - Final Effluent Objectives

Winter/Spring (January 1 to May 15) - Seasonal Flow Volume = 502,500 m^3

Concentration Objectives of Works (upon completion of construction of all Proposed Works)

Final Effluent Parameter	Averaging Calculator	Limit (maximum unless otherwise indicated)
CBOD5	Monthly Average Effluent Concentration	15 mg/L
Total Suspended Solids	Monthly Average Effluent Concentration	15 mg/L
Total Phosphorus	Monthly Average Effluent Concentration	0.8 mg/L
Total Ammonia Nitrogen January 1 to March 31 April 1 to May 15	Monthly Average Effluent Concentration	 12.0 mg/L 6.0 mg/L
E. coli	Monthly Geometric Mean Density	*100 CFU/100 mL
Hydrogen Sulphide	Monthly Average Effluent Concentration	0.1 mg/L
pH of the effluent maintained between 6.8 to 7.8, inclusive, at all times		

*If the MPN method is utilized for *E. coli* analysis the objective shall be 100 MPN/100 mL.

Loading Objectives of Works (upon completion of construction of all Proposed Works)

Final Effluent Parameter	Averaging Calculator	Limit (maximum unless otherwise indicated)
CBOD5	Seasonal Average Daily Effluent Loading	55.84 kg/d
Total Suspended Solids	Seasonal Average Daily Effluent Loading	55.84 kg/d
Total Phosphorus	Seasonal Average Daily Effluent Loading	2.98 kg/d
Total Ammonia Nitrogen January 1 to March 31 April 1 to May 15	Seasonal Average Daily Effluent Loading	 44.67 kg/d 22.33 kg/d
Hydrogen Sulphide	Seasonal Average Daily Effluent Loading	0.37 kg/d

Schedule B (cont.)

Fall - Final Effluent Objectives

Fall (October 1 to December 31) - Seasonal Flow Volume = 267,650 m^3

Concentration Objectives of Works (upon completion of construction of all Proposed Works)

Final Effluent Parameter	Averaging Calculator	Limit (maximum unless otherwise indicated)
CBOD5	Monthly Average Effluent Concentration	10 mg/L
Total Suspended Solids	Monthly Average Effluent Concentration	10 mg/L
Total Phosphorus	Monthly Average Effluent Concentration	0.8 mg/L
Total Ammonia Nitrogen October 1 to November 30 December 1 to December 31	Monthly Average Effluent Concentration	 5.0 mg/L 12.0 mg/L
E. coli	Monthly Geometric Mean Density	*100 CFU/100 mL
Hydrogen Sulphide	Monthly Average Effluent Concentration	Not Detected
pH of the effluent maintained between 6.8 to 7.8, inclusive, at all times		

*If the MPN method is utilized for *E. coli* analysis the objective shall be 100 MPN/100 mL.

Loading Objectives of Works (upon completion of construction of all Proposed Works)

Final Effluent Parameter	Averaging Calculator	Limit (maximum unless otherwise indicated)
CBOD5	Seasonal Average Daily Effluent Loading	28.99 kg/d
Total Suspended Solids	Seasonal Average Daily Effluent Loading	28.99 kg/d
Total Phosphorus	Seasonal Average Daily Effluent Loading	2.33 kg/d
Total Ammonia Nitrogen October 1 to November 30 December 1 to December 31	Seasonal Average Daily Effluent Loading	 14.55 kg/d 34.89 kg/d
Hydrogen Sulphide	Seasonal Average Daily Effluent Loading	-

Schedule B (cont.)

Spring - Final Effluent Compliance Limits

Winter/Spring (January 1 to May 15) - Seasonal Flow Volume = 502,500 m^3

Concentration Limits of Works (upon completion of construction of all Proposed Works)

Final Effluent Parameter	**Averaging Calculator**	**Limit** (maximum unless otherwise indicated)
CBOD5	Monthly Average Effluent Concentration	25
Total Suspended Solids	Monthly Average Effluent Concentration	25
Total Phosphorus	Monthly Average Effluent Concentration	1.0
Total Ammonia Nitrogen January 1 to March 31 April 1 to May 15	Monthly Average Effluent Concentration	 12.0 mg/L 6.0 mg/L
E. coli	Monthly Geometric Mean Density	*200 CFU/100 mL
Hydrogen Sulphide	Monthly Average Effluent Concentration	0.1 mg/L
pH of the effluent maintained between 6.0 to 8.0, inclusive, at all times		

*If the MPN method is utilized for *E. coli* analysis the objective shall be 200 MPN/100 mL.

Loading Objectives of Works (upon completion of construction of all Proposed Works)

Final Effluent Parameter	**Averaging Calculator**	**Limit** (maximum unless otherwise indicated)
CBOD5	Seasonal Average Daily Effluent Loading	93.06 kg/d
Total Suspended Solids	Seasonal Average Daily Effluent Loading	93.06 kg/d
Total Phosphorus	Seasonal Average Daily Effluent Loading	3.73 kg/d
Total Ammonia Nitrogen January 1 to March 31 April 1 to May 15	Seasonal Average Daily Effluent Loading	 44.67 kg/d 22.33 kg/d
Hydrogen Sulphide	Seasonal Average Daily Effluent Loading	0.37 kg/d

Schedule B (cont.)

Fall - Final Effluent Compliance Limits

Fall (October 1 to December 31) - Seasonal Flow Volume = 267,650 m^3

Concentration Limits of Works (upon completion of construction of all Proposed Works)

Final Effluent Parameter	Averaging Calculator	Limit (maximum unless otherwise indicated)
CBOD5	Monthly Average Effluent Concentration	15
Total Suspended Solids	Monthly Average Effluent Concentration	25
Total Phosphorus	Monthly Average Effluent Concentration	1.0
Total Ammonia Nitrogen October 1 to November 30 December 1 to December 31	Monthly Average Effluent Concentration	 5.0 mg/L 12.0 mg/L
E. coli	Monthly Geometric Mean Density	*200 CFU/100 mL
Hydrogen Sulphide	Monthly Average Effluent Concentration	Not Detected
pH of the effluent maintained between 6.0 to 8.0, inclusive, at all times		

*If the MPN method is utilized for *E. coli* analysis the objective shall be 200 MPN/100 mL.

Loading Limits of Works (upon completion of construction of all Proposed Works)

Final Effluent Parameter	Averaging Calculator	Limit (maximum unless otherwise indicated)
CBOD5	Seasonal Average Daily Effluent Loading	43.64 kg/d
Total Suspended Solids	Seasonal Average Daily Effluent Loading	72.73 kg/d
Total Phosphorus	Seasonal Average Daily Effluent Loading	2.91 kg/d
Total Ammonia Nitrogen October 1 to November 30 December 1 to December 31	Seasonal Average Daily Effluent Loading	 14.55 kg/d 34.89 kg/d
Hydrogen Sulphide	Seasonal Average Daily Effluent Loading	-

Schedule B (cont.)

Maximum Monthly Effluent Discharge Rates

Discharge Period	Maximum Discharge Rate	Maximum Discharge Rate Based on Dilution Ratio
January 1 - 31	5,000 m^3/d	SNR Flow/10
February 1 - 28/29	5,000 m^3/d	SNR Flow/10
March 1 - 31	5,000 m^3/d	SNR Flow/40
April 1 -30	7,000 m^3/d	SNR Flow/60
May 1 -15	7,000 m^3/d	SNR Flow/60
October 1 -31	4,000 m^3/d	SNR Flow/15
November 1 - 30	4,000 m^3/d	SNR Flow/10
December 1 - 31	5,000 m^3/d	SNR Flow/15

Schedule C

Monitoring Program

Influent - Sampling Point: Main Pumping Station

Parameters	Sample Type	Minimum Frequency
BOD5	4 hour composite	Monthly
Total Suspended Solids	4 hour composite	Monthly
Total Phosphorus	4 hour composite	Monthly
Total Kjeldahl Nitrogen	4 hour composite	Monthly

Lagoon Content Monitoring

Sampling Location: Cell "C" - At least seven days prior to a scheduled discharge

Parameters	Sample Type*	Minimum Frequency
CBOD5	Grab	Once
Total Suspended Solids	Grab	Once
Total Phosphorus	Grab	Once
Total Kjeldahl Nitrogen	Grab	Once
Total Ammonia Nitrogen (TAN)	Grab	Once
pH	Grab	Once
Hydrogen Sulphide (if odour is present)	Grab	Once
Dissolved Oxygen (if odour is present)	Grab	Once
* A minimum of three (3) grab samples from the surface, middle and bottom of the liquid portion at three (3) locations representative of the lagoon content, collected and composited as one (1) grab sample.		

Final Effluent Sampling Point

Sampling Location: MBBR/Disc Filter Treatment System Effluent Discharge Outlet

Sample Type	Grab
Minimum Frequency	Weekly during each seasonal discharge periods.
Parameters	CBOD5, Total Suspended Solids, Total Phosphorus, Total Ammonia Nitrogen, Total Kjeldahl Nitrogen, Nitrate as Nitrogen, Nitrite as Nitrogen, *E. coli,* Hydrogen Sulphide (if odour is present), Field pH, and Field Temperature

Schedule C (cont.)

South Nation River Monitoring

Sampling Point*: Upstream of the Effluent Outfall and Downstream of the Effluent Outfall

Parameters	Sample Type	Minimum Frequency
CBOD5	Grab	Weekly
Total Suspended Solids	Grab	Weekly
Total Phosphorus	Grab	Weekly
Total Ammonia Nitrogen (TAN)	Grab	Weekly

Notes:

* Minimum of two (2) sampling points in the South Nation River shall be employed:

1. one (1) upstream of the effluent outfall at the Casselman Water Treatment Plant intake; and

2. one (1) downstream of the effluent outfall and upstream of the Village's landfill from one of the shores of South Nation River on the outfall side, excluding the weeks when there is ice cover on the South Nation River (i.e. when sampling is not feasible).

Schedule D

Limited Operational Flexibility

Protocol for Pre-Authorized Modifications to Municipal Sewage Works

1. General

    1. Pre-authorized modifications are permitted only where Limited Operational Flexibility has already been granted in the Approval and only permitted to be made at the pumping stations and sewage treatment plant in the Works, subject to the conditions of the Approval.

    2. Where there is a conflict between the types and scope of pre-authorized modifications listed in this document, and the Approval where Limited Operational Flexibility has been granted, the Approval shall take precedence.

    3. The Owner shall consult the District Manager on any proposed modifications that may fall within the scope and intention of the Limited Operational Flexibility but is not listed explicitly or included as an example in this document.

    4. The Owner shall ensure that any pre-authorized modifications will not:

        a. adversely affect the hydraulic profile of the Sewage Treatment Plant or the performance of any upstream or downstream processes, both in terms of hydraulics and treatment performance;

        b. result in new Overflow or Bypass locations, or any potential increase in frequency or quantity of Overflow(s) or Bypass(es).

        c. result in a reduction in the required Peak Flow Rate of the treatment process or equipment as originally designed.

2. Modifications that do not require pre-authorization:

    1. Sewage works that are exempt from Ministry approval requirements;

    2. Modifications to the electrical system, instrumentation and control system.

3. Pre-authorized modifications that do not require preparation of “Notice of Modification to Sewage Works”

    1. Normal or emergency maintenance activities, such as repairs, renovations, refurbishments and replacements with Equivalent Equipment, or other improvements to an existing approved piece of equipment of a treatment process do not require pre-authorization. Examples of these activities are:

        a. Repairing a piece of equipment and putting it back into operation, including replacement of minor

components such as belts, gear boxes, seals, bearings;

b. Repairing a piece of equipment by replacing a major component of the equipment such as motor, with the same make and model or another with the same or very close power rating but the capacity of the pump or blower will still be essentially the same as originally designed and approved;

c. Replacing the entire piece of equipment with Equivalent Equipment.

2. Improvements to equipment efficiency or treatment process control do not require pre-authorization. Examples of these activities are:

a. Adding variable frequency drive to pumps;

b. Adding on-line analyzer, dissolved oxygen probe, ORP probe, flow measurement or other process control device.

4. Pre-Authorized Modifications that require preparation of "Notice of Modification to Sewage Works"

1. Pumping Stations

a. Replacement, realignment of existing sewers including manholes, valves, gates, weirs and associated appurtenances provided that the modifications will not add new influent source(s) or result in an increase in flow from existing sources as originally approved.

b. Extension or partition of wetwell to increase retention time for emergency response and improve station maintenance and pump operation;

c. Replacement or installation of inlet screens to the wetwell;

d. Replacement or installation of flowmeters, construction of station bypass;

e. Replacement, reconfiguration or addition of pumps and modifications to pump suctions and discharge pipings including valve, gates, motors, variable frequency drives and associated appurtenances to maintain firm pumping capacity or modulate the pump rate provided that the modifications will not result in a reduction in the firm pumping capacity or discharge head or an increase in the peak pumping rate of the pumping station as originally designed;

f. Replacement, realignment of existing forcemain(s) valves, gates, and associated appurtenances provided that the modifications will not reduce the flow capacity or increase the total dynamic head and transient in the forcemain.

2. Sewage Treatment Plant

1. Sewers and appurtenances

a. Replacement, realignment of existing sewers (including pipes and channels) or construction of new sewers, including manholes, valves, gates, weirs and associated appurtenances within the a sewage treatment plant, provided that the modifications will not add new influent source(s) or result in an increase in flow from existing sources as originally approved and that the modifications will remove hydraulic bottlenecks or improve the conveyance of sewage into and through the Works.

2. Flow Distribution Chambers/Splitters

   a. Replacement or modification of existing flow distribution chamber/splitters or construction of new flow distribution chamber/splitters, including replacements or installation of sluice gates, weirs, valves for distribution of flows to the downstream process trains, provided that the modifications will not result in a change in flow distribution ratio to the downstream process trains as originally designed.

3. Imported Sewage Receiving Facility

   1. Replacement, relocation or installation of loading bays, connect/disconnect hook-up systems and unloading/transferring systems;

   2. Replacement, relocation or installation of screens, grit removal units and compactors;

   3. Replacement, relocation or installation of pumps, such as dosing pumps and transfer pumps, valves, piping and appurtenances;

   4. Replacement, relocation or installation of storage tanks/chambers and spill containment systems;

   5. Replacement, relocation or installation of flow measurement and sampling equipment;

   6. Changes to the source(s) or quantity from each source, provided that changes will not result in an increase in the total quantity and waste loading of each type of Imported Sewage already approved for co-treatment.

4. Preliminary Treatment System

   a. Replacement of existing screens and grit removal units with equipment of the same or higher process performance technology, including where necessary replacement or upgrading of existing screenings dewatering washing compactors, hydrocyclones, grit classifiers, grit pumps, air blowers conveyor system, disposal bins and other ancillary equipment to the screening and grit removal processes.

   b. Replacement or installation of channel aeration systems, including air blowers, air supply main, air headers, air laterals, air distribution grids and diffusers.

5. Primary Treatment System

a. Replacement of existing sludge removal mechanism, including sludge chamber;

b. Replacement or installation of scum removal mechanism, including scum chamber;

c. Replacement or installation of primary sludge pumps, scum pumps, provided that:the modifications will not result in a reduction in the firm pumping capacity or discharge head that the primary sludge pump(s) and scum pump(s) are originally designed to handle.

6. Secondary Treatment System

1. Biological Treatment

a. Conversion of complete mix aeration tank to plug-flow multi-pass aeration tank, including modifications to internal structural configuration;

b. Addition of inlet gates in multi-pass aeration tank for step-feed operation mode;

c. Partitioning of an anoxic/flip zone in the inlet of the aeration tank, including installation of submersible mixer(s);

d. Replacement of aeration system including air blowers, air supply main, air headers, air laterals, air distribution grids and diffusers, provided that the modifications will not result in a reduction in the firm capacity or discharge pressure that the blowers are originally designed to supply or in the net oxygen transferred to the wastewater required for biological treatment as originally required.

2. Secondary Sedimentation

a. Replacement of sludge removal mechanism, including sludge chamber;

b. Replacement or installation of scum removal mechanism, including scum chamber;

c. Replacement or installation of return activated sludge pump(s), waste activated sludge pump(s), scum pump(s), provided that the modifications will not result in a reduction in the firm pumping capacity or discharge head that the activated sludge pump(s) and scum pump(s) are originally designed to handle.

7. Tertiary Treatment System

a. Replacement of filtration system with equipment of the same filtration technology, including feed pumps, backwash pumps, filter reject pumps, filtrate extract pumps, holding tanks associated with the pumping system, provided that the modifications will not result in a reduction in the capacity of the filtration system as originally designed.

8. Disinfection System

    1. UV Irraditation

        a. Replacement of UV Irraditation system, provided that the modifications will not result in a reduction in the design capacity of the disinfection system or the radiation level as originally designed.

    2. Chlorination/Dechlorination and Ozonation Systems

        a. Extension and reconfiguration of contact tank to increase retention time for effective disinfection and reduce dead zones and minimize short-circuiting;

        b. Replacement or installation of chemical storage tanks, provided that the tanks are provided with effective spill containment.

9. Supplementary Treatment Systems

    1. Chemical systems

        a. Replacement, relocation or installation of chemical storage tanks for existing chemical systems only, provided that the tanks are sited with effective spill containment;

        b. Replacement or installation of chemical dosing pumps provided that the modifications will not result in a reduction in the firm capacity that the dosing pumps are originally designed to handle.

        c. Relocation and addition of chemical dosing point(s) including chemical feed pipes and valves and controls, to improve phosphorus removal efficiency;

        d. Use of an alternate chemical provided that it is a non-proprietary product and is a commonly used alternative to the chemical approved in the Works, provided that the chemical storage tanks, chemical dosing pumps, feed pipes and controls are also upgraded, as necessary..

10. Sludge Management System

    1. Sludge Holding and Thickening

        a. Replacement or installation of sludge holding tanks, sludge handling pumps, such as transfer pumps, feed pumps, recirculation pumps, provided that modifications will not result in reduction in the solids storage or handling capacities;

    2. Sludge Digestion

        a. Replacement or installation of digesters, sludge handling pumps, such as transfer pumps, feed pumps, recirculation pumps, provided that modifications will not result in reduction in the solids

storage or handling capacities;

b. replacement of sludge digester covers.

3. Sludge Dewatering and Disposal

a. Replacement of sludge dewatering equipment, sludge handling pumps, such as transfer pumps, feed pumps, cake pumps, loading pumps, provided that modifications will not result in reduction in solids storage or handling capacities.

4. Processed Organic Waste

a. Changes to the source(s) or quantity from each source, provided that changes will not result in an increase in the total quantity already approved for co-processing.

11. Standby Power System

1. Replacement or installation of standby power system, including feed from alternate power grid, emergency power generator, fuel supply and storage systems, provided that the existing standby power generation capacity is not reduced.

12. Pilot Study

1. Small side-stream pilot study for existing or new technologies, alternative treatment process or chemical, provided:

i. all effluent from the pilot system is hauled off-site for proper disposal or returned back to the sewage treatment plant for at a point no further than immediately downstream of the location from where the side-stream is drawn;

ii. no proprietary treatment process or propriety chemical is involved in the pilot study;

iii. the effluent from the pilot system returned to the sewage treatment plant does not significantly alter the composition/concentration of or add any new contaminant/inhibiting substances to the sewage to be treated in the downstream process;

iv. the pilot study will not have any negative impacts on the operation of the sewage treatment plant or cause a deterioration of effluent quality;

v. the pilot study does not exceed a maximum of two years and a notification of completion shall be submitted to the District Manager within one month of completion of the pilot project.

13. Lagoons

a. installing baffles in lagoon provided that the operating capacity of the lagoon system is not reduced;

b. raise top elevation of lagoon berms to increase free-board;

c. replace or install interconnecting pipes and chambers between cells, provided that the process design operating sequence is not changed;

d. replace or install mechanical aerators, or replace mechanical aerators with diffused aeration system provided that the mixing and aeration capacity are not reduced;

e. removal of accumulated sludge and disposal to an approved location offsite.

3. Final Effluent Disposal Facilities

1. Replacement or realignment of the Final Effluent channel, sewer or forcemain, including manholes, valves and appurtenances from the end of the treatment train to the discharge outfall section, provided that the sewer conveys only effluent discharged from the Sewage Treatment Plant and that the replacement or re-aligned sewer has similar dimensions and performance criteria and is in the same or approximately the same location and that the hydraulic capacity will not be reduced.

This page contains an image of the form entitled "Notice of Modification to Sewage Works". A digital copy can be obtained from the District Manager.

Ontario
Ministry of
the Environment

Notice of Modification to Sewage Works

RETAIN COPY OF COMPLETED FORM AS PART OF THE ECA AND SEND A COPY TO THE WATER SUPERVISOR (FOR MUNICIPAL) OR DISTRICT MANAGER (FOR NON-MUNICIPAL SYSTEMS)

Part 1 – Environmental Compliance Approval (ECA) with Limited Operational Flexibility

(Insert the ECA's owner, number and issuance date and notice number, which should start with "01" and consecutive numbers thereafter)

ECA Number	Issuance Date (mm/dd/yy)	Notice number (if applicable)

ECA Owner	Municipality

Part 2: Description of the modifications as part of the Limited Operational Flexibility

(Attach a detailed description of the sewage works)

Description shall include:
1. A detail description of the modifications and/or operations to the sewage works (e.g. sewage work component, location, size, equipment type/model, material, process name, etc.)
2. Confirmation that the anticipated environmental effects are negligible.
3. List of updated versions of, or amendments to, all relevant technical documents that are affected by the modifications as applicable, i.e. submission of documentation is not required, but the listing of updated documents is (design brief, drawings, emergency plan, etc.)

Part 3 – Declaration by Professional Engineer

I hereby declare that I have verified the scope and technical aspects of this modification and confirm that the design:
1. Has been prepared or reviewed by a Professional Engineer who is licensed to practice in the Province of Ontario;
2. Has been designed in accordance with the Limited Operational Flexibility as described in the ECA;
3. Has been designed consistent with Ministry's Design Guidelines, adhering to engineering standards, industry's best management practices, and demonstrating ongoing compliance with s.53 of the Ontario Water Resources Act; and other appropriate regulations.

I hereby declare that to the best of my knowledge, information and belief the information contained in this form is complete and accurate

Name (Print)	PEO License Number

Signature	Date (mm/dd/yy)

Name of Employer

Part 4 – Declaration by Owner

I hereby declare that:
1. I am authorized by the Owner to complete this Declaration;
2. The Owner consents to the modification; and
3. This modifications to the sewage works are proposed in accordance with the Limited Operational Flexibility as described in the ECA.
4. The Owner has fulfilled all applicable requirements of the *Environmental Assessment Act*.

I hereby declare that to the best of my knowledge, information and belief the information contained in this form is complete and accurate

Name of Owner Representative (Print)	Owner representative's title (Print)

Owner Representative's Signature	Date (mm/dd/yy)

EAB Form December 2, 2013

Schedule E

Methodology for Calculating and Reporting Monthly Average Effluent Concentration, Annual Average Effluent Concentration and Monthly Geometric Mean Density

1. Monthly Average Effluent Concentration

Step 1: Calculate the arithmetic mean of all Single Sample Results of the concentration of a contaminant in the Final Effluent sampled or measured during a calendar month and proceed as follows depending on the result of the calculation:

a. If the arithmetic mean does not exceed the compliance limit for the contaminant, then report and use this arithmetic mean as the Monthly Average Effluent Concentration for this parameter where applicable in this Approval;

b. If the arithmetic mean exceeds the compliance limit for the contaminant and there was no Bypass Event during the calendar month, then report and use this arithmetic mean as the Monthly Average Effluent Concentration for this parameter where applicable in this Approval;

c. If the arithmetic mean exceeds the compliance limit for the contaminant and there was Bypass Event(s) during the calendar month, then proceed to Step 2;

d. If the arithmetic mean does not exceed the compliance limit for the contaminant and there was Bypass Event(s) during the calendar month, the Owner may still elect to proceed to Step 2 calculation of the flow-weighted arithmetic mean.

Step 2: Calculate the flow-weighted arithmetic mean of all Single Sample Results of the concentration of a contaminant in the Final Effluent sampled or measured during a calendar month and proceed depending on the result of the calculation:

a. Group No Bypass Days (**NBPD**) data and Bypass Days (**BPD**) data during a calendar month separately;

b. Calculate the arithmetic mean of all Single Sample Results of the concentration of a contaminant in the Final Effluent sampled or measured on all NBPD during a calendar month and record it as **Monthly Average NBPD Effluent Concentration**;

c. Obtain the "**Total Monthly NBPD Flow**" which is the total amount of Final Effluent discharged on all NBPD during the calendar month;

d. Calculate the arithmetic mean of all Single Sample Results of the concentration of a contaminant in the Final Effluent sampled or measured on all BPD during a calendar month

and record it as **Monthly Average BPD Effluent Concentration**;

e. Obtain the "**Total Monthly BPD Flow**" which is the total amount of Final Effluent discharged on all BPD during the calendar month;

f. Calculate the flow-weighted arithmetic mean using the following formula:

[(Monthly Average NBPD Effluent Concentration × Total Monthly NBPD Flow) + (Monthly Average BPD Effluent Concentration × Total Monthly BPD Flow)] ÷ (Total Monthly NBPD Flow + Total Monthly BPD Flow)

It should be noted that in this method, if there are no Bypass Event for the month, the calculated result would be the same as the non-flow-weighted arithmetic mean method;

g. Report and use the lesser of the flow-weighted arithmetic mean obtained in Step 2 and the arithmetic mean obtained in Step 1 as the Monthly Average Effluent Concentration for this parameter where applicable in this Approval.

2. Annual Average Effluent Concentration

Step 1: Calculate the arithmetic mean of all Single Sample Results of the concentration of a contaminant in the Final Effluent sampled or measured during a calendar year and proceed as follows depending on the result of the calculation:

a. If the arithmetic mean does not exceed the compliance limit for the contaminant, then report and use this arithmetic mean as the Annual Average Effluent Concentration for this parameter where applicable in this Approval;

b. If the arithmetic mean exceeds the compliance limit for the contaminant and there was no Bypass Event during the calendar year, then report and use this arithmetic mean as the Annual Average Effluent Concentration for this parameter where applicable in this Approval;

c. If the arithmetic mean exceeds the compliance limit for the contaminant and there was Bypass Event(s) during the calendar year, then proceed to Step 2;

d. If the arithmetic mean does not exceed the compliance limit for the contaminant and there was Bypass Event(s) during the calendar year, the Owner may still elect to proceed to Step 2 calculation of the flow-weighted arithmetic mean.

Step 2: Calculate the flow-weighted arithmetic mean of all Single Sample Results of the concentration of a contaminant in the Final Effluent sampled or measured during a calendar year and proceed depending on the result of the calculation:

a. Group No Bypass Days (**NBPD**) data and Bypass Days (**BPD**) data during a calendar year

separately;

b. Calculate the arithmetic mean of all Single Sample Results of the concentration of a contaminant in the Final Effluent sampled or measured on all NBPD during a calendar year and record it as **Annual Average NBPD Effluent Concentration**;

c. Obtain the "**Total Annual NBPD Flow**" which is the total amount of Final Effluent discharged on all NBPD during the calendar year;

d. Calculate the arithmetic mean of all Single Sample Results of the concentration of a contaminant in the Final Effluent sampled or measured on all BPD during a calendar year and record it as **Annual Average BPD Effluent Concentration**;

e. Obtain the "**Total Annual BPD Flow**" which is the total amount of Final Effluent discharged on all BPD during the calendar year;

f. Calculate the flow-weighted arithmetic mean using the following formula:

[(Annual Average NBPD Effluent Concentration × Total Monthly NBPD Flow) + (Monthly Average BPD Effluent Concentration × Total Annual BPD Flow)] ÷ (Total Annual NBPD Flow + Total Annual BPD Flow)

It should be noted that in this method, if there are no Bypass Event for the calendar year, the calculated result would be the same as the non-flow-weighted arithmetic mean method;

g. Report and use the lesser of the flow-weighted arithmetic mean obtained in Step 2 and the arithmetic mean obtained in Step 1 as the Annual Average Effluent Concentration for this parameter where applicable in this Approval.

3. Monthly Geometric Mean Density

Geometric mean is defined as the n^{th} root of the product of n numbers. In the context of calculating Monthly Geometric Mean Density for *E. coli*, the following formula shall be used:

$$\sqrt[n]{x_1 x_2 x_3 \cdots x_n}$$

in which,

"n" is the number of samples collected during the calendar month; and

"x" is the value of each Single Sample Result.

For example, four weekly grab samples were collected and tested for *E. coli* during the calendar month. The *E. coli* densities in the Final Effluent were found below:

Sample Number	*E. coli* Densities* (CFU/100 mL)
1	10
2	100
3	300
4	50

The Geometric Mean Density for these data:

$$\sqrt[4]{10 \times 100 \times 300 \times 50} = 62$$

*If a particular result is zero (0), then a value of one (1) will be substituted into the calculation of the Monthly Geometric Mean Density. If the MPN method is utilized for E. coli analysis, values in the table shall be MPN/100 mL.

Schedule F

Municipal and Local Services Board Wastewater System

Profile Information Form

(For reference only, images of the form are attached on the next four pages. A digital copy can be obtained from the District Manger.)

Ontario

Ministry of the Environment and Climate Change

Municipal and Local Services Board Wastewater System Profile Information Form

The information in this form is necessary to administer the Ministry's approvals, compliance and enforcement programs with respect to wastewater treatment and collection systems owned by municipalities and local services boards. These programs are authorized under the *Ontario Water Resources Act*, the *Environmental Protection Act*, the *Nutrient Management Act* and their respective regulations.

Email the completed form to: waterforms@ontario.ca
For any questions call 1-866-793-2588.

[A] SYSTEM PROFILE INFORMATION

Wastewater System Number *(if assigned)*	☐ New Profile ☐ Update Existing Profile
Name of System	Level of Treatment (select one*) ☐ Primary ☐ Secondary ☐ Tertiary ☐ Secondary Equivalent ☐ Other (specify): **See Terms and Concepts on page 4*
Name of Municipality or Local Services Board	

Population Served	Population (Design)	Type of System
		☐ Treatment & Collection System ☐ Collection System Only

Design Rated Capacity (m^3/day)	Peak Flow Rate (m^3/day)	Current Environmental Compliance Approval (ECA) Number	Current ECA Issue Date (yyyy/mm/dd):

The treatment plant receives sewage from: (Check all that applies.* If you have checked more than one option below, indicate the approximate %)

☐ Sanitary Sewer ☐ Combined Sewer
☐ Nominally Separated Sewer ☐ Partially Separated Sewer **See Terms and Concepts on page 4*

[B] OWNER INFORMATION

Legal Name of Municipality or Local Services Board

Unit No	Street No.	Street Name.	Street Type (St, Rd, etc)	Street Direction (N,S,E,W)

PO Box	City/Town	Postal Code

☐ Dr ☐ Miss ☐ Mr ☐ Mrs ☐ Ms	Owner Contact First Name	Owner Contact Last Name	Owner Contact Job Title

Tel. No. ( ) - ext.	Fax Number ( ) -	Email address

[C] OPERATING AUTHORITY ☐ Check if same as owner

Legal Name of Operator

Unit No	Street No.	Street Name.	Street Type (St, Rd, etc)	Street Direction (N,S,E,W)

PO Box	City/Town	Postal Code

☐ Dr ☐ Miss ☐ Mr ☐ Mrs ☐ Ms	Operator Contact First Name	Operator Contact Last Name	Operator Contact Job Title

Tel. No. ( ) - ext.	Fax Number ( ) -	Email address

[D] 24/7 CONTACT

☐ Dr ☐ Miss ☒ Mr ☐ Mrs ☐ Ms	First Name	Last Name	Job Title

Tel. No. ( ) - ext.	Fax Number ( ) -	Email address

[E] SYSTEM CIVIC LOCATION ADDRESS (I.E. ADDRESS OF TREATMENT PLANT)

Unit No	Street No.	Street Name.	Street Type (St, Rd, etc)	Street Direction (N,S,E,W)

PO Box	City/Town	Postal Code

If the Wastewater System has no street address

Geographical Township	Lot	Concession

Geographical Referencing (if known, enter the Geographical Reference Information for this Wastewater System)

Map Datum	Geo-Referencing Method	Accuracy Estimate	Location Reference	
Latitude	**Longitude**	**Zone**	**Easting**	**Northing**

[F] TREATMENT PROCESS

Preliminary	Primary	Secondary	Secondary Equivalent	Post-Secondary	Additional Treatment
☐ Screening ☐ Shredding/ grinding ☐ Grit Removal ☐ Other(specify):	☐ Settling/sedimentation/ clarification ☐ Scum Removal ☐ Polymer Addition ☐ Other(specify):	☐ Conventional Activated Sludge (CAS) ☐ Extended Aeration ☐ Membrane Bioreactor (MBR) ☐ Sequencing Batch Reactor (SBR) ☐ Rotating Biological Contactor (RBC) ☐ Trickling Filter (TF) ☐ Biological Aerated Filter (BAF) ☐ Other(specify):	☐ Aerated Lagoon ☐ Facultative Lagoon ☐ Anaerobic Lagoon ☐ Aerobic Lagoon ☐ Other(specify):	☐ Filtration ☐ Clarification ☐ Intermittent Sand Filter (after lagoons) ☐ Polishing Wetlands ☐ Polishing Lagoons ☐ Other(specify):	☐ Phosphorous Removal ☐ Biological ☐ Chemical If chemical is used, specify: ☐ Nitrification ☐ Denitrification ☐ Other(specify):

[G] DISINFECTION

Method of Disinfection	Disinfection Period
☐ Chlorination If you chlorinate, do you practice de-chlorination? ☐ Yes ☐ No	☐ Continuous ☐ Seasonal
☐ Ultraviolet Irradiation	☐ Continuous ☐ Seasonal
☐ Other (specify):	☐ Continuous ☐ Seasonal

[H] SLUDGE	
Sludge Stabilization Process	Method of Sludge Disposal/Utilization
☐ Aerobic Digestion	☐ Agricultural
☐ Anaerobic Digestion	☐ Landfill
☐ Drying & Pelletization	☐ Incineration
☐ Lime Treatment	☐ Other (specify):
☐ Composting	
☐ Other (specify):	
Available Sludge Storage Capacity (m^3):	

[I] EFFLUENT	
Effluent Disposal Method	Effluent Discharge Frequency
☐ Surface Water Receiving Water Body Name:	☐ Continuous ☐ Seasonal
☐ Subsurface	☐ Continuous ☐ Seasonal
☐ Other (specify):	☐ Continuous ☐ Seasonal

Is the effluent discharged in a vulnerable area identified in the local source protection assessment report approved under the Clean Water Act, 2006?
☐ Yes ☐ No

[J] INFLUENT

Does the plant receive sewage from another municipality or local services board either through an interconnected collection system or hauled sewage?

☐ Yes ☐ No
(if yes, name(s) of other municipality or local services board):

Plant receives:
☐ Leachate (approximate annual volume in m^3):
☐ Septage (approximate annual volume in m^3):
☐ Industrial input (approximate annual volume in m^3):
or (approximate volume in %):

Terms and Concepts

The following Terms and Concepts are provided to assist you when completing Wastewater System Profile Information Form.

In order to determine the level of treatment that applies to the wastewater system, the effluent quality objectives that the wastewater treatment plant was designed to meet must be considered. The process based approach often used in the past has led to confusion and is open to interpretation due to recent developments and practices in the wastewater treatment industry. For example, a plant with a high rate filter (often referred to as a tertiary filter) after its secondary treatment was considered a tertiary treatment in the past since the filter was designed and operated to produce a tertiary quality effluent. However, secondary plants are now being constructed with these filters as a safeguard against any potential secondary clarifier performance degradation and not for the purpose of ensuring tertiary treatment performance. Also, new technologies have evolved that can produce tertiary quality effluent without having these high rate filters (e.g., membrane bioreactors). Lagoons were considered in the past as being capable of providing only secondary equivalent treatment. However, with add-on treatment after the lagoons (e.g. intermittent sand filters), many lagoon treatment systems are capable of producing secondary or tertiary quality effluent.

During the establishment of sewage works, site-specific effluent limits (including averaging periods) are provided by the Ministry's Regional Technical Support Section, considering the assimilative capacity of the receivers and the minimum treatment requirements provided in Procedure F-5-1. The designer of the sewage works then selects objective values that are acceptable to the Ministry and are less (i.e. more stringent) than the effluent limits, in order to provide an adequate safety factor based on the designer's confidence/experience with the technology chosen and other site-specific conditions. The sewage works are then designed (and operated) to meet these design objectives in a reliable and consistent manner. Therefore, the values that are to be used in the determination of the level of treatment that applies to the sewage works must be based on the design objectives, and not the effluent limits.

Two common parameters used in almost all sewage works performance evaluations are $CBOD_5$ (carbonaceous biochemical oxygen demand) (BOD_5 – biochemical oxygen demand - for primary sewage works) and total suspended solids (TSS). Therefore, it is logical that the **objective values** of these two parameters are used to determine the level of treatment at the sewage works.

Level of Treatment:

Primary:
Wastewater treatment plants that have only settling/sedimentation (with or without chemical addition) and designed, approved and operated to reliably and consistently produce 30% and 50% or better reduction of BOD_5 and TSS respectively are considered primary plants (MOE Procedures F-5-1 and F-5-5).

Secondary:
Wastewater treatment plants that have biological processes (e.g. activated sludge process and its variations, fixed film processes) or physical-chemical processes designed, approved and operated to reliably and consistently produce an effluent quality of $CBOD_5$ and TSS of 15 mg/L or better are considered secondary plants (Section 8.2, MOE Design Guidelines for Sewage Works, 2008).

Secondary Equivalent:
Wastewater treatment plants designed, approved and operated to reliably and consistently produce an effluent quality of $CBOD_5$ of 25 mg/L and TSS of 30 mg/L or better are considered as secondary equivalent plants (Section 8.2, MOE Design Guidelines for Sewage Works, 2008).

Note: Wastewater treatment plants that provide only primary settling of solids and the addition of chemicals to improve the removal of TSS (and phosphorus) are not considered as secondary treatment plants or secondary equivalent plants (Section 8.2, MOE Design Guidelines for Sewage Works, 2008) even if they produce secondary or secondary equivalent effluent quality.

Tertiary:
Wastewater treatment plants that have biological processes (e.g. activated sludge process and its variations, fixed film processes) and/or physical-chemical processes designed, approved and operated to reliably and consistently produce an effluent quality of $CBOD_5$ and TSS of 5 mg/L or better are considered tertiary plants (adapted from Section 15.2.1, MOE Design Guidelines for Sewage Works, 2008).

Note: Biological processes such as nitrification, denitrification and enhanced biological phosphorus removal can be part of either a secondary or tertiary treatment plant. They may be described as secondary treatment plant with nitrification, secondary treatment plant with enhanced biological phosphorus removal, tertiary treatment plant with nitrification etc.

Sewer System Type:

Sanitary Sewers:
Pipes that convey sanitary sewage flows made up of wastewater discharges from residential, commercial, institutional and industrial establishments plus extraneous flow components from such sources as groundwater and surface run off.

Combined Sewers:
Pipes that convey both sanitary sewage and stormwater runoff through a single-pipe system.

Partially Separated Sewers:
Exist when either a portion of the combined sewer area was retrofitted to separate (sanitary and storm) sewers and/or a service area with combined sewers has had a new development area with separate sewers added to the service area; whatever the case may be, the final flows will be combined sewage.

Nominally Separated Sewers:
These sewers are constructed as separate sewers, but the sanitary sewers accept stormwater from roof and foundation drains (i.e., these are separated sewers in name only).

Upon issuance of the environmental compliance approval, I hereby revoke Approval No(s). 8225-B3HSD4 issued on October 3, 2018

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

a. The portions of the environmental compliance approval or each term or condition in the environmental compliance approval in respect of which the hearing is required, and;
b. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

Pursuant to subsection 139(3) of the Environmental Protection Act, a hearing may not be required with respect to any terms and conditions in this environmental compliance approval, if the terms and conditions are substantially the same as those contained in an approval that is amended or revoked by this environmental compliance approval.

The Notice should also include:

1. The name of the appellant;
2. The address of the appellant;
3. The environmental compliance approval number;
4. The date of the environmental compliance approval;
5. The name of the Director, and;
6. The municipality or municipalities within which the project is to be engaged in.

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, Suite 1500
Toronto, Ontario
M5G 1E5

AND

The Director appointed for the purposes of Part II.1 of the Environmental Protection Act
Ministry of the Environment, Conservation and Parks
135 St. Clair Avenue West, 1st Floor
Toronto, Ontario
M4V 1P5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349, Fax: (416) 326-5370 or www.ert.gov.on.ca**

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 29th day of April, 2019



Youssouf Kalogo, P.Eng.
Director
appointed for the purposes of Part II.1 of the
Environmental Protection Act

SH/
c: Area Manager, MECP Cornwall
c: District Manager, DWECD, MECP Ottawa
Sarah Gore, J.L. Richards & Associates Limited

Kevin Cortez

From: Nick Bialik
Sent: March 12, 2026 2:21 PM
To: Jennifer Boyer; Sandra Mancini; Shahin Zand; John Mesman; Ronda Boutz; Carl Bickerdike
Cc: Jordan Morrissette; Yves Morrissette; Kevin Cortez; Eric Gadoua; Pierre-Paul Beauchamp
Subject: Municipality of Casselman Sewage Treatment System Schedule C Class EA - Notice of Completion
Attachments: 16953-131 Casselman Class EA_Notice of Completion_English.pdf; 16953-131 Casselman Class EA_Notice of Completion_French.pdf

Hello,

Please find attached Notice of Completion for the above-noted project. The Environmental Study Report can also be found through the following link: Casselman STS Class EA_ESR with Appendices (Bookmarked) 1.pdf

The linked report is bookmarked for easier navigation.

Please note that, while compiling the ESR, we noticed that SNC was not notified of Public Information Centre No. 2, which was held on July 10, 2025. If you are interested, we would be happy to schedule a call with you over the next couple weeks to go through the study, including the preferred design concept and phasing approach.

Also note that as part of the study, the preferred design concept included participation in the TPM program. The Municipality may reach out to you to discuss payment options for this program.

Should you have any questions, please let us know.

Thanks,

Nick Bialik, P.Eng. (he/him)
Environmental Engineer

Ottawa ON
Work: 343-804-5346

Kevin Cortez

From: Jennifer Boyer <Jboyer@nation.on.ca>
Sent: May 22, 2025 11:11 AM
To: Nick Bialik
Cc: Pierre-Paul Beauchamp; Sandra Mancini; Shahin Zand; John Mesman; Ronda Boutz; Carl Bickerdike; Jordan Morrissette; Kevin Cortez
Subject: RE: Municipality of Casselman - Schedule 'C' Class Environmental Assessment Notice of Commencement - SNC

[CAUTION] This email originated from outside JLR. Do not click links or open attachments unless you recognize the sender and know the content is safe. Do not forward suspicious emails, if you are unsure, please send a separate message to Helpdesk.

Good morning,

On behalf of SNC, thank you kindly for your email following up on the Schedule C Class C EA to determine the preferred expansion design concept of the Casselman Sewage Treatment System (STS).

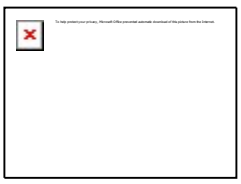
As we are interested in being consulted, if you could please keep us informed on the details on Phase 3 of developing and evaluating the alternative design concepts. Also, if you and your project team could circulate us on the notice and date of the upcoming Public Information Centre.

Thank you for informing us on exploring the option of participating in the Total Phosphorous Management program.

Yes, the program is still running in 2025, and there have been no changes in the program since 2022.
The current costs for 2025 TPM Programme is $585.00/kg.

Ronda Boutz and SNC staff would be pleased to set up a meeting with you to discuss if you require any further details.

Thank you,
Jennifer



Jennifer Boyer | BES, M.Sc., MCIP RPP
Managing Director, Approvals
38 Victoria Street, Box 29, Finch, ON K0C 1K0
Tel: 613-984-2948 or 1-877-984-2948 | Fax: 613-984-2872
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From: Nick Bialik <nbialik@jlrichards.ca>
Sent: May 12, 2025 11:43 AM
To: Jennifer Boyer <Jboyer@nation.on.ca>
Cc: Pierre-Paul Beauchamp <ppbeauchamp@casselman.ca>; Sandra Mancini <SMancini@nation.on.ca>; Shahin Zand <szand@nation.on.ca>; John Mesman <jmesman@nation.on.ca>; Ronda Boutz <RBoutz@nation.on.ca>; Carl Bickerdike

<cbickerdike@nation.on.ca>; Jordan Morrissette <jmorrissette@jlrichards.ca>; Kevin Cortez <kcortez@jlrichards.ca>
Subject: RE: Municipality of Casselman - Schedule 'C' Class Environmental Assessment Notice of Commencement - SNC

Hi Jennifer,

Please see below update in red:

- The status of the Schedule C Class C EA to determine the preferred expansion design concept of the Casselman Sewage Treatment System (STS). We are currently in Phase 3, developing and evaluating alternative design concepts. We are also reviewing phasing of the upgrades (e.g., 10-year, 20-year).
- The status and anticipated timing of the Environmental Compliance Approval (ECA) amendment application with MECP for the proposed year-round discharge. ECA application would be submitted during the design stage which follows the Class EA process. Anticipated timing is unknown, but not for several months at a minimum.
- Whether there was a date scheduled for public consultation meeting under the Class EA process; as the original Notice of Commencement from November 28, 2024 indicates there will be a Public Open House sometime in Q1 2025? There have been delays during Phase 3; you did not miss any public consultation opportunities. A public consultation meeting (Public Information Centre) will be setup for the next month or so. A notice will be sent out once a date is confirmed.

On another note, we are exploring the option of participating in the Total Phosphorous Management program. We previously consulted with Ronda for the Plantagenet WW Class EA. Could you confirm that the program is still active, if there have been any changes in the program since 2022, and what the current offsetting cost is for 2025?

Please let us know if you have any further questions.

Thank you,

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

Nick Bialik, P.Eng. (he/him)
Environmental Engineer

1000-343 Preston Street
Ottawa ON K1S 1N4
Work: 343-804-5346
nbialik@jlrichards.ca

From: Jennifer Boyer <Jboyer@nation.on.ca>
Sent: Monday, April 28, 2025 1:30 PM
To: Kevin Cortez <kcortez@jlrichards.ca>; Jordan Morrissette <jmorrissette@jlrichards.ca>; Nick Bialik <nbialik@jlrichards.ca>; Rachel Nafziger <rnafziger@jlrichards.ca>; Susan Jingmiao Shi <sshi@jlrichards.ca>; Meaghan Keon <mkeon@jlrichards.ca>
Cc: Pierre-Paul Beauchamp <ppbeauchamp@casselman.ca>; Sandra Mancini <SMancini@nation.on.ca>; Shahin Zand <szand@nation.on.ca>; John Mesman <jmesman@nation.on.ca>; Ronda Boutz <RBoutz@nation.on.ca>; Carl Bickerdike <cbickerdike@nation.on.ca>
Subject: RE: Municipality of Casselman - Schedule 'C' Class Environmental Assessment Notice of Commencement - SNC

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Good afternoon,

Thank you for providing the update and Notice regarding the Class EA for the Casselman Sewage Treatment System expansion.

As a follow-up, we would appreciate an update on a few items:

- The status of the Schedule C Class C EA to determine the preferred expansion design concept of the Casselman Sewage Treatment System (STS).
- The status and anticipated timing of the Environmental Compliance Approval (ECA) amendment application with MECP for the proposed year-round discharge.
- Whether there was a date scheduled for public consultation meeting under the Class EA process; as the original Notice of Commencement from November 28, 2024 indicates there will be a Public Open House sometime in Q1 2025?

South Nation Conservation remains supportive of initiatives that maintain watershed health while accommodating community growth, and we appreciate the opportunity to continue to participate in the review process.

Please let us know if there are additional project updates or milestones we should be aware of at this stage.

Thank you again, and we look forward to hearing from you.
Jennifer

Jennifer Boyer | BES, M.Sc., MCIP RPP
Managing Director, Approvals
38 Victoria Street, Box 29, Finch, ON K0C 1K0
Tel: 613-984-2948 or 1-877-984-2948 | Fax: 613-984-2872
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From: Kevin Cortez <kcortez@jlrichards.ca>
Sent: November 29, 2024 8:22 AM
To: Claire Lemay <clemay@nation.on.ca>; Sandra Mancini <SMancini@nation.on.ca>; Shahin Zand <szand@nation.on.ca>
Cc: Pierre-Paul Beauchamp <ppbeauchamp@casselman.ca>; Jordan Morrissette <jmorrissette@jlrichards.ca>; Nick Bialik <nbialik@jlrichards.ca>
Subject: Municipality of Casselman - Schedule 'C' Class Environmental Assessment Notice of Commencement - SNC

Good afternoon,

The Municipality of Casselman has initiated a Schedule 'C' Class Environmental Assessment (EA) to determine the preferred expansion design concept for the Casselman Sewage Treatment System (STS) to effectively treat wastewater generated from the existing and projected future development areas. This Class EA follows the Casselman Water and Wastewater Infrastructure Master Plan, which was completed in July 2024. More information on the current study is provided in the attached Notice, which we invite you to review.

For your reference, we have identified below latest correspondences with the SNC relating to the expansion of the Casselman STS:

- *Master Plan – On June 13, 2023, the SNC (Sandra Mancini) provided a response to the Master Plan's Notice of Study Commencement acknowledging receipt of the notice and commenting on the SNC's process for data requisition.*

- *Assimilative Capacity Study (ACS) - On November 29, 2023, the SNC (Claire Lemay) noted that they had no concerns regarding the ACS approach to expand the effluent discharge window to be year-round provided that total phosphorus loading does not exceed the current Environmental Compliance limit. No further comments were provided.*

Please let us know if you have any comments for the project team now that we have entered the Class EA phase of this project.

Regards,

Kevin Cortez, M.Eng., B.Eng., EIT
Environmental Engineering Graduate

1000-343 Preston Street
Ottawa, ON, K1S 1N4

Work: 343-803-4074
kcortez@jlrichards.ca

Jennifer Boyer | Managing Director, Approvals / Directrice générale, Approbations
38 Victoria Street, Box 29, Finch, ON K0C 1K0
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Infrastructure Ontario

Kevin Cortez

From: ASL-Hotrum, Katherine (IO) <Katherine.Hotrum@infrastructureontario.ca>
Sent: November 29, 2024 8:32 AM
To: Kevin Cortez
Subject: Automatic reply: Municipality of Casselman Sewage Treatment System Schedule 'C' Class EA - Notice of Commencement

Follow Up Flag: Follow up
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Please be advised Katherine Hotrum is currently out of office. Please contact their manager Carrie Sheaffer at e-mail Carrie.Sheaffer@infrastructureontario.ca for further assistance.

Ministry of Tourism, Culture and Gaming

Kevin Cortez

From: Help Desk
Sent: March 12, 2026 2:20 PM
To: Nick Bialik
Subject: Your message couldn't be delivered
Attachments: ATT00001

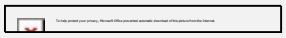


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Further information
5.4.1 Recipient address rejected: Access denied. For more information see https://aka.ms/EXOSmtpErrors [QB1PEPF00004E09.CANPRD01.PROD.OUTLOOK.COM 2026-03-12T18:19:57.749Z 08DE79AD0FAF47E9]

If you sent this message to multiple addresses, you'll receive a notification like this for every one that didn't arrive.



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Kevin Cortez

From: Antler, James (MTCG) <James.Antler@ontario.ca>
Sent: November 29, 2024 8:28 AM
To: Kevin Cortez
Subject: Automatic reply: Municipality of Casselman Sewage Treatment System Schedule 'C' Class EA - Notice of Commencement

Follow Up Flag: Follow up
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Retirement Alert: Please be advised that I will be out of the office as of August 2, 2024. If you need assistance please contact Laurie Brownlee at 705-561-4554, laurie.brownlee@ontario.ca or Josh Wilson at 705-255-4069, josh.wilson@ontario.ca. Thanks.

Jim Antler, Policy Advisor
Tourism Policy Unit
Tourism and Culture Division
Ministry of Tourism, Culture and Gaming

Ontario Provincial Police (OPP)

Kevin Cortez

From: Davidson, Serena (OPP) <Serena.Davidson@opp.ca>
Sent: March 13, 2026 2:36 PM
To: Nick Bialik
Cc: Chown, Jennifer (OPP)
Subject: RE: Municipality of Casselman Sewage Treatment System Schedule C Class EA - Notice of Completion

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Good day,

Please update your OPP contact list for present and future projects to the following:

Jennifer Chown cc'd
Serena Davidson (info in signature)
Kindly remove Nicole Rodaro from your distribution list.
Communication by email is preferred and will expedite the process.
Kind Regards,

Serena

Serena Davidson Administrative Assistant
Business Management Bureau
777 Memorial Avenue, Orillia, ON L3V 7V3
Office: (705) 329-6852

From: Nick Bialik <nbialik@jlrichards.ca>
Sent: 12-Mar-26 2:19 PM
Cc: Jordan Morrissette <jmorrissette@jlrichards.ca>; Yves Morrissette <ymorrissette@casselman.ca>; Kevin Cortez <kcortez@jlrichards.ca>; Eric Gadoua <egadoua@casselman.ca>; Pierre-Paul Beauchamp <ppbeauchamp@casselman.ca>
Subject: Municipality of Casselman Sewage Treatment System Schedule C Class EA - Notice of Completion

You don't often get email from nbialik@jlrichards.ca. Learn why this is important

CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments in unexpected emails.

Hello,

You have been copied on this email because you were identified as a stakeholder for the Casselman Sewage Treatment System Upgrade Schedule 'C' Class Environmental Assessment.

Please find attached the Notice of Completion for this study. Through issuance of this notice, the Environmental Study Report is being place on public record for thirty (30) calendar days in accordance with the requirements of the Municipal

Class EA process. Please refer to the attached notice for additional information, including where you can review the Environmental Study Report, and how you can provide comments or submit a Section 16 Order request.

Should you have any questions or feedback, please do not hesitate to respond to this email or contact the project contacts found in the attached notice.

Best,

Nick Bialik, P.Eng. (he/him)
Environmental Engineer

1000-343 Preston Street
Ottawa ON K1S 1N4
Work: 343-804-5346
nbialik@jlrichards.ca

Kevin Cortez

From: Rodaro, Nicole (OPP) <Nicole.Rodaro@opp.ca>
Sent: December 4, 2024 2:37 PM
To: Kevin Cortez
Cc: Chown, Jennifer (OPP)
Subject: OPP Contact Update Request
Attachments: 16953-131_Casselman Lagoon EA_NOC_FR.pdf; 16953-131_Casselman Lagoon EA_NOC_EN.pdf

Follow Up Flag: Follow up
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[2022-030]
Municipality of Casselman Sewage Treatment System Schedule 'C' Class EA - Notice of Commencement

Good day,

Please update your contact list for present and future projects to the following:

Jennifer Chown cc'd
Nicole Rodaro (info in signature)
Kindly Wendy Robertson from you distribution list.
Communication by email is preferred and will expedite the process.
Kind Regards,

Nicole Rodaro | Facilities Coordinator
Ontario Provincial Police, BMB Facilities Section
777 Memorial Avenue, Orillia, ON L3V 7V3
Cell: 705-238-7008 Work: 705-329-6812

Ministry of Agriculture, Food and
Agri-business (OMAFA)

Kevin Cortez

From: Shared EA Notices (OMAFA) <SharedEANotices@ontario.ca>
Sent: March 12, 2026 2:25 PM
To: Nick Bialik
Subject: Automatic reply: Municipality of Casselman Sewage Treatment System Schedule C Class EA - Notice of Completion

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Hello,

Thank you for contacting the Ministry of Agriculture, Food and Agri-business (OMAFA) Agricultural Land Use Planning team. Unfortunately, due to staffing constraints OMAFA will not be providing comments on this project at this time. As you are likely aware, OMAFA is concerned with avoiding, minimizing, and mitigating impacts on Ontario's agricultural system and agricultural resources. The 2024 PPS provides direction related to non-agricultural uses in prime agricultural areas (Section 4.3.5) and requires that "Impacts from any new or expanding non-agricultural uses on the agricultural system are to be avoided, or where avoidance is not possible, minimized and mitigated as determined through an agricultural impact assessment or equivalent analysis, based on provincial guidance" (Policy 4.3.5.2). Please continue to keep us informed as this project evolves.

If you haven't done so already, you may want to circulate relevant agricultural organizations about this project (e.g., the local federation of agriculture).

If you have a technical question related to provincial agricultural land use planning policy, please contact the Rural Planner with geographic coverage of your area: Agricultural land use planning staff | ontario.ca. For more general agricultural inquiries or immediate assistance, please contact the Agricultural Information Contact Centre (AICC) at ag.info.omafra@ontario.ca or by phone 1-877-424-1300.

Thank you,
OMAFA Rural Planners

Appendix F5

Project Committee Meeting Minutes

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

Municipality of Casselman Lagoon Expansion EA
Microsoft Teams

Project Initiation Meeting
Minutes of Meeting No. 1

Attendance:	Pierre-Paul Beauchamp	Municipality of Casselman	ppbeauchamp@casselman.ca
	Jordan Morrissette	J.L. Richards & Associates Limited	jmorrissette@jlrichards.ca
	Nicolas Bialik	J.L. Richards & Associates Limited	nbialik@jlrichards.ca
	Kevin Cortez	J.L. Richards & Associates Limited	kcortez@jlrichards.ca

The meeting commenced at 11:00 a.m. on Friday, November 15, 2024 at Microsoft Teams.

The following summary of the discussions of this meeting has been prepared to record decisions reached and actions required for the project. Please advise the undersigned of any errors or omissions within the next three business days.

ITEM	ACTION BY	DUE BY

1.1 **Introductions**

- JLR introduced the project team and their involvement on the project.
  Jordan Morrissette – Project Manager
  Nicolas Bialik – Class EA Lead and Assistant Project Manager
  Kevin Cortez – Environmental Support
- JLR noted that involvement from other disciplines (i.e., mechanical, structural, electrical, etc.) would only be as required. It was also noted that discipline leads were previously involved with the previous lagoon expansion.
- OCWA to be included in correspondences as key stages in Class EA process.

1.2 **Review Scope of Work**

- JLR walked through the approach for completing the requirements for the project. It was noted that the notice of commencement will be provided to the Municipality for review shortly. The general approach includes a review of the background documentation, the completion of Phase 3 (Identification and Evaluation of Alternative Design Concept – Draft Environmental Study Report (ESR)), review meetings, Public Information Centre (PIC) No. 2 and Phase 4 (Final ESR).
- JLR to identify if there are additional studies required. Refer to Item 1.7.
- PIC No. 2 is planned to be after the Client meeting for the review of the draft ESR report. OCWA to be included in the review meeting.

1.3 **Project Budget**

- Project budget was reviewed.
- For invoicing, JLR to follow same process as other JLR-Casselman projects.
- PM reports to be completed each month (if needed) and to be kept general with technical, schedule, budget, and scope change items.

1.4 **Schedule Management**

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

Municipality of Casselman Lagoon Expansion EA
Microsoft Teams

Project Initiation Meeting
Minutes of Meeting No. 1

ITEM	ACTION BY	DUE BY

- JLR noted that, although the project initiation meeting was delayed from the date suggested in the proposal, JLR has begun working on the project and should be able to meet the project completion timelines listed in the proposal (e.g., Notice of Completion by March 31, 2025).
- Meetings to be conducted as required. Two (2) weeks were identified in design schedule for the Owner review of submittals. JLR to set up a review meeting with the Municipality one (1) week following the submittal of the deliverable to walk through the report. Municipality to provide comments one (1) week following the review meeting.

1.5 **Communication Management**

- Emails to be directed to Pierre-Paul, copying OCWA only as required.
- JLR project team listed in 1.1 to be copied in correspondences.

1.6 **Consultation Plan**

- The Stakeholder Consultation List was reviewed as a group and finalized.
- Key project consultations to be bilingual.

1.7 **Specialized Studies**

- JLR noted that background natural environment, cultural heritage and geotechnical information is available for the site based on previous designs and studies. JLR intends to use this information to complete the background summary for this Class EA. JLR does not expect additional studies will be required. This will be confirmed once background information is reviewed, and the specialized studies allowance will be adjusted as necessary.

1.8 **Review of Potential Design Concepts and Design Preferences**

- JLR to review and identify if there are potential opportunities for phasing as part of the proposed expansion.
- Different building options were general discussed. The Municipality would prefer to not expand into the adjacent snow storage lot, if possible, but noted that ultimate decision on building expansion or new building location will be assessed through the Class EA evaluation process.
- No other design or operational preferences were noted. JLR to begin the Class EA process and consult with the Municipality and OCWA as required.
- JLR noted that they would further consult with suppliers of specialized treatment technologies in developing alternative design concepts in Phase 3.

1.9 **Other items**

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

Municipality of Casselman Lagoon Expansion EA
Microsoft Teams

Project Initiation Meeting
Minutes of Meeting No. 1

ITEM	ACTION BY	DUE BY
• JLR to provide the Municipality with latest As-built drawings for the lagoon facility.	JLR	

Meeting adjourned at 11:40 a.m.

Next meeting will be held on TBD.

Prepared by: Issued on: November 18, 2024



Kevin Cortez, M.Eng., EIT
Environmental Engineering Intern

Reviewed by:



Nicolas Bialik, P.Eng.
Environmental Engineer

Distribution: All attendees

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

Municipality of Casselman Lagoon Expansion Class EA
Microsoft Teams

Project Discussion with South Nation Conservation
Minutes of Meeting No. 2

Attendance:	Name	Company	Email
	Ronda Boutz	South Nation Conservation (SNC)	RBoutz@nation.on.ca
	Jennifer Boyer	SNC	Jboyer@nation.on.ca
	Sandra Mancini	SNC	SMancini@nation.on.ca
	Claire Lemay	SNC	clemay@nation.on.ca
	Shahin Zand	SNC	szand@nation.on.ca
	Nick Bialik	J.L. Richards & Associates Limited (JLR)	nbialik@jlrichards.ca
	Kevin Cortez	JLR	kcortez@jlrichards.ca

The meeting commenced at 1:00 p.m. on Monday, March 30, 2026 at MS Teams.

The following summary of the discussions of this meeting has been prepared to record decisions reached and actions required for the project. Please advise the undersigned of any errors or omissions within the next three business days.

ITEM	**ACTION BY**	**DUE BY**

2.1 **Introductions**

- All individuals on the call introduced themselves.
- It was noted that the purpose of the meeting was to provide SNC with an opportunity to discuss the above-noted study, as they were mistakenly omitted from the notice of Public Information Centre (PIC) No. 2.

2.2 **Project Summary**

JLR provided a summary of the project and conducted a walkthrough of the slides used during PIC No. 2, which can be found in the Environment Study Report (ESR). An overview of the preferred solution is described below:

- The system's rated capacity is projected to increase from 2,050 m^3/day to 4,050 m^3/day.
- The preferred solution maintains the existing lagoon storage capacity and treatment facilities. Capacity is increased by:
  - Expanding the effluent discharge window from seasonal to year-round (with monthly variable maximum flow rates);
  - Adding a UV-disinfection system (required for summer discharge);
  - Adding baffles in the lagoon cells to optimize retention time and prevent short-circuiting;
  - Adding a second disc filter system to assist in the reduction of Total Suspended Solids (TSS) and Total Phosphorous (TP); and
  - Enrollment in the SNC's Total Phosphorus Management (TPM) Program to offset all TP loading projected to be discharged beyond an effluent concentration of 0.5 mg/L (0.5 mg/L was established as the current TP treatment capacity of the system).

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

Municipality of Casselman Lagoon Expansion Class EA
Microsoft Teams

Project Discussion with South Nation Conservation
Minutes of Meeting No. 2

ITEM	ACTION BY	DUE BY

- The Municipality has limited funds for expansion and will therefore be upgrading the system using a phased approach: Phase 1 (rated capacity of 3,019 m^3/day) and Phase 2 (rated capacity of 4,050 m^3/day).

2.3 **Questions and Discussion**

- SNC inquired about the location of the flow monitoring points used to establish the maximum allowable discharge rates, as they noted flow in the South Nation River during winter is typically low and that in 2025, a drought caused little to no flow in the river near the dam. JLR noted the Assimilative Capacity Study (ACS) completed by Blue Sky Energy Engineering & Consulting Inc. (Blue Sky) would contain the information requested and is appended to the ESR; Appendix B1 for initial ACS and Appendix G1 for Phased approach ACS.
- SNC inquired about the South Nation River flow monitoring location when operating the facility. JLR to review and advise. **Post-Meeting Note: JLR identified the location of flow monitoring, as identified in the Environmental Compliance Approval (ECA), via email on March 30, 2026.**
- SNC noted that the flow had changed a lot in the past 20 years and inquired what contingency had been included in assessing the operational capacity of the treatment system. JLR noted that they considered net precipitation data from the last five (5) years and accounted for flexibility in the operation of the system in ensuring the system was sized to accommodate the Phase 1 and Phase 2 rated capacities.
- SNC requested information on the amount of phosphorus offsetting (through the TPM program) required for the Phase 1 and Phase 2 upgrades and noted that an agreement for phosphorous offsetting with SNC is typically completed when applying for the ECA amendment. JLR pointed to correspondences with the MECP during the Class EA in establishing the Phase 1 and Phase 2 offsetting amounts. These correspondences can be found in Appendix F4 of the ESR. It was discussed that sign-off of the TP offsetting amount from the MECP was required before entering into an agreement with SNC. JLR noted that this would be coordinated during the design of the upgrades.
- SNC requested the latest ECA. JLR to distribute the latest 2019 ECA. **Post-Meeting Note: JLR distributed the 2019 ECA via email on March 30, 2026.**
- SNC inquired about the Class EA process and next steps. JLR noted that after the 30-day review period and the 30-day waiting period, if no issues are identified, the ESR will be finalized, and the project can proceed to implementation. Based on discussions with the Client, the design of the Phase 1 upgrades is expected to begin in Spring 2026, the project tendered in early 2027 and constructed in 2027.

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

Municipality of Casselman Lagoon Expansion Class EA
Microsoft Teams

Project Discussion with South Nation Conservation
Minutes of Meeting No. 2

Prepared by:

Issued on: April 16, 2026



Kevin Cortez, M.Eng., P.Eng.
Environmental Engineer

Distribution: All attendees
Jordan Morrissette, J.L. Richards & Associates Limited
Yves Morrissette, Municipality of Casselman

Appendix F6

Public Information Centre No. 2 – Notice, Presentation and Attendance Sheet

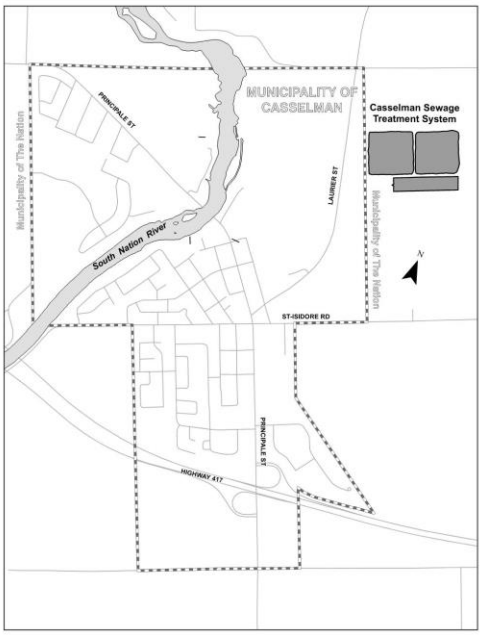
Notice of Public Information Centre #2

Municipality of Casselman
Casselman Sewage Treatment System
Schedule 'C' Class Environmental Assessment

The Municipality of Casselman (Municipality) initiated a Class Environmental Assessment (Class EA) in November 2024 to determine the preferred expansion design concept for the Casselman Sewage Treatment System (STS) to effectively treat wastewater generated from existing and projected future development areas.

How Will This Affect Me?

The study is being undertaken following the completion of the Casselman Water & Wastewater Infrastructure Master Plan in July 2024, which recommended to increase the existing STS's rated capacity from 2,110 m^3/day to 4,050 m^3/day via an increase of the discharge window (continuous discharge) and process upgrades. Public, agency and indigenous consultation are key elements of the Class EA process and your input will be an important consideration in developing the preferred design concept.



We Want to Hear From You!

Public Information Centre (PIC) No. 2 is scheduled as follows:

Date:	**Thursday, July 10, 2025**
Time:	**6:00 PM – 8:00 PM (Drop in at any time)**
Location:	**Deguire Casselman Community Hall**
Address:	**758 Brébeuf St., Casselman, ON**

PIC No. 1, held on April 3, 2024, identified the system's existing problems and/or opportunities, and identified several potential alternative solutions. Using feedback received during PIC No. 1, the following preferred solution was identified for the Casselman Sewage Treatment System (STS): ***Maintain Lagoon-Based Treatment System; Expand Lagoon Rated Capacity; Expand Lagoon Discharge Window to Year-Round.*** PIC No. 2 will identify and solicit feedback on the proposed preferred design concept for the preferred solution. This PIC will summarize the alternative design concepts considered and the evaluation process undertaken to develop the preferred design concept, as well as review potential phasing of the proposed upgrades. If you have any questions regarding the study, please visit www.casselman.ca. You are also invited to contact a member of the study team at anytime with questions or to provide input into the study.

Nicolas Bialik, P.Eng.
Environmental Engineer
J.L. Richards & Associates Ltd.
nbialik@jlrichards.ca
Phone: 343-804-5346

Pierre-Paul Beauchamp
Director of Public Works
Municipality of Casselman
ppbeauchamp@casselman.ca
Phone: 613-764-3139 ext. 243

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This Notice was issued June 26, 2025, and July 3, 2025.

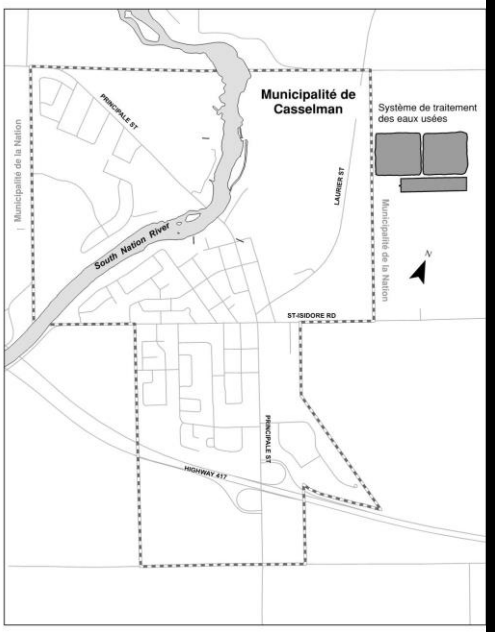
Avis de Séance d'Information Publique # 2

La Municipalité de Casselman
Système de traitement des eaux usées de Casselman
Étude environnementale de portée générale Annexe C

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En quoi cela vous concerne?

Cette étude fait suite à l'achèvement du plan directeur de l'infrastructure de l'eau et des égouts de Casselman en juillet 2024. Le plan directeur a recommandé une augmentation de la capacité du système de 2,110 m^3/jour à une capacité future de 4,050 m^3/jour, par une augmentation de la période de décharge (décharge continuelle) et l'amélioration des processus de traitement. La consultation du public, des organismes et des communautés autochtones constitue un élément clé du processus d'évaluation environnementale de portée générale, et vos commentaires seront pris en compte de façon importante dans l'élaboration du concept de conception privilégié.



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La séance d'information publique est prévu comme suit:

Date: Jeudi 10 juillet 2025
Heure: De 18 h à 20 h (venez à tout moment)
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Cet avis a été publié le 26 juin 2025, et 3 julliet 2025.

Prescott Russell

Comtés unis de Prescott et Russell
United Counties of Prescott and Russell

AVIS : DEMANDES D'AUTORISATION

Les demandes d'autorisation suivantes ont été déposées au service d'Urbanisme et de Foresterie de la corporation des Comtés unis de Prescott et Russell :

B-041-2025 : Cette demande d'autorisation vise à diviser 0,53 hectare de la propriété située au149 chemin St-Pierre pour la création d'un nouveau lot. Le terrain visé est décrit comme étant une partie du lot 21, concession 6 dans le canton de Russell. La propriété est sujette aux demandes B-042-2025 et B-043-2025.

B-042-2025 : Cette demande d'autorisation vise à diviser 0,54 hectare de la propriété située au149 chemin St-Pierre pour la création d'un nouveau lot. Le terrain visé est décrit comme étant une partie du lot 21, concession 6 dans le canton de Russell. La propriété est sujette aux demandes B-041-2025 et B-043-2025.

B-043-2025 : Cette demande d'autorisation vise à diviser 0,54 hectare de la propriété située au149 chemin St-Pierre pour la création d'un nouveau lot. Le terrain visé est décrit comme étant une partie du lot 21, concession 6 dans le canton de Russell. La propriété est sujette aux demandes B-041-2025 et B-042-2025.

B-045-2025 : Cette demande d'autorisation vise à diviser 0,81 hectare de la propriété située au 91 chemin de concession 300 est pour des fins de lot de surplus à la ferme. Le terrain visé est décrit comme étant une partie du lot 2, concession 4 dans le canton géographique de Cambridge, maintenant dans la municipalité de La Nation.

B-046-2025 : Cette demande d'autorisation vise à diviser 34,6 hectare de la propriété située au 752 chemin Limoges pour la création d'un nouveau lot. Le terrain visé est décrit comme étant une partie du lot 11, concession 10 dans le canton de Russell.

Des renseignements additionnels concernant cette demande sont disponibles au public aux fins de consultation sur notre site web au https://fr.prescott-russell.on.ca/habiter/avis_publics. Nos bureaux sont ouverts du lundi au vendredi entre 8 h et 12 h et entre 13 h et 16 h.

Pour de plus amples renseignements à ce sujet, veuillez communiquer avec le service d'Urbanisme par courriel au planning@prescott-russell.on.ca ou par téléphone au 1 800 667-6307 ou le (613) 675-4661.

Avis en date du 25 juin 2025

NOTICE: CONSENT APPLICATIONS

The following consent applications have been submitted to the Planning and Forestry Department of the Corporation of the United Counties of Prescott and Russell:

B-041-2025: The purpose of this application is to sever 0.53 hectare from the property located at 149 St. Pierre Road for the creation of a new lot. The subject land is described as Part of Lot 21, Concession 6, in the Township of Russell. The property is also subject to the following applications B-042-2025 and B-043-2025.

B-042-2025: The purpose of this application is to sever 0.54 hectare from the property located at 149 St. Pierre Road for the creation of a new lot. The subject land is described as Part of Lot 21, Concession 6, in the Township of Russell. The property is also subject to the following applications B-041-2025 and B-043-2025.

B-043-2025: The purpose of this application is to sever 0.54 hectare from the property located at 149 St. Pierre Road for the creation of a new lot. The subject land is described as Part of Lot 21, Concession 6, in the Township of Russell. The property is also subject to the following applications B-041-2025 and B-042-2025.

B-045-2025: The purpose of this application is to sever 0.81 hectare from the property located at 91 Concession 300 East Road as a lot surplus to a farming operation. The subject land is described as Part of Lot 2, Concession 4, in the Geographic Township of Cambridge, now The Nation Municipality

B-046-2025: The purpose of this application is to sever 34.6 hectare from the property located at 752 Limoges Road for the creation of a new lot, Limoges. The subject land is described as Part of Lot 11, Concession 10, in the Township of Russell.

Additional information regarding this application is available for public viewing on our website at https://en.prescott-russell.on.ca/stay/public_notices. Our offices are open Monday to Friday, 8 a.m. to 12 p.m. and 1 p.m. to 4 p.m.

For more information about this matter, please contact the Planning Department by e-mail at planning@prescott-russell.on.ca or by telephone at 1 800 667-6307 or (613) 675-4661.

Notice dated June 25, 2025

www.prescott-russell.on.ca

Notice of Public Information Centre #2

Avis de Séance d'Information Publique # 2

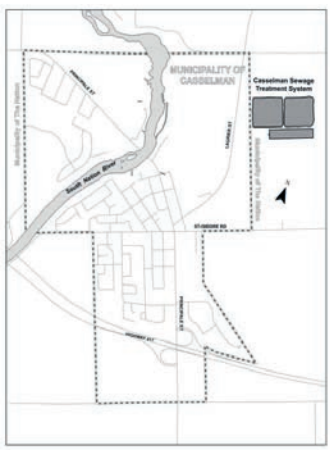
HAVE YOUR SAY

Municipality of Casselman
Casselman Sewage Treatment System
Schedule 'C' Class Environmental Assessment

The Municipality of Casselman (Municipality) initiated a Class Environmental Assessment (Class EA) in November 2024 to determine the preferred expansion design concept for the Casselman Sewage Treatment System (STS) to effectively treat wastewater generated from existing and projected future development areas.

How Will This Affect Me?

The study is being undertaken following the completion of the Casselman Water & Wastewater Infrastructure Master Plan in July 2024, which recommended to increase the existing STS's rated capacity from 2,110 m^3/day to 4,050 m^3/day via an increase of the discharge window (continuous discharge) and process upgrades. Public, agency and indigenous consultation are key elements of the Class EA process and your input will be an important consideration in developing the preferred design concept.



We Want to Hear From You!

Public Information Centre (PIC) No. 2 is scheduled as follows:

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Address:	**758 Brébeuf St., Casselman, ON**

PIC No. 1, held on April 3, 2024, identified the system's existing problems and/or opportunities, and identified several potential alternative solutions. Using feedback received during PIC No. 1, the following preferred solution was identified for the Casselman Sewage Treatment System (STS): ***Maintain Lagoon-Based Treatment System; Expand Lagoon Rated Capacity; Expand Lagoon Discharge Window to Year-Round.*** PIC No. 2 will identify and solicit feedback on the proposed preferred design concept for the preferred solution. This PIC will summarize the alternative design concepts considered and the evaluation process undertaken to develop the preferred design concept, as well as review potential phasing of the proposed upgrades. If you have any questions regarding the study, please visit www.casselman.ca. You are also invited to contact a member of the study team at anytime with questions or to provide input into the study.

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Cet avis a été publié le 25 juin 2025 et le 2 juillet 2025.

UCPR TAKING STEPS TOWARDS COUNTY ROAD 17 EXPANSION

GREGG CHAMBERLAIN
nouvelles@eap.on.ca

After years of public discussion and consultation and planning, the United Counties of Prescott-Russell (UCPR) will begin work on making expansion of County Road 17 a reality.

After lengthy discussion during their June 25 session the eight mayors on the UCPR approved resolutions to accept a new asset management plan for the counties and also begin the work necessary towards the rehabilitation and expansion of County Road 17 at Rockland.

The UCPR noted in its resolution that "one of the most vital projects for the United Counties of Prescott-Russell is the upgrade of County Road 17,, which is the primary connecting link for communities in Eastern Ontario and a continuation of Highway 174 into Ottawa."

Upgrading of the highway between Rockland and Orléans-Ottawa has been an ongoing issue for almost two decades and included past environmental assessments and financial studies to determine the challenges, feasibility and financial needs for such a large-scale project. While the City of Ottawa has assigned low priority to future expansion of Highway 174, its portion of the link, the UCPR has continued to look how to manage its County Road 17 portion of the route.

The link between Rockland and Ottawa now sees between 22,000 to 23,000 vehicles on a daily basis now, including both commuter and transport freight vehicles. The UCPR's asset management study noted this amount of traffic is "well above the provincial safety capacity for a two-lane road" and that future growth in both Clarence-Rockland and other Prescott-Russell communities located along County Road 17 will see even higher traffic volume in future between Rockland and Orléans-Ottawa.

Future increases in traffic along the Rockland-Ottawa highway corridor will mean "growing traffic congestion" and "urgent need for immediate and long-term upgrades to support sustainable regional growth."

The UCPR has almost $750,000 set aside now to help fund early-stage design and planning work for an upgrade and expansion of its County Road 17 portion of the Rockland-Ottawa connector. An environmental assessment (EA) on expansion of such an upgrade was done in 2016 with a 10-year limit on its usefulness as a reference guide.

The UCPR's new asset management plans proposes that the future expansion and rehabilitation of County Road 17 link to Highway 174 be a five-phase project covering a period of 11 years. It would deal with the entire 9.1-kilometre length of the Rockland section of County Road 17, from the Landry Road intersection at the east end of town to the Highway 174 connection at the west end. Total cost for the project, including the design portion, is estimated now at $121.2 million.

The UCPR resolution proposes that the counties adopt the County Road 17 upgrade strategy proposed in the new assets management plan and have the UCPR public works department start work on an extension of the 2016 EA using the upgrade strategy as a guideline.

The resolution also states that the UCPR public works department will start the process later this year for a detailed design over a three-year period of the needed upgrades to County Road 17. The cost estimate at present for that detailed design plan is $2.3 million and the money in the County Road 17 reserve fund will go towards that cost along with annual budget allocations over the next three years.

The goal is to have "a construction-ready design" on the project ready and available to present to both the provincial and federal governments when infrastructure support funding programs or support grants become available from either or both senior governments.



Les Comtés unis de Prescott et Russell ont décidé d'aller de l'avant avec les plans de réhabilitation et d'expansion de la route 17 du corridor autoroutier Rockland-Ottawa, (Gregg Chamberlain, EAP)

Notice of Public Information Centre #2

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July 10, 2025

Municipality of Casselman Sewage Treatment System Schedule ‘C’ Class Environmental Assessment

Public Information Centre #2

Welcome! Please sign in.

CANADA BEST MANAGED COMPANIES Platinum member

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

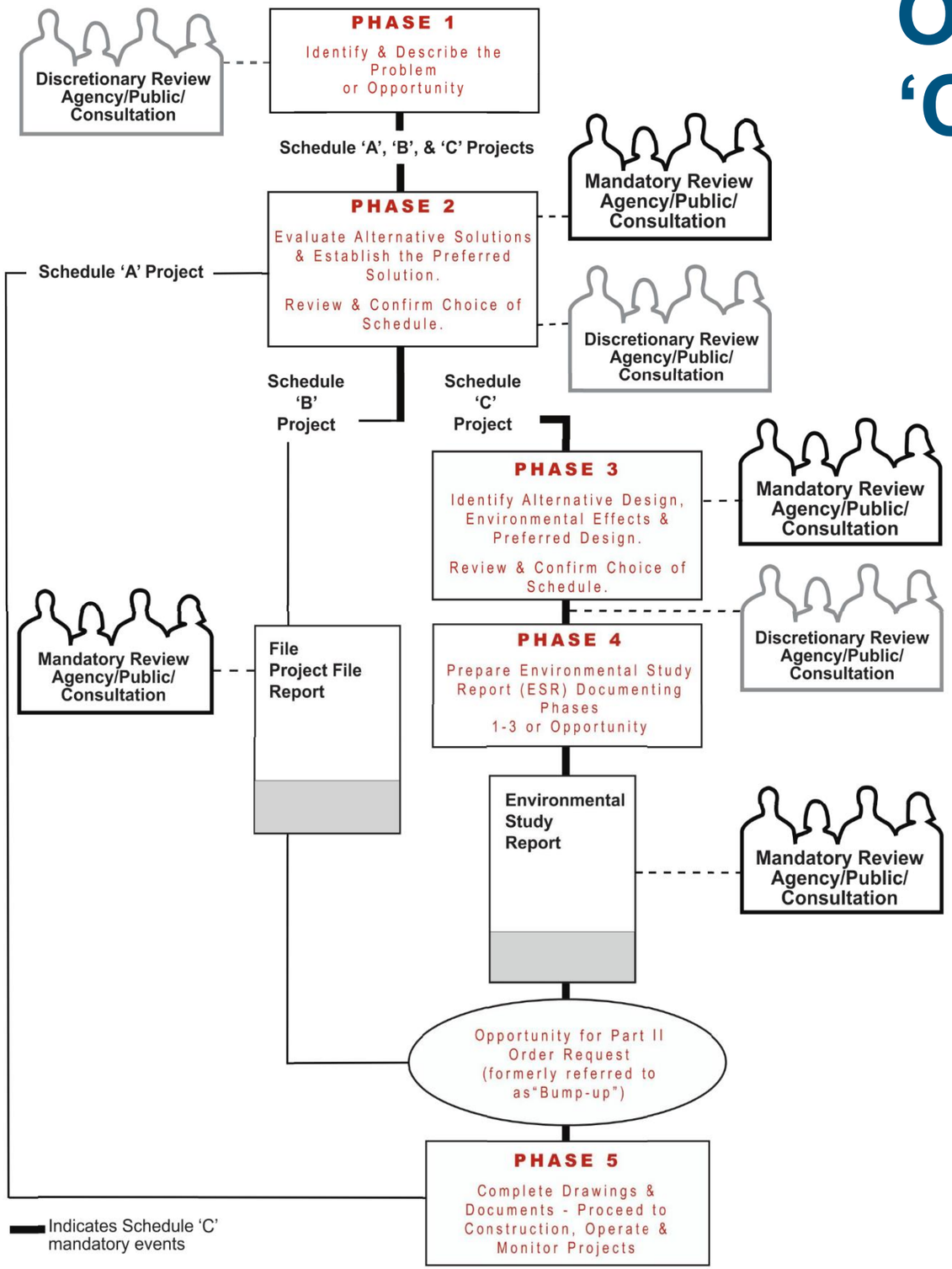
Overview of Casselman Sewage Treatment System Schedule ‘C’ Class EA

- The Municipality is undertaking this Schedule ‘C’ Municipal Class Environmental Assessment to determine the preferred expansion design concept for the Casselman Sewage Treatment System (STS) to effectively treat wastewater generated from existing and projected future development areas.
- The Casselman Water and Wastewater Infrastructure Master Plan was completed in July 2024:
  - The following 25-year development was forecasted: Short-Term (0-5 Years) – 980 Units, Mid-Term (5-10 Years) – 742 Units, and Long-Term (10-25 Years) – 329 Units
  - Preferred Solution to Accommodate Forecasted Growth:
    - **Maintain Lagoon-Based Treatment System**
    - **Expand Lagoon Rated Capacity** – 2,050 m3/day to 4,050 m3/day
    - **Expand Lagoon Discharge Window to Year-Round**





Overview of the Schedule ‘C’ Class EA Process



Casselman Water and Wastewater Infrastructure Master Plan (Approach 1)

- ✓Notice of Study Commencement
- ✓Phase 1 – Identification of Problem or Opportunity
- ✓Phase 2A – Identification and Screening of Alternative Solutions
- ✓Public Information Centre No. 1 – Review of Recommended Solution with Public and Agency Stakeholders
- ✓Phase 2B - Evaluation of Screened Alternative Solutions, Identification of a Preferred Solution and Review of Class EA Schedule

Casselman Sewage Treatment System Schedule ‘C’ Class EA

- ✓Phase 3A – Identification and Screening of Alternative Designs
- ✓Phase 3B – Evaluation of Screened Alternative Designs, Identification of a Preferred Design and Review of Class EA Schedule
- ❑**Public Information Centre No. 2**
- ❑Phase 4 – Environmental Study Report
- ❑Place Project File Report on Public Record for 30-day Review Period
- ❑Notice of Study Completion

Class EA Phase 3 - Design Basis

Preferred Solution:

- Maintain existing lagoon storage and treatment facilities and improve flow path within the existing lagoon cells through the implementation of baffles.
- Maintain existing MBBR treatment process and its rated capacities (monthly variable).
- Provision of a second Disc filter for the treatment of higher monthly flows, higher solids removal requirements and additional redundancy.
- Provision of a coagulation chamber to provide a secondary point of coagulant dosing, to ensure that all reactive phosphorus is precipitated into particulate form prior to filtration.
- Provision of a disinfection system to provide tertiary disinfection of Disc Filter effluent.
- Construction of a new building to house the disc filters and chemical systems.
- Opinion of Probable Cost (including design and construction) = $9,000,000 +/- 30% (excluding HST)



Class EA Phase 3 - Design Basis (continued)

Existing and Proposed Maximum Daily Discharge Rates.

MONTH	EXISTING (1)		PROPOSED	
	MAXIMUM DAILY DISCHARGE RATE	MINIMUM DILUTION RATIO	MAXIMUM DAILY DISCHARGE RATE	MINIMUM DILUTION RATIO
January	5,000 m^3/d	SNR Flow/10	5,750 m^3/d	12.4
February	5,000 m^3/d	SNR Flow/10	5,600 m^3/d	12.4
March	5,000 m^3/d	SNR Flow/40	7,250 m^3/d	12.3
April	7,000 m^3/d	SNR Flow/60	10,000 m^3/d	72.9
May 1-15	7,000 m^3/d	SNR Flow/60	4,500 m^3/d	40.5
May 16-31	N/A	N/A	4,500 m^3/d	40.5
June	N/A	N/A	2,150 m^3/d	26.2
July	N/A	N/A	1,050 m^3/d	26.2
August	N/A	N/A	900 m^3/d	26.3
September	N/A	N/A	910 m^3/d	26.2
October	4,000 m^3/d	SNR Flow/15	2,250 m^3/d	13.1
November	4,000 m^3/d	SNR Flow/10	6,050 m^3/d	13.1
December	5,000 m^3/d	SNR Flow/15	8,750 m^3/d	12.4

Notes:
(1) Per ECA No. 8160-BAHPRF (April 19, 2019).

Existing and Proposed Effluent Criteria.

PARAMETER	AVERAGING PERIOD	EXISTING (1)		PROPOSED	
		OBJECTIVE	LIMIT	OBJECTIVE	LIMIT
$cBOD_5$					
Jan 1 to May 15	Monthly	15 mg/L	25 mg/L	10 mg/L	12 mg/L
May 15 to Sep 30	Monthly	N/A	N/A	10 mg/L	12 mg/L
Oct 1 to Dec 31	Monthly	10 mg/L	15 mg/L	10 mg/L	12 mg/L
TSS					
Jan 1 to May 15	Monthly	15 mg/L	25 mg/L	10 mg/L	12 mg/L
May 15 to Sep 30	Monthly	N/A	N/A	10 mg/L	12 mg/L
Oct 1 to Dec 31	Monthly	10 mg/L	25 mg/L	10 mg/L	12 mg/L
TP	Monthly	0.8 mg/L	1.0 mg/L	0.2 mg/L	0.3 mg/L
TAN					
Jan 1 to Mar 31	Monthly	12.0 mg/L	12.0 mg/L	9.2 mg/L	11.5 mg/L
Apr 1 to May 15	Monthly	6.0 mg/L	6.0 mg/L	4.8 mg/L	6.0 mg/L
May 15 to May 31	Monthly	N/A	N/A	4.8 mg/L	6.0 mg/L
Jun 1 to Sep 30	Monthly	N/A	N/A	1.0 mg/L	1.3 mg/L
Oct 1 to Nov 30	Monthly	5.0 mg/L	5.0 mg/L	4.0 mg/L	5.0 mg/L
Dec 1 to Dec 31	Monthly	12.0 mg/L	12.0 mg/L	9.2 mg/L	11.5 mg/L
E. coli	Monthly	100 CFU/100 mL	200 CFU/100 mL	150 CFU/100 mL	200 CFU/100 mL
Hydrogen Sulphide					
Jan 1 to May 15	Monthly	0.1 mg/L	0.1 mg/L	N/A	N/A
Oct 1 to Dec 31	Monthly	Not Detected	Not Detected	N/A	N/A
pH	Single Grab	6.8 to 7.8	6.0 to 8.0	6.8 to 7.8	6.0 to 8.0

Notes:
(1) Per ECA No. 8160-BAHPRF (April 19, 2019).



Class EA Phase 3 – Review of Treatment Technologies – TAN and BOD Removal

- BOD = Biochemical Oxygen Demand, TAN = Total Ammonia Nitrogen
- Existing system uses facultative lagoons (Cells ‘A’ and ‘B’) and aerated lagoon (Cell ‘C’) for pre-treatment of BOD and TAN, and a Moving Bed Biofilm Reactor (MBBR) to achieve low levels of BOD and TAN, including in cold weather conditions.
- The following upgrades are proposed to accommodate the 25-year BOD and TAN criteria, based on discussions with the MBBR supplier:
  - Increase aeration capacity to MBBR by replacing existing blowers and variable frequency drives.
  - Install a direct pipe connection between Cell ‘A’ and the MBBR inlet to maintain a healthy biomass in the MBBR between Summer and Winter.
  - Add floating baffles in Cell ‘A’ and Cell ‘B’ to minimize short-circuiting upstream of the MBBR.
- Given that existing MBBR could be re-utilized, no alternatives were reviewed for TAN and BOD removal. These upgrades will be included as part of preferred design concept.
- OCWA noted that the existing MBBR produced a lot of foam. A review of cover options will be recommended as part of the Class EA.



Class EA Phase 3 – Review of Treatment Technologies – TSS and TP Removal

- TSS = Total Suspended Solids, TP = Total Phosphorous
- Existing system uses alum dosing, facultative lagoons (Cells ‘A’ and ‘B’), aerated lagoon (Cell ‘C’) and a Disc Filter to achieve TSS and TP removal.
- The following upgrades are proposed to accommodate the 25-year TP and TSS criteria, based on discussions with the disc filter supplier:
  - Additional identical disc filter parallel to existing to treat the higher discharge flows, higher solids loading and for system redundancy.
  - Coagulation-flocculation system, consisting of a tank, chemical dosing system and polymer automatic preparation system to achieve effluent TP concentrations of 0.2 mg/L.
- South Nation Conservation also has the Total Phosphorous Management (TPM) program, which allows municipalities to purchase TP offset credits instead of adding an enhanced treatment process.
- <u>Alternative Design Concepts</u>:
  - TP1 – Total Phosphorous Management Program
  - TP2 – Coagulation/Flocculation System



Class EA Phase 3 – Review of Treatment Technologies – Disinfection

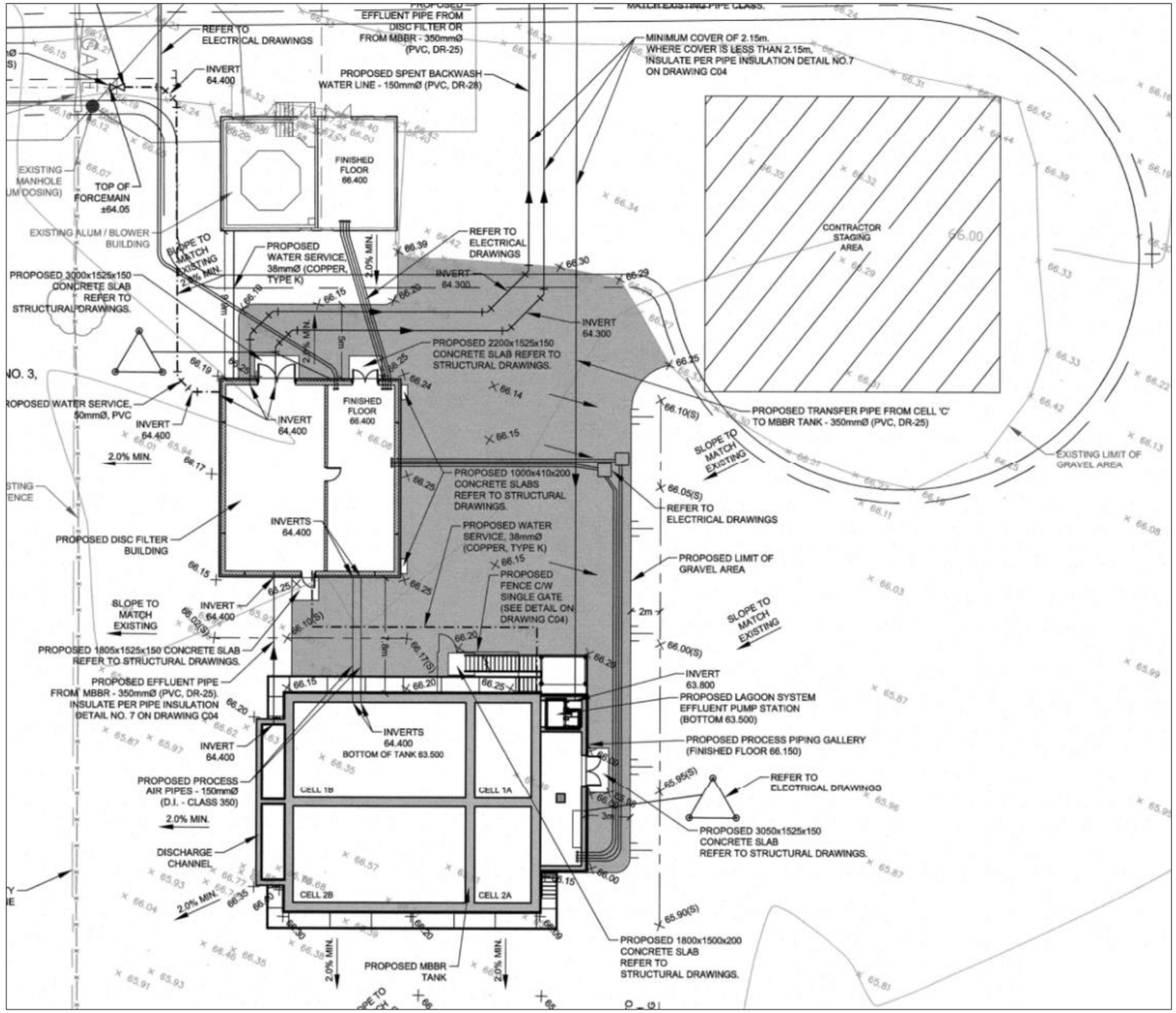
- Existing system does not have a disinfection system.
- Disinfection is required for the upgraded system due to discharge occurring during summer months. However, an E. Coli design criteria of 150 CFU/100 mL is included for all months.
- UV Disinfection (large installation shown in figure) was screened as the preferred disinfection technology due to the following:
  - Reduced spacing requirements compared to other technologies.
  - Ease of implementation with the existing system.
  - Ease of operation and control.
  - No generation of disinfection byproducts.
  - No post-treatment residuals.
  - No requirement for additional chemicals.
  - Competitive costing.



Class EA Phase 3 – Development of Alternative Design Concepts

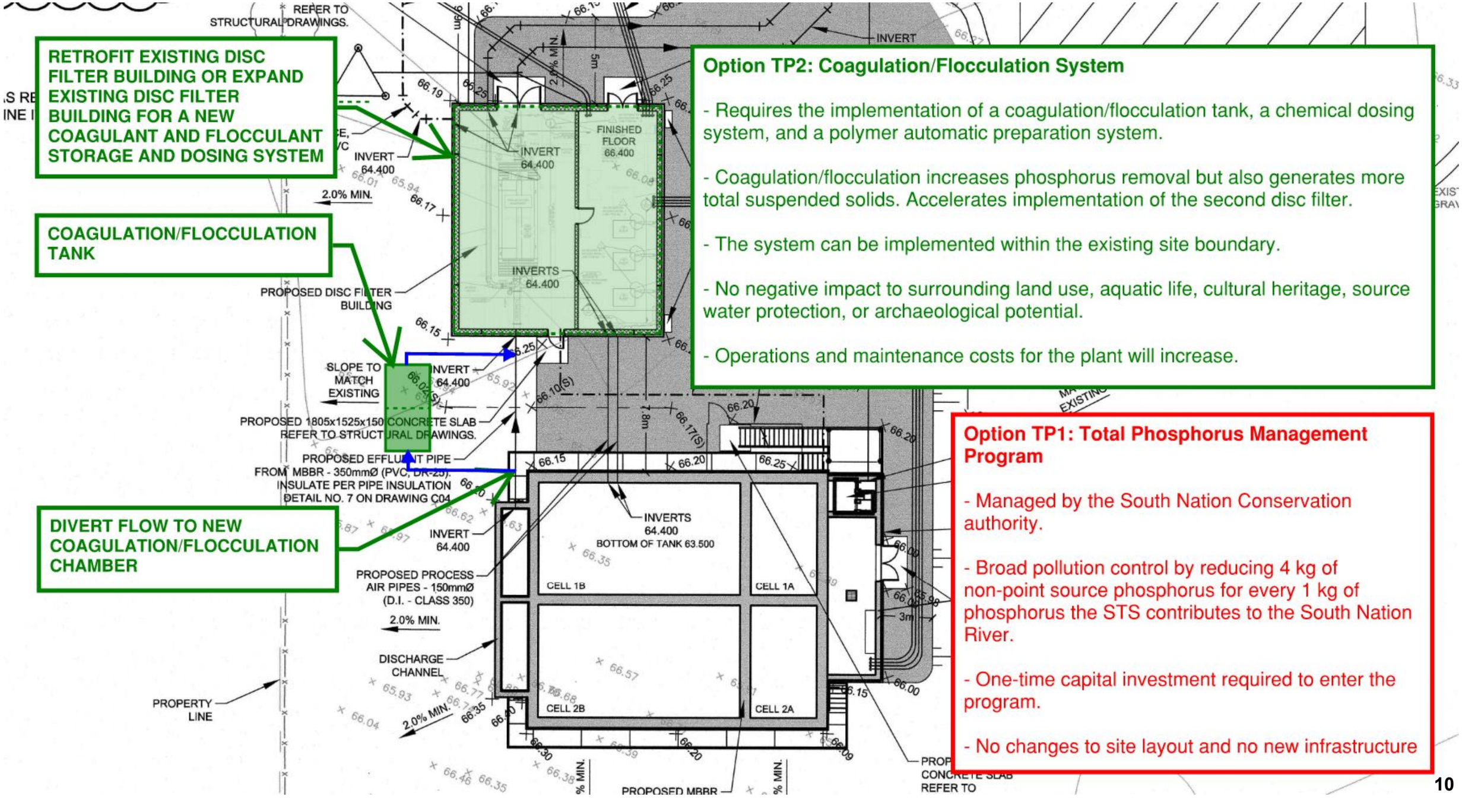
- Disc Filter and UV Implementation Options:
  - DF1 – Expansion of Existing Disc Filter Building
  - DF2 – Install New Building to the West of the Existing Disc Filter Building
  - ~~DF3 – Install New Building to the East of the Existing Disc Filter Building~~ (not carried forward as not feasible from a process hydraulics perspective)

- TP Removal Options:
  - TP1 – Total Phosphorous Management Program
  - TP2 – Coagulation/Flocculation System



Civil Site Plan Drawing of Existing System

Class EA Phase 3 – TP Removal Options



Option TP2: Coagulation/Flocculation System

- Requires the implementation of a coagulation/flocculation tank, a chemical dosing system, and a polymer automatic preparation system.

- Coagulation/flocculation increases phosphorus removal but also generates more total suspended solids. Accelerates implementation of the second disc filter.

- The system can be implemented within the existing site boundary.

- No negative impact to surrounding land use, aquatic life, cultural heritage, source water protection, or archaeological potential.

- Operations and maintenance costs for the plant will increase.

Option TP1: Total Phosphorus Management Program

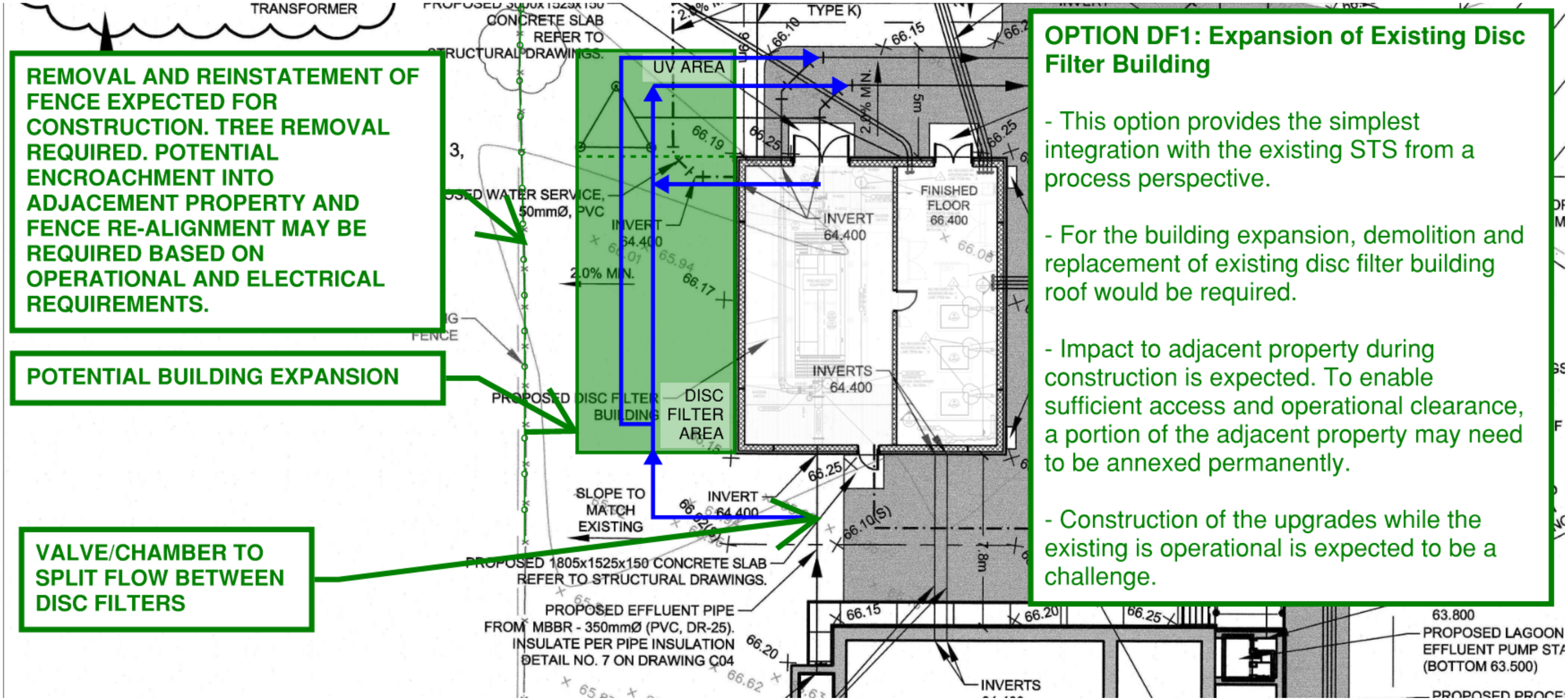
- Managed by the South Nation Conservation authority.

- Broad pollution control by reducing 4 kg of non-point source phosphorus for every 1 kg of phosphorus the STS contributes to the South Nation River.

- One-time capital investment required to enter the program.

- No changes to site layout and no new infrastructure

Class EA Phase 3 – Disc Filter and UV Implementation Options – Option DF1, Expansion



OPTION DF1: Expansion of Existing Disc Filter Building

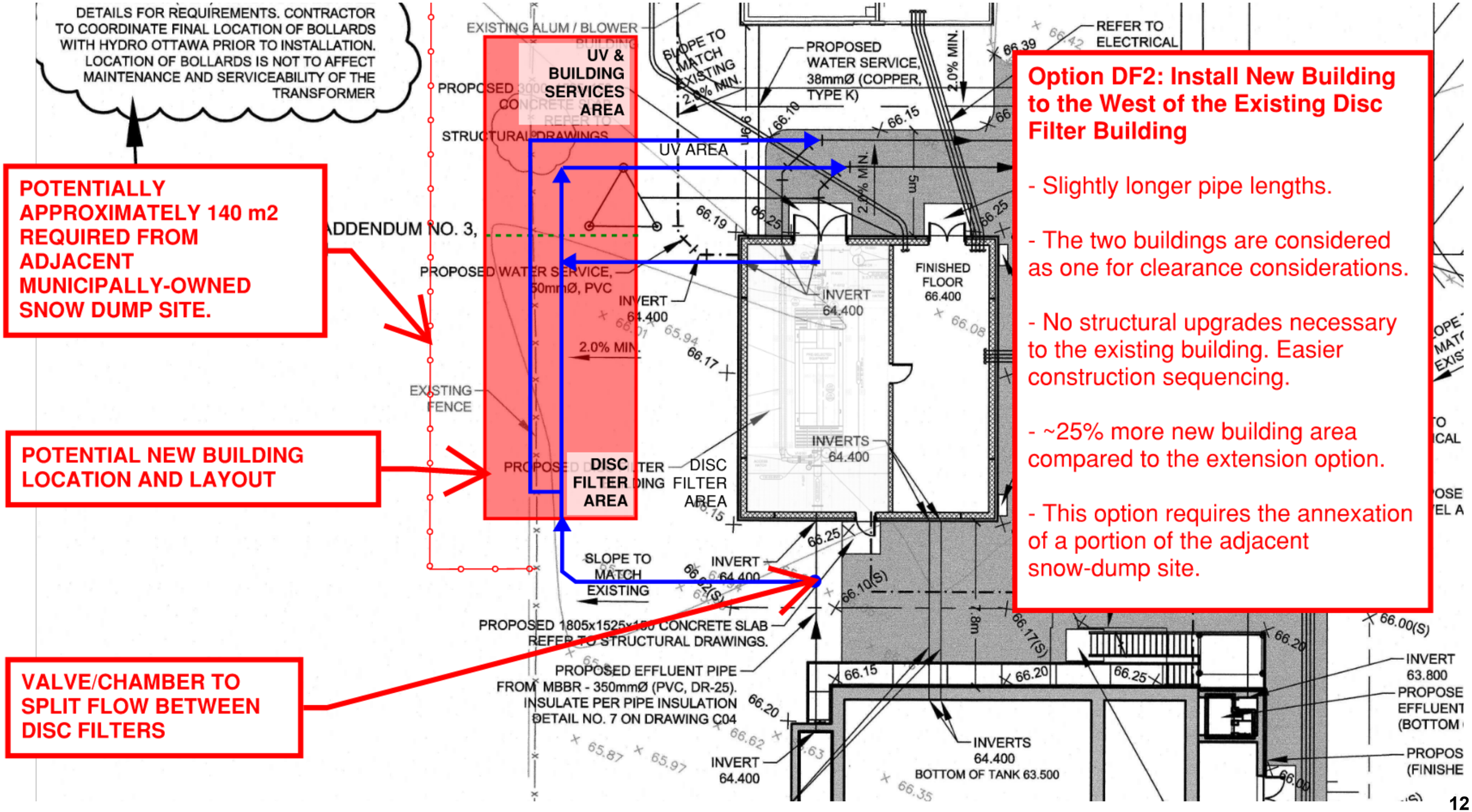
- This option provides the simplest integration with the existing STS from a process perspective.

- For the building expansion, demolition and replacement of existing disc filter building roof would be required.

- Impact to adjacent property during construction is expected. To enable sufficient access and operational clearance, a portion of the adjacent property may need to be annexed permanently.

- Construction of the upgrades while the existing is operational is expected to be a challenge.

Class EA Phase 3 – Disc Filter and UV Implementation Options – Option DF2, New Building



Class EA Phase 3 – TP Removal Options Evaluation

Criteria		Description	Alternative TP1 Participation in the TPM Program	Alternative TP2 Install a Coagulation/Flocculation System
Natural Environment Considerations		Impact to natural features including natural heritage areas, species at risk, areas of natural and significant interest, designated natural areas, water courses and aquatic habitat.		
		Evaluation	**Equal Impact**	**Equal Impact**
Social and Cultural Environment		Impact to social and cultural environment features including residential, commercial and institutional areas, archaeological resources and areas of archaeological potential, known and potential built heritage resources and cultural heritage landscapes.		
		Evaluation	**Equal Impact**	**Equal Impact**
Impacts to Neighbouring Lands		Construction impacts to adjacent lands, and need for purchase or annexation of land.		
		Evaluation	**Equal Impact**	**Equal Impact**
Technical Feasibility - Constructability	Ease of connecting to existing infrastructure, ease of construction due to site conditions (geotechnical, hydrogeological, etc.), and ease of sequencing construction of the works.		• No construction required. • Implementation of program is dependent on an established approvals process.	• Established technology that can be integrated into the treatment process rather simply. • Geotechnical conditions on site, which necessitated a specialized foundation for the MBBR, may require a specialized foundation to support the new coagulation/flocculation tank. • Equipment and piping can largely be constructed with minimal impacts to the existing system.
		Evaluation	**Preferred**	**Less Preferred**
Technical Feasibility - Expandability	Ease of phasing the proposed upgrades and accommodating additional future expansion of the system.		• If phasing construction, increase in loading can also be phased, and payment would only be for loading being offset by the first phase. • Offsetting can also be integrated with other phosphorus removal technologies for increased future demand.	• Treatment process (tanks, chemical dosing) can be designed to be phased and to have operational flexibility. • Process generates additional TSS which may necessitate the need for another disc filter earlier than for TP1.
		Evaluation	**Preferred**	**Less Preferred**
Financial Considerations - Capital	Capital cost of the upgrades.		• The Municipality pays a fixed upfront capital cost to enter the program, based on the estimate of annual loading to be offset. Depending on feedback from the MECP, capital investment is estimated to be within the range of $160,000 to $745,000 (excluding HST) for the 20-year upgrades. • Once cost is confirmed, the only variable to cost is the change in offsetting cost, which is updated each year (currently $585.00/kg).	• Capital investment of approximately $920,000 (Class ‘D’ Opinion of Probable Cost). • Less capital cost certainty compared to TP1.
		Evaluation	**Preferred**	**Least Preferred**
Financial Considerations – O&M	Costs to operate and maintain the works following the upgrades.		There are no O&M costs of the TPM program. One time fee.	Higher O&M cost due to chemical and energy usage, and additional equipment to operate and maintain (e.g., mixers, chemical pumps, tanks, etc.).
		Evaluation	**Preferred**	**Less Preferred**
		Overall Evaluation		

Class EA Phase 3 – Disc Filter and UV Implementation Options Evaluation

Criteria	Description	Alternative DF1 Expansion of Existing Disc Filter Building	Alternative DF2 Install New Building to the West of the Existing Disc Filter Building
Natural Environment Considerations	Impact to natural features including natural heritage areas, species at risk, areas of natural and significant interest, designated natural areas, water courses and aquatic habitat.		
Evaluation		**Equal Impact**	**Equal Impact**
Social and Cultural Environment	Impact to social and cultural environment features including residential, commercial and institutional areas, archaeological resources and areas of archaeological potential, known and potential built heritage resources and cultural heritage landscapes.		
Evaluation		**Equal Impact**	**Equal Impact**
Impacts to Neighbouring Lands	Construction impacts to adjacent lands, and need for purchase or annexation of land.	• The expansion of the existing building is expected to disturb the adjacent site (potentially new fencing, access to site, etc.) during construction, and may also require the partial annexation of the adjacent land (dependent on building size, access requirements, etc.). It is expected that annexation area is less than 100 m2.	• New building will require the partial annexation of the adjacent municipally owned snow dump site. A minimum area of 130 m2 is expected to be required. • Construction impacts are expected to be greater than Option DF2 given that a larger area of the site is expected to be impacted.
Evaluation		**Preferred**	**Less Preferred**
Technical Feasibility - Constructability	Ease of connecting to existing infrastructure, ease of construction due to site conditions (geotechnical, hydrogeological, etc.), and ease of sequencing construction of the works.	• Equipment and connections along the west wall of the current disc filter building may need to be relocated to accommodate the expansion. • Construction of expansion to existing building is feasible but will require additional effort during the design phase and construction to sequence works such that impacts to current operations are minimized. • Site conditions are expected to be similar between the two options. Specialized foundation is not expected to be required. • Construction may be limited to summer months when facility is not actively being operated. However, if an initial construction phase is completed to allow discharge for all months, construction sequencing is further complicated.	• Building can be constructed separately from the existing system, with impacts only seen during installation of tie-ins to existing infrastructure. • Site conditions are expected to be similar between the two options. Specialized foundation is not expected to be required.
Evaluation		**Less Preferred**	**Preferred**
Technical Feasibility - Expandability	Ease of phasing the proposed upgrades and accommodating additional future expansion of the system.		
Evaluation		**Equal Impact**	**Equal Impact**
Financial Considerations - Capital	Capital cost of the upgrades.	• Capital investment for building of approximately $1.22M (Class ‘D’ Opinion of Probable Cost).	• Capital investment for building of approximately $1.28M (Class ‘D’ Opinion of Probable Cost).
Evaluation		**Equal Impact**	**Equal Impact**
Financial Considerations – O&M	Costs to operate and maintain the works following the upgrades.		
Evaluation		**Equal Impact**	**Equal Impact**
Overall Evaluation			

Class EA Phase 3 – Phasing of the Upgrades

- Phasing is being reviewed to provide the Municipality financial flexibility in implementing the proposed upgrades to the system. A 2-phase upgrade strategy is being reviewed.
- **Phase 1 -** Interim construction phase which aims to expand the rated capacity of the system without completing large-scale upgrades (e.g., new disc filter, significant new infrastructure, etc.).
  - Increased Rated Capacity to between 2,871 m3/day and 3,019 m3/day, dependent on review by the MECP.
  - Will enable development near mid-term (5-10 year) average daily flow of 2,930 m3/day (1,722 residential units & 3 ha of Industrial Commercial, Institutional area).
  - Installation of floating baffles, upgrade of blowers, installation of direct connection between Cell ‘C’ and the MBBR inlet, installation of UV system and construction of infrastructure to house new UV system.
  - High-level opinion of probable cost of $2M.
  - Phased approach awaiting MECP approval.
- **Phase 2 –** Upgrade facility to the developed preferred design concept.





Next Steps

- ❑Phase 4 – Environmental Study Report
- ❑Place Project File Report on Public Record for 30-day Review Period
- ❑Notice of Study Completion

THANK YOU
Your Comments Are Important to Us

Please complete a comment sheet and place it in the box provided or e-mail it to us at the noted addresses by July 24, 2025.

YOUR COMMENTS WILL BE CONSIDERED IN FINALIZING THE PREFERRED DESIGN CONCEPT AND THE ENVIRONMENTAL STUDY REPORT

Ongoing information about this project can be found at www.casselman.ca

Email Addresses for comments: **jmorrissette@jlrichards.ca and ppbeauchamp@casselman.ca**



10 julliet 2025

Municipalité de Casselman

Évaluation Environnementale de Portée Générale pour les Projets d'Infrastructures Municipales Annexe 'C'

Session d'Information Publique #2

Bienvenue! Veuillez Remplir la Feuille de Présence.

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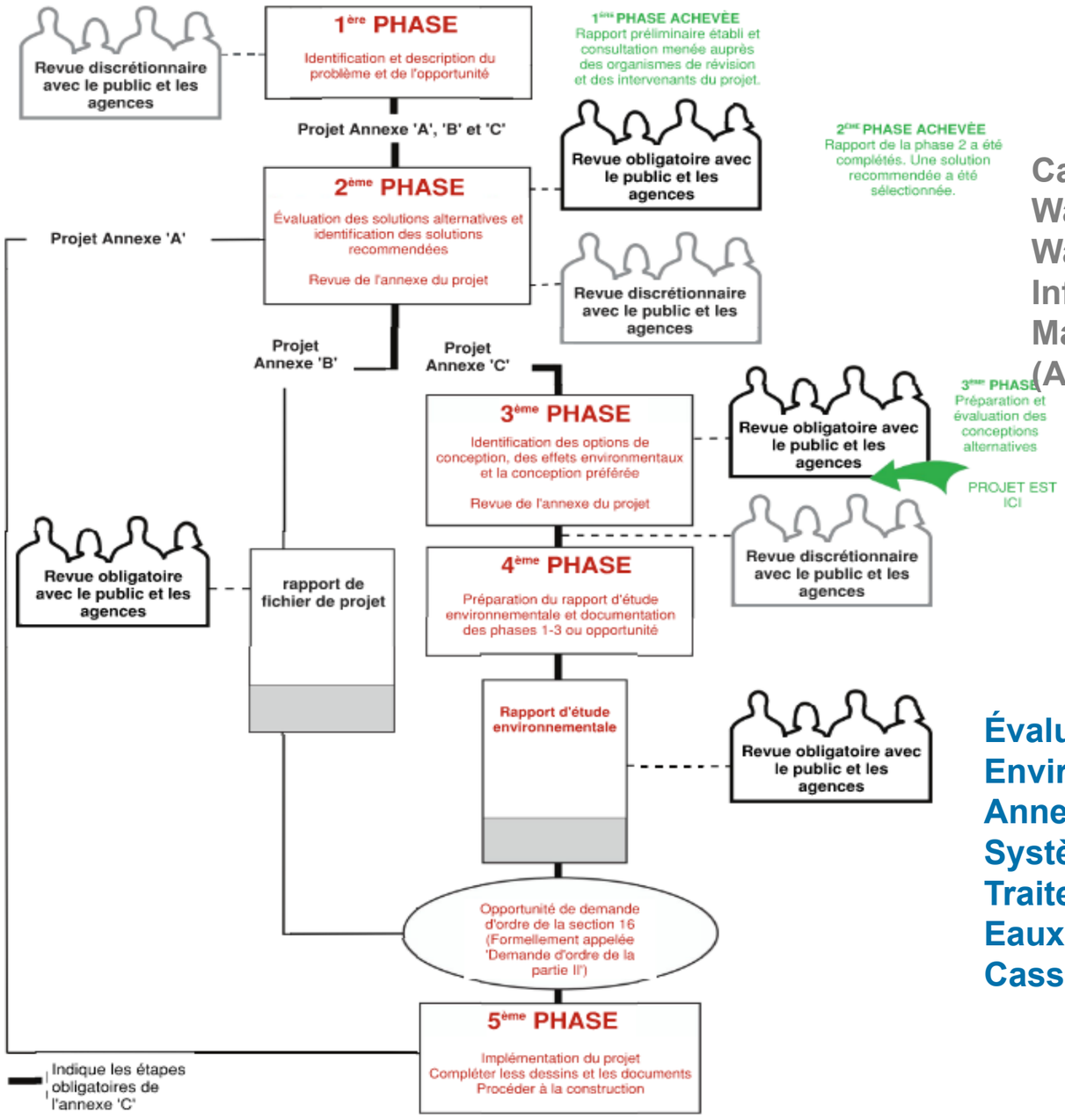
Sommaire de l’ Évaluation Environnementale Annexe ‘C’ du Système de Traitement des Eaux Usées de Casselman

- La Municipalité mène actuellement une Évaluation Environnementale de Portée Générale pour les Projets d’Infrastructures Municipales Annexe ‘C’ afin de déterminer un concept d’expansion préférentiel du système de traitement des eaux usées existant, dans le but de traiter efficacement les eaux usées générées par les zones de développement existantes et futures.
- Dans le plan directeur (Casselman Water and Wastewater Infrastructure Master Plan) des infrastructures d’eau potable et d’eaux usées de Casselman, finalisé en juillet 2024, les prévisions de développement suivantes ont été établies pour une période de 25 ans:
  - À court terme (0-5 ans) – 980 unités, à moyen terme (5-10 ans) – 742 unités, et à long terme (10-25 ans) – 329 unités
  - Solution Privilégiée pour répondre à la Croissance Prévue :
    - **Maintenir le Système de Traitement des Eaux Usées Actuel Basé sur le Lagunage**
    - **Augmenter la Capacité Nominale des Lagunes –** 2050 m3/jour à 4050 m3/jour
    - **Prolonger la Période de Déversement Actuelle pour Permettre des Rejets tout au long de l’Année**





Sommaire de l’ Évaluation Environnementale Annexe ‘C’



Casselman Water and Wastewater Infrastructure Master Plan (Approche 1)

- ✓Avis de Lancement d’Étude
- ✓Phase 1 – Identification du Problème ou de l’Opportunité
- ✓Phase 2A – Identification et Sélection des Solutions Alternatives
- ✓Session d’Information Publique Nº1: Présentation de la Solution Recommandée auprès du Public et autres Parties Prenantes
- ✓Phase 2B – Évaluation des Solutions Alternatives Sélectionnées, l’Identification d’une Solution Préférée et l’Examen de l’Échéancier de l’Évaluation Environnementale.

Évaluation Environnementale Annexe ‘C’ du Système de Traitement des Eaux Usées de Casselman

- ✓Phase 3A – Identification et Sélection de Conceptions alternatives
- ✓Phase 3B – Évaluation des Conceptions de Rechange, l’Identification d’un Concept Privilégié et l’Examen de l’échéancier de l’Évaluation Environnementale
- ❑ **Session d’Information Publique Nº2**
- ❑ Phase 4 – Rapport d'Étude Environnementale
- ❑ Soumettre le Rapport de Projet au Registre Public pour une Période d’Examen de 30 Jours
- ❑ Avis de Fin d’Étude

Phase 3 - Évaluation Environnementale – Bases de Conception

Solution Privilégiée:

- Maintenir la capacité de rétention et les installations de traitement actuels, tout en améliorant les transitions des écoulements d'une lagune à l'autre grâce à la mise en place de déflecteurs.
- Maintenir le processus de traitement du réacteur à film biologique à lit mobile (MBBR) et ses capacités nominales actuellement en place.
- Fournir un second filtre à disques pour permettre le traitement de débits mensuels plus élevés, de répondre à des exigences plus importantes en matière d'élimination des solides et offrir une redondance supplémentaire.
- Fournir une chambre de coagulation pour ajouter un point de dosage secondaire, afin d'assurer que tout le phosphore ayant réagi est précipité sous forme de particules avant l'étape de filtration.
- Fournir un système de désinfection tertiaire pour assurer la désinfection des effluents du filtre à disques.
- Construire un nouveau bâtiment pour abriter les filtres à disques et les dispositifs chimiques.
- Estimation des coûts probables (compris de la conception et construction) = 9 000 000 $ +/- 30% (hors TVH)



Phase 3 - Évaluation Environnementale – Bases de Conception (suite)

Débits journaliers maximaux existants et proposés

MOIS	EXISTANT[1]		PROPOSÉ	
	DÉBIT QUOTIDIEN MAXIMAL	RATIO DE DILUTION MINIMAL	DÉBIT QUOTIDIEN MAXIMAL	RATIO DE DILUTION MINIMAL
Janvier	5000 m^3/jr	RNS Débit/10	5750 m^3/jr	12.4
Février	5000 m^3/jr	RNS Débit/10	5600 m^3/jr	12.4
Mars	5000 m^3/jr	RNS Débit/40	7250 m^3/jr	12.3
Avril	7000 m^3/jr	RNS Débit/60	10 000 m^3/jr	72.9
1 au 15 mai	7000 m^3/jr	RNS Débit/60	4500 m^3/jr	40.5
16 au 31 mai	N.D.	N.D.	4500 m^3/jr	40.5
Juin	N.D.	N.D.	2150 m^3/jr	26.2
Juillet	N.D.	N.D.	1050 m^3/jr	26.2
Août	N.D.	N.D.	900 m^3/jr	26.3
Septembre	N.D.	N.D.	910 m^3/jr	26.2
Octobre	4000 m^3/jr	RNS Débit/15	2250 m^3/jr	13.1
Novembre	4000 m^3/jr	RNS Débit/10	6050 m^3/jr	13.1
Décembre	5000 m^3/jr	RNS Débit/15	8750 m^3/jr	12.4

Notes: (1) Selon AE No. 8160-BAHPRF (19 avril 2019).

Critères d'effluents existants et proposés

PARAMÈTRES	PÉRIODE POUR LE CALCUL DE LA MOYENNE	EXISTANT[1]		PROPOSÉ	
		OBJECTIF	LIMITE	OBJECTIF	LIMITE
$cDBO_5$					
1er jan. au 15 mai	Mensuelle	15 mg/L	25 mg/L	10 mg/L	12 mg/L
15 mai au 30 sept.	Mensuelle	N.D.	N.D.	10 mg/L	12 mg/L
1er oct. au 31 décembre	Mensuelle	10 mg/L	15 mg/L	10 mg/L	12 mg/L
MEST					
1er jan. au 15 mai	Mensuelle	15 mg/L	25 mg/L	10 mg/L	12 mg/L
15 mai au 30 sept.	Mensuelle	N.D.	N.D.	10 mg/L	12 mg/L
1er oct. au 31 décembre	Mensuelle	10 mg/L	25 mg/L	10 mg/L	12 mg/L
PT	Mensuelle	0.8 mg/L	1.0 mg/L	0.2 mg/L	0.3 mg/L
ATT					
1er jan. au 31 mars	Mensuelle	12 mg/L	12 mg/L	9.2 mg/L	11.5 mg/L
1er avril au 15 mai	Mensuelle	6.0 mg/L	6.0 mg/L	4.8 mg/L	6.0 mg/L
15 mai au 31 mai	Mensuelle	N.D.	N.D.	4.8 mg/L	6.0 mg/L
1er juin au 30 sept.	Mensuelle	N.D.	N.D.	1.0 mg/L	1.3 mg/L
1er oct. au 30 novembre	Mensuelle	5.0 mg/L	5.0 mg/L	4.0 mg/L	5.0 mg/L
1er décembre au 31 décembre	Mensuelle	12 mg/L	12 mg/L	9.2 mg/L	11.5 mg/L
E. coli	Mensuelle	100 UFC/100 mL	200 UFC/100 mL	150 UFC/100 mL	200 UFC/100 mL
Sulfure d'Hydrogène					
1er jan. au 15 mai	Mensuelle	0.1 mg/L	0.1 mg/L	N.D.	N.D.
1er oct. au 31 décembre	Mensuelle	Non Détecté	Non Détecté	N.D.	N.D.
pH	Prélèvement Unique	6.8 à 7.8	6.0 à 8.0	6.8 à 7.8	6.0 à 8.0

Notes: (1) Selon AE No. 8160-BAHPRF (19 avril 2019).



Phase 3 - Évaluation Environnementale – Analyse des Technologies de Traitement – Élimination de l’AAT et de la DBO

- DBO = Demande Biologique en Oxygène, AAT = Azote Ammoniacal Total
- Le système de traitement existant utilise des lagunes facultatives (Cellules ‘A’ et ‘B’) et une lagune aérée (Cellule ‘C’) pour le prétraitement de la DBO et de l’AAT. Un réacteur à film biologique à lit mobile (MBBR) est ensuite utilisé pour atteindre de faibles niveaux de DBO et d’AAT, y compris dans des conditions climatiques froides.
- Les améliorations suivantes sont proposées afin de satisfaire aux critères requis de DBO et de l’ATT sur une période de 25 ans, selon des discussions avec le fournisseur du MBBR:
  - Augmenter la capacité d'aération du MMBR en remplaçant les soufflantes d’air et variateurs de fréquence (VFD) existants.
  - Installer une conduite directe entre la Cellule ‘A’ et l'entrée du MBBR pour maintenir une biomasse saine dans le MBBR entre l'été et l'hiver.
  - Ajouter des déflecteurs flottants dans les Cellules ‘A’ et ‘B’ pour minimiser les courts-circuits hydrauliques en amont du MBBR.
- Étant donné que le MBBR existant peut être réutilisé, aucune autre solution n’a été envisagée pour l’élimination de l’AAT et de la DBO. Ces améliorations seront intégrées dans le concept privilégié.
- OCWA a fait remarquer que le MBBR existant produisait beaucoup de mousse. Un examen des options de couverture sera recommandé dans l’étude environnementale.



Phase 3 - Évaluation Environnementale – Analyse des Technologies de Traitement – Élimination des MEST et du PT

- MEST = Matières en Suspension Totales,
  PT = Phosphore Total
- Le système existant utilise un dosage de sulfate d'aluminium (alum), des lagunes facultatives (Cellules 'A' et 'B'), une lagune aérée (Cellule 'C') et un filtre à disques pour assurer l'élimination des MEST et du PT.
- Améliorations proposées pour répondre aux critères de MEST et PT sur 25 ans, selon des discussions avec le fournisseur du filtre à disques:
  - L'ajout d'un filtre à disques identique en parallèle avec l'existant, afin de traiter des débits de rejet plus élevés, une charge en solides accrue, et pour assurer la redondance du système.
  - L'ajout d'un système de coagulation-floculation, comprenant un réservoir, un système de dosage de produits chimiques et un système automatique de préparation de polymères, afin d'atteindre une concentration de PT dans l'effluent de 0.2 mg/L.
- La Conservation de la Nation du Sud a également mis en place un programme qui permet aux municipalités d'acheter des crédits de compensation pour le PT, en remplacement de l'ajout d'un procédé de traitement amélioré.
- <u>Sommaire des Concepts de Rechange Proposés:</u>
  - PT1 – Programme de gestion du phosphore total
  - PT2 – Système de coagulation-floculation



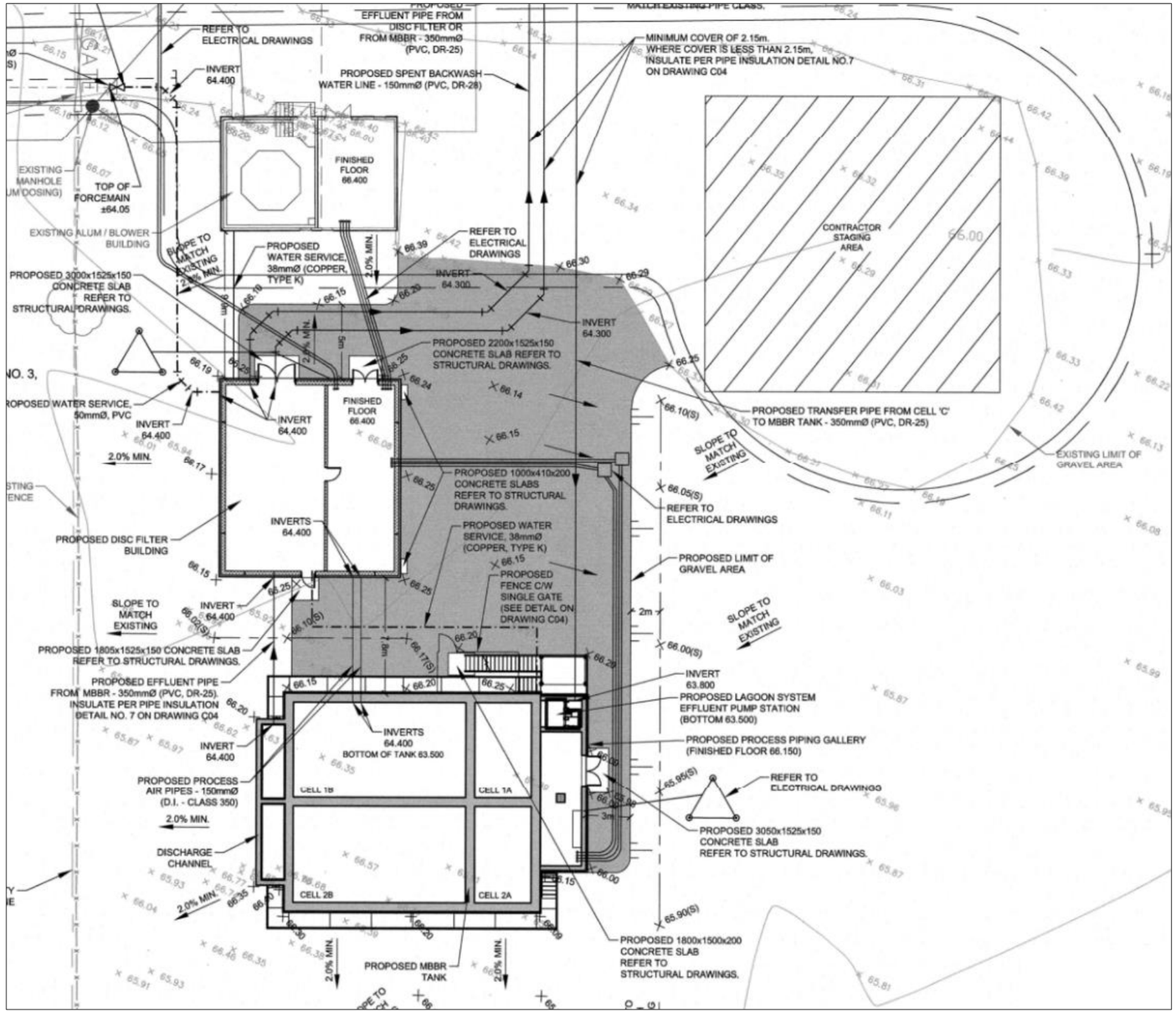
Phase 3 - Évaluation Environnementale – Analyse des Technologies de Traitement – Désinfection Tertiaire

- Le traitement actuel ne comprend pas de système de désinfection.
- Un système de désinfection est requis dans le cadre de l'ajout des améliorations proposées, en raison des rejets qui auront lieu durant les mois d'été. Toutefois, un critère de conception pour l'E. coli de 150 UFC/100 mL est inclus pour l'ensemble des mois de l'année.
- La désinfection par rayonnement UV (installation illustrée sur la figure) a été retenue comme technologie de désinfection privilégiée, en raison des avantages suivants :
  - Exigences d'espace réduites comparativement aux autres technologies de désinfection.
  - Facilité d'intégration au système existant.
  - Simplicité d'exploitation et de contrôle.
  - Aucune production de sous-produits de désinfection.
  - Aucun résidu post-traitement.
  - Aucun besoin en produits chimiques supplémentaires.
  - Coût compétitif.



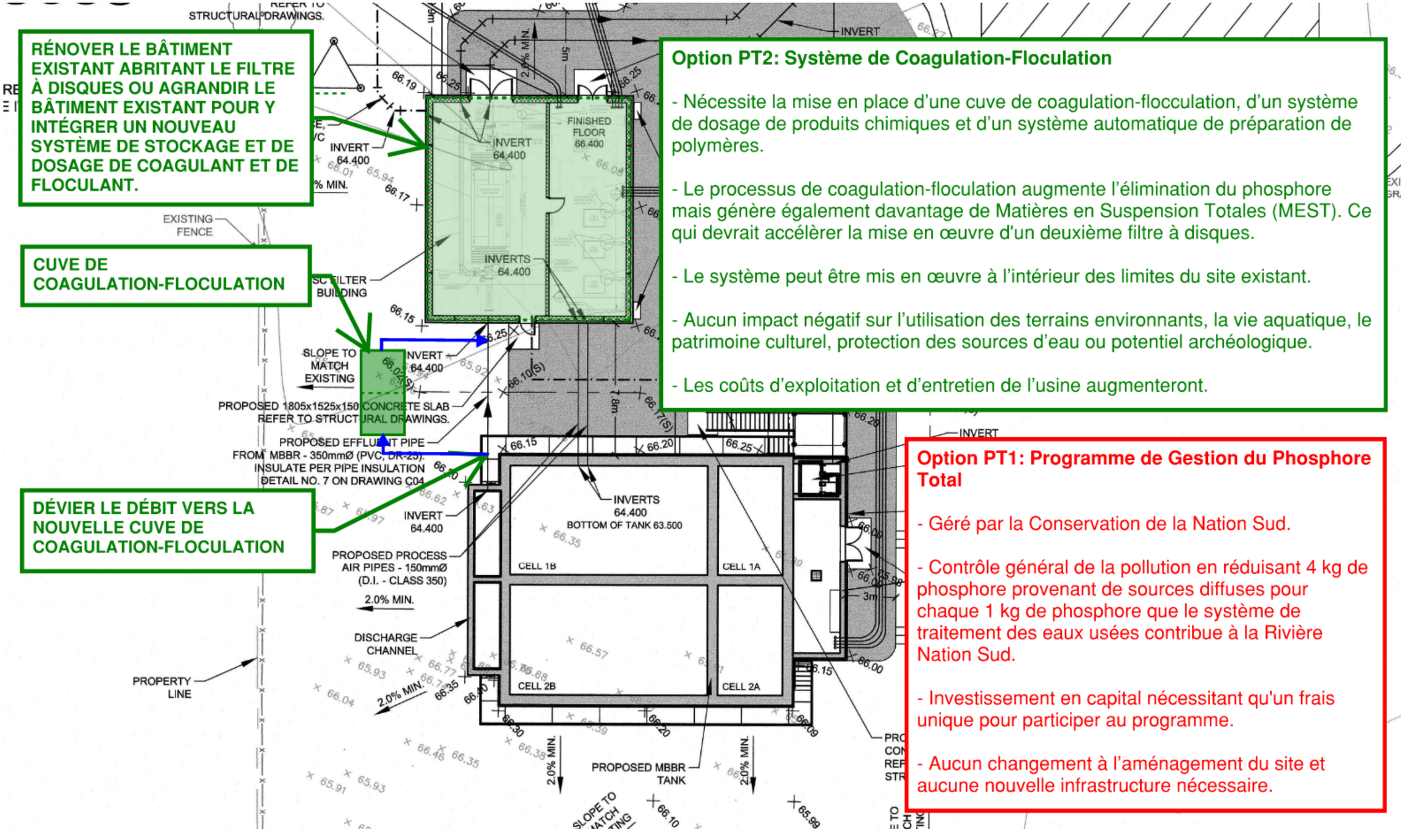
Phase 3 - Évaluation Environnementale – Élaboration des Conceptions alternatives Proposés

- <u>L'Ajout d'un Filtre à Disques et d'un Système Désinfection UV:</u>
  - FD1 – Expansion du Bâtiment Existant Abritant le Filtre à Disques
  - FD2 – Construction d'un Nouveau Bâtiment à l'Ouest du Bâtiment Existant Abritant le Filtre à Disques
  - FD3 – ~~Construction d'un Nouveau Bâtiment à l'Est du Bâtiment Existant du Filtre à Disques~~ (cette option est jugée non réalisable d'un point de vue hydraulique)
- Options Proposés pour l'Élimination du Phosphore Total (PT):
  - PT1 – Programme de gestion du phosphore total
  - PT2 – Système de coagulation-floculation



Plan Civil du Système de Traitement Existant

Phase 3 - Évaluation Environnementale – Options Proposés pour l’ Élimination du PT



Option PT2: Système de Coagulation-Floculation

- Nécessite la mise en place d’une cuve de coagulation-flocculation, d’un système de dosage de produits chimiques et d’un système automatique de préparation de polymères.

- Le processus de coagulation-floculation augmente l’élimination du phosphore mais génère également davantage de Matières en Suspension Totales (MEST). Ce qui devrait accélérer la mise en œuvre d'un deuxième filtre à disques.

- Le système peut être mis en œuvre à l’intérieur des limites du site existant.

- Aucun impact négatif sur l’utilisation des terrains environnants, la vie aquatique, le patrimoine culturel, protection des sources d’eau ou potentiel archéologique.

- Les coûts d’exploitation et d’entretien de l’usine augmenteront.

Option PT1: Programme de Gestion du Phosphore Total

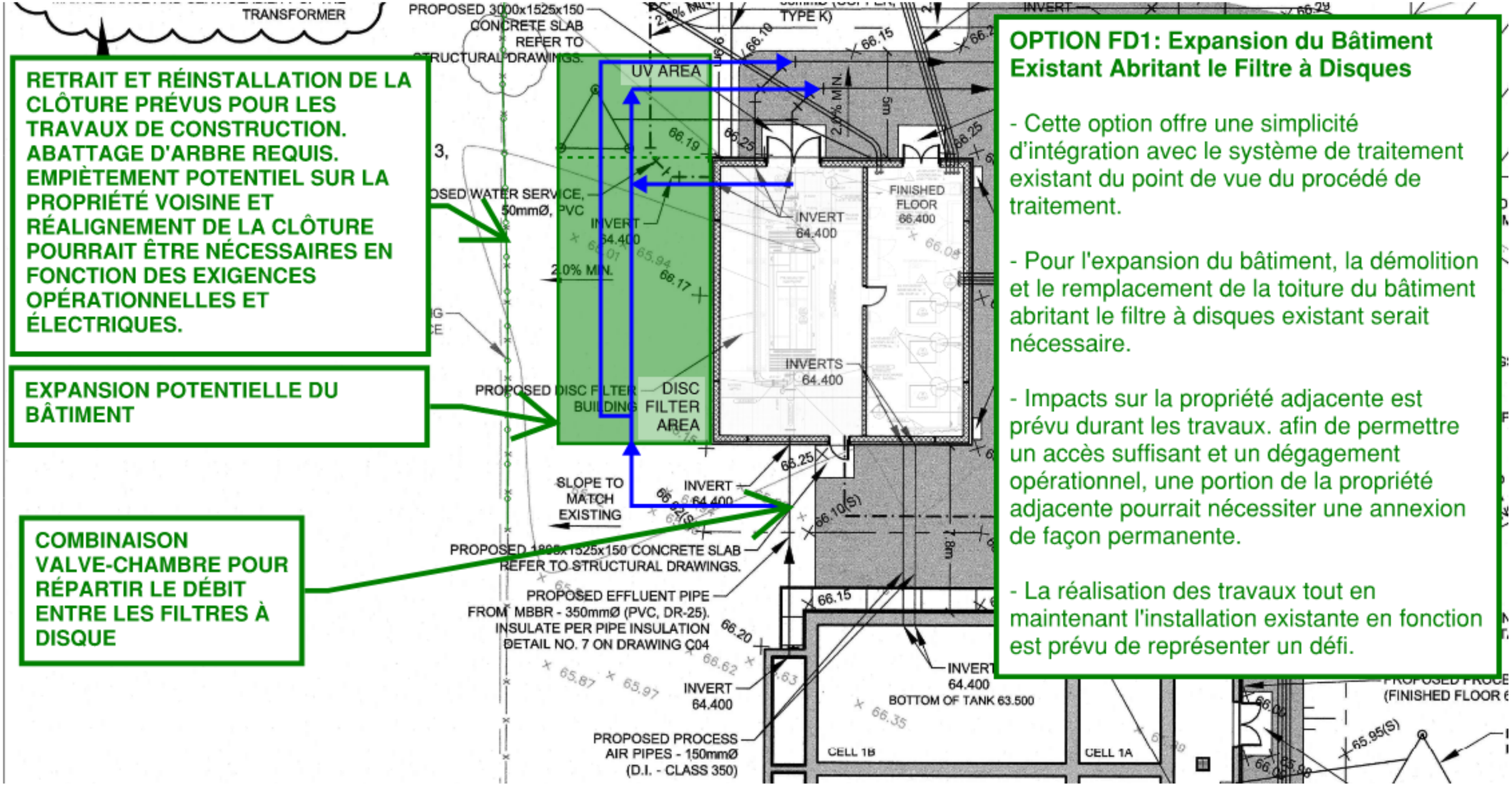
- Géré par la Conservation de la Nation Sud.

- Contrôle général de la pollution en réduisant 4 kg de phosphore provenant de sources diffuses pour chaque 1 kg de phosphore que le système de traitement des eaux usées contribue à la Rivière Nation Sud.

- Investissement en capital nécessitant qu'un frais unique pour participer au programme.

- Aucun changement à l’aménagement du site et aucune nouvelle infrastructure nécessaire.

Phase 3 - Évaluation Environnementale – Ajout d'un Filtre à Disques et d'un Système Désinfection UV – Option FD1, Expansion du Bâtiment Existant



OPTION FD1: Expansion du Bâtiment Existant Abritant le Filtre à Disques

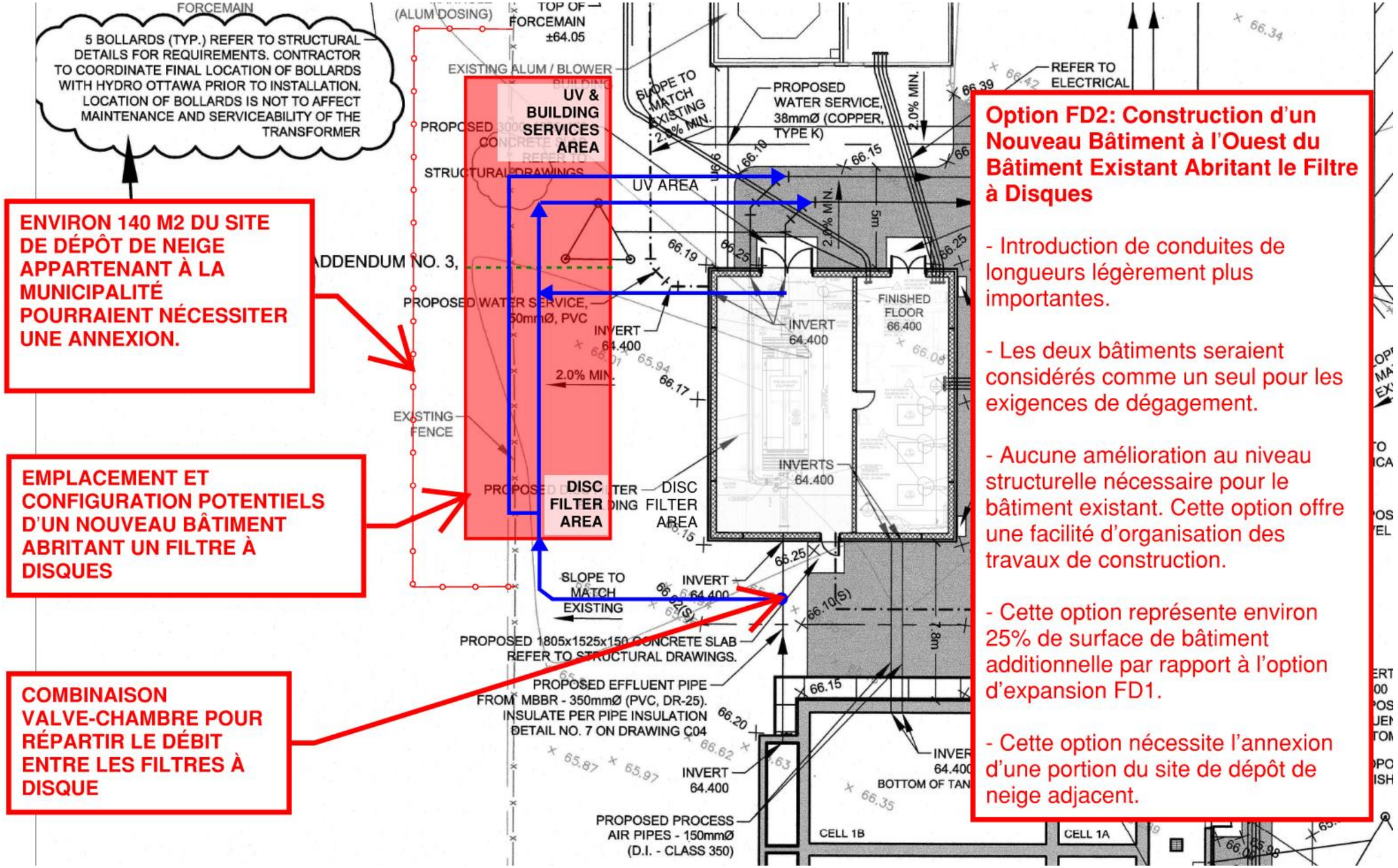
- Cette option offre une simplicité d'intégration avec le système de traitement existant du point de vue du procédé de traitement.

- Pour l'expansion du bâtiment, la démolition et le remplacement de la toiture du bâtiment abritant le filtre à disques existant serait nécessaire.

- Impacts sur la propriété adjacente est prévu durant les travaux. afin de permettre un accès suffisant et un dégagement opérationnel, une portion de la propriété adjacente pourrait nécessiter une annexion de façon permanente.

- La réalisation des travaux tout en maintenant l'installation existante en fonction est prévu de représenter un défi.

Phase 3 - Évaluation Environnementale – Ajout d'un Filtre à Disques et d'un Système Désinfection UV – Option FD2, Nouveau Bâtiment



Phase 3 - Évaluation Environnementale – Évaluation des Options Proposés pour l' Élimination du PT

Critères		Description	Alternative PT1 Participation au Programme de Gestion du PT	Alternative PT2 Ajout d'un Système de Coagulation-Floculation
Considérations Liées à l'Environnement Naturel		Impacts potentiels sur les éléments naturels, y compris les zones de patrimoine naturel, les espèces en péril, les zones d'intérêt naturel et scientifique, les aires naturelles désignées, ainsi que les cours d'eau et les habitats aquatiques.		
		Évaluation	**Impact Équivalent**	**Impact Équivalent**
Environnement Social et Culturel		Impacts potentiels sur les composantes de l'environnement social et culturel, incluant les zones résidentielles, commerciales et institutionnelles, les ressources archéologiques et les zones présentant un potentiel archéologique, ainsi que les ressources patrimoniales connues ou potentielles et les lieux historiques culturels et patrimoniaux.		
		Évaluation	**Impact Équivalent**	**Impact Équivalent**
Impacts sur les Terres Avoisinantes		Impacts potentiels de la construction sur les terrains adjacents, ainsi que les besoins éventuels en matière d'acquisition ou d'annexion de terrains.		
		Évaluation	**Impact Équivalent**	**Impact Équivalent**
Faisabilité Technique – Constructibilité	Facilité d'intégration aux infrastructures existantes, facilité de construction en fonction des conditions du site (géotechniques, hydrogéologiques, etc.), et facilité d'organisation des travaux de construction.		• Aucune construction requise. • La mise en oeuvre du programme dépend d'un processus d'approbation préétabli.	• Technologie éprouvée pouvant être intégrée au procédé de traitement de manière relativement simple. • Les conditions géotechniques du site, qui ont nécessité une fondation spécialisée pour le MBBR, pourraient également exiger une fondation spécialisée pour soutenir le nouveau réservoir de coagulation-floculation. • Les équipements et la tuyauterie peuvent, dans l'ensemble, être construits avec un impact minimal sur le système existant.
		Évaluation	**Privilégiée**	**Moins Privilégiée**
Faisabilité Technique – Possibilité d'Expansion	Facilité d'apporter les améliorations proposées en phases et capacité à accommoder une expansion future supplémentaire du système.		• Si les travaux sont réalisés par phases, l'augmentation de la quantité/charge peut également être échelonnée, et le paiement ne concernerait que la charge compensée par la première phase. • La compensation peut également être intégrée à d'autres technologies de réduction du phosphore afin de répondre à une demande accrue à l'avenir.	• Ce processus de traitement (cuves, dosage chimique) peut être conçu de manière progressive pour plus de flexibilité opérationnelle. • Ce procédé génère des MEST supplémentaires, ce qui pourrait nécessiter l'installation d'un autre filtre à disques, et ce plus tôt que prévu, comparativement à l'Alternative PT1.
		Évaluation	**Privilégiée**	**Moins Privilégiée**
Considérations Financières – Capital	Coût d'investissement pour les mises à niveau-améliorations		• La Municipalité paie un coût en capital fixe initial pour adhérer au programme, basé sur l'estimation de la charge annuelle à compenser. Dépendamment des commentaires emis par le MEPP, l'investissement en capital est estimé entre 160 000 $ et 745 000 $ pour les améliorations sur une période de 20 ans. • Une fois le coût confirmé, la seule variable restante est le coût de compensation, qui est mis à jour chaque année (actuellement 585.00 $/kg).	• Un investissement en capital d'environ 920 000 $ est estimé selon une estimation des coûts probables de Classe 'D'. • Le niveau de certitude quant aux coûts en capital est inférieur à celui de l'alternative PT1.
		Évaluation	**Privilégiée**	**Moins Privilégiée**
Considérations Financières – E&M	Coûts d'exploitation et de maintenance des installations suite à la mise en œuvre des améliorations.		Le programme de gestion du Phosphore Total ne comporte aucun coût d'E&M. Un seul coût à frais unique est requis	Coûts d'E&M plus élevés en raison de l'utilisation additionnelle de produits chimiques et d'énergie, ainsi que de l'équipement supplémentaire à exploiter et à entretenir (par exemple, mélangeurs, pompes à produits chimiques, réservoirs, etc.).
		Évaluation	**Privilégiée**	**Moins Privilégiée**
		Évaluation Générale		

Phase 3 - Évaluation Environnementale – Évaluation des Options Proposés pour l'Ajout d'un Filtre à Disques et d'un Système Désinfection UV

Critères	Description	Alternative FD1 Expansion du Bâtiment Existant Abritant le Filtre à Disques	Alternative FD2 Construction d'un Nouveau Bâtiment à l'Ouest du Bâtiment Existant Abritant le Filtre à Disques
Considérations Liées à l'Environnement Naturel	Impacts potentiels sur les éléments naturels, y compris les zones de patrimoine naturel, les espèces en péril, les zones d'intérêt naturel et scientifique, les aires naturelles désignées, ainsi que les cours d'eau et les habitats aquatiques.		
Évaluation		**Impact Équivalent**	**Impact Équivalent**
Environnement Social et Culturel	Impacts potentiels sur les composantes de l'environnement social et culturel, incluant les zones résidentielles, commerciales et institutionnelles, les ressources archéologiques et les zones présentant un potentiel archéologique, ainsi que les ressources patrimoniales connues ou potentielles et les lieux historiques culturels et patrimoniaux.		
Évaluation		**Impact Équivalent**	**Impact Équivalent**
Impacts sur les Terres Avoisinantes	Impacts potentiels de la construction sur les terrains adjacents, ainsi que les besoins éventuels en matière d'acquisition ou d'annexion de terrains.	• Il est prévu que l'expansion du bâtiment existant devrait perturber le site adjacent pendant les travaux (installation possible de nouvelles clôtures, accès au site, etc.) et pourrait également nécessiter l'annexion partielle du terrain voisin (selon la taille du bâtiment, les exigences d'accès, etc.). Il est prévu que la superficie annexée soit inférieure à 100 m2.	• Il est prévu que la construction du nouveau bâtiment nécessiterait l'annexion partielle du site adjacent, le dépôt de neige appartenant à la Municipalité. Une superficie minimale de 130-140 m2 devrait être requise. • Les impacts liés à la construction devraient être plus importants que pour l'Alternative FD2, étant donné qu'une plus grande portion du site devrait être affectée.
Évaluation		**Privilégiée**	**Moins Privilégiée**
Faisabilité Technique – Constructibilité	Facilité d'intégration aux infrastructures existantes, facilité de construction en fonction des conditions du site (géotechniques, hydrogéologiques, etc.), et facilité d'organisation des travaux de construction.	• Les équipements et les connexions situés à proximité du mur ouest du bâtiment actuel devront peut-être être déplacés pour permettre l'expansion. • La construction d'une extension du bâtiment existant est possible, mais nécessitera des efforts supplémentaires durant la phase de conception et de construction pour ordonner les travaux de manière à minimiser les impacts sur les opérations actuelles. • Les conditions du site devraient être similaires entre les deux options. Des fondations spécialisées ne devraient pas être requise. • La construction peut être limitée aux mois d'été quand le facilité n'étais pas opératif. • Cependant, si une phase de construction initiale est complétés pour permettre décharge continue, la séquence de construction serais plus compliquée.	• Le bâtiment peut être construit séparément du système de traitement existant, avec des impacts prévus uniquement lors de l'installation des raccordements aux infrastructures existantes. • Les conditions du site devraient être similaires entre les deux Alternatives. Une fondation spécialisée ne devrait pas être requise.
Évaluation		**Moins Privilégiée**	**Privilégiée**
Faisabilité Technique – Possibilité d'Expansion	Facilité d'apporter les améliorations proposées en phases et capacité à accommoder une expansion future supplémentaire du système.		
Évaluation		**Impact Équivalent**	**Impact Équivalent**
Considérations Financières – Capital	Coût d'investissement pour les mises à niveau-améliorations	• Un investissement en capital d'environ 1.22 M$ est estimé selon une estimation des coûts probables de Classe 'D'.	• Un investissement en capital d'environ 1.28 M$ est estimé selon une estimation des coûts probables de Classe 'D'.
Évaluation		**Impact Équivalent**	**Impact Équivalent**
Considérations Financières – E&M	Coûts d'exploitation et de maintenance des installations suite à la mise en œuvre des améliorations.		
Évaluation		**Impact Équivalent**	**Impact Équivalent**
Évaluation Générale			

Phase 3 - Évaluation Environnementale – Phasage des Améliorations Proposées

- Un plan de phasage est actuellement mis à l'étude afin d'offrir à la Municipalité une plus grande flexibilité financière pour la mise en œuvre des améliorations proposées au système de traitement. Présentement, une stratégie de mise à jour en deux phases est envisagée.
- **Phase 1 –** Une phase de construction intérimaire visant à augmenter la capacité nominale du système de traitement, sans entreprendre de mises à jour majeures (par exemple, l'ajout d'un nouveau filtre à disques ou la construction d'infrastructures importantes).
  - Augmentation de la capacité nominale entre 2871 m3/jour et 3019 m3/jour. Cette augmentation est dépendante d'une évaluation finale du MEPP.
  - Cette augmentation permettra de soutenir le développement à moyen terme précédemment établi, correspondant à un débit moyen quotidien de 2930 m3/jour sur une période de 5 à 10 ans desservant 1722 unités résidentielles et 3 hectares de zone Industrielle, Commerciale et Institutionnelle.
  - Comprendrait également l'ajout de déflecteurs flottants, la modernisation des soufflantes, la construction d'une conduite entre la Cellule 'A' et l'entrée du MBBR, ainsi que l'installation d'un système de désinfection UV incluant la construction de la structure destinée à accueillir le nouveau système.
  - L' estimation sommaire des coûts probables est de 2M $.
  - Phasage proposé est présentement en attente d'approbation du MEPP.
- **Phase 2 –** La mise à niveau du reste des installations en fonction du concept final retenu.





Étapes Suivantes

- ❑ Phase 4 – Rapport d'Étude Environnementale
- ❑ Soumettre le Rapport de Projet au Registre Public pour une Période d'Évaluation de 30 Jours
- ❑ Avis de Fin d'Étude

MERCI BEAUCOUP
Vos Commentaires et Suggestions Nous Tiennent à Coeur

Veuillez s'il vous plaît remplir la feuille de commentaires et la déposer dans la boîte prévue à cet effet, ou l'envoyer par courriel à l'adresse indiquée, au plus tard le 24 juillet 2025

VOS COMMENTAIRES SERONT PRIS EN CONSIDÉRATION DANS LE CADRE DE L'ÉLABORATION DU CONCEPT FINAL ET DU RAPPORT D'ÉTUDE ENVIRONNEMENTALE

Des informations à jour pour ce projet sont disponibles sur le site suivant:
www.casselman.ca

Adresses courriel pour transmettre vos commentaires:
jmorrissette@jlrichards.ca et ppbeauchamp@casselman.ca

Municipality of Casselman
Casselman Sewage Treatment System
Schedule C Municipal Class Environmental Assessment
Public Information Centre No. 2

July 10, 2025

Sign-in Sheet

Municipalité de Casselman
Système de traitement d'eaux usées de Casselman
Étude environnementale de portée générale Annexe C
Séance d'information publique N°2

10 juillet 2025

Feuille de presence

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

Please Print Clearly / S'il vous plait imprimer clairement

Name / Nom	Address / Adresse	Postal Code / Code postal	Email / couriel électronique	Telephone / Téléphone
[redacted]				
[redacted]				
Marc-Olivier Gratton	1121 Notre-Dame	K0A 1W0	mogratton@nationmun.ca	343-575-4011

Municipality of Casselman
Casselman Sewage Treatment System
Schedule C Municipal Class Environmental Assessment
Public Information Centre No. 2

July 10, 2025

Sign-in Sheet

Municipalité de Casselman
Système de traitement d'eaux usées de Casselman
Étude environnementale de portée générale Annexe C
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ENGINEERS · ARCHITECTS · PLANNERS

Please Print Clearly / S'il vous plait imprimer clairement

Name / Nom	Address / Adresse	Postal Code / Code postal	Email / couriel électronique	Telephone / Téléphone
[redacted]				
[redacted]				
[redacted]				
[redacted]	[redacted]			
[redacted]				
[redacted]				
[redacted]				
[redacted]				

Kevin Cortez

From: Nick Bialik
Sent: October 10, 2025 8:44 AM
To: Kevin Cortez
Cc: Jordan Morrissette
Subject: Fw: FW: Casselman Lagoon Class EA - Notice of Public Open House (Information Centre) No. 2

FYI, in case you didn't receive this email. To be considered in finalizing the ESR.

Thanks,

Nick Bialik, P.Eng. (he/him)
Environmental Engineer

Ottawa ON
Work: 343-804-5346

From: [redacted]
Sent: Tuesday, August 26, 2025 8:22 AM
To: Yves Morrissette <ymorrissette@casselman.ca>; [redacted]
Cc: Nick Bialik <nbialik@jlrichards.ca>; Jordan Morrissette <jmorrissette@jlrichards.ca>; [redacted]; Pierre-Paul Beauchamp <ppbeauchamp@casselman.ca>; Sebastien Dion <sdion@casselman.ca>; [redacted]; Francine Leblanc <fleblanc@casselman.ca>; paul groulx <pgroulx@casselman.ca>; Geneviève Lajoie <glajoie@casselman.ca>; Sylvain Cléroux <scleroux@casselman.ca>; [redacted]
Subject: Re: FW: Casselman Lagoon Class EA - Notice of Public Open House (Information Centre) No. 2

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Merci M. Morrissette pour votre écoute et votre suggestion.

Je demande maintenant à toutes et à tous impliqués directement ou indirectement dans le dossier de restructuration des frontières entre la municipalité de Casselman et la municipalité de la Nation de bien vouloir commenter sur la suggestion de M. Morrissette dans le but d'éliminer les termes "Lagoon - Expansion" et "Lagoon Buffer Area" de toutes correspondances futures fait par la municipalité de Casselman qui utilisent cette carte.

Merci de faire suivre vos commentaires directement à M. Yves Morrissette et de m'inclure si possible.

Je demeure disponible si vous désirez en discuter plus longuement.

Bonne journée!

[redacted]

On Mon, Aug 25, 2025 at 5:08 PM Yves Morrissette <ymorrissette@casselman.ca> wrote:

> Bonjour [redacted]
>
> Je vous remercie de votre suivi et de votre patience dans ce dossier.
>
> Les documents déjà publiés par la Municipalité ne peuvent malheureusement pas être modifiés rétroactivement. Toutefois, advenant que la Municipalité doive utiliser la carte publiquement, nous nous engageons à apporter les ajustements nécessaires à la version produite par la firme d'ingénierie J.L. Richards afin d'y préciser clairement qu'il s'agit du terrain visé par la restructuration municipale.
>
> Plus précisément, plutôt que de représenter des zones distinctes en jaune et en bleu pour illustrer une éventuelle expansion des lagunes et les zones tampons, la carte sera modifiée pour indiquer un seul bloc de terrain à annexer à la Municipalité de Casselman, sans référence explicite à l'expansion des lagunes.
>
> En espérant que ces ajustements sauront répondre à vos préoccupations, je vous souhaite une excellente semaine.
>
> Cordialement,
>
> **Yves Morrissette**
>
> **Directeur général / CAO**

Municipalité de/Municipality of Casselman

751 rue St. Jean Street

C.P./P.O. Box 710

Casselman, ON

K0A 1M0

Tel: (613) 764-3139 Poste / Ext: 203

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ymorrissette@casselman.ca
www.casselman.ca

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From: [redacted]
Sent: August 18, 2025 10:19 AM
To: Yves Morrissette <ymorrissette@casselman.ca>; nbialik@jlrichards.ca; jmorrissette@jlrichards.ca; [redacted]
Cc: [redacted]
Pierre-Paul Beauchamp <ppbeauchamp@casselman.ca>; Sebastien Dion <sdion@casselman.ca>; [redacted] Francine Leblanc <fleblanc@casselman.ca>; paul groulx <pgroulx@casselman.ca>; Geneviève Lajoie <glajoie@casselman.ca>; Sylvain Cléroux <scleroux@casselman.ca> [redacted]

[redacted];

Subject: Re: FW: Casselman Lagoon Class EA - Notice of Public Open House (Information Centre) No. 2

Bonjour M. Yves Morrissette, suivi sur notre demande, point 3 à mon dernier courriel du 15 juillet 2025:

1. Finalement, l'approche privilégiée pour augmenter la capacité du système de traitement d'eaux usées de la municipalité de Casselman indique clairement que seulement les infrastructures existantes seront utilisées et améliorées pour atteindre les objectifs de croissance de la municipalité de Casselman. En toute humilité, je vous demande M. Yves Morrissette, de modifier les plans d'ingénierie de JL Richards qui indiquent clairement qu'une grande partie de nos terres agricoles font partie d'un "Lagoon - Expansion" et "Lagoon Buffer Area". Si l'approche privilégiée est possible et viable, la municipalité de Casselman n'a pas besoin de nos terres agricoles, donc pas besoin des identifier comme "Lagoon - Expansion" et "Lagoon Buffer Area".

Je demeure disponible pour en discuter plus longuement avec vous et votre équipe d'ingénierie chez J.L.Richards.

J'attends de vos nouvelles et une possible date de rencontre pour modifier les plans de J.L. Richards qui identifient une grande partie de nos terres agricoles comme "Lagoon - Expansion" et "Lagoon Buffer Area"

Bonne journée!

[redacted]

[redacted]

On Tue, Jul 15, 2025 at 11:32 AM [redacted] wrote:

> Bonjour M. Morrissette!

En premier lieu, merci à vous M. Yves Morrissette, ainsi qu'à Mme Leblanc, M. Beauchamp ainsi qu'à votre équipe chez JL Richards pour votre présence et accueil à cette 2ème séance d'information publique en ce qui concerne l'agrandissement du système de traitement des eaux usées de la municipalité de Casselman qui a eu lieu le jeudi 10 juillet à la salle communautaire Deguire à Casselman.

Deuxièmement, un gros merci à vous et à M. Jordan Morrissette chez JL Richards pour vos explications et la mise à jour sur la solution privilégiée pour l'agrandissement du système de traitement des eaux usées de la municipalité de Casselman.

Je crois sincèrement que votre approche, qui inclut le **maintien du système de traitement par lagunes; l'augmentation de la capacité nominale et l'extension de la période de déversement pour qu'elle soit possible toute l'année** est viable et responsable pour la municipalité de Casselman, ses résidents et les agriculteurs concernés.

Cependant M. Morrissette, merci de prendre note des 3 points suivants:

1. Pour augmenter l'efficience du système de traitement actuel, serait-il possible que le système d'aération à la cellule 3 soit fonctionnel 365 jours par année, incluant les mois d'hiver.
2. Vérifier l'étanchéité des lagunes existantes pour éviter un écoulement des eaux plus ou moins propres des lagunes sur les terres agricoles adjacentes aux lagunes.
3. Finalement, l'approche privilégiée pour augmenter la capacité du système de traitement d'eaux usées de la municipalité de Casselman indique clairement que seulement les infrastructures existantes seront utilisées et améliorées pour atteindre les objectifs de croissance de la municipalité de Casselman. En toute humilité, je vous demande M. Yves Morrissette, de modifier les plans d'ingénierie de JL Richards qui indiquent clairement qu'une grande partie de nos terres agricoles font partie d'un "Lagoon - Expansion" et "Lagoon Buffer Area". Si l'approche privilégiée est possible et viable, la municipalité de Casselman n'a pas besoin de nos terres agricoles, donc pas besoin des identifier comme "Lagoon - Expansion" et "Lagoon Buffer Area".

Merci pour votre écoute et suivi.

Je vous invite tous et toutes à soumettre vos suggestions et commentaires à M. Yves Morrissette.

Veuillez accepter mes salutations distinguées.

[redacted]

On Mon, Jul 14, 2025 at 11:07 AM Yves Morrissette <ymorrissette@casselman.ca> wrote:

> Bonjour à toutes et à tous,
>
> Vous trouverez en pièces jointes l'information contenue sur les panneaux lors de la séance d'information publique tenue le 10 juillet dernier. Je vous invite à communiquer avec moi pour des questions.
>
> Bonne semaine,
>
> **Yves Morrissette**
>
> **Directeur général / CAO**

Municipalité de/Municipality of Casselman

751 rue St. Jean Street

C.P./P.O. Box 710

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From: Yves Morrissette
Sent: July 9, 2025 3:05 PM
To: [redacted] Sebastien Dion <sdion@casselman.ca>; Clerk casselman <clerk@casselman.ca>; [redacted] Pierre-Paul Beauchamp <ppbeauchamp@casselman.ca>; nbialik@jlrichards.ca; Mireille Groleau <mgroleau@casselman.ca>
Cc: [redacted]
Subject: RE: FW: Casselman Lagoon Class EA - Notice of Public Open House (Information Centre) No. 2

Bonjour à toutes et à tous,

L'avis de séance d'information publique invitait le public à consulter le site web de la Municipalité pour obtenir de l'information supplémentaire, notamment les sections pertinentes du Plan directeur de l'infrastructure de l'eau et des eaux usées – des documents que vous connaissez bien à ce stade. L'objectif était d'offrir aux citoyens un contexte clair en lien avec la tenue de cette séance, puisque celle-ci découle directement des recommandations du plan directeur. Vous pouvez accéder aux documents via l'hyperlien suivant : https://www.casselman.ca/uploads/16953-1.PDF, plus précisément la section 2.6 du document à la page 37.

Je suis désolé si la formulation de l'avis a pu semer une certaine confusion.

Je tiens à vous rassurer que nos intentions demeurent inchangées quant à l'alternative privilégiée, soit l'obtention d'une autorisation pour un déversement en continu. La mention du « Maintien du système de traitement par lagunes… » visait simplement à préciser que la Municipalité n'envisage pas de modifier son mode de traitement – c'est-à-dire qu'il n'est pas question de passer à un système mécanique, mais bien de conserver le système par lagunes.

L'objectif de la séance est de recueillir les commentaires du public à propos du projet de déversement en continu des eaux usées traitées, une approche qui permettrait d'augmenter la capacité de traitement tout en maintenant les installations actuelles.

Au plaisir de vous rencontrer ce jeudi 10 juillet à 18 h, à la Salle communautaire Comptoir populaire Deguire.

Cordialement,

Yves

From: [redacted]
Sent: July 9, 2025 9:20 AM
To: Sebastien Dion <sdion@casselman.ca>; Clerk casselman <clerk@casselman.ca>; [redacted] Pierre-Paul Beauchamp <ppbeauchamp@casselman.ca>; nbialik@jlrichards.ca
Cc: Yves Morrissette <ymorrissette@casselman.ca>; [redacted]

[redacted]

Subject: Fwd: FW: Casselman Lagoon Class EA - Notice of Public Open House (Information Centre) No. 2

Bonjour à vous, selon votre avis de séance d'information publique en ce qui concerne l'agrandissement du système de traitement des eaux usées de la municipalité de Casselman, il y a des informations additionnelles sur le site web de Casselman.....malheureusement je ne trouve pas ces informations.

Svp et merci de me donner accès aux informations en question.

Aussi, merci de préciser vos intentions sur le "Maintien du système de traitement par lagunes"....j'aimerais une confirmation que le "Maintien du système de traitement par lagunes" signifie que le système de traitement actuel (avec améliorations et un déversement en continu des eaux traitées) répond au besoin de la municipalité de Casselman que la municipalité renonce à utiliser nos terres agricoles pour en faire de lagunes additionnels.

J'attends de vos nouvelles!

Bonne journée!

[redacted]

---------- Forwarded message ---------
From: **Yves Morrissette** <ymorrissette@casselman.ca>
Date: Wed, Jun 25, 2025 at 4:25 PM
Subject: FW: Casselman Lagoon Class EA - Notice of Public Open House (Information Centre) No. 2
To: [redacted]

[redacted]

[redacted]

Bonjour à toutes et à tous,

Dans le cadre de mon engagement à vous tenir informés de l'évolution de l'étude environnementale de portée générale Annexe C, je vous transmets cette invitation à participer à une séance d'information publique qui se tiendra le 10 juillet prochain, de 18 h à 20 h, à la salle communautaire Comptoir populaire Deguire.

Cette rencontre a pour objectif de recueillir les commentaires du public sur la solution privilégiée, soit l'option d'un déversement en continu. Pour plus de détails, je vous invite à consulter l'avis en pièce jointe.

L'équipe d'ingénierie sera sur place pour répondre à toutes vos questions.

Cordialement,

Yves Morrissette

Directeur général / CAO

Municipalité de/Municipality of Casselman

751 rue St. Jean Street

C.P./P.O. Box 710

Casselman, ON

K0A 1M0

Tel: (613) 764-3139 Poste / Ext: 203

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ymorrissette@casselman.ca
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From: Kevin Cortez <kcortez@jlrichards.ca>
Sent: June 25, 2025 3:54 PM
Cc: Pierre-Paul Beauchamp <ppbeauchamp@casselman.ca>; Yves Morrissette <ymorrissette@casselman.ca>; Jordan Morrissette <jmorrissette@jlrichards.ca>; Nick Bialik <nbialik@jlrichards.ca>
Subject: Casselman Lagoon Class EA - Notice of Public Open House (Information Centre) No. 2

Good afternoon,

This email is intended to notify you of an upcoming Public Open House (PIC) where the public, agencies and indigenous communities will have the opportunity to learn more about the above-noted study and have further opportunity to provide feedback. The Open House (PIC No. 2) will be held the evening of July 10, 2025, at the Deguire Casselman Community Hall, as described in the attached notice.

Feedback received during PIC No. 1, held on April 3, 2024, helped identify the following preferred solution for the Casselman Sewage Treatment System (STS): ***Maintain Lagoon-Based Treatment System; Expand Lagoon Rated Capacity; Expand Lagoon Discharge Window to Year-Round.***

PIC No. 2 will identify and solicit feedback on the preferred design concept for the preferred solution. This PIC will summarize the alternative design concepts considered and the evaluation process undertaken to develop the preferred design concept, as well as review potential phasing of the proposed upgrades.

If you have any questions or concerns, please do not hesitate to contact the undersigned.

Best,

Kevin Cortez, M.Eng., P.Eng.
Environmental Engineer

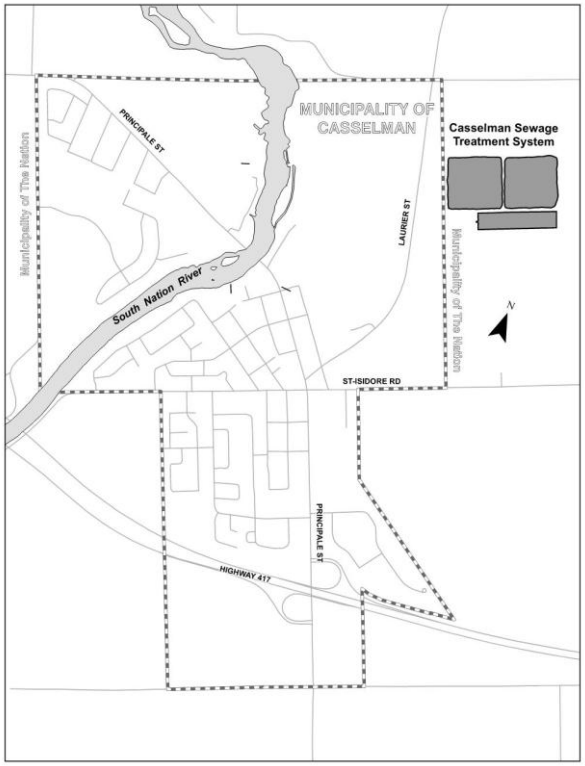
1000-343 Preston Street
Ottawa ON K1S 1N4
Work: 343-803-4074
kcortez@jlrichards.ca

Appendix F7

Study Notice of Completion

Notice of Completion

Municipality of Casselman
Casselman Sewage Treatment System
Schedule 'C' Class Environmental Assessment
Issue Date: March 12, 2026



The Municipality of Casselman (Municipality) has completed a Schedule 'C' Municipal Class Environmental Assessment (Class EA) for the Casselman Sewage Treatment System. The purpose of this Class EA was to provide recommendations on the preferred system upgrades to effectively treat wastewater generated from existing and projected future development areas.

This study was conducted according to the requirements of Phases 1 to 4 of the Municipal Engineers Association Municipal Class EA process, which is an approved process under the Environmental Assessment Act. The final Environmental Study Report demonstrates a sufficient level of investigation, consultation, and documentation to fulfill the requirements of a Schedule 'C' Class EA.

The preferred design concept for the Casselman Sewage Treatment System, as outlined in the Environmental Study Report, includes increasing the rated capacity of the existing lagoon-based treatment system to 4,050 m^3/day through the following:

- Expand effluent discharge window (year-round with monthly maximum discharge flows);
- Addition of floating baffles within lagoon Cell 'A' and Cell 'B';
- New connection between lagoon Cell 'A' and the Moving Bed Biofilm Reactor to enhance the ability of the Moving Bed Biofilm Reactor to maintain treatment capacity over entire year;
- Keep existing Moving Bed Biofilm Reactor, but increase aeration capacity to enhance biological treatment;
- Addition of second similar disc filter to be operated in parallel with existing disc filter for enhanced tertiary filtration capacity and redundancy;
- Addition of high-pressure cleaning system to existing disc filter;
- Addition of a UV disinfection system downstream of disc filters for tertiary disinfection, especially during summer months;
- Participation in the South Nation Conservation's Total Phosphorous Management program for the offset to Total Phosphorous beyond an effluent concentration of 0.50 mg/L; and
- Construction of a building expansion to the west of the existing Disc Filter building, to house the new disc filter and UV disinfection system.

Through issuance of this Notice, the Environmental Study Report is being placed on public record for thirty (30) calendar days in accordance with the requirements of the Municipal Class EA process. The Environmental Study Report is being made available on the Municipality's website through the following link: https://www.casselman.ca/en/my-municipality/administration/plans-reports-and-studies.

The report will also be available for review during normal business hours (Monday to Friday, 8:00 a.m. to 4:00 p.m.) at the Town Hall front desk, located at 751 St-Jean Street, Casselman, ON.

Interested persons may review this document and provide written comments on the proposed project to the Municipality within thirty (30) calendar days of issuance of this notice (by April 12, 2026). Comments should be directed to Nicolas Bialik of J.L. Richards & Associates Limited and Yves Morrissette of the Municipality of Casselman, whose contact information is provided below. Any information collected during the review period will be managed in accordance with the Freedom of Information and Protection Act. Except for personal information, all comments received by the Municipality will become part of the public record.

Nicolas Bialik, P.Eng.
Environmental Engineer
J.L. Richards & Associates Ltd.
nbialik@jlrichards.ca
Phone: 343-804-5346

Yves Morrissette
Chief Administrative Officer
Municipality of Casselman
ymorrissette@casselman.ca
Phone: 613-764-3139 ext. 203

In addition, a request may be made to the Ministry of the Environment, Conservation, and Parks for an order imposing additional conditions or requiring an individual environmental assessment on the grounds that the requested order may prevent, mitigate, or remedy adverse impacts on constitutionally protected Aboriginal and treaty rights. Requests should include your full name and contact information.

To ensure that the Ministry can efficiently begin reviewing the request, requests should specify what kind of order is being requested (additional conditions or an individual environmental assessment), how an order may prevent, mitigate, or remedy potential adverse impacts, and any information in support of the statements in the request. Please visit the Ministry's website for more information on requests for orders under section 16 of the Environmental Assessment Act at: https://www.ontario.ca/page/class-environmental-assessments-section-16-order. The request should be sent in writing or by e-mail to:

Minister of the Environment, Conservation and Parks	Director, Environmental Assessment Branch
Ministry of the Environment, Conservation and Parks 777 Bay Street, 5th Floor Toronto, ON M7A 2J3 minister.mecp@ontario.ca	Ministry of the Environment, Conservation and Parks 135 St. Clair Ave. W, 1st Floor Toronto, ON M4V 1P5 EABDirector@ontario.ca

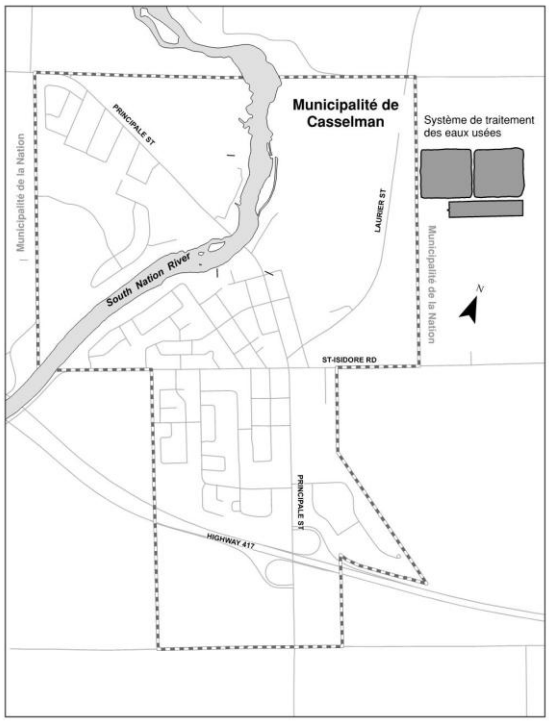
Requests to the Ministry should also be sent to Nicolas Bialik of J.L. Richards & Associates Limited and Yves Morrissette of the Municipality of Casselman by mail or by e-mail (see above contact information). All personal information included in your Section 16 Order request – such as name, address, telephone number and property location – is collected, under the authority of section 30 of the Environmental Assessment Act and is maintained for the purpose of creating a record that is available to the general public. As this information is collected for the purpose of a public record, the protection of personal information provided in the Freedom of Information and Protection of Privacy Act (FIPPA) does not apply (s.37). Personal information you submit will become part of a public record that is available to the public unless you request that your personal information remain confidential.

Subject to comments received as a result of this Notice, Section 16 orders, funding opportunities and the receipt of necessary approvals, the Municipality may then proceed with the proposed works.

This Notice is issued on **March 12, 2026.**

Avis d’achèvement d’étude

La Municipalité de Casselman
Système de traitement d’eaux usées de Casselman
Étude environnementale de portée générale, annexe C
Date d’émission: 12 mars 2026



La Municipalité de Casselman (la Municipalité) a terminé une évaluation environnementale (ÉE) de portée générale, annexe C, pour le système de traitement des eaux usées de Casselman. L’objectif de cette ÉE était de formuler des recommandations concernant les améliorations privilégiées du système afin de traiter efficacement les eaux usées générées par les secteurs de développement existants et futurs prévus. Cette étude a été réalisée conformément aux exigences des phases 1 à 4 du processus d’ÉE municipale de portée générale, qui est un processus approuvé en vertu de la Loi sur les évaluations environnementales. Le rapport d’étude environnementale démontre un niveau suffisant d’enquête, de consultation et de documentation pour satisfaire aux exigences d’une évaluation environnementale annexe C.

Le concept privilégié pour le système de traitement des eaux usées de Casselman, tel qu’il est présenté dans le rapport d’étude environnementale, prévoit l’augmentation de la capacité nominale du système de traitement à **4,050 m³/jour** grâce aux mesures suivantes:

- Élargissement de la fenêtre de décharge de l’effluent (toute l’année, avec des débits mensuels maximaux).
- Ajout de cloisons flottantes dans les cellules de lagune A and B.
- Nouvelle connexion entre la cellule de lagune A et le réacteur biologique à lit mobile (en anglais, « Moving Bed Biofilm Reactor » ou « MBBR ») afin d’améliorer la capacité du MBBR à maintenir son rendement de traitement tout au long de l’année.
- Augmentation de la capacité d’aération pour renforcer le traitement biologique du MBBR.
- Ajout d’un deuxième filtre à disques, similaire au filtre existant, fonctionnant en parallèle pour accroître la capacité de filtration tertiaire et assurer une redondance.
- Ajout d’un système de nettoyage à haute pression au filtre à disques existant.
- Ajout d’un système de désinfection par rayonnement ultraviolet (UV) en aval des filtres à disques pour la désinfection tertiaire, particulièrement durant les mois d’été.
- Participation au programme de gestion du phosphore total de la Conservation de la Nation Sud afin de compenser les charges de phosphore total dépassant une concentration d’effluent de 0,50 mg/L.
- Construction d’une extension du bâtiment à l’ouest du bâtiment actuel des filtres à disques, afin d’y loger le nouveau filtre à disque et le système de désinfection UV.

Par cet avis, le rapport d’étude environnementale sera placé en dossier public pour une période d’examen de trente (30) jours conformément aux exigences du processus de l’ÉE de portée générale. Le rapport sera disponible pour revue publique sur le site Web du Casselman (https://www.casselman.ca/fr/ma-ville/administration/plans-rapports-et-etudes) et sera également

disponible pendant les heures normales d'ouverture (du lundi au vendredi, de 8h00 à 16h00) à l'hôtel de ville, 751 St-Jean Street, Casselman, ON.

Les personnes intéressées peuvent consulter ce document et fournir des commentaires écrits sur le projet (au plus tard le **12 avril 2026**). Les commentaires doivent être adressés à Nicolas Bialik de J.L. Richards & Associates Limited et à Yves Morrissette de la Municipalité de Casselman, dont les coordonnées sont fournies ci-dessous. Toutes les informations recueillies au cours de la période d'examen seront gérées conformément à la Loi sur l'accès à l'information et la protection de la vie privée. À l'exception de l'information personnelle, tous les commentaires reçus par la municipalité feront partie du dossier public.

Nicolas Bialik, P.Eng.
Ingénieur en environnement
J.L. Richards & Associates Ltd.
nbialik@jlrichards.ca
Tél.: 343-804-5346

Yves Morrissette
Directeur général
Municipalité de Casselman
ymorrissette@casselman.ca
Tél.: 613-764-3139, poste 203

De plus, une demande peut être présentée au ministère de l'Environnement, de la Protection de la nature et des Parcs en vue d'obtenir un arrêté imposant des conditions supplémentaires ou exigeant une évaluation environnementale individuelle au motif que l'arrêté demandé peut prévenir, atténuer ou remédier aux effets préjudiciables sur les droits ancestraux et issus de traités protégés par la Constitution. Les demandes doivent inclure votre nom complet et vos coordonnées.

Pour s'assurer que le ministère peut examiner la demande avec efficacité, les demandes doivent préciser le type d'ordonnance demandée (conditions supplémentaires ou évaluation environnementale individuelle), la façon dont une ordonnance peut prévenir, atténuer ou remédier aux effets négatifs potentiels, ainsi que tout renseignement à l'appui des énoncés de la demande. Veuillez consulter le site Web du ministère pour obtenir de plus amples renseignements sur les demandes d'ordonnances en vertu de l'article 16 de la Loi sur les évaluations environnementales à l'adresse suivante : Évaluations environnementales de portée générale : arrêté pris en vertu de l'article 16 | ontario.ca. La demande doit être envoyée par écrit ou par courriel aux adresses suivante :

Ministre de l'Environnement, de la Protection de la nature et des Parcs	Directeur, Direction de l'évaluation environnementale
Ministère de l'Environnement, de la Protection de la nature et des Parcs 777, rue Bay, 5e étage Toronto, ON M7A 2J3 minister.mecp@ontario.ca	Ministère de l'Environnement, de la Protection de la nature et des Parcs 135, avenue St. Clair Ouest, 1er étage Toronto, ON M4V 1P5 EABDirector@ontario.ca

Les demandes au ministère doivent également être envoyées à Nicolas Bialik de J.L. Richards & Associates Limited et à Yves Morrissette de la Municipalité de Casselman par la poste ou par courriel (voir les coordonnées ci-dessus). Tous les renseignements personnels inclus dans votre demande d'ordonnance en vertu de l'article 16 – tels que le nom, l'adresse, le numéro de téléphone et l'emplacement de la propriété – sont recueillis, en vertu de l'article 30 de la Loi sur les évaluations environnementales, et sont conservés dans le but de créer un dossier qui est accessible au grand public. Étant donné que ces renseignements sont recueillis aux fins d'un dossier public, la protection des renseignements personnels prévue par la Loi sur l'accès à l'information et la protection de la vie privée ne s'applique pas (art. 37). Les renseignements personnels que vous soumettez feront partie d'un dossier public accessible au public, à moins que vous ne demandiez que vos renseignements personnels demeurent confidentiels.

Sous réserve des commentaires reçus à la suite du présent avis, des ordonnances en vertu de l'article 16, des possibilités de financement et de l'obtention des approbations nécessaires, la municipalité peut aller de l'avant avec les travaux proposés.

Le présent avis est publié le **12 mars 2026**.

Appendix G

Phasing Studies

Appendix G1

Updated Assimilative Capacity Study
(Blue Sky, 2025)

Final Report
Updated Assimilative Capacity Study to Support an Interim Capacity Increase of the Casselman WWTS

July 31, 2025

Prepared for:
J.L. Richards & Associates Limited
343 Preston Street
Tower II, Suite 1000
Ottawa, Ontario K1S 1N4

Attention: Jordan Morrissette, M.Eng., P.Eng.

Submitted by:

BLUE SKY Energy Engineering & Consulting Inc.
4826 Derrydown Drive, Mississauga, ON, L5J 7J7
647.721.7644
melody@bskyeng.com
www.bskyeng.com

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Appendix B – Correspondence with MECP regarding 2024 ACS (February 2024)

Appendix C – Correspondence with MECP regarding Effluent TP Requirements and Potential Offsetting (May to June 2025)

Appendix D – Updated CORMIX Modelling Details

1. Introduction

1.1 Overview

A Class Environmental Assessment (Class EA) study is underway to determine the most cost effective and environmentally sustainable approach to increasing wastewater servicing capacity to meet future growth needs in Casselman. An assimilative capacity study (ACS) of the South Nation River was completed in 2024 to support the Class EA study, and defined effluent discharge flow and concentration requirements for an expanded capacity of 4,347 m^3/d (including stored precipitation).

Since the approval of the 2024 ACS, options are being investigated to increase the capacity of the Casselman WWTS in a phased approach. Therefore, it is necessary to develop effluent requirements for an interim average day flow (ADF) capacity that will be between the current Environmental Compliance Approval (ECA) capacity of 2,110 m^3/d and the future design capacity of 4,347 m^3/d.

Blue Sky Energy Engineering & Consulting Inc. (Blue Sky), in association with J.L. Richards & Associates Limited (JLR), has been retained to update the ACS.

1.2 Objectives

The specific objectives of this technical memorandum (TM) are to:

- Develop recommendations for future effluent requirements for an interim capacity increase of the Casselman WWTS; and,
- Update CORMIX modelling as required.

2. Background

2.1 Approved Effluent Requirements

The existing Casselman WWTS is a lagoon-based treatment system operated under amended Environmental Compliance Approval (ECA) No. 8160-BAHPRF and has a rated capacity of 2,110 m^3/d. The facility discharges directly to the South Nation River.

Effluent discharge is currently permitted during two seasonal periods, namely:

- Winter/Spring (Jan 1 to May 15): Total allowable discharge volume of 502,500 m^3; and,
- Fall (Oct 1 to Dec 31): Total allowable discharge volume of 267,650 m^3.

In addition to the total seasonal discharge volumes permitted, maximum effluent discharge rates have been defined for each calendar month.

Based on the 2024 ACS (Appendix A) and follow-up correspondence with MECP (Appendix B), effluent requirements have been approved for a future ADF capacity of 4,050 m^3/d (excluding stored precipitation) and 4,347 m^3/d (including stored precipitation).

The approved maximum effluent discharge rates associated with the current ECA and the 2024 ACS are presented in Table 2.1, while the concentration objectives and limits are presented in Table 2.2.

In addition to the above, the ECA and 2024 ACS specified parameter loading limits. These are summarized in Table 2.3, and are based on the concentration limit (Table 2.2) and total allowable discharge volumes during each discharge period.

Table 2.1 – Currently Approved Maximum Monthly Effluent Discharge Rates – ECA Capacity (2,110 m^3/d) and 2024 ACS Capacity (4,347 m^3/d)

Discharge Period	Maximum Discharge Rate – ECA Rated Capacity (2,110 m^3/d)	Maximum Discharge Rate – 2024 ACS Capacity (4,347 m^3/d)
Jan 1 – 31	5,000 m^3/d	5,750 m^3/d
Feb 1 – 28/29	5,000 m^3/d	5,600 m^3/d
Mar 1 – 31	5,000 m^3/d	7,250 m^3/d
Apr 1 – 30	7,000 m^3/d	10,000 m^3/d
May 1 – 15	7,000 m^3/d	4,500 m^3/d
May 16 – 31	–	4,500 m^3/d
June 1 – 30	–	2,150 m^3/d
Jul 1 – 31	–	1,050 m^3/d
Aug 1 – 31	–	900 m^3/d
Sep 1 – 30	–	910 m^3/d
Oct 1 – 31	4,000 m^3/d	2,250 m^3/d
Nov 1 – 30	4,000 m^3/d	6,050 m^3/d
Dec 1 – 31	5,000 m^3/d	8,750 m^3/d

Table 2.2 – Currently Approved Effluent Objectives and Limits – ECA Capacity (2,110 m^3/d) and 2024 ACS Capacity (4,347 m^3/d)

Parameter	Current ECA Capacity (2,110 m^3/d)		2024 ACS Capacity (4,347 m^3/d)	
	Objective	Limit	Objective	Limit
$cBOD_5$				
Jan 1 to May 15	15 mg/L	25 mg/L	-	-
Oct 1 to Dec 31	10 mg/L	15 mg/L	-	-
Year-round	-	-	10 mg/L	12 mg/L
TSS				
Jan 1 to May 15	15 mg/L	25 mg/L	-	-
Oct 1 to Dec 31	10 mg/L	25 mg/L	-	-
Year-round	-	-	10 mg/L	12 mg/L
TP	0.8 mg/L	1.0 mg/L	0.20 mg/L	0.30 mg/L
TAN				
Jan 1 to Mar 31	12.0 mg/L	12.0 mg/L	9.2 mg/L	11.5 mg/L
Apr 1 to May 15	6.0 mg/L	6.0 mg/L	4.8 mg/L	6.0 mg/L
May 16 to 31	-	-	4.8 mg/L	6.0 mg/L
Jun 1 to Sep 30	-	-	1.0 mg/L	1.3 mg/L
Oct 1 to Nov 30	5.0 mg/L	5.0 mg/L	5.0 mg/L	5.0 mg/L
Dec 1 to Dec 31	12.0 mg/L	12.0 mg/L	9.2 mg/L	11.5 mg/L
E. coli	150 CFU/100 mL	200 CFU/100 mL	150 CFU/100 mL	200 CFU/100 mL
pH	6.8 to 7.8	6.0 to 8.0	6.8 to 7.8	6.0 to 8.0

Notes:

$cBOD_5$ – 5-day biochemical oxygen demand

TSS – total suspended solids

TP – total phosphorus

1. Averaging period monthly for all parameters with the exception of E. coli, which is based on monthly geometric mean, and pH, which is based on single sample results.

Table 2.3 – Currently Approved Effluent Loading Limits – ECA Capacity (2,110 m^3/d) and 2024 ACS Capacity (4,347 m^3/d)

Parameter	Current ECA Capacity (2,110 m^3/d)	2024 ACS Capacity (4,347 m^3/d)
$cBOD_5$		
Jan 1 to May 15	93.06 kg/d	-
Oct 1 to Dec 31	43.64 kg/d	-
Annual	-	52.5 kg/d
TSS		
Jan 1 to May 15	93.06 kg/d	-
Oct 1 to Dec 31	72.73 kg/d	-
Annual	-	52.5 kg/d
TP		
Jan 1 to May 15	3.73 kg/d	-
Oct 1 to Dec 31	2.91 kg/d	-
Annual	-	1.31 kg/d
TAN		
Jan	44.67 kg/d	66.1 kg/d
Feb	44.67 kg/d	64.4 kg/d
Mar	44.67 kg/d	83.4 kg/d
Apr	22.33 kg/d	60.0 kg/d
May	22.33 kg/d (1)	21.0 kg/d
Jun	-	2.80 kg/d
Jul	-	1.37 kg/d
Aug	-	1.17 kg/d
Sep	-	1.18 kg/d
Oct	14.55 kg/d	11.3 kg/d
Nov	14.55 kg/d	30.3 kg/d
Dec	34.89 kg/d	100.6 kg/d

Notes:
1. May 1 to 15. No discharge permitted May 16 to 31.

2.2 Existing Outfall Configuration

The existing outfall is a 500 to 525 mm diameter pipe discharging approximately 75 m off the east bank of the South Nation River via a two-port diffuser. An as-built drawing of the outfall (dated 1978) is shown in Figure 2.1. The existing outfall will be used for the expanded Casselman WWTS.

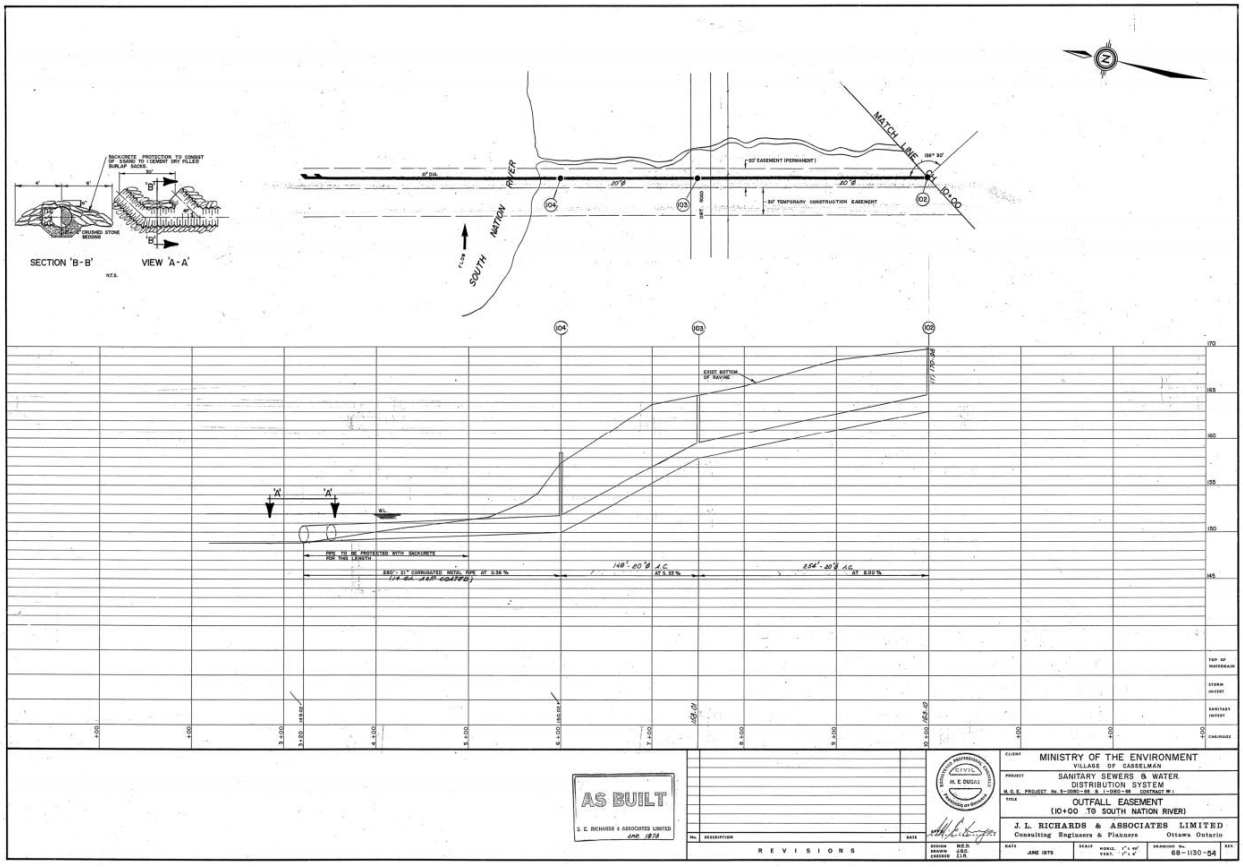


Figure 2.1 – As-Built Drawing of Existing Outfall

2.3 Available Data and Ambient Conditions

A summary of the available water quality and flow data for the South Nation River in the vicinity of the Casselman WWTS is provided in Section 2.3 of the 2024 ACS (see Appendix A).

Ambient water quality and low flow analyses are presented in Section 3 of the 2024 ACS (see Appendix A).

3. Determination of Effluent Limits for the Interim ADF Capacity

3.1 Methodology

The development of maximum effluent discharge rates, concentration targets and loading limits for the Interim ADF capacity was based on the methodology previously approved as part of the 2024 ACS, and consists of the following:

- The impact of stored precipitation in the lagoons to be considered on total discharge volume requirements. Based on an analysis of monthly precipitation / evaporation rates, the existing lagoon cells would contribute the equivalent of 297 m^3/d of stored precipitation. Therefore, two Interim ADF values are defined: raw wastewater volumetric flow, excluding precipitation; and, total discharge volumetric flow, including precipitation.
- Monthly discharge volumes to consider maintaining adequate dilution ratios (minimum value of 10 : 1), ensuring reasonable downstream fully-mixed water quality, and providing allowances for WWTS operational flexibility. To achieve this, the maximum discharge rate for each calendar month will be equal to or less than the value approved as part of the 2024 ACS.
- Allow the effluent discharge period to be expanded to year-round discharge. This approach was approved as part of the 2024 ACS and eliminates the need for additional effluent storage lagoon volume. For the purposes of developing effluent discharge rates for the Interim ADF over the period May to September, effluent discharge rates and parameter concentrations / loadings will be set to values at or below those approved in the 2024 ACS.
- For the cold weather periods (October to April), ensure that concentration limits for $cBOD_5$, TSS and TAN are equal to or less than the existing ECA limits, as appropriate.
- The Interim ADF needs to also consider the operation and capacity of the existing moving bed biofilm reactor (MBBR) system. To accomplish this, the development of Interim ADF discharge rates and effluent objectives / limits will consider the treatment capacity of the existing MBBR system as provided by Veolia, specifically with respect to nitrification performance at various operating temperatures.
- Utilize a mass-balance approach to ensure downstream, fully-mixed seasonal UIA concentrations remain at or below the PWQO at ambient (75^{th} percentile) concentrations and low (7Q20) flows. Proposed effluent TAN targets will also ensure non-toxicity at end-of-pipe.
- Nitrate is not currently a parameter of concern for the South Nation River. As a result, consistent with the approved 2024 ACS, no effluent nitrate targets will be proposed.
- Maintain effluent E. coli and pH objectives and limits that are consistent with the approved 2024 ACS.
- Evaluate and develop TP concentration and loading limits based on the results of the 2024 ACS as well as subsequent correspondence with MECP (see Appendix C).

Consistent with the approved 2024 ACS, the seasonal impact of TAN on the South Nation River was assessed assuming the following seasonal periods:

- Winter: December 1 to March 31
- Spring: April 1 to May 31
- Summer: June 1 to September 30
- Fall: October 1 to November 30

3.2 Maximum Effluent Discharge Rates

The proposed maximum effluent discharge rates and associated minimum dilution ratios for the Interim ADF are presented in Table 3.1. The approved maximum effluent discharge rates from 2024 ACS and the current ECA are also shown for comparison purposes.

Table 3.1 – Proposed Maximum Monthly Effluent Discharge Rates and Minimum Dilution Ratios at the Interim ADF Capacity

Month	Proposed Interim ADF Maximum Discharge Rate	Proposed Minimum Dilution Ratio	2024 ACS Maximum Discharge Rate	Current ECA Maximum Discharge Rate
January	5,000 m^3/d	14.3	5,750 m^3/d	5,000 m^3/d
February	5,000 m^3/d	13.9	5,600 m^3/d	5,000 m^3/d
March	5,000 m^3/d	17.9	7,250 m^3/d	5,000 m^3/d
April	7,000 m^3/d	104.2	10,000 m^3/d	7,000 m^3/d
May	4,500 m^3/d	40.5	4,500 m^3/d	7,000 m^3/d (1)
June	2,150 m^3/d	26.2	2,150 m^3/d	–
July	1,050 m^3/d	26.2	1,050 m^3/d	–
August	900 m^3/d	26.3	900 m^3/d	–
September	910 m^3/d	26.2	910 m^3/d	–
October	2,250 m^3/d	13.1	2,250 m^3/d	4,000 m^3/d
November	6,050 m^3/d	13.1	6,050 m^3/d	4,000 m^3/d
December	5,000 m^3/d	27.0	8,750 m^3/d	5,000 m^3/d

Notes:
1. May 1 – 15. The current ECA does not allow effluent discharge over the period May 16 – 31.

The proposed effluent discharge rates result in dilution ratios above the minimum design value of 10 : 1. Assuming that the upgraded Casselman WWTS discharges effluent at the maximum proposed discharge rates for all days each calendar month, a total annual volume of 1,358,000 m^3 could be discharged (equivalent to an average day flow of 3,720 m^3/d, including precipitation).

3.3 Effluent $cBOD_5$

As noted in the 2024 ACS, there are no PWQO or CWQG targets specified for $cBOD_5$. However, the presence of carbonaceous and nitrogenous biochemical oxygen demand (cBOD and nBOD, respectively) can affect downstream DO concentrations.

An assessment of ambient water quality (see Appendix A) concluded that the South Nation River is Policy 1 for DO, with historical 25th percentile concentrations at least 2.2 mg/L greater than the PWQO for all months. Furthermore, the available ambient BOD_5 concentration (ambient 75th percentile of 4.0 mg/L) suggest low background concentrations of oxygen depleting constituents.

As per Table 3.1, the proposed effluent discharge rates are consistent with or lower than the 2024 ACS over the Spring (April to May), Summer (June to September) and Fall (October to November) periods. Therefore, the 2024 ACS $cBOD_5$ requirements of 10 mg/L (design objective) and 12 mg/L (design limit) are proposed for Spring, Summer and Fall.

The proposed effluent discharge rates are consistent with the current ECA requirements for the Winter period (December to March). Therefore, the most stringent $cBOD_5$ requirements from the existing ECA over this seasonal period are proposed for the Winter season, namely 10 mg/L (design objective) and 15 mg/L (design limit).

3.4 Effluent Total Suspended Solids

As noted in the 2024 ACS, there is no PWQO target specified for TSS. The CWQG recommends a maximum short-term (< 24 h period) increase of 25 mg/L above background, and a maximum increase of 5 mg/L over long-term exposures (up to 30 days).

The proposed TSS requirements associated with TSS were developed using the approach presented above for $cBOD_5$. This results in proposed effluent TSS targets of 10 mg/L (design objective) and 12 mg/L (design limit) for Spring, Summer and Fall, and 10 mg/L (design objective) and 15 mg/L (design limit) for Winter.

3.5 Effluent Total Phosphorus

The South Nation River was determined to be Policy 2 for TP (see Appendix A) and, therefore, ambient (75th percentile) concentrations exceed the PWQO of 0.030 mg/L. Effluent requirements approved as part of the 2024 ACS for a rated capacity of 4,374 m^3/d including precipitation were: annual concentration limit of 0.30 mg/L; annual concentration objective of 0.20 mg/L; and, loading limit of 1.31 kg/d (476 kg/year). See Appendix A and Appendix B for details.

To accommodate the Interim ADF, expanding the discharge window over the period May 16 to September 30 is proposed (see Table 3.1). This expansion of the discharge window, and associated maximum discharge rates, are the same as those approved as part of the 2024 ACS. Therefore, to maintain approved loading limits and downstream concentration impacts over the period May to September, it is proposed that the TP concentration targets for the Interim ADF be set to the 2024 ACS approved values of 0.30 mg/L (limit) and 0.20 mg/L (objective). This is also consistent with feedback provided by MECP with respect to the potential for implementing a phosphorus offsetting program for the Casselman WWTS (see Appendix C).

With respect to the period October to April, months within the existing ECA approved discharge window, it is proposed that the effluent TP concentration targets be set to 0.35 mg/L (limit) and 0.25 mg/L (objective). This is substantially less than the current ECA targets (1.0 mg/L limit, 0.8 mg/L objective), and results in fully mixed TP concentration increases of no more than 13.4% above ambient (see Table 3.2).

With respect to TP loading, the above proposed effluent limits (0.30 mg/L May to September; 0.35 mg/L October to April) combined with the anticipated monthly average flow through the MBBR system (see Table 3.4 in Section 3.9) result in an annual TP loading limit of 410 kg/year (1.12 kg/d) based on an annual effluent discharge rate of 3,316 m^3/d (including precipitation). This TP loading limit is less than the value of 476 kg/year (1.31 kg/d) approved by MECP as part of the 2024 ACS.

Table 3.2 – Fully Mixed TP Concentration Under Proposed Effluent TP Limits and Maximum Monthly Effluent Discharge Rates

Month	Proposed Limit (mg/L)	Seasonal Ambient TP (1) (mg/L)	Fully-Mixed TP (mg/L)	Increase Above Ambient TP (%)	Change from Approved 2024 ACS in Increase Above Ambient TP Cocnentration
Jan	0.35	0.185	0.194	5.5	Higher than the 2024 ACS value of 4.4%
Feb	0.35	0.185	0.194	5.7	Higher than the 2024 ACS value of 4.4%
Mar	0.35	0.185	0.194	4.5	Same as the 2024 ACS value of 4.5%
Apr	0.35	0.110	0.113	2.0	Lower than the 2024 ACS value of 2.3%
May	0.30	0.110	0.115	4.0	No change
Jun	0.30	0.120	0.127	5.2	No change
Jul	0.30	0.120	0.127	5.2	No change
Aug	0.30	0.120	0.127	5.2	No change
Sep	0.30	0.120	0.127	5.2	No change
Oct	0.35	0.110	0.124	13.4	Higher than the 2024 ACS value of 10.9%
Nov	0.35	0.110	0.123	13.4	Higher than the 2024 ACS value of 10.9%
Dec	0.35	0.185	0.194	3.8	Lower than the 2024 ACS value of 4.4%

Notes:

1. See Appendix A for determination of ambient TP concentrations.

3.6 Effluent Total Ammonia Nitrogen

In developing TAN limits, two factors were considered: ensuring non-toxic effluent at end-of-pipe, and ensuring downstream conditions within the South Nation River meet the PWQO un-ionized ammonia (UIA) limit of 20 µg/L as NH_3 (16 µg/L as N).

Ambient water quality and end-of-pipe conditions are defined in the 2024 ACS. For the purposes of developing effluent targets for the Interim ADF capacity, the proposed effluent discharge rates were used as a basis for selecting effluent TAN targets:

- Seasons for which the proposed maximum effluent discharge rates (Table 3.1) are consistent with the current ECA (i.e. Winter), the current ECA TAN requirements are proposed.

- Seasons for which the proposed maximum effluent discharge rates (Table 3.1) are consistent with the 2024 ACS (i.e. Spring, Summer, Fall), the approved 2024 ACS TAN requirements are proposed.

A summary of the fully mixed un-ionized ammonia concentrations under the proposed effluent TAN limits and discharge rates associated with the Interim ADF are presented in Table 4.3. Under the proposed compliance limits, downstream fully-mixed UIA concentrations remain under the PWQO for all seasons.

In addition to the limits proposed in Table 3.3, it is proposed that the seasonal effluent objectives be consistent with the current ECA objective for the Winter months (12 mg/L), and with the approved 2024 ACS for the warmer weather periods (4.8 mg/L for Spring, 1.0 mg/L for Summer, and 4.0 mg/L for Fall).

Table 3.3 – Fully Mixed Un-ionized Ammonia Under Proposed Effluent TAN Limits and Effluent Discharge Rates for the Interim ADF

Month	Effluent TAN Limit (mg/L as N)	Seasonal Ambient UIA [1] (µg/L as NH_3)	Seasonal Dissociation Ratio [1] (%)	Fully-Mixed UIA (µg/L as NH_3)
January	12.0 [2]	1.74	1.8	17.7
February	12.0 [2]	1.74	1.8	13.9
March	12.0 [2]	1.74	1.8	14.6
April	6.0 [3]	6.19	8.0	13.4
May	6.0 [3]	6.19	8.0	19.4
June	1.3 [3]	12.74	14.3	19.4
July	1.3 [3]	12.74	14.3	19.4
August	1.3 [3]	12.74	14.3	19.3
September	1.3 [3]	12.74	14.3	19.4
October	5.0 [3]	2.73	4.1	19.3
November	5.0 [3]	2.73	4.1	19.3
December	12.0 [2]	1.74	1.8	10.2

Notes:

1. See Appendix A for details regarding the development of ambient UIA concentrations and seasonal dissociation ratios.
2. Proposed TAN limit consistent with current ECA limit over the period December to March.
3. Proposed TAN limit consistent with approved 2024 ACS limits over the period April to November.

3.7 Effluent E. coli

A year-round E. coli compliance limit of 200 CFU/100 mL and a year-round design objective of 150 CFU/100 mL (based on geometric mean) are proposed for the Interim ADF capacity. This is consistent with the effluent E. coli targets approved in the 2024 ACS.

3.8 Effluent pH

A compliance limit pH range of 6.0 to 8.0 is proposed as a single-sample limit, with a corresponding design objective of 6.8 to 7.8. This is consistent with the pH requirements approved in the 2024 ACS.

3.9 Analysis of Existing MBBR System Capacity and Selection of Interim ADF

As the supplier of the existing MBBR system at the Casselman WWTS, Veolia was contacted by JLR to confirm available treatment capacity under varying operating temperatures. Based on the proposed effluent TAN objectives and limits (see Section 3.6), Veolia developed maximum daily and monthly average capacities for the MBBR system, as summarized in Table 3.4.

Table 3.4 – Proposed Maximum Monthly Effluent Discharge Rates and Minimum Dilution Ratios at the Interim ADF Capacity

Month	MBBR System – Maximum Day Flow Capacity [1]	MBBR System– Recommended Average Flow [1]	Proposed Interim ADF Maximum Discharge Rate [2]
January	5,000 m^3/d	3,750 m^3/d	5,000 m^3/d
February	5,000 m^3/d	3,750 m^3/d	5,000 m^3/d
March	5,000 m^3/d	4,250 m^3/d	5,000 m^3/d
April	7,000 m^3/d	7,000 m^3/d	7,000 m^3/d
May	4,500 m^3/d	4,275 m^3/d	4,500 m^3/d
June	2,150 m^3/d	2,043 m^3/d	2,150 m^3/d
July	1,050 m^3/d	998 m^3/d	1,050 m^3/d
August	900 m^3/d	855 m^3/d	900 m^3/d
September	910 m^3/d	865 m^3/d	910 m^3/d
October	2,250 m^3/d	2,138 m^3/d	2,250 m^3/d
November	6,050 m^3/d	5,748 m^3/d	6,050 m^3/d
December	5,000 m^3/d	4,237 m^3/d	5,000 m^3/d
Potential Annual Discharge Volume	**1,358,000 m^3/yr**	**1,210,197 m^3/yr**	**1,358,000 m^3/yr**
Equivalent ADF Capacity	**3,720 m^3/d**	**3,316 m^3/d**	**3,720 m^3/d**

Notes:
1. Information provided by Veolia to JLR.
2. See Table 3.1.

Based on the information presented in Table 3.4, the maximum day flow capacity of the existing MBBR system is equivalent to the proposed Interim ADF maximum discharge rate for all months. In addition, the recommended operating ADF through the MBBR system is equivalent to an ADF capacity of 3,316 m^3/d (representing total discharge rate including stored precipitation). A total annual volume of 1,358,000 m^3 (or an average day flow of 3,720 m^3/d, including precipitation) could be discharged by the Casselman WWTS at the proposed maximum monthly discharge rates (Table 3.1, and shown above in Table 3.4). This provides a 12% safety factor, allowing for flexibility in effluent discharge rates in the event of process upset and/or unanticipated equipment maintenance needs.

Given the above, for the purposes of this ACS Update, the proposed Interim ADF is 3,316 m^3/d including stored precipitation (total volume discharged to the receiver), or 3,019 m^3/d excluding precipitation (influent raw wastewater basis).

4. Mixing Zone Modelling

A CORMIX model was configured and utilized to delineate monthly mixing zones as part of the 2024 ACS. Details can be found in Appendix A.

Since the proposed maximum effluent discharge rates for May to November are consistent with those presented in the 2024 ACS, it was not necessary to update the CORMIX modelling for those months. The proposed effluent maximum effluent discharge rates for the months of December to April are, however, less than those modelled in the 2024 ACS. Therefore, monthly modelling runs were completed for the months of December to April using the calculated monthly 7Q20 flow for the South Nation River (see Appendix A) and proposed monthly maximum discharge rates (Table 3.1). The results are presented in tabular format below, with details provided in Appendix D.

Excluding April, the modelling suggests that fully-mixed conditions are achieved within 175 m or less for all months. During the critical summer discharge period (June to September), fully-mixed conditions are achieved in 80 m or less. These represent relatively small mixing zones, and would result in minimal impact on the South Nation River.

Table 4.1 – Updated Monthly CORMIX Modelling Results

Month	Effluent Flow (m^3/d)	River Flow (m^3/s)	Dilution Ratio	Distance Downstream to Achieve Fully-Mixed Conditions (m)	Notes
January	5,000	0.826	14.3 : 1	82	18 m less than 2024 ACS result of 100 m.
February	5,000	0.802	13.9 : 1	85	15 m less than 2024 ACS result of 100 m.
March	5,000	1.035	17.9 : 1	120	10 m less than 2024 ACS result of 130 m.
April	7,000	8.442	104.2 : 1	350	25 m less than 2024 ACS result of 375 m.
May	4,500	2.108	40.5 : 1	175	No change from 2024 ACS.
June	2,150	0.652	26.2 : 1	80	No change from 2024 ACS.
July	1,050	0.319	26.2 : 1	75	No change from 2024 ACS.
August	900	0.274	26.3 : 1	80	No change from 2024 ACS.
September	910	0.276	26.2 : 1	80	No change from 2024 ACS.
October	2,250	0.340	13.1 : 1	80	No change from 2024 ACS.
November	6,050	0.918	13.1 : 1	125	No change from 2024 ACS.
December	5,000	1.251	12.4 : 1	119	1 m less than 2024 ACS result of 120 m.

5. Summary

Proposed seasonal effluent discharge rates and associated effluent objectives and limits were developed for an upgraded Casselman WWTS operating at an Interim ADF capacity of 3,316 m^3/d including stored precipitation (total volume discharged to the receiver), or 3,019 m^3/d excluding precipitation (influent raw wastewater basis). These were developed based approved effluent discharge rates and concentration targets as stipulated in the current ECA and 2024 ACS.

The proposed maximum daily effluent discharge rates are presented in Table 5.1 and result in mixing zone lengths consistent with or less than those associated with the approved 2024 ACS. The proposed effluent objectives and limits are presented in Table 5.2. Effluent loadings for $cBOD_5$, TSS, TP and TAN are also summarized in Table 5.3, and are equal to or less than those associated with the approved 2024 ACS.

Table 5.1 – Proposed Maximum Daily Effluent Discharge Rates for an Interim ADF Capacity of 3,316 m^3/d (including stored precipitation)

Date Range	Maximum Daily Discharge Rate
January	5,000 m^3/d
February	5,000 m^3/d
March	5,000 m^3/d
April	7,000 m^3/d
May	4,500 m^3/d
June	2,150 m^3/d
July	1,050 m^3/d
August	900 m^3/d
September	910 m^3/d
October	2,250 m^3/d
November	6,050 m^3/d
December	5,000 m^3/d

Table 5.2 – Proposed Effluent Objectives and Limits for an Interim ADF Capacity of 3,316 m^3/d (including stored precipitation)

Parameter	Averaging Period	Objective (mg/L unless noted otherwise)	Limit (mg/L unless noted otherwise)
$cBOD_5$			
Dec 1 to Mar 31	Monthly	10	15
Apr 1 to Nov 30	Monthly	10	12
TSS			
Dec 1 to Mar 31	Monthly	10	15
Apr 1 to Nov 30	Monthly	10	12
TP			
Oct 1 to Apr 30	Monthly	0.25	0.35
May 1 to Sep 30	Monthly	0.20	0.30
TAN			
Dec 1 to Mar 31	Monthly	12.0	12.0
Apr 1 to May 31	Monthly	4.8	6.0
Jun 1 to Sep 30	Monthly	1.0	1.3
Oct 1 to Nov 30	Monthly	4.0	5.0
E. coli			
May 1 to Oct 31	Monthly	150 CFU/100 mL	200 CFU/100 mL
pH	Single Grab	6.8 to 7.8	6.0 to 8.0

Table 5.3 – Proposed Effluent Loading Limits for an Interim ADF Capacity of 3,316 m^3/d (including stored precipitation)

Parameter	Averaging Period	Proposed Limit (kg/d)	2024 ACS Approved Limit (kg/d)
$cBOD_5$	Annual	43.8 (1)	52.5
TSS	Annual	43.8 (1)	52.5
TP	Annual	1.12 (410 kg/year)	1.31 (476 kg/year)
TAN (2)			
Jan	Monthly	60.0	66.1
Feb	Monthly	60.0	64.4
Mar	Monthly	60.0	83.4
Apr	Monthly	42.0	60.0
May	Monthly	27.0	27.0
Jun	Monthly	2.80	2.80
Jul	Monthly	1.37	1.37
Aug	Monthly	1.17	1.17
Sep	Monthly	1.18	1.18
Oct	Monthly	11.3	11.3
Nov	Monthly	30.3	30.3
Dec	Monthly	60.0	100.6

Notes:

1. Based on projected average operating effluent discharge rates (Table 3.4) and a limit of 15.0 mg/L from Dec 1 to Mar 31, and 12.0 mg/L from Apr 1 to Nov 30.
2. Based on projected average operating effluent discharge rates (Table 3.4) and a limit of 0.35 mg/L from Oct 1 to Apr 30, and 0.30 mg/L from May 1 to Sep 30.
3. TAN loading limits based on proposed maximum monthly discharge rates (Table 3.1) and limits as presented in Table 5.2.

6. References

MOEE (1994). Policy B-1-5 – Deriving Receiving Water Based Point Source Effluent Requirements for Ontario Waters.

Appendix A
ACS Report dated January 2024

Final Report
Assimilative Capacity Study to Support the Expansion of the Casselman WWTS

January 11, 2024

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Appendix B – CORMIX Modelling Details

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1. Introduction

1.1 Overview

A Class Environmental Assessment (Class EA) study is underway to determine the most cost effective and environmentally sustainable approach to increasing wastewater servicing capacity to meet future growth needs in Casselman. An assimilative capacity assessment of the South Nation River is required to develop reasonable effluent targets and discharge rates for an upgraded Casselman WWTS.

Blue Sky Energy Engineering & Consulting Inc. (Blue Sky), in association with J.L. Richards & Associates Limited (JLR), has been retained to conduct a desk-top assimilative capacity study (ACS) of the South Nation River to support the Casselman WWTS Class EA study. This report summarizes the results of the ACS.

1.2 Objectives

The specific objectives of the ACS are to:

- Document data sources and assumptions used;
- Define ambient water quality and verify low flow conditions in the South Nation River;
- Complete CORMIX modelling of the mixing zone; and,
- Develop recommendations for future effluent requirements for an upgraded Casselman WWTS a future annual discharge average daily flow (ADF) value of 4,050 m^3/d.

2. Background

2.1 Current Effluent Requirements

The existing Casselman WWTS is a lagoon-based treatment system operated under amended Environmental Compliance Approval (ECA) No. 8160-BAHPRF and has a rated capacity of 2,110 m^3/d. The facility discharges directly to the South Nation River.

Effluent discharge is currently permitted during two seasonal periods, namely:

- Winter/Spring (Jan 1 to May 15): Total allowable discharge volume of 502,500 m^3; and,
- Fall (Oct 1 to Dec 31): Total allowable discharge volume of 267,650 m^3.

In addition to the total seasonal discharge volumes permitted, maximum effluent discharge rates have been defined for each calendar month, as shown in Table 2.1. Effluent concentration objectives and limits are shown in Table 2.2.

In addition to the above, the ECA specifies seasonal loading limits for $cBOD_5$, TSS TP, and hydrogen sulfide, as well as semi-seasonal loading limits for TAN. These are summarized in Table 2.3, and are based on the concentration limit (Table 2.2) and total allowable discharge volumes during each discharge period.

Table 2.1 – Existing Maximum Monthly Effluent Discharge Rates – Casselman WWTS (2,110 m^3/d)

Discharge Period	Maximum Discharge Rate	Maximum Discharge Rate Based on Dilution Ratio [1]
Jan 1 – 31	5,000 m^3/d	SNR Flow/10
Feb 1 – 28/29	5,000 m^3/d	SNR Flow/10
Mar 1 – 31	5,000 m^3/d	SNR Flow/40
Apr 1 – 30	7,000 m^3/d	SNR Flow/60
May 1 – 15	7,000 m^3/d	SNR Flow/60
Oct 1 – 31	4,000 m^3/d	SNR Flow/15
Nov 1 – 30	4,000 m^3/d	SNR Flow/10
Dec 1 – 31	5,000 m^3/d	SNR Flow/15

Notes:
1. SNR Flow = South Nation River Flow

Table 2.2 – Existing Effluent Objectives and Limits – Casselman WWTS (2,110 m³/d)

Parameter	Objective		Limit	
	Averaging Period	Value	Averaging Period	Value
$cBOD_5$				
Jan 1 to May 15	Monthly	15 mg/L	Monthly	25 mg/L
Oct 1 to Dec 31	Monthly	10 mg/L	Monthly	15 mg/L
TSS				
Jan 1 to May 15	Monthly	15 mg/L	Monthly	25 mg/L
Oct 1 to Dec 31	Monthly	10 mg/L	Monthly	25 mg/L
TP	Monthly	0.8 mg/L	Monthly	1.0 mg/L
TAN				
Jan 1 to Mar 31	Monthly	12.0 mg/L	Monthly	12.0 mg/L
Apr 1 to May 15	Monthly	6.0 mg/L	Monthly	6.0 mg/L
Oct 1 to Nov 30	Monthly	5.0 mg/L	Monthly	5.0 mg/L
Dec 1 to Dec 31	Monthly	12.0 mg/L	Monthly	12.0 mg/L
E. coli	Monthly (1)	100 CFU/100 mL	Monthly (1)	200 CFU/100 mL
Hydrogen Sulfide				
Jan 1 to May 15	Monthly	0.1 mg/L	Monthly	0.1 mg/L
Oct 1 to Dec 31	Monthly	Not Detected	Monthly	Not Detected
pH	Single Sample	6.8 to 7.8	Single Sample	6.0 to 8.0

Notes:
$cBOD_5$ – 5-day biochemical oxygen demand
TSS – total suspended solids
TP – total phosphorus
1. Monthly geometric mean

Table 2.3 – Existing Effluent Loading Limits – Casselman WWTS (2,110 m³/d)

Parameter	Averaging Period	Limit
$cBOD_5$		
Jan 1 to May 15	Seasonal	93.06 kg/d
Oct 1 to Dec 31	Seasonal	43.64 kg/d
TSS		
Jan 1 to May 15	Seasonal	93.06 kg/d
Oct 1 to Dec 31	Seasonal	72.73 kg/d
TP		
Jan 1 to May 15	Seasonal	3.73 kg/d
Oct 1 to Dec 31	Seasonal	2.91 kg/d
TAN		
Jan 1 to Mar 31	Seasonal	44.67 kg/d
Apr 1 to May 15	Seasonal	22.33 kg/d
Oct 1 to Nov 30	Seasonal	14.55 kg/d
Dec 1 to Dec 31	Seasonal	34.89 kg/d
Hydrogen Sulfide		
Jan 1 to May 15	Seasonal	0.37 kg/d
Oct 1 to Dec 31	Seasonal	-

2.2 Existing Outfall Configuration

The existing outfall is a 500 to 525 mm diameter pipe discharging approximately 75 m off the east bank of the South Nation River via a two-port diffuser. An as-built drawing of the outfall (dated 1978) is shown in Figure 2.1.

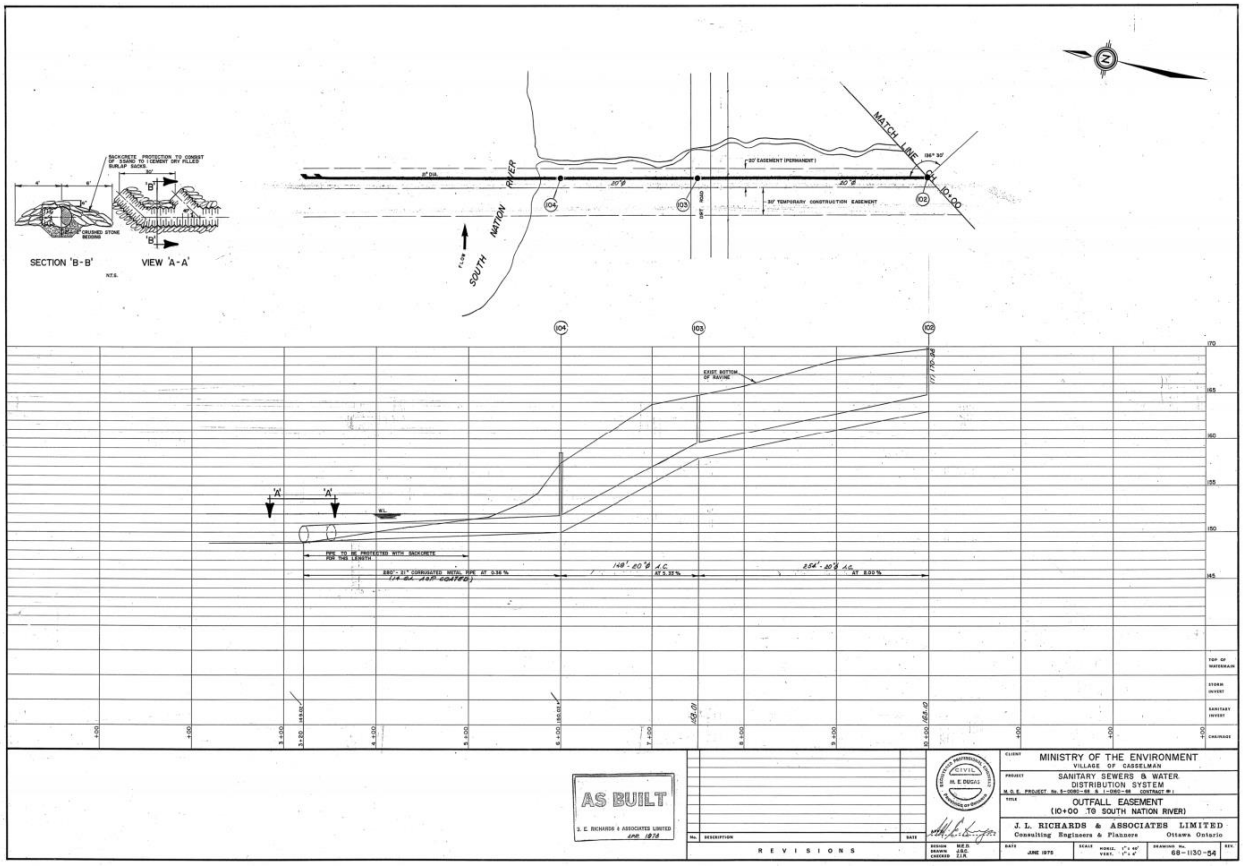


Figure 2.1 – As-Built Drawing of Existing Outfall

2.3 Available Data

In establishing ambient water quality and flow for a receiver, recent data available in the upstream vicinity of the effluent discharge location is reviewed to establish ambient conditions. In the case of the Casselman WWTS assimilative capacity assessment, a nearby Provincial Water Quality Monitoring Network (PWQMN) station is located approximately 1 km upstream of the outfall, while a Water Survey of Canada (WSC) gauge is located approximately 1 km upstream of the outfall. Information regarding the PWQMN and WSC stations is presented in Table 2.2, while their locations are presented in Figure 2.2.

Table 2.2 – Summary of Key Data Sources to Assess Ambient Conditions

Key Location Along South Nation River	Distance Relative to Plantagenet WWTS Outfall	Parameters of Interest	Period of Record Used in this Study
PWQMN Station 18207010002	1 km upstream	BOD_5, DO, ammonia, temperature, pH, TP, TSS, nitrate, E. coli	1970 – 2020
WSC Gauge 02LB013	1 km upstream	Flow	1950 – 2021

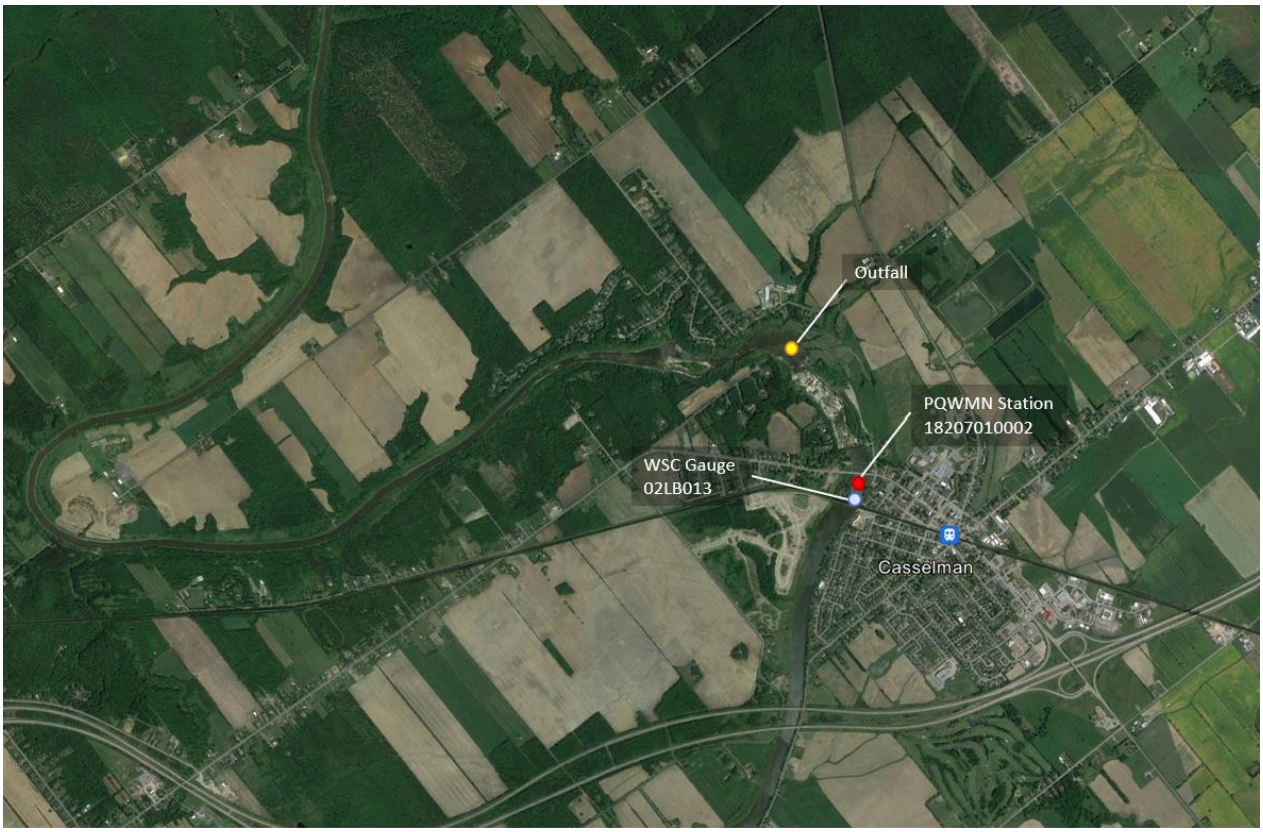


Figure 2.2 – Locations of the Outfall, WSC Gauge and PWQMN Station

3. Ambient Conditions

3.1 Water Quality

Representative background water quality can be defined by examining South Nation River water quality in the vicinity of the Plantagenet WWTP outfall. For analysis purposes, the 75th percentile threshold is applied to characterize ambient conditions, as recommended by the Ministry of the Environment (MOE), now Ministry of the Environment, Conservation and Parks (MOECP). The MOE states, "Normally the 75th percentile is used to determine background quality…".[1] The receiving water quality is assigned Policy 1 if the ambient concentration is less than the Provincial Water Quality Objective (PWQO) and Policy 2 if the ambient concentration exceeds the PWQO. The implication of being a Policy 1 or Policy 2 receiver is described briefly below.

- **Policy 1:** In areas which have water quality better than the Provincial Water Quality Objectives, water quality shall be maintained at or above the Objectives.
- **Policy 2:** Water quality which presently does not meet the Provincial Water Quality Objectives shall not be degraded further and all practical measures shall be taken to upgrade the water quality to the Objectives.

For the purposes of this analysis, PWQMN data collected over the period 1970 to 2020 were used. The findings for each parameter of interest are summarized in the sections below.

3.1.1 Total Phosphorus

The MOE PWQO state that, as an interim guideline for streams and rivers, total phosphorus (TP) should not exceed 0.03 mg/L, to prevent excessive plant growth. The statistical summary for total phosphorus concentration is shown in Table 3.1. The monthly and annual 75th percentile concentrations exceed the PWQO. Therefore, the receiver is MOE Policy 2 in the vicinity of Casselman with respect to TP.

[1] Ministry of Environment and Energy, *Water Management: Policies, Guidelines, Provincial Water Quality Objectives.* July 1994 (MOE Blue Book).

Table 3.1 – Total Phosphorous Concentrations in the South Nation River in the Vicinity of Casselman

Month	Average (mg/L)	Median (mg/L)	75th Percentile (mg/L)	Number of Observations
January	0.133	0.110	0.180	9
February	0.210	0.150	0.255	11
March	0.154	0.110	0.135	15
April	0.107	0.070	0.099	22
May	0.069	0.060	0.080	38
June	0.067	0.059	0.090	46
July	0.091	0.080	0.120	42
August	0.181	0.090	0.140	43
September	0.141	0.091	0.158	38
October	0.160	0.088	0.116	40
November	0.099	0.051	0.096	38
December	0.083	0.080	0.120	11
Overall	**0.146**	**0.110**	**0.175**	**353**
PWQO	–	–	0.030	–

3.1.2 Unionized Ammonia

The percentage of unionized ammonia in aqueous solution varies depending on the temperature and pH of the water. Ambient total ammonia, pH, and temperature are summarized in Table 3.2, Table 3.3, and Table 3.4, respectively. Synoptic pH and temperature data were used to determine daily dissociation ratios; using the daily dissociation ratios and associated daily total ammonia concentrations, it was possible to calculate daily unionized ammonia (UIA) concentrations in the South Nation River. The average, median and 75th Percentile unionized ammonia concentrations are presented in Table 3.5.

Ambient total ammonia concentrations showed limited seasonal variation. While also showing limited seasonal trends, pH in the South Nation River is elevated, which increases the ammonia dissociation ratio for this receiver. As expected, temperature varies seasonally and is quite high (>24°C) over the period June to August, also increasing the dissociation ratios for those months. Ambient UIA concentrations were, therefore, elevated over these warm months, with little to no assimilative capacity over that period; conversely, ambient (75th) percentile UIA concentrations were well below the PWQO during all other months. Therefore, the receiver can be characterized as Policy 1 for UIA, with limited assimilative capacity over the period June to August.

Table 3.2 – Total Ammonia Concentrations in the South Nation River in the Vicinity of Casselman

Month	Average (mg/L)	Median (mg/L)	75th Percentile (mg/L)	Number of Observations
January	0.31	0.31	0.32	6
February	0.35	0.33	0.51	6
March	0.15	0.11	0.15	10
April	0.12	0.09	0.13	21
May	0.07	0.07	0.10	33
June	0.08	0.07	0.10	41
July	0.08	0.07	0.09	40
August	0.13	0.11	0.15	40
September	0.10	0.08	0.13	37
October	0.08	0.05	0.09	37
November	0.06	0.05	0.08	34
December	0.05	0.05	0.07	8
Overall	**0.19**	**0.12**	**0.30**	**313**

Notes:

Ammonia concentrations as reported as mg/L as NH_3.

Table 3.3 – pH in the South Nation River in the Vicinity of Casselman

Month	Average (mg/L)	Median (mg/L)	75th Percentile (mg/L)	Number of Observations
January	7.84	7.70	8.03	5
February	7.59	7.55	7.65	7
March	7.92	7.90	8.09	11
April	8.12	8.10	8.18	19
May	8.30	8.32	8.43	31
June	8.29	8.30	8.48	39
July	8.41	8.36	8.50	34
August	8.23	8.24	8.38	37
September	8.11	8.20	8.34	31
October	8.09	8.16	8.34	33
November	8.21	8.21	8.32	32
December	8.13	8.20	8.31	10
Overall	**7.90**	**7.83**	**8.19**	**289**

Table 3.4 – Temperature in the South Nation River in the Vicinity of Casselman

Month	Average (mg/L)	Median (mg/L)	75th Percentile (mg/L)	Number of Observations
January	0.9	0.5	1.0	9
February	1.0	1.0	1.5	11
March	2.6	2.0	3.0	15
April	8.3	8.8	11.4	23
May	15.6	15.9	17.7	36
June	22.1	22.5	24.0	43
July	23.7	24.2	25.9	41
August	22.5	23.1	24.3	44
September	17.8	18.4	19.0	36
October	10.1	10.1	12.4	39
November	5.2	4.8	6.4	37
December	2.4	2.0	3.7	11
Overall	**1.8**	**1.0**	**2.5**	**345**

Table 3.5 – Unionized Ammonia Concentrations in the South Nation River in the Vicinity of Casselman

Month	Average (µg/L)	Median (µg/L)	75th Percentile (µg/L)	Number of Observations
January	1.3	1.3	1.5	2
February	1.4	1.4	1.9	2
March	2.1	0.8	2.1	6
April	2.8	2.5	3.6	17
May	5.5	4.9	8.1	25
June	9.5	8.0	13.0	34
July	22.8	8.0	17.2	30
August	20.3	9.3	16.0	32
September	4.8	4.4	6.6	27
October	2.2	1.9	3.2	28
November	1.9	1.1	2.2	26
December	0.7	0.6	0.9	7
Overall	**1.3**	**0.7**	**1.7**	**236**
PWQO	–	–	20	–

Notes:

Unionized ammonia concentrations as reported as mg/L as NH_3. As a conservative measure, the dataset includes two elevated, single-sample UIA results in July and August 2021 that impacted the calculated average concentrations for those months.

3.1.3 Dissolved Oxygen and BOD_5

For dissolved oxygen (DO), low concentrations are indications of degraded water quality; therefore 25th percentiles are typically used, rather than 75th percentiles, to characterize ambient conditions. Assuming the South Nation River is a warm water fishery, the PWQO for DO ranges from 4 to 7 mg/L from month-to-month based on temperature: cooler temperatures have a higher PWQO for DO than warmer temperatures.

Average and 25th percentile DO concentrations are presented in Table 3.6 along with the monthly PWQO (based on ambient temperature data shown in Table 3.4). In addition to DO data, 178 samples were analyzed over the review period for BOD_5, with an average concentration of 3.0 mg/L and 75th percentile value of 4.0 mg/L, suggesting low background concentrations of oxygen depleting constituents.

Based on the available data, the South Nation River is Policy 1 with respect to DO in the vicinity of Casselman. This demonstrates that there is adequate assimilative capacity available for future BOD_5 loads from an upgraded and expanded WWTP.

Table 3.6 – Dissolved Oxygen Concentrations in the South Nation River in the Vicinity of Casselman

Month	Average (mg/L)	25th Percentile (mg/L)	PWQO (1)	Number of Observations
January	9.8	8.4	7	8
February	10.1	8.7	7	9
March	10.5	10.0	7	14
April	10.8	10.2	5	19
May	9.5	9.0	5	30
June	9.3	8.0	4	37
July	8.3	7.3	4	35
August	7.7	6.5	4	38
September	7.5	7.2	5	31
October	9.2	7.9	5	31
November	11.8	11.4	6	32
December	11.7	11.0	7	7

Notes:

1. The PWQO values applied were based on the 75th percentile monthly temperatures shown in Table 3.4 assuming a warm water fishery.

3.1.4 Total Suspended Solids

There are no PWQO values for total suspended solids (TSS), however the Canadian Water Quality Guidelines for the Protection of Aquatic Life (CWQG) recommend a maximum average increase of 5 mg/L from background levels for long-term exposures. Reported PWQMN TSS concentrations are elevated throughout all months for which data are available. A statistical summary of TSS concentrations is provided in Table 3.7.

Since there is no PWQO, it is not possible to define a Policy status for the South Nation River in relation to TSS. However, to be consistent with the objectives of the CWQG, the discharge of effluent from the WWTP should not increase downstream fully-mixed concentrations by more than 5 mg/L.

Table 3.7 – Total Suspended Solids Concentrations in the South Nation River in the Vicinity of Casselman

Month	Average (mg/L)	Median (mg/L)	75th Percentile (mg/L)	Number of Observations
January	15.0	–	–	1
February	15.0	–	–	1
March	9.1	9.1	11.1	2
April	18.7	13.8	21.5	16
May	12.9	9.0	12.0	21
June	8.9	7.1	10.0	29
July	11.1	7.0	9.1	23
August	8.4	6.9	10.9	29
September	7.8	7.0	9.3	23
October	14.8	11.7	16.4	22
November	7.8	6.7	8.7	21
December	8.4	8.2	10.3	6
Overall	**9.8**	**9.7**	**14.5**	**194**

3.1.5 Nitrate

There is no PWQO for nitrate, however the CWQG recommends a long-term exposure limit of 3.0 mg/L as N, and a short-term (acute) exposure limit of 124 mg/L as N. A statistical summary of reported PWQMN nitrate concentrations is provided in Table 3.8.

During most calendar months, the ambient (75th percentile) nitrate concentration is below the CWQG long-term exposure limit. Monthly ambient (75th percentile) nitrate concentrations occasionally exceeded the long-term exposure limit (June, November and December), but were significantly below the short-term exposure limit. In addition, monthly median nitrate concentrations were below the short-term exposure limit with the exception of December. Such seasonal variability in ambient concentrations, with higher values during colder periods, is typical of surface waters such as the South Nation River.

Table 3.8 – Nitrate Concentrations in the South Nation River in the Vicinity of Casselman

Month	Average (mg/L)	Median (mg/L)	75th Percentile (mg/L)	Number of Observations
January	–	–	–	–
February	1.1	–	–	1
March	1.8	1.4	2.3	5
April	2.3	2.2	3.0	16
May	1.5	1.5	2.2	25
June	2.5	2.0	4.1	33
July	1.6	1.1	2.2	32
August	0.9	0.5	1.5	31
September	0.6	0.2	0.7	28
October	1.9	1.2	2.9	28
November	2.9	2.4	4.1	27
December	2.9	3.1	3.8	6
Overall	**2.3**	**1.9**	**3.6**	**232**

3.1.6 E. coli

A total of 15 samples were analyzed for E. coli over the review period. Individual sample results ranged from 8 to 1,800 CFU/100 mL with an overall geometric mean of 38 CFU/100 mL, which is below the PWQO of 100 CFU/100 mL. As a result, the South Nation River can be characterized as Policy 1 with respect to E. coli.

3.2 Flow

Typically for assimilative capacity analyses, the 7Q20 river flow (minimum average 7-day low flow with a return period of 20 years) represents an appropriate design condition. As described in Section 2.3, the closest stream flow gauge with relevant data is Water Survey of Canada (WSC) hydrometric station 02LB013 which is located on South Nation River approximately 1 km upstream of the Casselman outfall.

A statistical analysis of recorded flows in the South Nation River was used to determine monthly low (7Q20) flows in the receiver. The results of the low flow analysis are presented in Table 3.9, while details can be found in Appendix A. Flows in the South Nation River vary seasonally, with the lowest flows through the Summer into early Fall (June to September). The highest 7Q20 flow occurs in April, coinciding with the Spring freshet.

Table 3.9 – Results of Low Flow Analysis – South Nation River in the Vicinity of Casselman

Month	WSC Station 02LB013 Mean Flow (m^3/s)	WSC Station 02LB013 7Q20 Flow (m^3/s)
January	16.1	0.826
February	13.9	0.802
March	61.8	1.035
April	106.6	8.442
May	21.7	2.108
June	10.8	0.652
July	6.7	0.319
August	4.6	0.274
September	4.5	0.276
October	11.6	0.340
November	20.3	0.918
December	21.6	1.251

4. Determination of Effluent Limits

4.1 Methodology

A conference call was held between MECP and Blue Sky staff on October 5, 2023 to discuss a preliminary approach to completing the ACS study, with a follow-up virtual meeting on November 2, 2023. During the November 2023 meeting, alternative discharge windows were discussed (namely, retaining the existing discharge period (October 1 to May 15) or expanding to year-round discharge), and additional details presented regarding the proposed approach to defining effluent limits for a number of parameters.

Subsequently, the South Nation Conservation (SNC) was contacted to discuss the ongoing Class EA Study and proposed ACS approach. In email correspondence dated November 29, 2023, SNC confirmed that they have no concerns with respect to expanding the discharge period to year-round provided total TP loading does not exceed the current ECA limit.

Copies of correspondence and meeting notes from these consultation activities are included in Appendix C. Based on the outcome of these consultation activities with MECP and SNC, the approved ACS approach consists of the following:

- Allow the effluent discharge period to be expanded to year-round discharge. This approach eliminates the need for additional effluent storage lagoon volume.
- Consider the impact of stored precipitation in the lagoons on total discharge volume requirements. Based on an analysis of monthly precipitation / evaporation rates, the existing lagoon cells would contribute the equivalent of 297 m^3/d of stored precipitation. As a result, effluent limits were developed assuming a total equivalent annual average effluent discharge rate of 4,347 m^3/d.
- Monthly discharge volumes to consider maintaining adequate dilution ratios (minimum value of 10 : 1), ensuring reasonable downstream fully-mixed water quality, and providing allowances for WWTS operational flexibility.
- Utilize a mass-balance approach to ensure downstream, fully-mixed seasonal UIA concentrations remain at or below the PWQO at ambient (75^{th} percentile) concentrations and low (7Q20) flows. Proposed effluent TAN targets will also ensure non-toxicity at end-of-pipe.
- Limit future effluent TP loadings to 770 kg/yr (current ECA limit). Consideration will also be given to minimizing TP loadings during the critical Summer period, decreasing the annual TP loading limit if possible, as well as the impact on downstream, fully-mixed TP concentrations.
- An assessment of mixing zone characteristics using the expert system CORMIX.
- Nitrate is not currently a parameter of concern for the South Nation River. As a result, no effluent nitrate targets will be proposed.
- Effluent pH and *E. coli* targets will be consistent with targets for other municipal WWTSs in Ontario and, in particular, facilities discharging to the South Nation River.

In addition to the above, the seasonal impact of effluent on the South Nation River was assessed assuming the following seasonal periods:

- Winter: December 1 to March 31
- Spring: April 1 to May 31
- Summer: June 1 to September 30
- Fall: October 1 to November 30

4.2 Maximum Effluent Discharge Rates

Maximum effluent discharge rates were developed for each calendar month, and are presented in Table 4.1. Associated monthly minimum dilution ratios are also shown.

The proposed effluent discharge rates result in dilution ratios consistent with the required minimum design value of 10 : 1. Assuming that the upgraded Casselman WWTS discharges effluent at the maximum proposed discharge rates for all days each calendar month, a total annual volume of 1,674,050 m^3 could be discharged (equivalent to an average day flow of 4,586 m^3/d). This provides sufficient flexibility to discharge the design influent ADF (4,050 m^3/d) plus the anticipated stored precipitation volume (297 m^3/d).

Table 4.1 – Proposed Maximum Monthly Effluent Discharge Rates

Month	Maximum Daily Discharge Rate	Minimum Dilution Ratio
January	5,750 m^3/d	12.4
February	5,600 m^3/d	12.4
March	7,250 m^3/d	12.3
April	10,000 m^3/d	72.9
May	4,500 m^3/d	40.5
June	2,150 m^3/d	26.2
July	1,050 m^3/d	26.2
August	900 m^3/d	26.3
September	910 m^3/d	26.2
October	2,250 m^3/d	13.1
November	6,050 m^3/d	13.1
December	8,750 m^3/d	12.4

4.3 Effluent $cBOD_5$

There are no PWQO or CWQG targets specified for $cBOD_5$. However, the presence of carbonaceous and nitrogenous biochemical oxygen demand (cBOD and nBOD, respectively) can affect downstream DO concentrations.

An assessment of ambient water quality (see Section 3) concluded that the South Nation River is Policy 1 for DO, with historic 25th percentile concentrations at least 2.2 mg/L greater than the PWQO for all months. Furthermore, the available ambient BOD_5 concentration (ambient 75th percentile of 4.0 mg/L) suggest low background concentrations of oxygen depleting constituents.

Proposed $cBOD_5$ requirements of 10 mg/L (design objective) and 12 mg/L (design limit) are being proposed in conjunction with year-round nitrification (see Section 5.6). At the design limit, low flow conditions and ambient background concentrations, the fully mixed $cBOD_5$ concentration would increase by up to 0.59 mg/L (Winter). During the critical Summer period (June to September), the fully mixed $cBOD_5$ concentration would only increase by up to 0.29 mg/L. These increases would have minimal impact on the downstream DO concentrations.

4.4 Effluent Total Suspended Solids

There is no PWQO target specified for TSS. The CWQG recommends a maximum short-term (< 24 h period) increase of 25 mg/L above background, and a maximum increase of 5 mg/L over long-term exposures (up to 30 days).

Effluent TSS requirements of 10 mg/L (design objective) and 12 mg/L (design limit) are proposed. These are consistent with the proposed cBOD5 limits (see Section 5.3). At the design limit, low flow conditions and ambient background concentrations, the fully mixed TSS concentration would only increase by up to 0.13 mg/L, which meets the CWQG recommendation.

4.5 Effluent Total Phosphorus

The South Nation River was determined to be Policy 2 for TP (see Appendix A) and, therefore, ambient (75th percentile) concentrations exceed the PWQO of 0.030 mg/L. During the November 2023 consultation meeting with MECP, a future TP concentration limit of 0.30 mg/L was proposed (see Appendix C). This is equivalent to a total annual TP loading limit of 476 kg/year (based on a total average annual discharge volume of 4,347 m3/d), which is consistent with the target of maintaining effluent TP at or below the current ECA limit (770 kg/year). In addition to the TP limit of 0.30 mg/L, a TP objective of 0.20 mg/L is also proposed. The ambient TP concentrations and resulting downstream fully-mixed TP concentrations are shown in Table 4.2.

To minimize the environmental impact associated the effluent discharge, the combined daily maximum effluent discharge rate and TP concentration limit ensure that downstream, fully-mixed TP concentration would increase by no more than 5.2% above ambient conditions during the critical Summer (June to September) period.

Table 4.2 – Fully Mixed TP Concentration Under Proposed Effluent TP Limits and Effluent Discharge Rates

Month	Seasonal Ambient TP [1] (mg/L)	Fully-Mixed TP (mg/L)	Increase Above Ambient TP (%)
January	0.185	0.194	4.4
February	0.185	0.194	4.4
March	0.185	0.194	4.5
April	0.110	0.113	2.3
May	0.110	0.115	4.0
June	0.120	0.127	5.2
July	0.120	0.127	5.2
August	0.120	0.127	5.2
September	0.120	0.127	5.2
October	0.110	0.124	10.9
November	0.110	0.123	10.9
December	0.185	0.194	4.4
January	0.185	0.194	4.4

Notes:

1. For the purposes of assessing ambient TP concentrations, seasonal 75th percentile concentrations were utilized (Winter = Dec to Mar; Spring = Apr to May; Summer = Jun to Sep; Fall = Oct to Nov).

4.6 Effluent Total Ammonia Nitrogen

In developing TAN limits, two factors were considered: ensuring non-toxic effluent at end-of-pipe, and ensuring downstream conditions within the South Nation River meet the PWQO un-ionized ammonia (UIA) limit of 20 µg/L as NH_3 (16 µg/L as N).

Extensive research by the US EPA and others has demonstrated that a non-toxic limit for UIA ranges between 0.1 mg/L and 0.5 mg/L as NH_3, depending on the aquatic species present in the receiver. The federal Wastewater Systems Effluent Regulations (WSER) under the Fisheries Act set effluent UIA toxicity to 1.25 mg/L (at 15^{o}C). Therefore, selecting a value of 0.2 mg/L as NH_3 at end-of-pipe, which is near the low end of the US EPA range, is more conservative than, and consistent with, the requirements of WSER.

The percentage of UIA in aqueous solution varies depending on the temperature and pH of the water. In order to determine the in-stream UIA concentration, it is necessary to specify anticipated ambient temperature and pH values that can be used to estimate the ammonia dissociation ratio. To account for the seasonal variability in stream temperatures, four seasonal periods were defined: Winter (Dec to Mar); Spring (Apr to May); Summer (Jun to Sep); Fall (Oct to Nov). For each season, ambient conditions were taken to be the 75th percentile UIA concentration, and 75th percentile dissociation ratio over that period.

To confirm non-toxicity at end-of-pipe, it was necessary to define effluent temperature and pH values. Effluent pH and temperature data were available over the existing discharge window (Oct 1 to May 15). It was noted that effluent pH stabilized after the Casselman WWTS was upgraded in 2020. Analyzing single sample effluent pH over the period 2020 to 2023, it was determined that the 75th percentile pH values were 7.8 for Winter and Fall, and 7.6 for Spring. As a conservative measure, it was assumed that future

75th percentile effluent pH would be 7.8 for all seasons. Effluent is expected to continue to be stored in the lagoon prior to discharge. Using effluent temperature data over the period 2017 to 2023, 75th percentile effluent temperatures were determined to be 6.1°C in both April and November. Ambient temperatures in the South Nation River were higher in those months (6.4°C in Nov and 11.4°C in Apr, see Table 3.4). As a conservative measure, ambient seasonal South Nation River temperatures of 17.0°C, 24.2°C and 10.6°C were used to assess non-toxicity at end-of-pipe for Spring, Summer and Fall, respectively. The 75th percentile November temperature of 6.1°C in the South Nation River was used to represent worst-case Winter effluent temperatures, since it is possible that effluent temperatures of ~6°C could be possible in early December (the start of the Winter discharge period).

For the proposed effluent TAN limits to be acceptable, the downstream UIA concentration must be less than or equal to the PWQO of 20 µg/L (as NH_3), while also meeting the non-toxicity threshold of 0.2 mg/L (as NH_3) at end of pipe. Using the proposed effluent flows (see Table 5.1), it was determined that the effluent TAN limit was limited by downstream fully-mixed UIA less than the PWQO. As a result, the end-of-pipe UIA concentration would be below 0.20 mg/L for all months.

The recommended compliance limits for TAN are: 11.5 mg/L for Winter (Dec to Mar); 6.0 mg/L for Spring (Apr to May); 1.3 mg/L for Summer (Jun to Sep); and, 5.0 mg/L for Fall (Oct to Nov). These are consistent with, or more stringent than, the existing ECA discharge limits over the period Oct 1 to May 15. The proposed Summer TAN limit represents a high level of nitrification, and ensures downstream fully-mixed UIA concentrations remain under the PWQO during this critical, warm weather period. The proposed effluent ammonia limits and resulting downstream UIA concentrations at the minimum effluent dilution ratio are shown in Table 4.3.

Table 4.3 – Fully Mixed Un-ionized Ammonia Under Proposed Effluent TAN Limits and Effluent Discharge Rates

Month	Effluent TAN Limit (mg/L as N)	Seasonal Ambient UIA (1) (µg/L as NH_3)	Seasonal Dissociation Ratio (1) (%)	Fully-Mixed UIA (µg/L as NH_3)
January	11.5	1.74	1.8	19.2
February	11.5	1.74	1.8	19.3
March	11.5	1.74	1.8	19.4
April	6.0	6.19	8.0	13.4
May	6.0	6.19	8.0	19.4
June	1.3	12.74	14.3	19.4
July	1.3	12.74	14.3	19.4
August	1.3	12.74	14.3	19.3
September	1.3	12.74	14.3	19.4
October	5.0	2.73	4.1	19.3
November	5.0	2.73	4.1	19.3
December	11.5	1.74	1.8	19.3

Notes:

1. For the purposes of assessing ambient TP concentrations, seasonal 75th percentile concentrations were utilized (Winter = Dec to Mar; Spring = Apr to May; Summer = Jun to Sep; Fall = Oct to Nov).

4.7 Effluent E. coli

The current ECA specifies an E. coli compliance limit of 200 CFU/100 mL and a design objective of 150 CFU/100 mL (based on geometric mean). Despite this, other similarly sized facilities discharging to the South Nation River do not have E. coli specified over the cold-weather discharge period (e.g. November to April for Winchester WWTS).

Therefore, an E. coli compliance limit of 200 CFU/100 mL and a design objective of 150 CFU/100 mL (based on geometric mean) are proposed for the warm-weather discharge period (e.g. May to October) for an upgraded Casselman WWTS. This is consistent with the current ECA objective and limit, as well as seasonal disinfection requirements for similarly-sized municipal wastewater treatment discharging to the South Nation River.

4.8 Effluent pH

A compliance limit pH range of 6.0 to 8.0 is proposed as a single-sample limit, with a corresponding design objective of 6.8 to 7.8. This is consistent with the pH requirements stipulated in the current ECA.

5. Mixing Zone Modelling

5.1 Model Configuration

The model was developed based on the current configuration of the outfall, which consists of two 21" corrugated discharge pipes, approximately oriented along the main flow direction in the South Nation River. The discharge pipes are approximately center channel and are separated by approximately 9 m. The channel is highly irregular, with discharge located in a ponded area immediately upstream of a riffle section. CORMIX allows for either a single port outlet, or a diffuser having three or more outlets, but not a double pipe discharge. As recommended by CORMIX documentation, a double port discharge can be approximated by either modelling each port independently, or by modeling an equivalent single discharge pipe. Modeling each discharge port independently requires that the corresponding plumes do not overlap, and in this particular case, the mixing zones associated with each discharge pipe are too close to avoid interaction. Therefore, an equivalent single discharge pipe was applied for modelling purposes.

The shallow discharge location, combined with high discharge velocity relative to ambient conditions contributed uncertainty to near-field model predictions. Far-field model results are more reliable; however, the South nation River channel is highly irregular, with the discharge located in a ponded area, immediately upstream of a riffle section. Furthermore, CORMIX assumes that the river cross-section and ambient conditions are uniform down-stream of the discharge. Since the actual river cross-section, velocity, and depth is variable, additional mixing would take place and the far-field mixing results generated by CORMIX may be interpreted as conservative estimates. Definitive delineation of the mixing zone would require either field-dye studies under low-flow conditions are the development and application of a comprehensive numerical model.

The modelled location of the outfall outlet is shown in Figure 5.1.

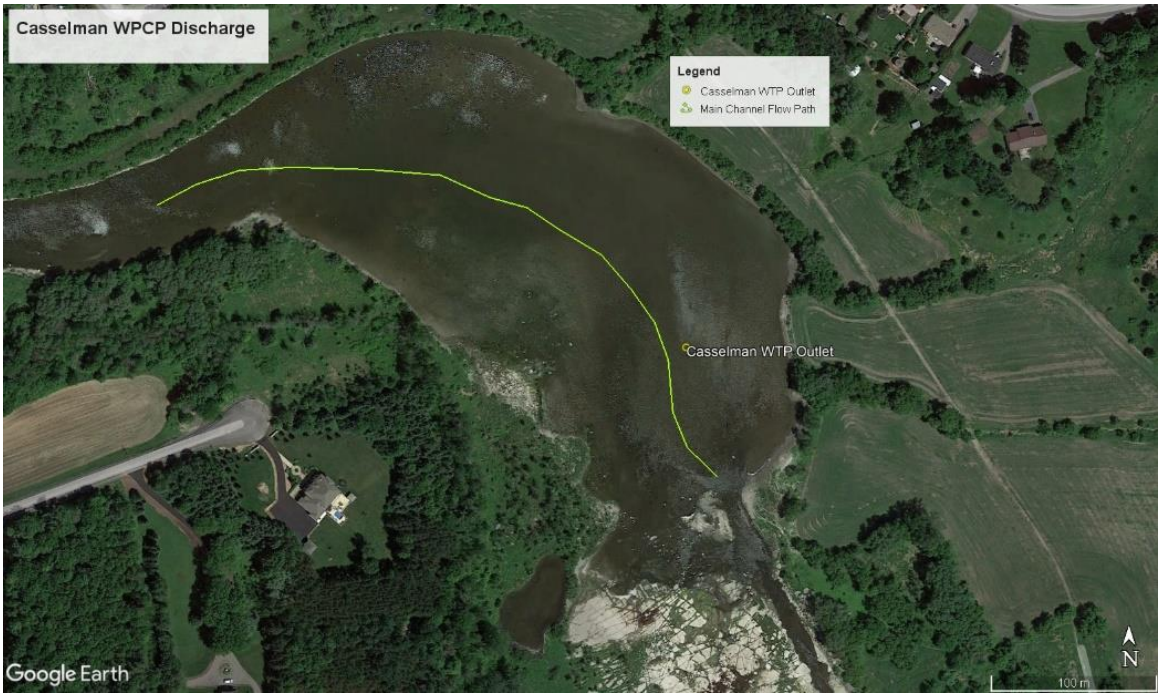


Figure 5.1 – Modelled Outfall Location

5.2 Modelling Results

Monthly modelling runs were completed using the calculated monthly 7Q20 flow (see Table 3.9) and proposed monthly maximum discharge rates (see Section 4.2, Table 4.1). The results are presented in tabular format below, with details provided in Appendix B.

Excluding April, the modelling suggests that fully-mixed conditions are achieved within 175 m or less for all months. During the critical summer discharge period (June to September), fully-mixed conditions are achieved in 80 m or less. These represent relatively small mixing zones, and would result in minimal impact on the South Nation River.

The distance to fully-mixed conditions in April is 375 m, which is significantly higher than that predicted for the other months. Despite this, the impact on downstream TP and UIA concentrations are anticipated to be low in April due to the high dilution ratio (72.9 : 1) and proposed effluent limits maintaining TP concentrations close to ambient values and UIA well below the PWQO (see Sections 4.6 and Table 4.3). Furthermore, the near-field region is modelled to be < 10 m, and the concentration excess in the plume reaches 5% by approximately 20 m (see Appendix B).

Table 5.1 – CORMIX Modelling Summary

Month	Effluent Flow (m^3/d)	River Flow (m^3/d)	Dilution Ratio	Distance Downstream to Achieve Fully-Mixed Conditions (m)
January	5,570	0.826	12.4 : 1	100
February	5,600	0.802	12.4 : 1	100
March	7,250	1.035	12.3 : 1	130
April	10,000	8.442	72.9 : 1	375
May	4,500	2.108	40.2 : 1	175
June	2,150	0.652	26.2 : 1	80
July	1,050	0.319	26.2 : 1	75
August	900	0.274	26.3 : 1	80
September	910	0.276	26.2 : 1	80
October	2,250	0.340	13.1 : 1	80
November	6,050	0.918	13.1 : 1	125
December	8,750	1.251	12.4 : 1	125

6. Summary

Proposed seasonal effluent discharge rates and associated effluent objectives and limits were developed for an upgraded Casselman WWTS and are summarized in Tables 5.1 and 5.2. These were developed for a future design influent ADF capacity of 4,050 m^3/d, and equivalent average effluent discharge rate (inclusive of stored precipitation) of 4,347 m^3/d.

Table 5.1 – Proposed Maximum Daily Effluent Discharge Rates

Date Range	Maximum Daily Discharge Rate
January	5,750 m^3/d
February	5,600 m^3/d
March	7,250 m^3/d
April	10,000 m^3/d
May	4,500 m^3/d
June	2,150 m^3/d
July	1,050 m^3/d
August	900 m^3/d
September	910 m^3/d
October	2,250 m^3/d
November	6,050 m^3/d
December	8,750 m^3/d

Table 5.2 – Proposed Effluent Objectives and Limits

Parameter	Averaging Period	Objective (mg/L unless noted otherwise)	Limit (mg/L unless noted otherwise)
$cBOD_5$	Monthly	10	12
TSS	Monthly	10	12
TP	Monthly	0.20	0.30
TAN			
Dec 1 to Mar 31	Monthly	9.2	11.5
Apr 1 to May 31	Monthly	4.8	6.0
Jun 1 to Sep 30	Monthly	1.0	1.3
Oct 1 to Nov 30	Monthly	4.0	5.0
E. coli			
May 1 to Oct 31	Monthly	150 CFU/100 mL	200 CFU/100 mL
pH	Single Grab	6.8 to 7.8	6.0 to 8.0

7. References

MOEE (1994). Policy B-1-5 – Deriving Receiving Water Based Point Source Effluent Requirements for Ontario Waters.

Appendix A
Low Flow Analysis Details

A.1. Summary of Low Flow Assessment Results

Although the period of record for the Water Survey Canada gauging station at Casselman (02LB013) spanned over 50 years, from 1972 through 2023, continuous daily flow measurements were limited. Complete seasonal daily flow information for Casselman was available for only 13 years. A complete seasonal period of record was deemed to be 90% or greater daily flow measurements. Fewer flow measurements prevented reliable estimation of most seasonal 7-day low flows. Furthermore, 13 years of record is too short to apply for estimation of seasonal 7Q20 low-flow estimates. In order to increase the available 7-day low flow data series for Casselman, and generate seasonal 7Q20 low-flows, the Water Survey Canada flow gauging station at Plantagenet (02LB005) was applied, Flow monitoring at Plantagenet spanned over 100 years from 1915 through 2023. A plot of the available seasonal 7-day low flows for both Casselman and Plantagenet is provided in Figure A.1

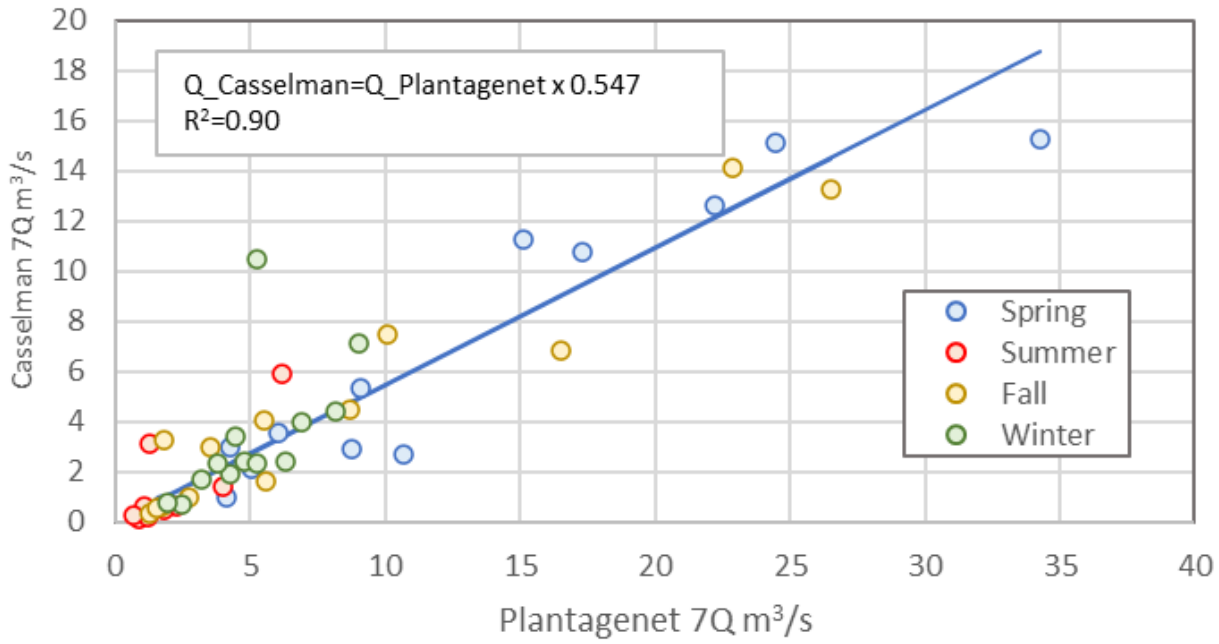


Figure A.1. Annual 7-day Low Flow for Plantagenet (02LB005) and Casselman (02LB013)

The correlation between 7-day seasonal low-flow for Plantagenet and Casselman was approximately 90%. Furthermore, the regression slope is 0.547 which is consistent with the drainage are ratio. The drainage area at Plantagenet is 3,810 km^2, while the drainage area at Casselman is 2,410 km^2, a ratio of about 63%. The regression relation illustrated on Figure 1 was applied to generate a 75 year composite low-flow series for each month for Casselman. The composite series incudes all available seasonal 7-day low-flow, and where not available, includes the low flow estimate generated using the regression relation discussed above. This composite seasonal low flow series was used to generate monthly 7Q20 low-flows and are summarized in Table A.1. The best-fit frequency distribution used for each month are also shown.

Table A.1 – Monthly 7Q20 Low Flow Estimates for the South Nation River in the Vicinity of Casselman

Month	Best-Fit Frequency Distribution	7Q20 Flow (m^3/s)
January	Log Normal	0.826
February	Log Normal	0.802
March	EVIII Method of Lowest Observed Drought	1.035
April	EVIII Method of Lowest Observed Drought	8.442
May	Log normal	2.108
June	Log normal	0.652
July	EVIII Method of Lowest Observed Drought	0.319
August	Log normal	0.274
September	EVIII Method of Lowest Observed Drought	0.276
October	EVIII Method of Lowest Observed Drought	0.340
November	EVIII Method of Lowest Observed Drought	0.918
December	Log Normal	1.251

C.2. Monthly Fitted Distribution Plots

Fitted distribution plots for each month are provided in Figures A.1 to A.12 below.

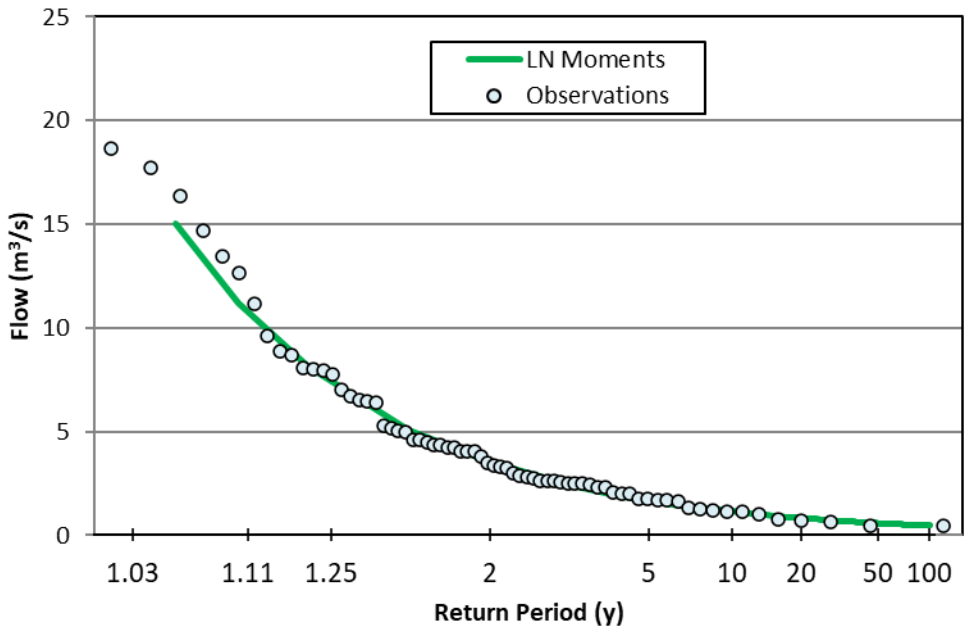


Figure A.1 January Low Flow Frequency Plot

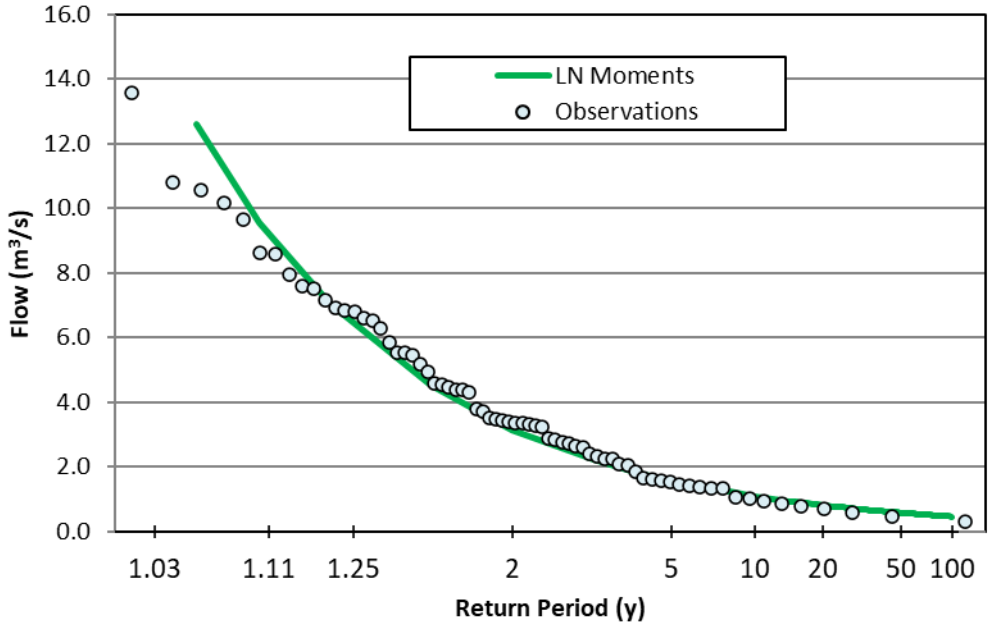


Figure A.2 February Low Flow Frequency Plot

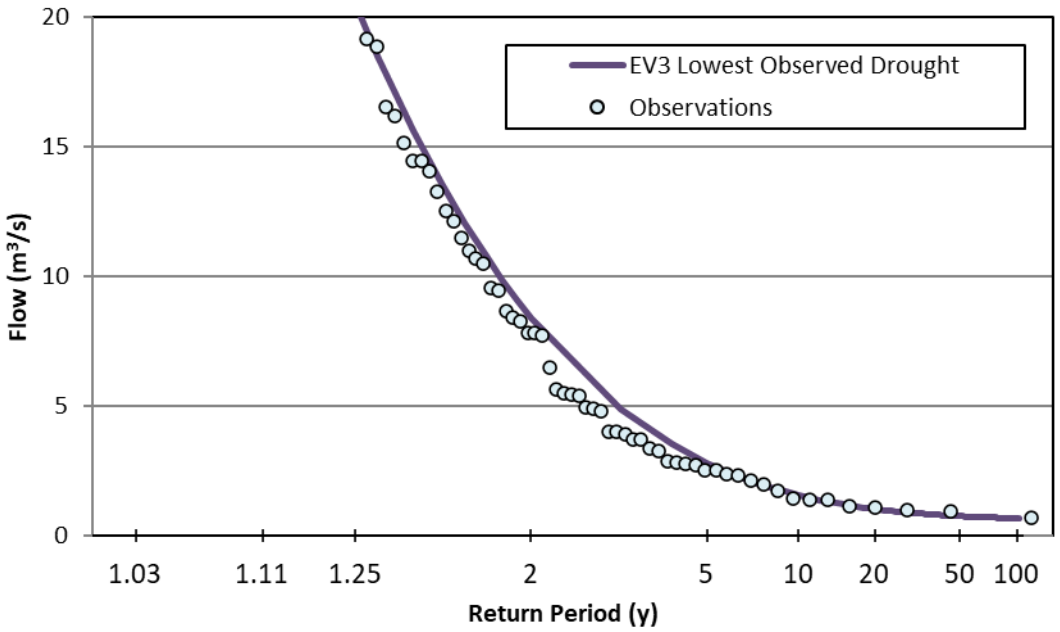


Figure A.3 March Low Flow Frequency Plot

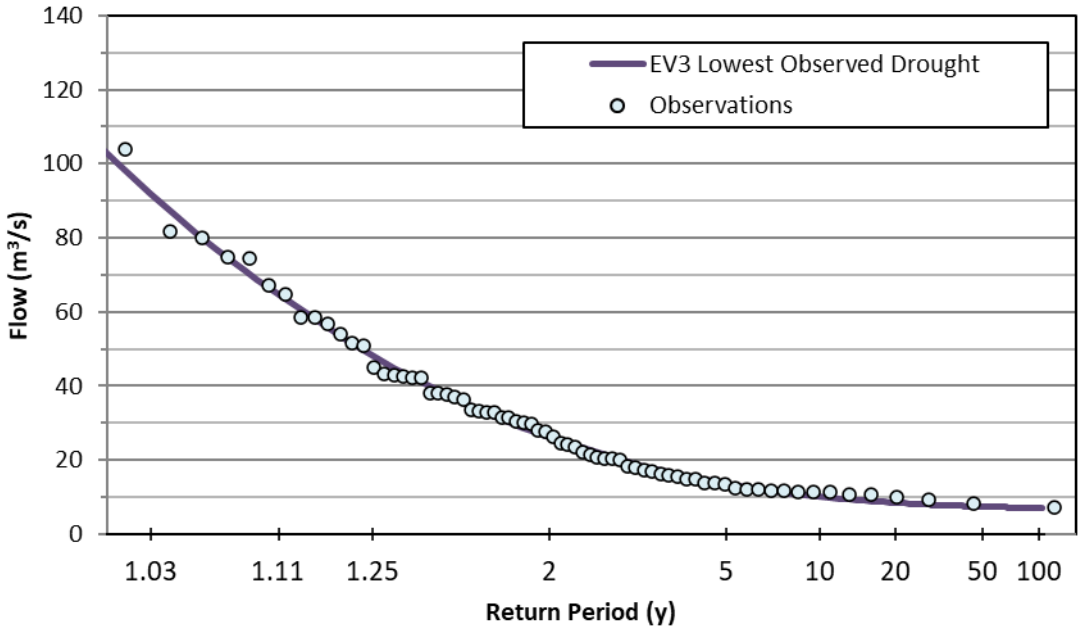


Figure A.4 April Low Flow Frequency Plot

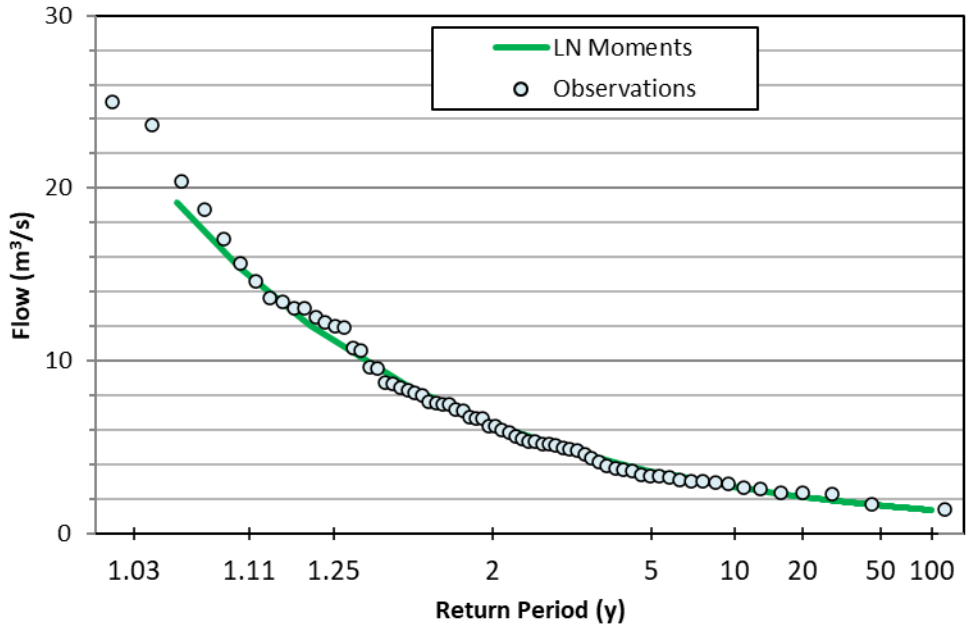


Figure A.5 May Low Flow Frequency Plot

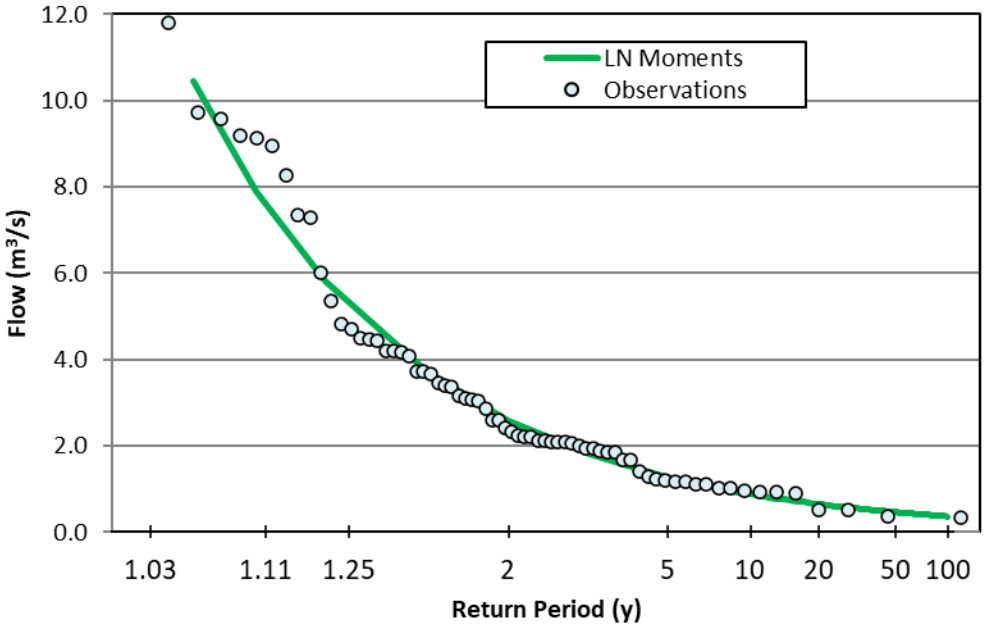


Figure A.6 June Low Flow Frequency Plot

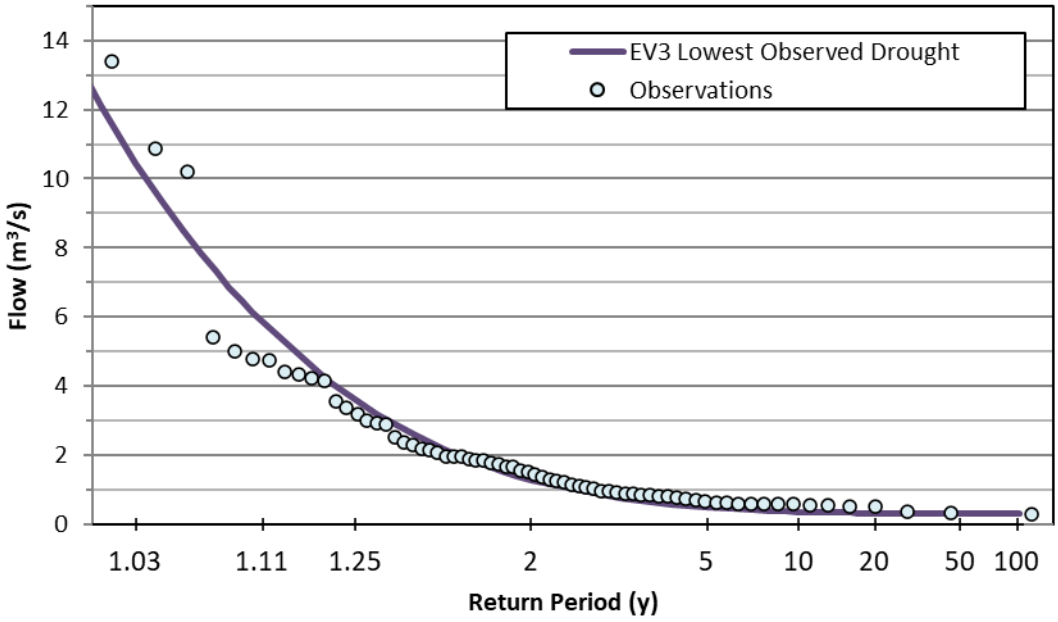


Figure A.7 July Low Flow Frequency Plot

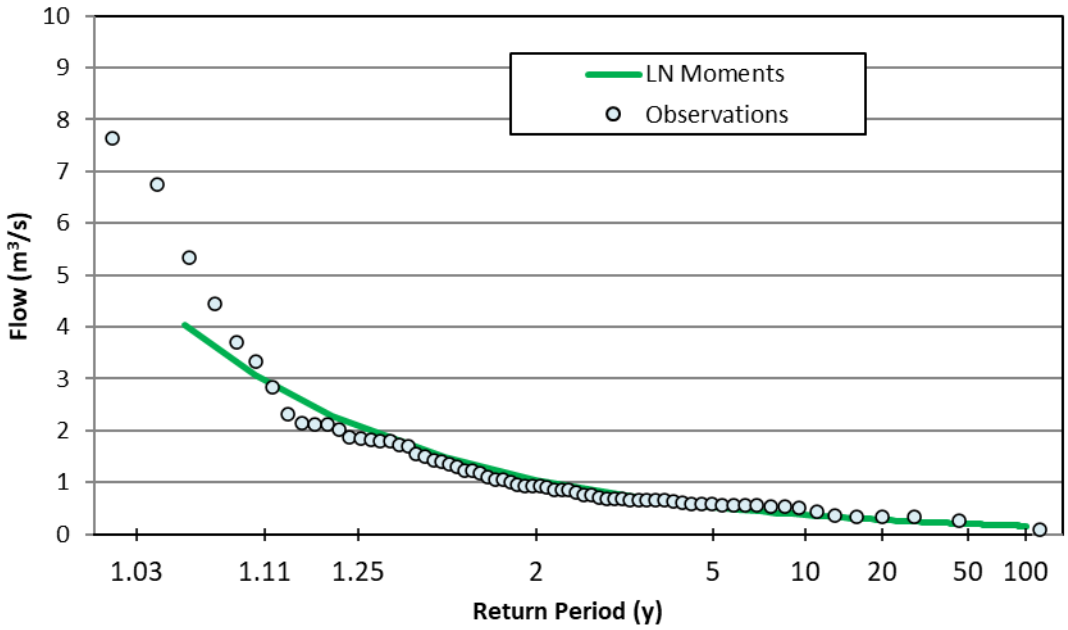


Figure A.8 August Low Flow Frequency Plot

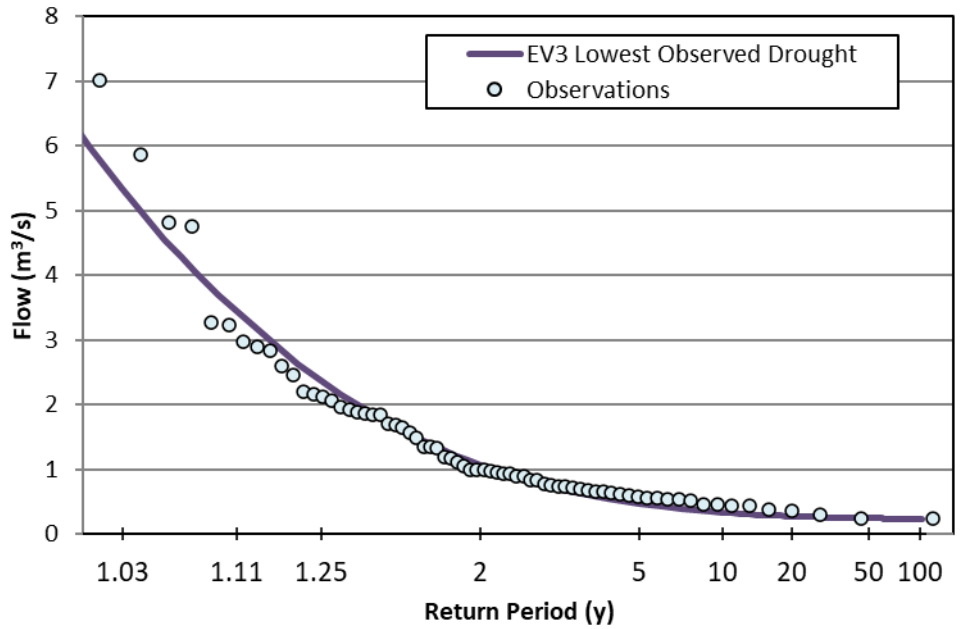


Figure A.9 September Low Flow Frequency Plot

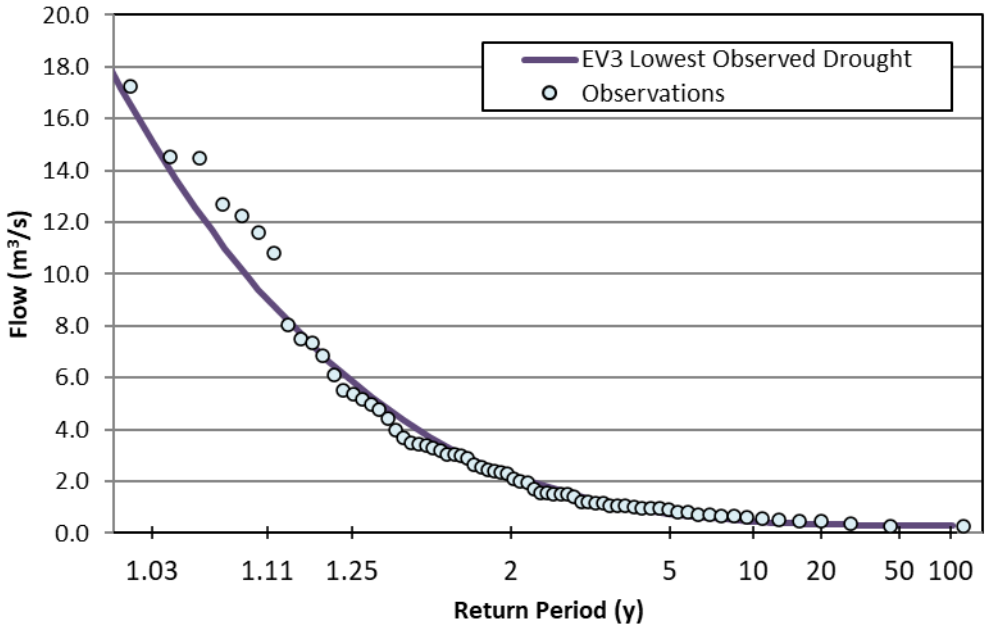


Figure A.10 October Low Flow Frequency Plot

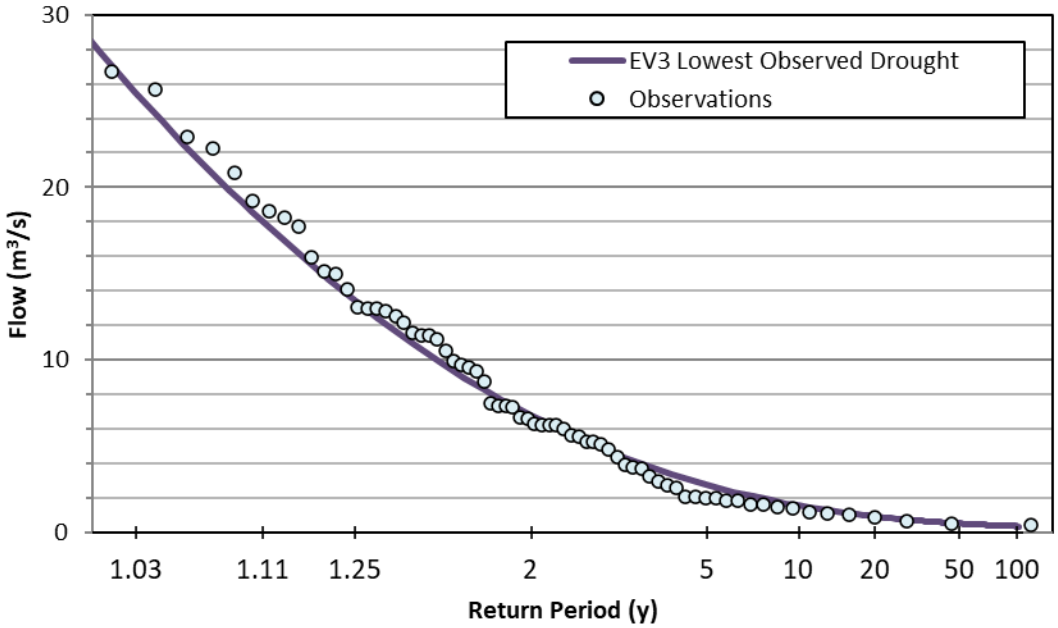


Figure A.11 November Low Flow Frequency Plot

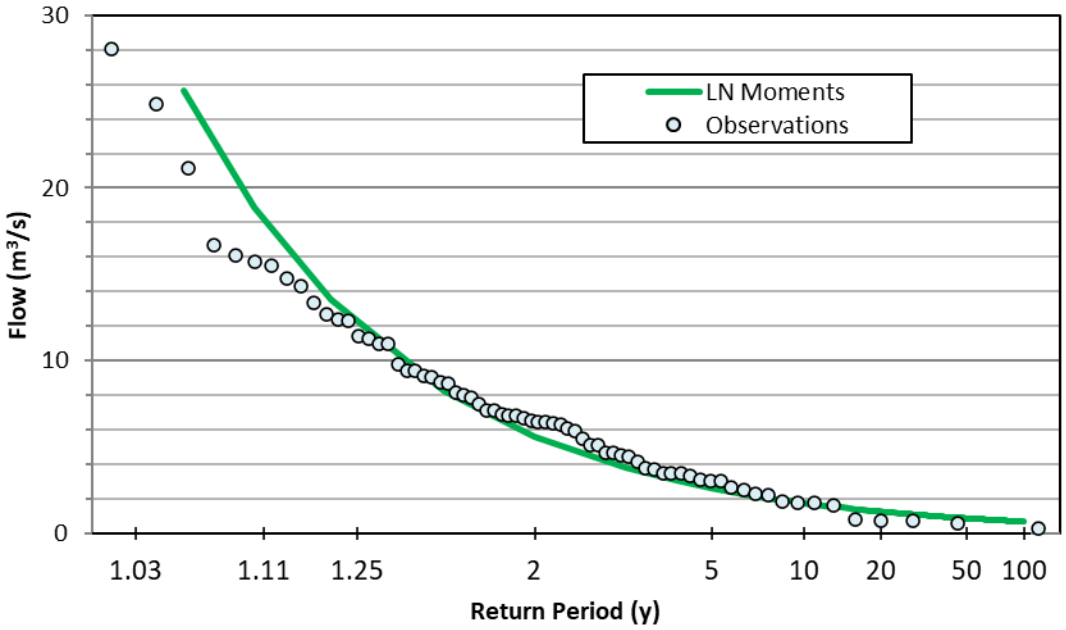


Figure A.12 December Low Flow Frequency Plot

Appendix B
CORMIX Modelling Details

B.1. January

- 7Q20 flow = 0.826 m^3/s, Effluent flow = 5,600 m^3/d (0.0648 m^3/s).
- Assumed channel depth = 1 m, and width = 20m.
- Assumed neutrally buoyant plume.
- CORMIX addresses multi-port diffusers with 3 or more ports, or submerged single port discharges. In this assessment, the two discharge pipes were replaced with three ports of equivalent total area.
- There is a significant difference between the effluent discharge velocity (~0.17 m/s) and the ambient stream velocity (0.03 m/s) resulting in potentially unreliable near-field CORMIX results. Replacing the three-port discharge approximation with an equivalent single port yielded similar results.
- Typical mixing results for January provided below. Completely mixed conditions achieved within the first 100 m.

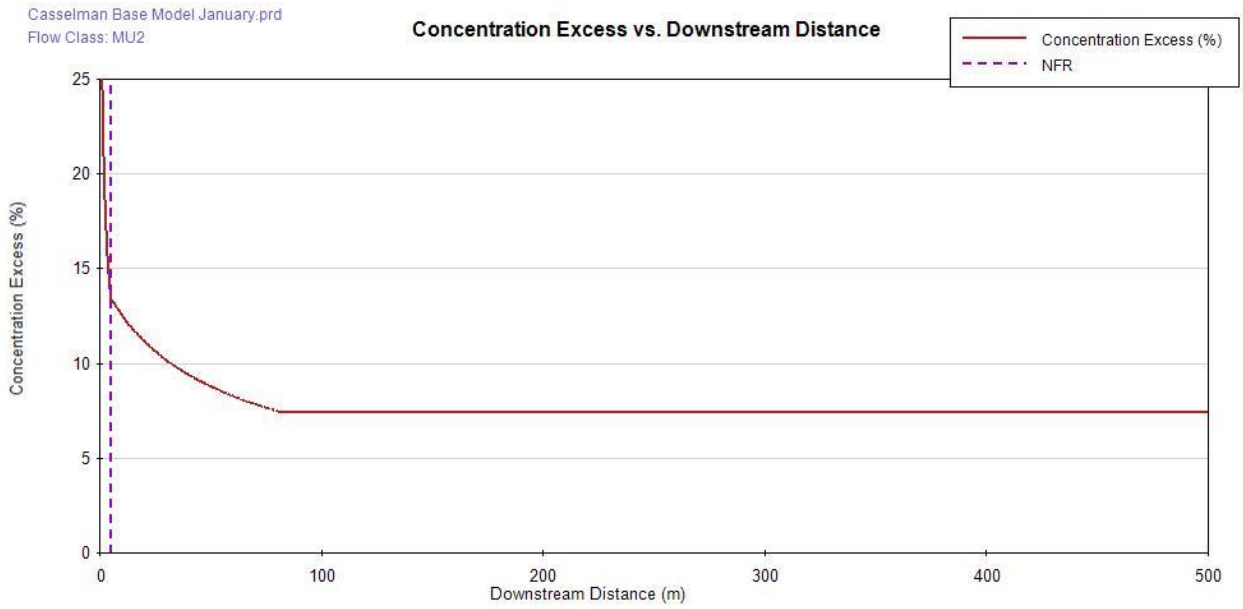


Figure B.1 – CORMIX Results for January

B.2. February

- 7Q20 flow = 0.802 m^3/s, Effluent flow = 5,750 m^3/d (0.0665 m^3/s).
- Assumed channel depth = 1 m, and width = 20m.
- Assumed neutrally buoyant plume.
- In this assessment, the two discharge pipes were replaced with three ports of equivalent total area.
- As with January results, near-field predictions are potentially unreliable, however, far-field predictions acceptable.
- Typical mixing results for February provided below. Completely mixed conditions achieved within the first 100 m.

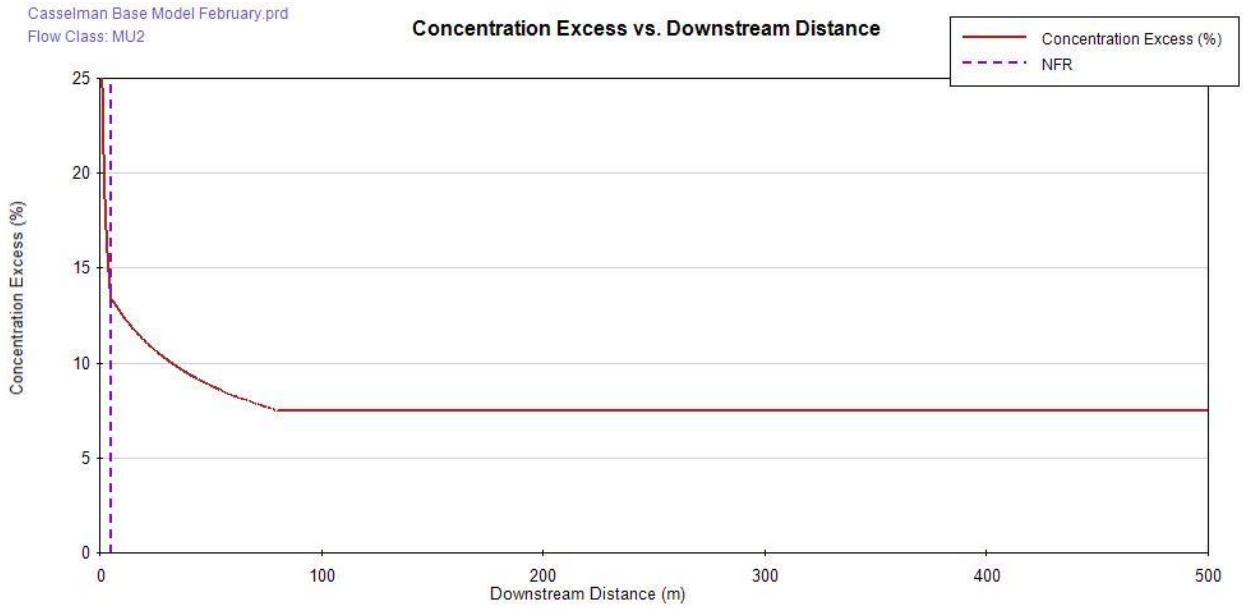


Figure B.1 – CORMIX Results for February

B.3. March

- 7Q20 flow = 1.035 m3/s, Effluent flow = 7,250 m3/d (0.0839 m3/s).
- Assumed channel depth = 1.2 m, and width = 25 m.
- Assumed neutrally buoyant plume.
- In this assessment, the two discharge pipes were replaced with three ports of equivalent total area.
- As with January results, near-field predictions are potentially unreliable, however, far-field predictions acceptable.
- Typical mixing results for March provided below. Completely mixed conditions achieved within the first 130 m.

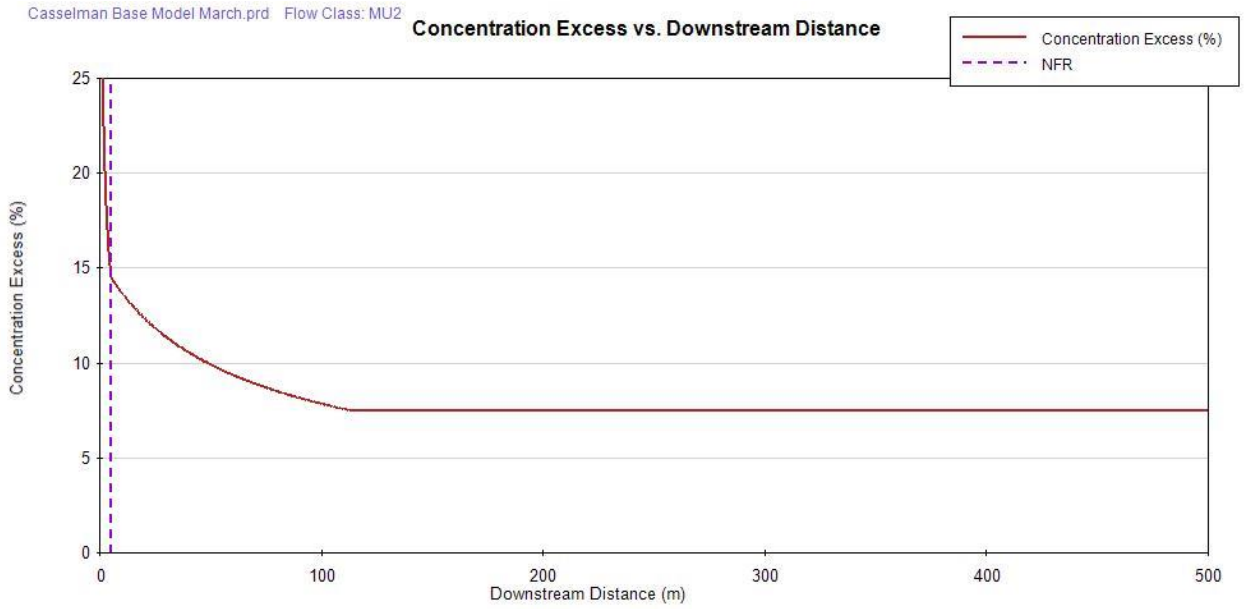


Figure B.3 – CORMIX Results for March

B.4. April

- 7Q20 flow = 8.442 m^3/s, Effluent flow = 10,000 m^3/d (0.116 m^3/s).
- Assumed channel depth = 2 m, and width = 60m.
- Assumed neutrally buoyant plume.
- Typical mixing results for April provided below. Completely mixed conditions achieved within the first 375 m.

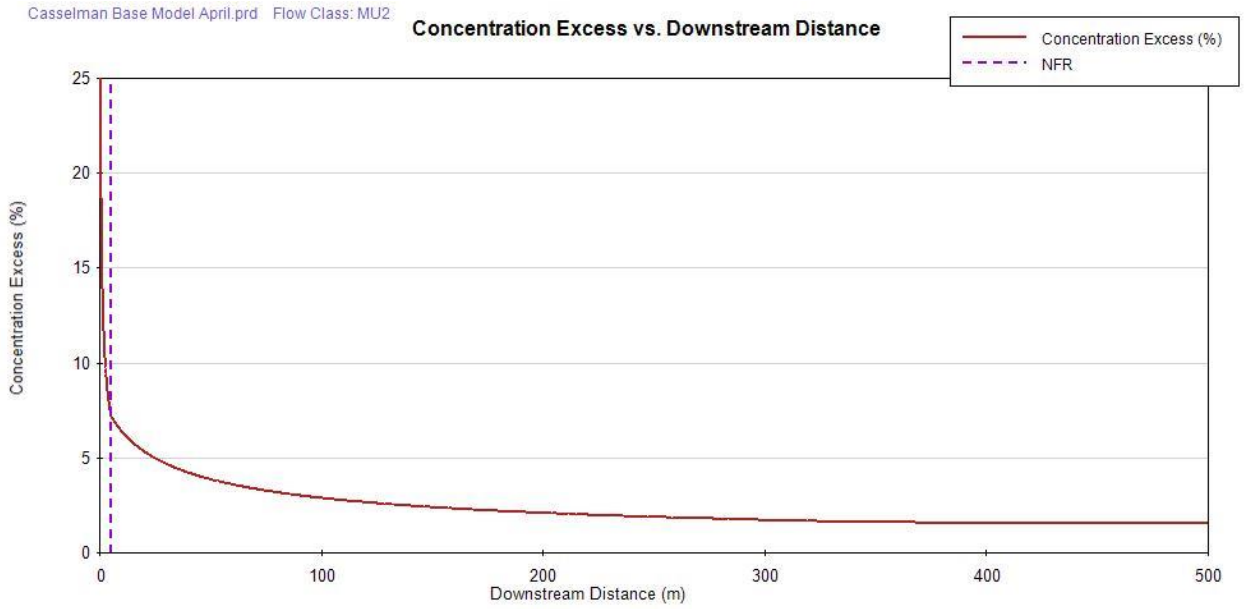


Figure B.4 – CORMIX Results for April

B.5. May

- 7Q20 flow = 2.108 m3/s, Effluent flow = 4,500 m3/d (0.0521 m3/s).
- Assumed channel depth = 1.8 m, and width = 35m.
- Assumed neutrally buoyant plume.
- In this assessment, the two discharge pipes were replaced with three ports of equivalent total area.
- As with January results, near-field predictions are potentially unreliable, however, far-field predictions acceptable.
- Typical mixing results for May provided below. Completely mixed conditions achieved within the first 175 m.

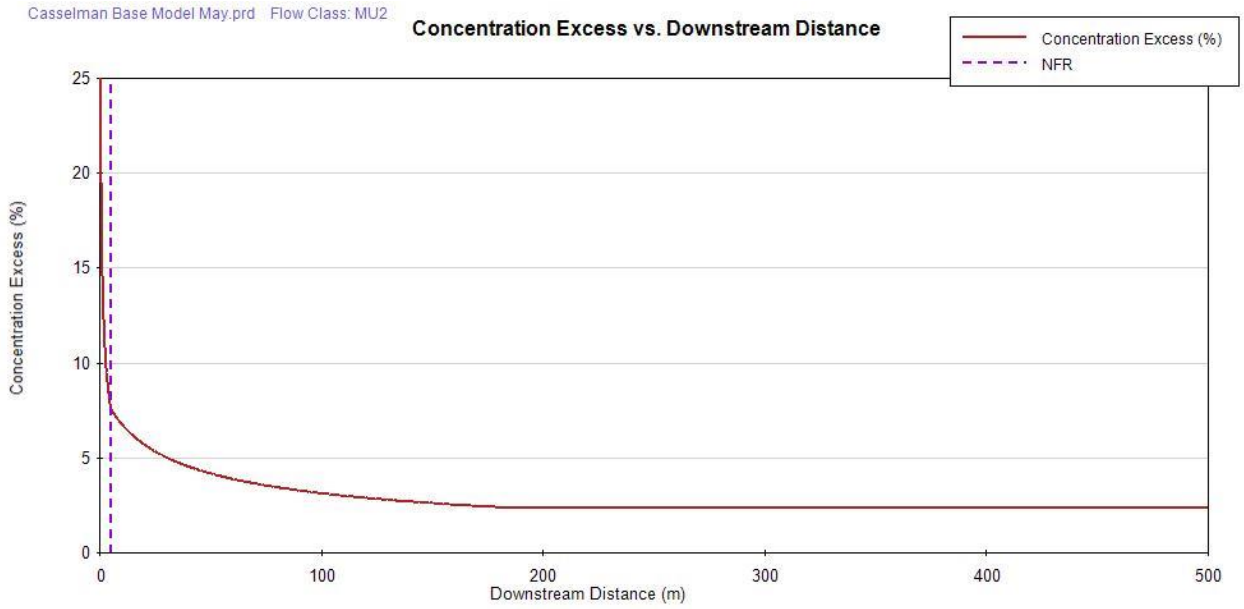


Figure B.5 – CORMIX Results for May

B.6. June

- 7Q20 flow = 0.652 m^3/s, Effluent flow = 2,150 m^3/d (0.0249 m^3/s).
- Assumed channel depth = 1.0 m, and width = 20 m.
- Assumed neutrally buoyant plume.
- In this assessment, the two discharge pipes were replaced with three ports of equivalent total area.
- As with January results, near-field predictions are potentially unreliable, however, far-field predictions acceptable.
- Typical mixing results for June provided below. Completely mixed conditions achieved within the first 80 m.

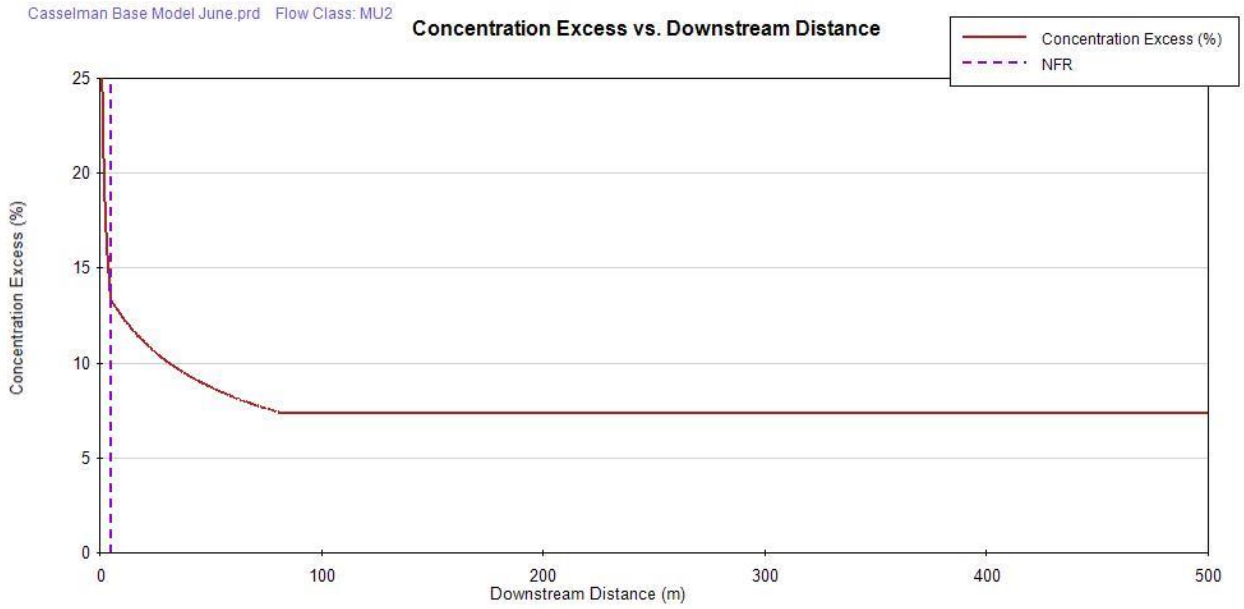


Figure B.6 – CORMIX Results for June

B.7. July

- 7Q20 flow = 0.319 m^3/s, Effluent flow = 1,050 m^3/d (0.0122 m^3/s).
- Assumed channel depth = 1.0 m, and width = 20 m.
- Assumed neutrally buoyant plume.
- In this assessment, the two discharge pipes were replaced with three ports of equivalent total area.
- As with January results, near-field predictions are potentially unreliable, however, far-field predictions acceptable.
- Typical mixing results for July provided below. Completely mixed conditions achieved within the first 75 m.

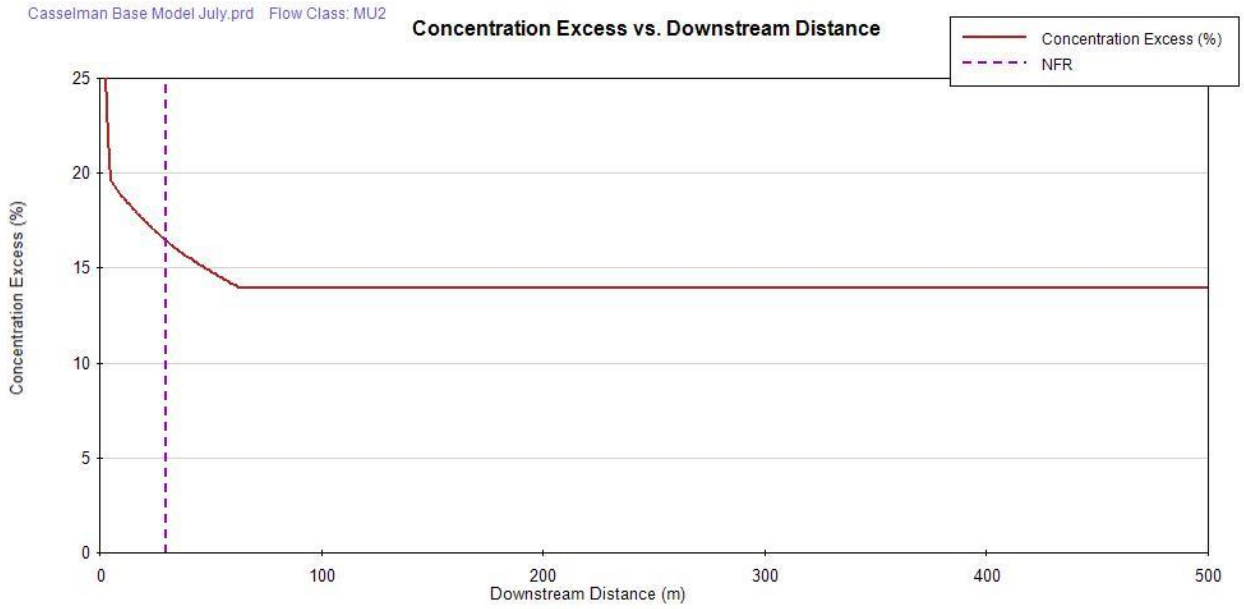


Figure B.7 – CORMIX Results for July

B.8. August

- 7Q20 flow = 0.274 m^3/s, Effluent flow = 900 m^3/d (0.0104 m^3/s).
- Assumed channel depth = 1.0 m, and width = 20 m.
- Assumed neutrally buoyant plume.
- In this assessment, the two discharge pipes were replaced with three ports of equivalent total area.
- As with January results, near-field predictions are potentially unreliable, however, far-field predictions acceptable.
- Typical mixing results for August provided below. Completely mixed conditions achieved within the first 80 m.

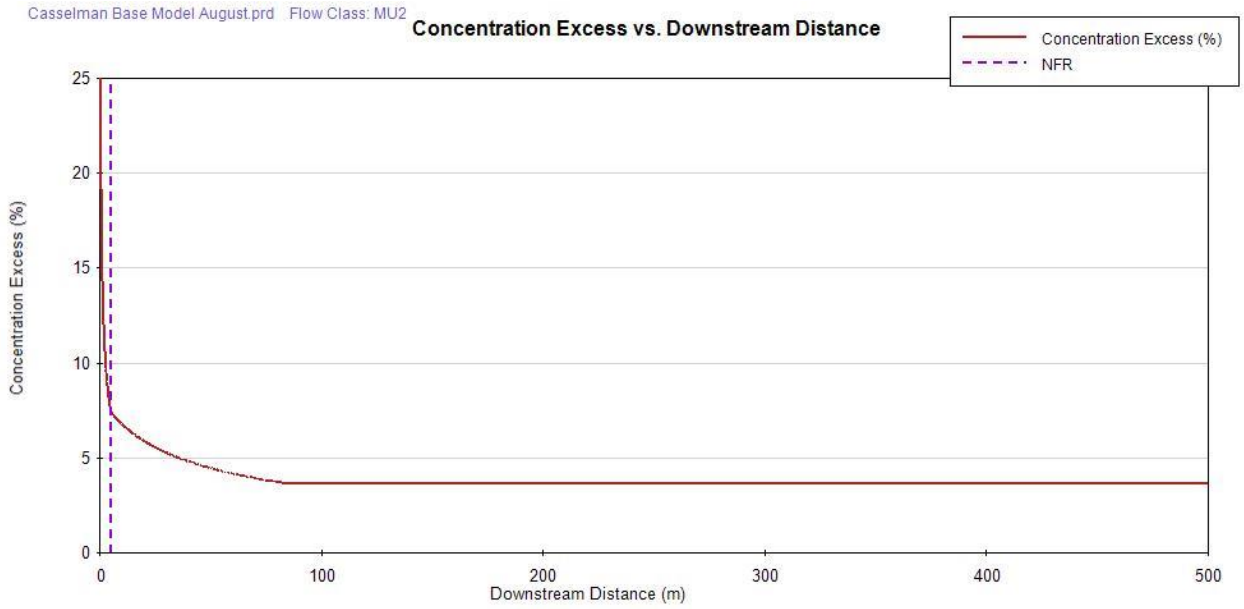


Figure B.8 – CORMIX Results for August

B.9. September

- 7Q20 flow = 0.276 m^3/s, Effluent flow = 910 m^3/d (0.0105 m^3/s).
- Assumed channel depth = 1.0 m, and width = 20 m.
- Assumed neutrally buoyant plume.
- In this assessment, the two discharge pipes were replaced with three ports of equivalent total area.
- As with January results, near-field predictions are potentially unreliable, however, far-field predictions acceptable.
- Typical mixing results for September provided below. Completely mixed conditions achieved within the first 80 m.

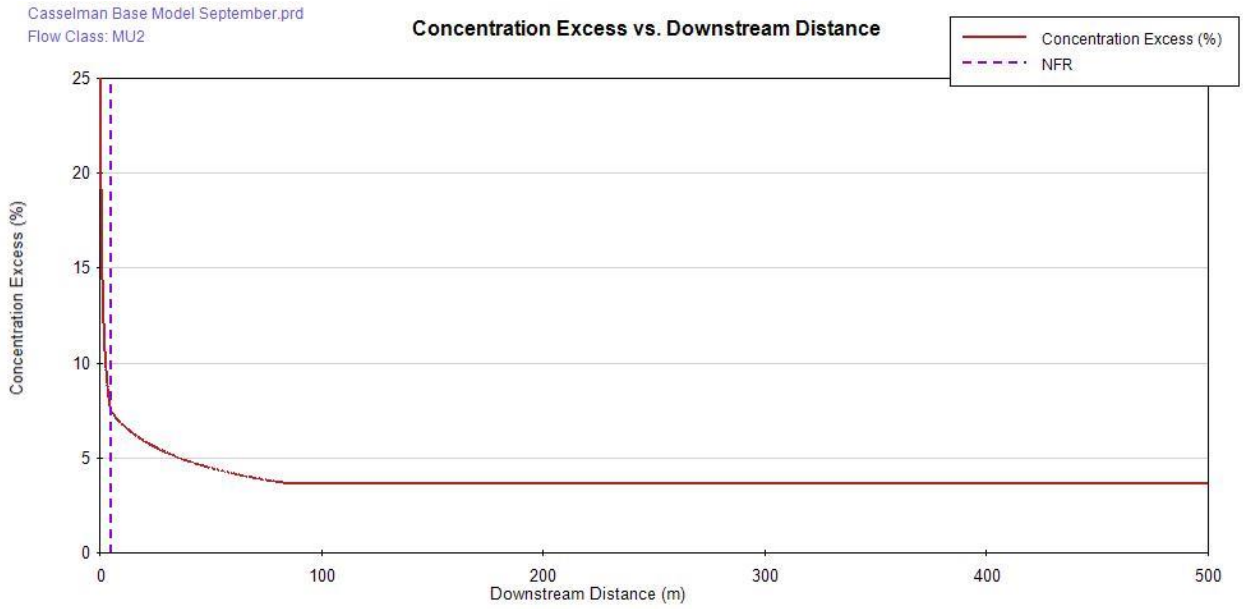


Figure B.9 – CORMIX Results for September

B.10. October

- 7Q20 flow = 0.340 m^3/s, Effluent flow = 2,250 m^3/d (0.0260 m^3/s).
- Assumed channel depth = 1.0 m, and width = 20 m.
- Assumed neutrally buoyant plume.
- In this assessment, the two discharge pipes were replaced with three ports of equivalent total area.
- As with January results, near-field predictions are potentially unreliable, however, far-field predictions acceptable.
- Typical mixing results for October provided below. Completely mixed conditions achieved within the first 80 m.

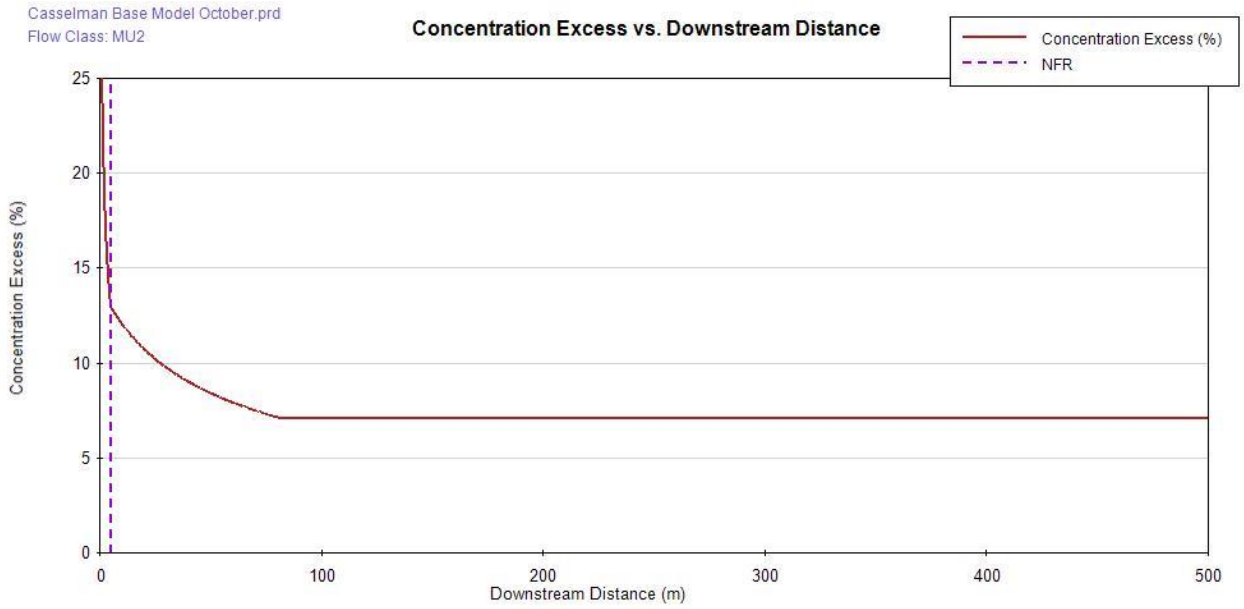


Figure B.10 – CORMIX Results for October

B.11. November

- 7Q20 flow = 0.918 m^3/s, Effluent flow = 6,050 m^3/d (0.0700 m^3/s).
- Assumed channel depth = 1.2 m, and width = 25 m.
- Assumed neutrally buoyant plume.
- In this assessment, the two discharge pipes were replaced with three ports of equivalent total area.
- As with January results, near-field predictions are potentially unreliable, however, far-field predictions acceptable.
- Typical mixing results for October provided below. Completely mixed conditions achieved within the first 125 m.

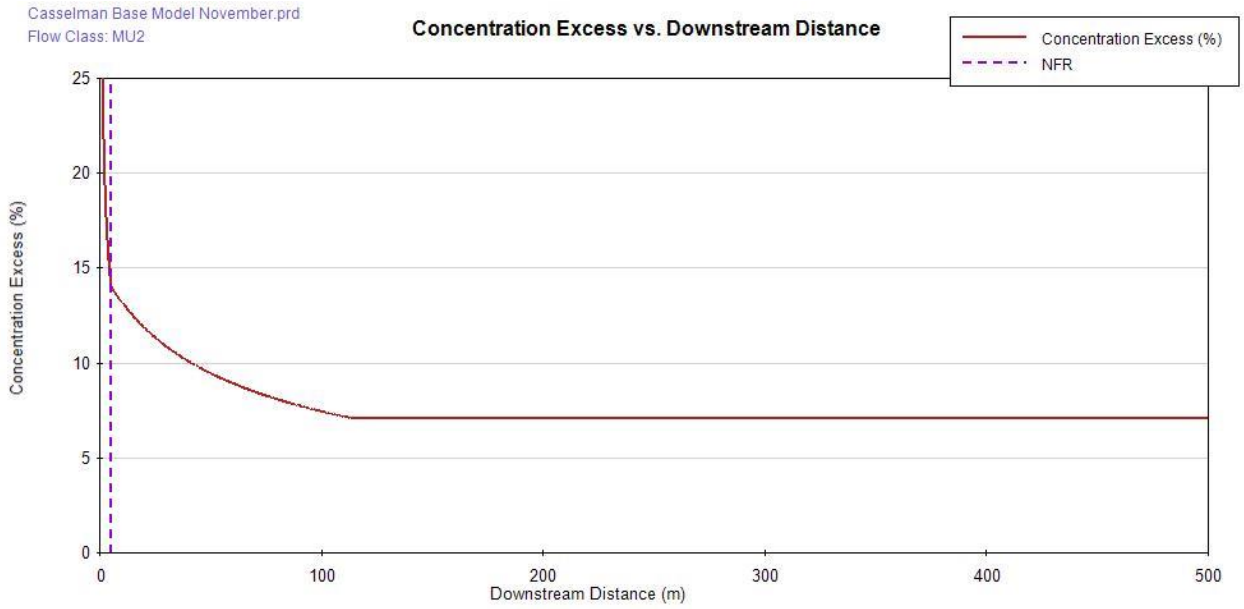


Figure B.11 – CORMIX Results for November

B.12. December

- 7Q20 flow = 1.251 m^3/s, Effluent flow = 8,750 m^3/d (0.101 m^3/s).
- Assumed channel depth = 1.2 m, and width = 25 m.
- Assumed neutrally buoyant plume.
- In this assessment, the two discharge pipes were replaced with three ports of equivalent total area.
- As with January results, near-field predictions are potentially unreliable, however, far-field predictions acceptable.
- Typical mixing results for October provided below. Completely mixed conditions achieved within the first 125 m.

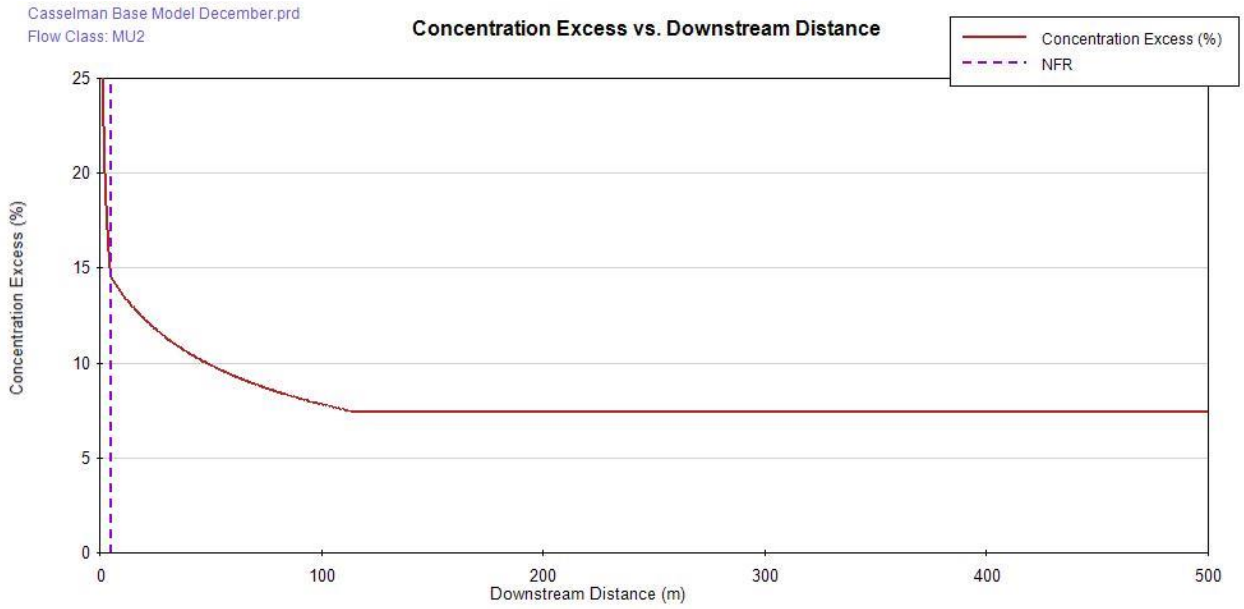


Figure B.12 – CORMIX Results for December

Appendix C

Correspondence Meeting Notes, Meeting Minutes and Presentation Materials from Consultation with MECP and SNC

Melody Johnson

From: Baxter, Sarah (She/Her) (MECP) <Sarah.Baxter@ontario.ca>
Sent: October 10, 2023 1:15 PM
To: Melody Johnson; Castro, Victor (MECP)
Cc: Carolyn Chan; Michael Hulley
Subject: RE: Casselman ACS - Notes from Conversation held Oct 5/23

Hey Melody,

Just wanted to confirm that your notes below accurately reflect our discussion last week.

I look forward to hearing about the ACS results on November 2.

Sarah Baxter
Surface Water Specialist
Technical Support Section – Eastern Region
Ministry of the Environment, Conservation and Parks
1259 Gardiners Road, Unit 3, Kingston ON, K7P 3J6
E: sarah.baxter@ontario.ca

From: Melody Johnson <melody@bskyeng.com>
Sent: October 6, 2023 1:02 PM
To: Baxter, Sarah (She/Her) (MECP) <Sarah.Baxter@ontario.ca>; Castro, Victor (MECP) <Victor.Castro@ontario.ca>
Cc: Carolyn Chan <cchan@jlrichards.ca>; Michael Hulley <Michael.Hulley@bskyeng.com>
Subject: Casselman ACS - Notes from Conversation held Oct 5/23

CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Hi Sarah / Victor,

Thank you for taking the time to speak with me yesterday regarding the ongoing Casselman ACS. I think it was a productive discussion and will help guide us in our subsequent analyses.

I've put together a summary of our conversation below, and attached a copy of the two high-level slides I presented during our call. Please let me know if you have any comments / changes / additions you'd like to make to the summary.

- Blue Sky presented a high-level overview of a proposed approach, which includes:
    - Extending the discharge period from the current Fall/Winter/Spring (Oct 1-May 15) period to year-round
    - Maintaining a minimum dilution ratio of 10:1 for all months (7Q20 : max discharge rate)
    - Ensure UIA PWQO is met at downstream, fully-mixed conditions
    - Ensure UIA non-toxicity at end-of-pipe (using an approach consistent with that used for Winchester)
    - Allow for the discharge of accumulated precipitation in lagoon cells
- Blue Sky also presented an initial low flow analysis (by calendar month) for the SNR in the vicinity of Casselman
- Victor noted that MECP is open to discussions re: extending the discharge period to year-round, however there are concerns related to Summer effluent discharges:
    - Nutrients, particularly phosphorus, are a significant concern in the SNR during the Summer months

    - Upstream agricultural impacts, low flows and elevated temperatures contribute to limited assimilative capacity
    - Current seasonal discharge facilities to this watershed can take advantage of a "trade off": less stringent nutrient limits by avoiding discharge during the critical Summer period
    - Extending the discharge period for the Casselman facility to the Summer months would require higher level treatment and more stringent effluent limits for P (and N)
- Melody noted that a recent ACS completed by Blue Sky for a constrained receiver in the Nottawasaga Valley watershed utilized an innovative approach to setting discharge flow rates
    - Effluent flows are a function of actual receiver flow, making it possible to discharge effluent during more critical seasonal periods (Summer) while minimizing impact on the receiver
    - Victor and Sarah noted that MECP could be open to considering an approach such as this for the SNR, but that details and supporting analyses would be required
    - Victor also noted that the expectation for stringent effluent requirements over the Summer period would remain
- MECP would like to see the following during the planned November 2, 2023 meeting:
    - An option that maintains the current discharge period (Oct 1-May 15) to determine the impact on effluent storage requirements and overall feasibility
    - That any options that incorporate extending discharge to the Summer period (May 16-Sep 30) take into consideration the receiver's seasonal sensitivity to nutrient loadings

Thanks, and have a lovely long weekend!

Melody Johnson, PhD, P.Eng., Senior Consultant
melody@bskyeng.com | www.bskyeng.com | M. 647.721.7644

BLUE SKY Energy Engineering & Consulting Inc.
EXPERTISE | BEST PRACTICES | CREATIVE THINKING

Casselman WWTS – ACS of the South Nation River

Current ECA Rated Capacity: 2,110 m^3/d (770,150 m^3/year)

Future Design Rated Capacity: 4,050 m^3/d (1,478,250 m^3/year)

Schedule B (cont.)

Spring - Final Effluent Compliance Limits

Winter/Spring (January 1 to May 15) - Seasonal Flow Volume = 502,500 m^3

Concentration Limits of Works (upon completion of construction of all Proposed Works)

Final Effluent Parameter	Averaging Calculator	Limit (maximum unless otherwise indicated)
CBOD5	Monthly Average Effluent Concentration	25
Total Suspended Solids	Monthly Average Effluent Concentration	25
Total Phosphorus	Monthly Average Effluent Concentration	1.0
Total Ammonia Nitrogen January 1 to March 31 April 1 to May 15	Monthly Average Effluent Concentration	 12.0 mg/L 6.0 mg/L
E. coli	Monthly Geometric Mean Density	*200 CFU/100 mL
Hydrogen Sulphide	Monthly Average Effluent Concentration	0.1 mg/L
pH of the effluent maintained between 6.0 to 8.0, inclusive, at all times		

*If the MPN method is utilized for *E. coli* analysis the objective shall be 200 MPN/100 mL.

Schedule B (cont.)

Fall - Final Effluent Compliance Limits

Fall (October 1 to December 31) - Seasonal Flow Volume = 267,650 m^3

oncentration Limits of Works (upon completion of construction of all Proposed Works)

luent Parameter	Averaging Calculator	Limit (maximum unless otherwise indicated)
	Monthly Average Effluent Concentration	15
pended Solids	Monthly Average Effluent Concentration	25
sphorus	Monthly Average Effluent Concentration	1.0
mmonia Nitrogen October 1 to November 30 December 1 to December 31	Monthly Average Effluent Concentration	 5.0 mg/L 12.0 mg/L
E. coli	Monthly Geometric Mean Density	*200 CFU/100 mL
Hydrogen Sulphide	Monthly Average Effluent Concentration	Not Detected
pH of the effluent maintained between 6.0 to 8.0, inclusive, at all times		

*If the MPN method is utilized for *E. coli* analysis the objective shall be 200 MPN/100 mL.

October 5, 2023

Casselman WWTS – ACS of the South Nation River

Schedule B (cont.)

Maximum Monthly Effluent Discharge Rates

Discharge Period	Maximum Discharge Rate	Maximum Discharge Rate Based on Dilution Ratio
January 1 - 31	5,000 m^3/d	SNR Flow/10
February 1 - 28/29	5,000 m^3/d	SNR Flow/10
March 1 - 31	5,000 m^3/d	SNR Flow/40
April 1 -30	7,000 m^3/d	SNR Flow/60
May 1 -15	7,000 m^3/d	SNR Flow/60
October 1 -31	4,000 m^3/d	SNR Flow/15
November 1 - 30	4,000 m^3/d	SNR Flow/10
December 1 - 31	5,000 m^3/d	SNR Flow/15

Low Flow Analysis Results – South Nation River in the Vicinity of Casselman

Month	7Q20 Flow (m^3/s)
January	0.826
February	0.802
March	1.035
April	8.442
May	2.108
June	0.652
July	0.319
August	0.274
September	0.276
October	0.340
November	0.918
December	1.251

Proposed Approach:

- Extend discharge period from Oct 1 – May 15 to year-round
- Maintain minimum dilution ratio of 10:1 for all months (7Q20 : max discharge rate)
- Ensure UIA PWQO met at fully-mixed conditions
- Ensure UIA non-toxicity at end-of-pipe (consistent with Winchester)
- Allow for discharge of accumulated precipitation in lagoon cells

October 5, 2023

J.L.Richards
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Casselman Lagoon Assimilative Capacity Study

MECP Pre-Consultation Meeting 1
Minutes of Meeting No. 1

Attendance:	Name	Company	Email
	Pierre-Paul Beauchamp (PB)	Village of Casselman (Casselman)	ppbeauchamp@casselman.ca
	Yves Morrissette (YM)	Casselman	ymorrissette@casselman.ca
	Dawn Crump (DC)	Ontario Clean Water Agency (OCWA)	dcrump@ocwa.com
	Victor Castro (VC)	Ministry of the Environment, Conservation and Parks (MECP)	victor.castro@ontario.ca
	Sarah Baxter (SB)	MECP	sarah.baxter@ontario.ca
	Jon Orpana (JO)	MECP	jon.orpana@ontario.ca
	Melody Johnson (MJ)	Blue Sky Energy Engineering and Consulting Inc. (Blue Sky)	melody@bskyeng.com
	Jordan Morrissette (JM)	J.L. Richards & Associates Limited (JLR)	jmorrissette@jlrichards.ca
	Carolyn Chan (CC)	JLR	cchan@jlrichards.ca
	Kevin Cortez (KC)	JLR	kcortez@jlrichards.ca

The meeting commenced at 10:00 a.m. on Thursday, November 2, 2023 at Microsoft Teams.

The following summary of the discussions of this meeting has been prepared to record decisions reached and actions required for the project. Please advise the undersigned of any errors or omissions within the next three business days.

ITEM		**ACTION BY**	**DUE BY**

1.1 INTRODUCTION

- JLR introduced the project and the team members.
- The Assimilative Capacity Study is being performed during the ongoing Master Plan Update project, prior to the commencement of a dedicated Environmental Assessment (EA) for the Casselman Lagoon system; results from the study will form a key input in the EA process.
- Blue Sky brought in as sub-consultant to perform the capacity assessment of the South Nation River.

1.2 OVERVIEW OF EXISTING SYSTEM

- The existing system consists of 3-Cell lagoon system with LagoonGuard MBBR and Disk Filter with a rated capacity of 2,110 m^3/d.
- Casselman Master Plan identified future facility rated capacity at 4,050m^3/d.
- Under existing ECA No. 8160-BAHPRF dated April 29, 2019, discharge to the South Nation River is permitted Seasonally (Spring and Fall).
- There are different maximum discharge values and effluent criteria for the different time periods; refer to attached slides.

1.3 ASSIMILATIVE CAPACITY OF SOUTH NATION RIVER

- All calculations are based on 7Q20 flows from the South Nation River.

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Casselman Lagoon Assimilative Capacity Study

MECP Pre-Consultation Meeting 1
Minutes of Meeting No. 1

ITEM	ACTION BY	DUE BY

- MJ noted that for the month of May, 7Q20 flows can be increased if considering the first half of May as Summer flow conditions occur in the later half of May.

- Proposed approach looked at two different scenarios:
  - Scenario 1 - Maintain the current effluent discharge window
  - Scenario 2 – Increase to year-round effluent discharge
- Approach maintained minimum dilution ratio of 10:1 for all months and did not exceed annual total phosphorus loading of 770 kg/year outlined in the existing ECA.
- SCENARIO 1 (refer to attached slides)
  - Updated maximum discharge rate is increased except for October.
  - MJ is proposing a reduced TP monthly limit of 0.45 mg/L, which results in annual TP loading of 770 kg/year.
  - TAN limit is reduced during the Fall and Winter to 4.5 mg/L and 10.0 mg/L, respectively, and maintained at 6.0 mg/L during the Spring
  - Estimated maximum effluent storage volume of 460,000m^3 (end of October). Given the storage requirement exceeds the existing storage capacity of 330,000m^3, new lagoon cells would be required.
  - Mixing calculations showed that TAN in fully mixed condition was below Provincial Water Quality Objective (PWQO) value for all months
  - TP percent increase above ambient conditions range between 4.0% in April and 19.6% in November
  - SB asked whether CORMIX modelling of the mixing zone had been performed. MJ noted that this was planned but not yet completed and confirmed that the fully mixed values presented were based on mass loading approach.
  - VC inquired about space availability and if the municipality would be required to purchase land for the construction of the additional lagoon cells. YM stated that all the surrounding land is owned by The Nation, purchasing additional land would be very difficult and expensive
- SCENARIO 2 (refer to attached slides)
  - For the new summer discharge, considered over 25:1 dilution ratio.
  - Proposed TP monthly limit of 0.3 mg/L results in TP total annual loading reduced to 476 kg/year, with 45.7 kg occurring during the summer
  - TAN monthly limit of 11.5 mg/L during the winter (Dec 1 – Mar 31), 6.0 mg/L during Spring (Apr 1 – May 31), 1.3 mg/L during Summer (June 1 – Sep 30), and 5.0 mg/L during Fall (Oct. 1 – Nov 30).
  - Total storage requirements of 310,000 m^3, no new lagoon cells necessary
  - Approximately 5% increase in TP concentration from the ambient concentration in the summer months
  - MECP inquired if the existing treatment system could consistently achieve the proposed effluent criteria. JLR noted that this would be investigated during the EA process; planning to discuss with Veolia regarding MBBR and disk filter capacity. Reviewing historical performance, warm weather TAN values look promising, TP to be further explored. JLR noted that the — JLR

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Casselman Lagoon Assimilative Capacity Study

MECP Pre-Consultation Meeting 1
Minutes of Meeting No. 1

ITEM		ACTION BY	DUE BY
	EA could include stress testing to demonstrate feasibility of meeting the proposed compliance limits. - MECP inquired if the plant currently monitors for effluent E.coli. OCWA confirmed that monitoring occurs, noting that the current ECA erroneously provides a limit for E.coli despite lack of disinfection. Reviewing recent results, DC reported a range of 2,700 cfu in January 2023 and 2 cfu in May 2023. A similar trend was observed for the year 2022. - MECP requested that ACS include review of E.coli criteria, especially if effluent is discharged during the summer months. - MJ commented that the purpose of the discussion is to determine if the MECP generally agrees with the approach and proposed limits presented, or whether they have initial concerns or see any red flags that must be addressed. - MECP commented that the approach was generally acceptable. Although new summer discharge into the SNR is a concern, and although the approach presents a 0.3 mg/L TP effluent limit which is not considered equivalent to “Best Available Technology” (i.e. as achieved by mechanical plants with advanced filtration), VC noted that there is recognition that the existing facility is not a new point source. SB commented that the overall reduction in total annual TP loading was favourable. - VC inquired if there were any additional scenarios considered, such as a mechanical plant. YM noted Casselman’s concerns as to cost. JM commented that the future EA would consider all options, but a mechanical plant is likely to be screened out given the availability of storage and the relative costs. - MECP would like project team to contact SNCA to discuss converting to year-round discharge, and incorporate SNCA’s comments into draft ACS report. JLR to initiate discussion with SNCA. - YM stated that Casselman is a small municipality whose borders are bounded by The Nation giving a cap to ultimate population. Given that the municipality has recently invested in the MBBR treatment system, YM considers that upgrading to a mechanical plant would be too expensive and have minimal benefit.	JLR/ Blue Sky JLR	
1.4	NEXT STEPS AND FINAL COMMENTS • SB expressed interest in CORMIX modelling results regarding mixing zone length. Blue Sky to complete for inclusion in Draft ACS report. • MECP inquired if there had been odour complaints. OCWA stated that no complaints were received except for foaming from the MBBR. • MECP inquired about the closest neighbouring property. JLR stated that the closest neighbour was a residential property approximately 150 m north. • JO requested to be copied in all future correspondence regarding the ACS for tracking purposes.	Blue Sky JLR	

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Casselman Lagoon Assimilative Capacity Study

MECP Pre-Consultation Meeting 1
Minutes of Meeting No. 1

ITEM	ACTION BY	DUE BY

Meeting adjourned at 10:52 a.m.

Prepared by:



Kevin Cortez, M.Eng., EIT
Environmental Engineering Intern

Issued on: November 9, 2023

Reviewed by:



Carolyn Chan, M.A.Sc., P.Eng.
Environmental Engineer

Distribution: All attendees

Project No. 16953-133

November 2, 2023

Casselman Lagoons - Assimilative Capacity Review of South Nation River



Agenda

- Project Contacts
- Overview of Existing System
- Assimilative Capacity of South Nation River
- Approach
- Preliminary Results
- Next Steps/Comments

Project Contacts

Village of Casselman (Owner)

- Pierre-Paul Beauchamp, Director of Public Works – ppbeauchamp@casselman.ca
- Yves Morrissette, Chief Administrative Office – ymorrissette@casselman.ca

Ontario Clean Water Agency (OCWA)

- Dawn Crump, Process & Compliance – dcrump@ocwa.com

Project Contacts

J.L. Richards and Associates Limited

- Jordan Morrissette, M.Eng., P.Eng., Senior Environmental Engineer – jmorrissette@jlrichards.ca
- Carolyn Chan, M.A.sc. P.Eng., Environmental Engineer – cchan@jlrichards.ca
- Kevin Cortez, Intern Environmental Engineer – kcortez@jlrichards.ca

Blue Sky Energy Engineering and Consulting Inc. (Assimilative Capacity Assessment)

- Melody Johnson, M.A.Sc., PhD, P.Eng., Senior Consultant – melody@bskyeng.com

Overview of Existing System



- ECA No. 8160-BAHPRF dated April 29, 2019
- Existing Rated Capacity = 2,110 m^3/d
- 3-Cell Lagoon System with LagoonGuard MBBR and Disk Filter
- Seasonal Discharge to South Nation River
- Future Rated Capacity = 4,050 m^3/d

Existing ECA

Schedule B (cont.)

Spring - Final Effluent Compliance Limits

Winter/Spring (January 1 to May 15) - Seasonal Flow Volume = 502,500 m^3

Concentration Limits of Works (upon completion of construction of all Proposed Works)

Final Effluent Parameter	Averaging Calculator	Limit (maximum unless otherwise indicated)
CBOD5	Monthly Average Effluent Concentration	25
Total Suspended Solids	Monthly Average Effluent Concentration	25
Total Phosphorus	Monthly Average Effluent Concentration	1.0
Total Ammonia Nitrogen January 1 to March 31 April 1 to May 15	Monthly Average Effluent Concentration	 12.0 mg/L 6.0 mg/L
E. coli	Monthly Geometric Mean Density	*200 CFU/100 mL
Hydrogen Sulphide	Monthly Average Effluent Concentration	0.1 mg/L
pH of the effluent maintained between 6.0 to 8.0, inclusive, at all times		

*If the MPN method is utilized for *E. coli* analysis the objective shall be 200 MPN/100 mL.

Schedule B (cont.)

Maximum Monthly Effluent Discharge Rates

Discharge Period	Maximum Discharge Rate	Maximum Discharge Rate Based on Dilution Ratio
January 1 - 31	5,000 m^3/d	SNR Flow/10
February 1 - 28/29	5,000 m^3/d	SNR Flow/10
March 1 - 31	5,000 m^3/d	SNR Flow/40
April 1 -30	7,000 m^3/d	SNR Flow/60
May 1 -15	7,000 m^3/d	SNR Flow/60
October 1 -31	4,000 m^3/d	SNR Flow/15
November 1 - 30	4,000 m^3/d	SNR Flow/10
December 1 - 31	5,000 m^3/d	SNR Flow/15

Schedule B (cont.)

Fall - Final Effluent Compliance Limits

Fall (October 1 to December 31) - Seasonal Flow Volume = 267,650 m^3

Concentration Limits of Works (upon completion of construction of all Proposed Works)

Final Effluent Parameter	Averaging Calculator	Limit (maximum unless otherwise indicated)
CBOD5	Monthly Average Effluent Concentration	15
Total Suspended Solids	Monthly Average Effluent Concentration	25
Total Phosphorus	Monthly Average Effluent Concentration	1.0
Total Ammonia Nitrogen October 1 to November 30 December 1 to December 31	Monthly Average Effluent Concentration	 5.0 mg/L 12.0 mg/L
E. coli	Monthly Geometric Mean Density	*200 CFU/100 mL
Hydrogen Sulphide	Monthly Average Effluent Concentration	Not Detected
pH of the effluent maintained between 6.0 to 8.0, inclusive, at all times		

*If the MPN method is utilized for *E. coli* analysis the objective shall be 200 MPN/100 mL.



Assimilative Capacity of South Nation River



Preliminary Analysis

Low Flow Analysis Results – South Nation River in the Vicinity of Casselman

Month	7Q20 Flow (m^3/s)
January	0.826
February	0.802
March	1.035
April	8.442
May	2.108
June	0.652
July	0.319
August	0.274
September	0.276
October	0.340
November	0.918
December	1.251

Ambient Water Quality:

- Policy 2 for TP
- Policy 1 for UIA

Proposed Approach

Schedule B (cont.)

Maximum Monthly Effluent Discharge Rates

Discharge Period	Maximum Discharge Rate	Maximum Discharge Rate Based on Dilution Ratio
January 1 - 31	5,000 m^3/d	SNR Flow/10
February 1 - 28/29	5,000 m^3/d	SNR Flow/10
March 1 - 31	5,000 m^3/d	SNR Flow/40
April 1 -30	7,000 m^3/d	SNR Flow/60
May 1 -15	7,000 m^3/d	SNR Flow/60
October 1 -31	4,000 m^3/d	SNR Flow/15
November 1 - 30	4,000 m^3/d	SNR Flow/10
December 1 - 31	5,000 m^3/d	SNR Flow/15

- Two scenarios:
  - Seasonal (maintain current discharge period of Oct 1 – May 15)
  - Year-round (extend discharge period from)
- Maintain minimum dilution ratio of 10:1 for all months (7Q20 : max discharge rate)
- The maximum annual TP loading to the SNR will not exceed the current equivalent ECA limit of 770 kg/year
- Ensure UIA PWQO met at fully-mixed conditions
- Ensure UIA non-toxicity at end-of-pipe (consistent with Winchester)
- Allow for discharge of accumulated precipitation in lagoon cells

Scenarios

1. Seasonal: Maintain current discharge window (Oct 1 to May 15)
2. Year-round: Extend discharge window

1. Seasonal Discharge

Discharge Period	Maximum Discharge Rate	Minimum Dilution Ratio Acheived [1]
Jan 1 – 31	6,750 m^3/d	10.6 : 1
Feb 1 – 28/29	6,550 m^3/d	10.6 : 1
Mar 1 – 31	8,450 m^3/d	10.6 : 1
Apr 1 – 30	10,000 m^3/d	72.9 : 1
May 1 – 15	9,000 m^3/d	39.4 : 1
May 16 – 31	-	-
Jun 1 – 30	-	-
July 1 – 31	-	-
Aug 1 – 31	-	-
Sep 1 – 30	-	-
Oct 1 – 31	2,500 m^3/d	11.8 : 1
Nov 1 – 30	6,800 m^3/d	11.7 : 1
Dec 1 – 31	10,200 m^3/d	10.6 : 1

Notes:

1. SNR 7Q20 flow : Effluent Flow

1. Seasonal Discharge

Parameter	Objective		Limit	
TP	Monthly	0.36 mg/L	Monthly	0.45 mg/L
TAN				
Winter (Dec 1 to Mar 31)	Monthly	8.0 mg/L	Monthly	10.0 mg/L
Spring (Apr 1 to May 15)	Monthly	4.8 mg/L	Monthly	6.0 mg/L
Fall (Oct 1 to Nov 30)	Monthly	3.6 mg/L	Monthly	4.5 mg/L

Excess Discharge Capacity: **0 to 6%** (depends on new storage lagoon area requirements)

Estimated Maximum Effluent Storage Volume Requirement: **460,000 m^3** (end of October) > 330,000 m^3

Maximum Summer TP Loading: **0 kg** (no summer discharge)

Maximum Annual TP Loading: **770 kg/year**

1. Seasonal Discharge

Discharge Period	Fully-Mixed UIA (ug/L as NH3)	Fully-Mixed TP (mg/L)	% Increase Above Ambient TP
Jan 1 – 31	19.4	0.208	11.0
Feb 1 – 28/29	19.4	0.208	11.0
Mar 1 – 31	19.4	0.208	11.0
Apr 1 – 30	13.4	0.115	4.0
May 1 – 15	19.7	0.118	7.1
May 16 – 31	-	-	-
Jun 1 – 30	-	-	-
July 1 – 31	-	-	-
Aug 1 – 31	-	-	-
Sep 1 – 30	-	-	-
Oct 1 – 31	19.2	0.137	19.5
Nov 1 – 30	19.3	0.137	19.6
Dec 1 – 31	19.3	0.208	11.0
PWQO	**20 ug/L as NH3**	**0.030 mg/L**	**n/a**

2. Year-Round Discharge

Discharge Period	Maximum Discharge Rate	Minimum Dilution Ratio Acheived [1]
Jan 1 – 31	5,750 m^3/d	12.4 : 1
Feb 1 – 28/29	5,600 m^3/d	12.4 : 1
Mar 1 – 31	7,250 m^3/d	12.3 : 1
Apr 1 – 30	10,000 m^3/d	72.9 : 1
May 1 – 31	4,500 m^3/d	40.5 : 1
Jun 1 – 30	2,150 m^3/d	26.2 : 1
July 1 – 31	1,050 m^3/d	26.2 : 1
Aug 1 – 31	900 m^3/d	26.3 : 1
Sep 1 – 30	910 m^3/d	26.2 : 1
Oct 1 – 31	2,250 m^3/d	13.1 : 1
Nov 1 – 30	6,050 m^3/d	13.1 : 1
Dec 1 – 31	8,750 m^3/d	12.4 : 1
Notes: 1. SNR 7Q20 flow : Effluent Flow		

2. Year-Round Discharge

Parameter	Objective		Limit	
TP	Monthly	0.20 mg/L	Monthly	0.30 mg/L
TAN				
Winter (Dec 1 to Mar 31)	Monthly	9.2 mg/L	Monthly	11.5 mg/L
Spring (Apr 1 to May 31)	Monthly	4.8 mg/L	Monthly	6.0 mg/L
Summer (June 1 to Sep 30)	Monthly	1.0 mg/L	Monthly	1.3 mg/L
Fall (Oct 1 to Nov 30)	Monthly	4.0 mg/L	Monthly	5.0 mg/L

Excess Discharge Capacity: **5.5%** (assumes no new lagoons required)

Estimated Maximum Effluent Storage Volume Requirement: **315,000 m^3** (end of October) < 330,000 m^3

Maximum Summer TP Loading: **45.7 kg** (average of 0.37 kg/d over the Summer)

Maximum Annual TP Loading: **476 kg/year**

2. Year-Round Discharge

Discharge Period	Fully-Mixed UIA (ug/L as NH3)	Fully-Mixed TP (mg/L)	% Increase Above Ambient TP
Jan 1 – 31	19.2	0.194	4.4
Feb 1 – 28/29	19.3	0.194	4.4
Mar 1 – 31	19.4	0.194	4.5
Apr 1 – 30	13.4	0.113	2.3
May 1 – 31	19.4	0.115	4.0
Jun 1 – 30	19.4	0.127	5.2
July 1 – 31	19.4	0.127	5.2
Aug 1 – 31	19.3	0.127	5.2
Sep 1 – 30	19.4	0.127	5.2
Oct 1 – 31	19.3	0.124	10.9
Nov 1 – 30	19.3	0.123	10.9
Dec 1 – 31	19.3	0.194	4.4
PWQO	**20 ug/L as NH3**	**0.030 mg/L**	**n/a**



Next Steps and Final Comments

- Maintaining seasonal discharge:
  - Expansion to effluent storage volume required
  - Project impacts (site, schedule, cost)
- Expanding discharge to year-round:
  - Minimum summer dilution ratio (~25 : 1)?
  - Summer TP concentration limit (0.30 mg/L)?
  - New TP loading to SNR over the summer (45.7 kg over June – Sep)?
- Next steps:
  - Update discharge alternatives (as required)
  - Evaluate and select preferred discharge alternative
  - Document in ACS report

Thank you!

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS



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Melody Johnson

From: Melody Johnson
Sent: November 30, 2023 11:10 AM
To: Melody Johnson
Subject: FW: 16953-133 Casselman Lagoon ACS

From: Claire Lemay <clemay@nation.on.ca>
Sent: Wednesday, November 29, 2023 3:27 PM
To: Carolyn Chan <cchan@jlrichards.ca>
Cc: Kevin Cortez <kcortez@jlrichards.ca>
Subject: Re: 16953-133 Casselman Lagoon ACS

Hi Carolyn,

SNC has no concerns with the proposal to extend the discharge period from seasonal to year-round as long as the proposal remains to maintain the total phosphorus loading to the South Nation River within the allowable limits of the existing ECA.

Thank you,
Claire Lemay

From: Carolyn Chan <cchan@jlrichards.ca>
Sent: Wednesday, November 29, 2023 10:07 AM
To: Claire Lemay <clemay@nation.on.ca>
Cc: Kevin Cortez <kcortez@jlrichards.ca>
Subject: RE: 16953-133 Casselman Lagoon ACS

Hi Claire,

Can you provide an update? Happy to schedule a meeting if that's quicker.

Best,
Carolyn

Carolyn Chan, P.Eng., M.A.Sc.
Environmental Engineer

J.L. Richards & Associates Limited
107 - 450 Speedvale Ave. West, Guelph, ON N1H 7Y6
Direct: 226-780-7367





From: Claire Lemay <clemay@nation.on.ca>
Sent: Tuesday, November 21, 2023 12:06 PM
To: Carolyn Chan <cchan@jlrichards.ca>

Cc: Info Mailbox <info@nation.on.ca>
Subject: RE: 16953-133 Casselman Lagoon ACS

Hi Carolyn,
Thank you for your inquiry. I'll get back to you within the next few days.
Regards,
Claire

From: Carolyn Chan <cchan@jlrichards.ca>
Sent: Monday, November 20, 2023 8:14 AM
To: Claire Lemay <clemay@nation.on.ca>
Cc: Info Mailbox <info@nation.on.ca>
Subject: RE: 16953-133 Casselman Lagoon ACS

Hi Claire,

Just following up on my previous email – did you get a chance to look at the attached?

Copying the general email inbox in case Claire is not the correct contact.

Thank you,
Carolyn

Carolyn Chan, P.Eng., M.A.Sc.
Environmental Engineer

J.L. Richards & Associates Limited
107 - 450 Speedvale Ave. West, Guelph, ON N1H 7Y6
Direct: 226-780-7367

J.L. Richards & Associates Limited
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CANADA BEST MANAGED COMPANIES Platinum member

From: Carolyn Chan
Sent: Thursday, November 9, 2023 3:05 PM
To: clemay@nation.on.ca
Cc: Melody Johnson <melody@bskyeng.com>; Jordan Morrissette <jmorrissette@jlrichards.ca>; Kevin Cortez <kcortez@jlrichards.ca>
Subject: 16953-133 Casselman Lagoon ACS

Hi Claire,

We're completing an Assimilative Capacity Study to support the ongoing Master Plan Update for the Municipality of Casselman, to plan for growth in the community. One of the scenarios under consideration is expanding the discharge window of the plant. See attached slides recently presented to the MECP showing proposed quantity and effluent quality on a monthly basis; with year-round discharge, there is an increase in TP loading to the river during summer months, but an overall reduction in approved TP loading on an annual basis.

We are interested in hearing the SNCA's opinion of this scenario and incorporating any comments into our draft ACS report. Could you take a look, or pass this to the appropriate contact? Happy to set up a virtual meeting to discuss.

Best,

Carolyn

SOUTH NATION CONSERVATION
DE LA NATION SUD

Claire Lemay | RPP, Senior Planner
38 Victoria Street, Box 29, Finch, ON K0C 1K0
Tel: 613-984-2948 or 1-877-984-2948 | Fax: 613-984-2872
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Appendix B
Correspondence with MECP regarding 2024 ACS
(February 2024)

Memorandum

To:	Sarah Baxter, Surface Water Specialist, Eastern Region, MECP
CC:	Jon Orpana, Environmental Assessment Coordinator, MECP Carolyn Chan, P.Eng., J.L. Richards & Associates Limited
From:	Melody Johnson, PhD, P.Eng.
Date:	February 16, 2024
Subject:	Casselman WWTS Assimilative Capacity Study – Response to MECP Comments

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"Final Report – Assimilative Capacity Study to Support the Expansion of the Casselman WWTS" dated January 11, 2024 was prepared by Blue Sky Energy Engineering & Consulting Inc. (Blue Sky) and submitted to the Ministry of the Environment, Conservation and Parks (MECP) for review. Comments were provided by Sarah Baxter, Surface Water Specialist, in a memorandum dated February 1, 2024 (see Attachment A).

MECP have agreed to both the maximum effluent discharge rates and proposed effluent objectives and limits as presented in the Assimilative Capacity Study report, with the following exceptions:

> "a. If disinfection equipment is to be installed it should be operated all year and E. Coli limits should be in place for all months; and,
>
> b. There should also be effluent loading limits established for $cBOD_5$, TSS, TAN, and TP."

Our responses to these two comments are provided below.

Comment: "a. If disinfection equipment is to be installed it should be operated all year and E. Coli limits should be in place for all months."

Response: We propose to update the E. coli effluent objectives and limits to apply year-round, rather than the previously proposed seasonal discharge period of May 1 to October 31.

Comment: "b. There should also be effluent loading limits established for $cBOD_5$, TSS, TAN, and TP."

Response: Due to the variable nature of permitted effluent discharge rates, and the fact that the proposed effluent objectives and limits for $cBOD_5$, TSS and TP remain constant year-round, we are proposing annual effluent limits for these parameters calculated as follows:

Average total annual discharge rate (4,374 m^3/d) * Effluent concentration limit

This results in proposed effluent $cBOD_5$, TSS and TP loading limits of 52.5 kg/d, 52.5 kg/d and 1.31 kg/d, respectively, calculated on an annual average basis.

Because effluent TAN limits vary seasonally, and effluent discharge rates vary monthly, we are proposing monthly TAN loading limits calculated as follows:

Maximum monthly discharge rate (m^3/d) * Seasonal TAN concentration limit

This results in monthly effluent TAN loading limits. These have been calculated and are presented in Table 3 below.

Given the above, the proposed effluent requirements have been updated and are presented below in Table 1 (discharge rate), Table 2 (concentration targets) and Table 3 (loading limits). Items in **bold font** represent new and/or modified values.

Table 1 – Maximum Monthly Effluent Discharge Rates

Month	Discharge Rate (m^3/d)	Minimum Dilution Ratio
January	5,750 m^3/d	12.4
February	5,600 m^3/d	12.4
March	7,250 m^3/d	12.3
April	10,000 m^3/d	72.9
May	4,500 m^3/d	40.5
June	2,150 m^3/d	26.2
July	1,050 m^3/d	26.2
August	900 m^3/d	26.3
September	910 m^3/d	26.2
October	2,250 m^3/d	13.1
November	6,050 m^3/d	13.1
December	8,750 m^3/d	12.4

Table 2 – Proposed Effluent Objectives and Limits

Parameter	Averaging Period	Objective (mg/L unless noted otherwise)	Limit (mg/L unless noted otherwise)
$cBOD_5$	Monthly	10	12
TSS	Monthly	10	12
TP	Monthly	0.20	0.30
TAN			
Dec 1 to Mar 31	Monthly	9.2	11.5
Apr 1 to May 31	Monthly	4.8	6.0
Jun 1 to Sep 30	Monthly	1.0	1.3
Oct 1 to Nov 30	Monthly	4.0	5.0
E. coli	**Monthly**	**150 CFU/100 mL**	**200 CFU/100 mL**
pH	Single Grab	6.8 to 7.8	6.0 to 8.0

Table 3 – Proposed Effluent Loading Limits

Parameter	Averaging Period	Limit (kg/d)
cBOD5	**Annual**	**52.5**
TSS	**Annual**	**52.5**
TP	**Annual**	**1.31**
TAN		
January	**Monthly**	**66.1**
February	**Monthly**	**64.4**
March	**Monthly**	**83.4**
April	**Monthly**	**60.0**
May	**Monthly**	**27.0**
June	**Monthly**	**2.80**
July	**Monthly**	**1.37**
August	**Monthly**	**1.17**
September	**Monthly**	**1.18**
October	**Monthly**	**11.3**
November	**Monthly**	**30.3**
December	**Monthly**	**100.6**

We trust that the above adequately addresses your comments and provides you with the information you require at this time. Should you have any questions or concerns, please do not hesitate to contact Melody Johnson at melody@bskyeng.com or 647-721-7644.

Attachment A

MECP Memorandum dated February 1, 2024

Ministry of the Environment, Conservation and Parks
Eastern Region
1259 Gardiners Road, Unit 3
Kingston ON K7P 3J6
Phone: 613.549.4000
or 1.800.267.0974

Ministère de l'Environnement, de la Protection de la nature et des Parcs
Région de l'Est
1259, rue Gardiners, unité 3
Kingston (Ontario) K7P 3J6
Tél: 613 549-4000
ou 1 800 267-0974

Ontario

M E M O R A N D U M

February 1, 2024

TO: Jon Orpana
Environmental Assessment Coordinator
Environmental Assessment and Permissions Division
Eastern Region

FROM: Sarah Baxter
Surface Water Specialist
Technical Support Section
Eastern Region

RE: Casselman Wastewater Treatment System
Assimilative Capacity Study
Municipality of Casselman; United Counties of Prescott and Russell
Environmental Compliance Approval #8160-BAHPRF
ECHO #1-278240452

I have reviewed the "*Final Report, Assimilative Capacity Study to Support the Expansion of the Casselman WWTS*" dated January 11, 2024 and prepared by Blue Sky Energy Engineering & Consulting Inc. The following comments, relative to surface water impact concerns, are provided for your consideration.

Background

The Casselman Wastewater Treatment System (WWTS) is a municipal facultative lagoon system that services the Village of Casselman. The system has a rated capacity of 2,110 m^3/day and is regulated by Environmental Compliance Approval (ECA) #8160-BAHPRF. The system includes 3 facultative lagoon cells (A, B, C), an aeration system, a phosphorus removal system, and a flow measurement system. Effluent is discharged to the South Nation River via an outfall sewer equipped with two diffuser ports.

Effluent discharge is permitted between October 1 to May 15 each year. Schedule B of the ECA lists the monthly maximum effluent discharge rate. The Village is permitted to release a total of 502,500 m^3 of effluent during the winter/spring discharge period (January 1 to May 15) and 267,650 m^3 of effluent during the fall discharge period (October 1 to December 31).

The effluent objectives and limits for carbonaceous biochemical oxygen demand ($CBOD_5$), total suspended solids (TSS), total phosphorous (TP), total ammonia nitrogen (TAN), E. Coli, hydrogen sulphide (H_2S), and pH are presented in **Table 1** and **Table 2**.

Table 1: Effluent Objectives and Limits for the Spring/Winter Discharge Period

Parameter	Timeframe	Concentration Objective	Concentration Limit	Loading Limit
$CBOD_5$	Jan 1 – May 15	15 mg/L	25 mg/L	93.06 kg/d
TSS	Jan 1 – May 15	15 mg/L	25 mg/L	93.06 kg/d
TP	Jan 1 – May 15	0.8 mg/L	1 mg/L	3.73 kg/d
TAN	Jan 1 – Mar 31	12 mg/L	12 mg/L	44.67 kg/d
	Apr 1 – May 15	6 mg/L	6 mg/L	22.34 kg/d
E.Coli	Jan 1 – May 15	100 CFU/100 mL	200 CFU/100 mL	
H_2S	Jan 1 – May 15	0.1 mg/L	0.1 mg/L	0.37 kg/d
pH		6.8 – 7.8	6.0 – 8.0	

Table 2: Effluent Objectives and Limits for the Fall Discharge Period

Parameter	Timeframe	Concentration Objective	Concentration Limit	Loading Limit
$CBOD_5$	Oct 1 – Dec 31	10 mg/L	15 mg/L	43.64 kg/d
TSS	Oct 1 – Dec 31	10 mg/L	25 mg/L	72.73 kg/d
TP	Oct 1 – Dec 31	0.8 mg/L	1 mg/L	2.91 kg/d
TAN	Oct 1 – Nov 30	5 mg/L	5 mg/L	14.55 kg/d
	Dec 1 – Dec 31	12 mg/L	12 mg/L	34.89 kg/d
E.Coli	Oct 1 – Dec 31	100 CFU/100 mL	200 CFU/100 mL	
H_2S	Oct 1 – Dec 31	Non-detect	Non-detect	
pH	Oct 1 – Dec 31	6.8 – 7.8	6.0 – 8.0	

The Village is completing a Class Environmental Assessment (EA) to increase wastewater servicing capacity to meet the needs of future growth projections. An increase in wastewater volume to 4,050 m^3/day is proposed. Completion of an Assimilative Capacity Study (ACS) serves the EA by determining the site-specific effluent criteria so appropriate upgrades and technology can be explored. The reviewed document has been provided as a result.

Assimilative Capacity Study

Blue Sky have completed the ACS on the basis that the effluent discharge window will be extended to a year-round discharge. In previous pre-submission consultation (PSC) meetings, consideration was given to maintaining the existing discharge window. However, maintaining the existing discharge period would require the construction of another lagoon and it is my understanding that there is no property available to do so.

Background flow data was obtained from Water Survey of Canada (WSC) gauge #02LB013, which is located approximately 1 kilometer upstream of the WWTS. Data was available for 1950-2021. Background water quality data for BOD_5, dissolved oxygen (DO), TAN, temperature, pH, TP, TSS, nitrate, and E. Coli was obtained from Provincial Water Quality Monitoring Network (PWQMN) station #18207010002. This station is also approximately 1 kilometer upstream of the sewage system with data available from 1950-2020.

The ACS approach also:

- Assumed that the lagoon system would receive 297 m^3/d of precipitation, so the discharge capacity was increased to 4,347 m^3/d;
- Maintained a minimum dilution ratio of 10:1;
- Limited future TP loadings to 770 kg/yr (the current ECA limit);
- Used a mass-balance approach to ensure downstream un-ionized ammonia (UIA) concentrations were below the PWQO;
- Proposed TAN effluent limits that would be non-toxic at end-of-pipe;
- Suggested effluent limits for pH and E.Coli based on those approved for other similar WWTS; and,
- Assessed the proposed effluent limits using CORMIX.

Flows

Blue Sky developed maximum effluent discharge rates for each month, using monthly average 7Q20 flows in the South Nation River and a minimum dilution ratio of 10:1. The proposed rates are provided in Table 3 below.

Table 3: Proposed Maximum Monthly Effluent Discharge Rates

Month	Discharge Rate (m3/d)	Minimum Dilution Ratio
January	5,750	12.4
February	5,600	12.4
March	7,250	12.3
April	10,000	72.9
May	4,500	40.5
June	2,150	26.2
July	1,050	26.2
August	900	26.3
September	910	26.2
October	2,250	13.1
November	6,050	13.1
December	8,750	12.4

The proposed maximum discharge rates would permit an annual discharge volume of 1,674,050 m^3 or an average daily flow of 4,586 m^3. Blue Sky notes this volume will provide some flexibility in discharging the design flow plus the anticipated precipitation.

Total Phosphorus

The South Nation River is a Policy 2 receiver with respect to total phosphorus, so the existing discharge load of 770 kg/yr must be maintained or reduced. The South Nation Conservation Authority were contacted regarding the proposed effluent discharge during the summer months and there were no objections provided that the annual phosphorus loading be maintained or reduced.

Blue Sky has proposed an effluent design objective of 0.2 mg/L, a compliance limit of 0.3 mg/L, and a loading limit of 446 mg/L (**Table 4**). This loading limit is 57% less than the value currently approved. Blue Sky indicates that phosphorus concentrations downstream of the discharge are not anticipated to increase more than 5.2% above ambient during the summer months.

Carbonaceous Biochemical Oxygen Demand

The South Nation River is a Policy 1 receiver with respect to dissolved oxygen. The long-term annual 75th percentile for BOD is 4 mg/L, indicating background concentrations are low.

Blue Sky has proposed a design objective of 10 mg/L and a compliance limit of 12 mg/L (**Table 4**). At these values, $CBOD_5$ concentrations in the mixing zone could increase from 0.29 mg/L (June-September) to 0.59 mg/L (winter). Blue Sky suggests these minor concentration increases would not have a significant impact on dissolved oxygen concentrations.

Total Suspended Solids

South Nation River background TSS concentrations are elevated compared to many receiving streams of a similar size, having a long-term annual 75th percentile of 14.5 mg/L. Since there is no Provincial Water Quality Objective (PWQO) for TSS, Blue Sky recommends not exceeding the long-term Canadian Water Quality Guideline (CWQG) of a 5 mg/L increase above ambient.

Blue Sky has proposed a design objective of 10 mg/L and a compliance limit of 12 mg/L (**Table 4**). The proposed limit is significantly less than that currently approved (25 mg/L). Blue Sky indicates that downstream concentrations should not increase more than 0.13 mg/L, which meets the long-term CWQG.

Total Ammonia Nitrogen

Ambient TAN concentrations in the South Nation River are relatively low. However, the receiver has a naturally elevated pH (long-term annual 75th percentile of 8.19) and water temperatures are elevated in the summer months, so there is limited assimilative capacity available for UIA in June, July, and August.

When developing monthly TAN limits, Blue Sky used conservative effluent and/or receiver pH and temperature values to ensure the un-ionized ammonia concentration did not exceed 0.2 mg/L at the end-of-pipe. They also ensured that the downstream UIA concentrations met the PWQO of 0.02 mg/L.

The proposed TAN limits are 11.5 mg/L (December to March), 6 mg/L (April to May), 1.3 mg/L (June to September), and 5 mg/L (October to November) (**Table 4**). Blue Sky notes that these values are consistent with, or more stringent, than existing TAN limits.

pH

Blue Sky has proposed a pH design objective of 6.8-7.8 and a compliance limit of 6.0-8.0 (**Table 4**). These values are consistent with those approved by the existing ECA.

E. Coli

Blue Sky has proposed an E.Coli design objective of 150 CFU/100 mL and a compliance limit of 200 CFU/100 mL during the warm weather discharge period of May to October (**Table 4**). They suggest these values are consistent with the current ECA and other municipal WWTS discharging to the South Nation River.

Table 4: Proposed Effluent Design Objectives and Compliance Limits

Parameter	Timeframe	Objective	Limit
$CBOD_5$	All months	10 mg/L	12 mg/L
TSS	All months	10 mg/L	12 mg/L
TP	All months	0.2 mg/L	0.3 mg/L
TAN	Dec 1 – Mar 31	9.2 mg/L	11.5 mg/L
	Apr 1 – May 31	4.8 mg/L	6.0 mg/L
	Jun 1 – Sep 30	1.0 mg/L	1.3 mg/L
	Oct 1 – Nov 30	4.0 mg/L	5.0 mg/L
E. Coli	May 1 – Oct 31	150 CFU/100 mL	200 CFU/100 mL
pH	All months	6.8 – 7.8	6.0 – 8.0

CORMIX Modelling

Blue Sky completed CORMIX modelling using the monthly 7Q20 flows and the maximum monthly discharge rates. With the exception of April, fully mixed conditions are achieved within 175 meters of the diffuser. In the critical summer months, the mixing zone is only 80 meters in length.

In April, the estimated mixing zone size is 375 meters. Blue Sky acknowledges that this value is considerably larger than the other months, but notes there should be limited impact on downstream water quality because of the high dilution ratio in April (72.9:1). They also indicate that the concentration excess in the plume should reach 5% by 20 meters downstream of the diffuser.

Conclusions and Recommendations

1. The Village of Casselman are completing a Class EA to increase wastewater servicing capacity. The reviewed ACS has been completed to develop appropriate site-specific effluent criteria and aid in selection of appropriate sewage works upgrades/treatment options.

2. I have no objections to the proposed maximum effluent discharge rates listed in **Table 3** as all dilution ratios are greater than 10:1 and additional dilution capacity was allocated in the more critical summer months.

3. I have no objections to the proposed effluent objectives and limits outlined in **Table 4** except that:

    a. If disinfection equipment is to be installed it should be operated all year and E.Coli limits should be in place for all months; and,

    b. There should also be effluent loading limits established for $CBOD_5$, TSS, TAN, and TP.

If you have any questions regarding the above comments, I would be pleased to discuss them with you.



Sarah Baxter, B.Sc.H.

ec: V. Castro
C. Klein

c: File SW PR CA 03 07 (Casselman WWTS)

Melody Johnson

From: Baxter, Sarah (She/Her) (MECP) <Sarah.Baxter@ontario.ca>
Sent: February 23, 2024 8:43 AM
To: Melody Johnson
Cc: Carolyn Chan; Michael Hulley; Orpana, Jon (MECP)
Subject: RE: Casselman ASC Final Report MECP Review and Comment

Hi Melody,

Thank you for your comments. I acknowledge the incorporation of a year-round E.Coli objective and limit. I have no objections to the proposed effluent loading limits.

Let me know if you need anything further on this file.

Sarah Baxter
Surface Water Specialist
Technical Support Section – Eastern Region
Ministry of the Environment, Conservation and Parks
1259 Gardiners Road, Unit 3, Kingston ON, K7P 3J6
E: sarah.baxter@ontario.ca

From: Melody Johnson <melody@bskyeng.com>
Sent: February 16, 2024 1:17 PM
To: Orpana, Jon (MECP) <Jon.Orpana@ontario.ca>; Baxter, Sarah (She/Her) (MECP) <Sarah.Baxter@ontario.ca>
Cc: Carolyn Chan <cchan@jlrichards.ca>; Michael Hulley <Michael.Hulley@bskyeng.com>
Subject: RE: Casselman ASC Final Report MECP Review and Comment

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Hi Jon / Sarah,

Attached please find our response to Sarah's comments in her memorandum dated February 1, 2024.

As always, please feel free to contact me if you have any questions or concerns.

Thanks, and have a great weekend!

Melody Johnson, PhD, P.Eng., Senior Consultant
melody@bskyeng.com | www.bskyeng.com | M. 647.721.7644

BLUE SKY Energy Engineering & Consulting Inc.
EXPERTISE | BEST PRACTICES | CREATIVE THINKING

From: Orpana, Jon (MECP) <Jon.Orpana@ontario.ca>
Sent: February 1, 2024 11:18 AM

To: Melody Johnson <melody@bskyeng.com>
Cc: Pierre-Paul Beauchamp <ppbeauchamp@casselman.ca>; Hamilton-Browne, Shannon (She/Her) (MECP) <Shannon.HamiltonBrowne@ontario.ca>
Subject: Casselman ASC Final Report MECP Review and Comment

Hello Melody,

Please find Sarah Baxter's technical memo review comments on the final ASC study prepared in support of expansion of the Casselman WWTP.

Regards,

Jon

Jon K. Orpana hear name
Regional Environmental Planner
Environmental Assessment Branch
Ministry of the Environment, Conservation and Parks
Kingston Regional Office
PO Box 22032, 1259 Gardiners Road
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Email: jon.orpana@ontario.ca

Appendix C

Correspondence with MECP regarding Effluent TP Requirements and Potential Offsetting

(May to June 2025)

From: Nick Bialik <nbialik@jlrichards.ca>
Sent: June 19, 2025 2:29 PM
To: Baxter, Sarah (MECP); Orpana, Jon (MECP); Kevin Cortez; Castro, Victor (MECP)
Cc: Pierre-Paul Beauchamp; Jordan Morrissette; EA Notices to ERegion (MECP); Melody Johnson
Subject: RE: 16953-131 Casselman Lagoon Expansion Class EA - Phase 1 & 2 Background Summary

Hi Sarah,

That makes sense. Thank you for getting back to us. Noted about using the incoming flow rate for loading calculation.

Question 1 Answer: Understood. We would like to have an engineer from the Approvals Branch review, as the offsetting amount (and resulting cost) will impact the preferred design concept for TP removal. The cost for the TPM is highly variable on what is approved by the MECP. If possible, please forward the background information provided via email to a review engineer and have them setup a meeting if they have any questions.

Question 2 Answer: It is understood that if enhanced TP treatment is identified as the preferred design concept, a TP limit of 0.3 mg/L and TP objective of 0.2 mg/L will be used, resulting in a loading of 443.48 kg/year. Our question relates to the loading to be used for the TPM Offsetting program, which will likely need to be assessed by a review engineer, based on Question 1. Note that the TPM program applies a 4:1 offsetting ratio; therefore, for any additional loading that is sent to the river (compared to what is allowed to be discharged), 4x as much is being offset from non-point sources. Noted about the existing river quality. To clarify, we are proposing the following based on our assessment:

- During summer months, TP loadings based on TP limit of 0.3 mg/L, as established in the Assimilative Capacity Study.
- During non-summer months, maintain existing allowable loading, resulting in a decrease in TP concentration limit (calculated to be equivalent to 0.49 mg/L) due to increase in flow for these months.
- Under this scenario, overall TP loading would decrease from 770.15 kg/yr to less than 724.47 kg/year (current loading calculated based on outgoing flow; to be adjusted based on incoming flow as noted). We are not recommending an increase in TP loadings during the non-summer months.

Question 3 Answer: Understood.

Feel free to give me a call if you would like to discuss.

Thanks,

Nick Bialik, P.Eng. (he/him)
Environmental Engineer

1000-343 Preston Street
Ottawa ON K1S 1N4
Work: 343-804-5346
nbialik@jlrichards.ca

From: Baxter, Sarah (MECP) <Sarah.Baxter@ontario.ca>
Sent: Thursday, June 19, 2025 10:00 AM
To: Nick Bialik <nbialik@jlrichards.ca>; Orpana, Jon (MECP) <Jon.Orpana@ontario.ca>; Kevin Cortez <kcortez@jlrichards.ca>; Castro, Victor (MECP) <Victor.Castro@ontario.ca>
Cc: Pierre-Paul Beauchamp <ppbeauchamp@casselman.ca>; Jordan Morrissette <jmorrissette@jlrichards.ca>; EA Notices to ERegion (MECP) <eanotification.eregion@ontario.ca>; Melody Johnson <melody@bskyeng.com>
Subject: RE: 16953-131 Casselman Lagoon Expansion Class EA - Phase 1 & 2 Background Summary

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Hi Nick,

Thank you for your patience on this file. I have been away on leave but wanted to ensure that I was the one to review your latest emails to maintain file consistency.

Under the current Environmental Compliance Approval (ECA), the Casselman Lagoons are permitted to discharge 3.73 kg/d for winter/spring discharge window and 2.91 kg/d for the fall discharge window. This equates to an annual discharge of 770.15 kg/yr based on a TP limit of 1.0 mg/L and a rated capacity of 2,110 m^3/day:

1.0 mg/L x 2,110,000 L/d x 365 d/yr = 770,150,000 mg/yr or 770.15 kg/yr

For the proposed expansion, the annual TP loading was substantially lowered based on the proposal to continuously discharge throughout the year and during the summer low-flow periods. This loading (and associated TP discharge limit of 0.3 mg/L) was determined by an Assimilative Capacity Assessment which considered the sensitivity and Policy 2 status of the South Nation River. Based on a TP limit of 0.3 mg/L and a rated capacity of 4,050 m^3/day (we wouldn't consider precipitation in this calculation), the calculated annual loading is 443.48 kg/yr:

0.3 mg/L x 4,050,000 L/d x 365 d/yr = 443,475,000 mg/yr or 443.48 kg/yr

Question 1: I am not able to confirm the amount of TP offsetting necessary at this time, as I am not able to comment on the proposed ability of the treatment system to achieve a TP concentration of 0.5 mg/L (rather than the TP objective of 0.8 mg/L as listed in the existing ECA). This matter would need to be discussed and accepted by an engineer at our Approvals Branch . If this is a meeting you would like to pursue, please let me know and I can put you in touch with an appropriate engineer. Once this matter is settled, we can determine the offsetting that is required for the ultimate expansion.

Question 2: There is no opportunity to increase the future allowable loading for the ultimate expansion. This loading was determined by an assimilative capacity study (ACS) that has been reviewed and accepted by the Technical Support Section of the Ministry. Increasing the phosphorus loading during the non-summer months and allowing a summer discharge window is not considered an adequate level of improvement to this highly impaired river system. A phosphorus limit of 0.3 mg/L is considered a reasonable level of treatment but by no means is it even close to tertiary level removal, which could be argued is the level that point-source discharges in this watershed should be

held to. The TPM program offers a unique ability to offset loadings at a cost which in many instances is lower than the capital costs of upgrading the treatment. The alternative is to improve the phosphorus removal technology.

Question 3: There is no opportunity to increase the TP limit from 0.3 mg/L to 0.49 mg/L during the non-summer months. The year-round TP limit of 0.3 mg/L was determined by the ACS completed by Blue Sky Engineering in 2024. I reviewed this study and accepted the proposed limits in February 2024.

I hope that I have answered all your questions. If not, please don't hesitate to reach out again and I will try my best to get back to you promptly.

Sarah Baxter
Surface Water Specialist
Technical Support Section – Eastern Region
Ministry of the Environment, Conservation and Parks
1259 Garinders Road, Unit 3, Kingston, ON
Sarah.baxter@ontario.ca

From: Nick Bialik <nbialik@jlrichards.ca>
Sent: Tuesday, June 17, 2025 8:41 AM
To: Orpana, Jon (MECP) <Jon.Orpana@ontario.ca>; Kevin Cortez <kcortez@jlrichards.ca>; Castro, Victor (MECP) <Victor.Castro@ontario.ca>
Cc: Baxter, Sarah (MECP) <Sarah.Baxter@ontario.ca>; Pierre-Paul Beauchamp <ppbeauchamp@casselman.ca>; Jordan Morrissette <jmorrissette@jlrichards.ca>; EA Notices to ERegion (MECP) <eanotification.eregion@ontario.ca>; Melody Johnson <melody@bskyeng.com>
Subject: RE: 16953-131 Casselman Lagoon Expansion Class EA - Phase 1 & 2 Background Summary

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Hi Jon,

Wanted to follow-up again. Is there a timeline by which you expect to complete this review?

Thanks,

Nick Bialik, P.Eng. (he/him)
Environmental Engineer

1000-343 Preston Street
Ottawa ON K1S 1N4
Work: 343-804-5346
nbialik@jlrichards.ca

From: Orpana, Jon (MECP) <Jon.Orpana@ontario.ca>
Sent: Wednesday, June 4, 2025 4:43 PM

To: Nick Bialik <nbialik@jlrichards.ca>; Kevin Cortez <kcortez@jlrichards.ca>; Castro, Victor (MECP) <Victor.Castro@ontario.ca>
Cc: Baxter, Sarah (MECP) <Sarah.Baxter@ontario.ca>; Pierre-Paul Beauchamp <ppbeauchamp@casselman.ca>; Jordan Morrissette <jmorrissette@jlrichards.ca>; EA Notices to ERegion (MECP) <eanotification.eregion@ontario.ca>; Melody Johnson <melody@bskyeng.com>
Subject: RE: 16953-131 Casselman Lagoon Expansion Class EA - Phase 1 & 2 Background Summary

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Hello Nick,

I just chatted with Victor and we should be getting back to you shortly regarding this and your short follow up should not take too long.

Regards,

Jon

Jon K. Orpana
Regional Environmental Planner
Environmental Assessment Branch
Ministry of the Environment, Conservation and Parks
Kingston Regional Office
PO Box 22032, 1259 Gardiners Road
Kingston, Ontario
K7M 8S5

Phone: (613) 561 8250
Email: jon.orpana@ontario.ca

From: Nick Bialik <nbialik@jlrichards.ca>
Sent: June 4, 2025 2:51 PM
To: Orpana, Jon (MECP); Kevin Cortez; Castro, Victor (MECP)
Cc: Baxter, Sarah (MECP); Pierre-Paul Beauchamp; Jordan Morrissette; EA Notices to ERegion (MECP); Melody Johnson
Subject: RE: 16953-131 Casselman Lagoon Expansion Class EA - Phase 1 & 2 Background Summary

Hi Jon and Victor,

Just wanted to follow-up on the status of this request, and also request the review of one additional related component in the TPM offsetting calculations.

Given that the TP limit of 0.3 mg/L was established due to requiring a higher level of treatment during the summer months, would the MECP be amenable, **for the TPM offsetting calculation only**, to maintaining the existing allowable TP loading during the non-summer months (e.g., October 1 to April 30)? This would result in a maximum allowable annual loading of 724.47 kg, as calculated below. During the non-summer months, there would be an equivalent TP limit of 0.49 mg/L instead of 0.3 mg/L.

Months	Days	Existing ECA No. 8160-BAHPRF					
		Maximum Allowable Discharge Flow (m3/day)	Average Rated Capacity / Discharge Capacity (m3/day)	TP Limit (mg/L)	Maximum Monthly TP Loading (kg)	Equalized Maximum Monthly TP Loading (kg)	Maxim Disc (
January	31	5000		1.0	155.0	102.55	
February	28	5000		1.0	140.0	92.63	
March	31	5000		1.0	155.0	102.55	
April	30	7000		1.0	210.0	138.94	
May 1-15	15	7000		1.0	105.0	69.47	
May 16-31	16	0		N/A	-	-	
June	30	0	2110	N/A	-	-	
July	31	0		N/A	-	-	
August	31	0		N/A	-	-	
September	30	0		N/A	-	-	
October	31	4000		1.0	124.0	82.04	
November	30	4000		1.0	120.0	79.40	
December	31	5000		1.0	155.0	102.55	
	365	-	-	-	1164.0	770.15	
	Existing TP Loading (kg/year):		770.15		Annual discharge volume (m3):		1

Let us know if you have any questions, or would like us to complete any additional analyses for the above.

Thank you,

Nick Bialik, P.Eng. (he/him)
Environmental Engineer

1000-343 Preston Street
Ottawa ON K1S 1N4
Work: 343-804-5346
nbialik@jlrichards.ca

From: Orpana, Jon (MECP) <Jon.Orpana@ontario.ca>
Sent: Friday, May 23, 2025 11:17 AM
To: Nick Bialik <nbialik@jlrichards.ca>; Kevin Cortez <kcortez@jlrichards.ca>; Castro, Victor (MECP) <Victor.Castro@ontario.ca>
Cc: Baxter, Sarah (MECP) <Sarah.Baxter@ontario.ca>; Pierre-Paul Beauchamp <ppbeauchamp@casselman.ca>; Jordan Morrissette <jmorrissette@jlrichards.ca>; EA Notices to ERegion (MECP) <eanotification.eregion@ontario.ca>; Melody Johnson <melody@bskyeng.com>
Subject: RE: 16953-131 Casselman Lagoon Expansion Class EA - Phase 1 & 2 Background Summary
Importance: High

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Hello Nick,

I acknowledge receipt of this and Victor has been copied as well. Sarah Baxter is currently on short term leave and Victor will assign this task to another surface water staff person for review and comment.

Regards,

Jon

Jon K. Orpana
Regional Environmental Planner
Environmental Assessment Branch
Ministry of the Environment, Conservation and Parks
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Phone: (613) 561 8250
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From: Nick Bialik <nbialik@jlrichards.ca>
Sent: Friday, May 23, 2025 11:06 AM

To: Orpana, Jon (MECP) <Jon.Orpana@ontario.ca>; Kevin Cortez <kcortez@jlrichards.ca>
Cc: Baxter, Sarah (MECP) <Sarah.Baxter@ontario.ca>; Pierre-Paul Beauchamp <ppbeauchamp@casselman.ca>; Jordan Morrissette <jmorrissette@jlrichards.ca>; EA Notices to ERegion (MECP) <eanotification.eregion@ontario.ca>; Melody Johnson <melody@bskyeng.com>
Subject: RE: 16953-131 Casselman Lagoon Expansion Class EA - Phase 1 & 2 Background Summary

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Hi Jon,

Hope you're doing well. We would like to request MECP feedback on the below re: the SNC's TPM program and TP loading. Specific questions have been **bolded** below. Let us know if you have any questions.

As part of Phase 3 of the Class EA, we are reviewing alternative design concepts for TP removal for the 20-year upgrades to the Casselman STS. The following two (2) options have been developed:

1. Option TP1 – Participation in the Total Phosphorous Management Program
2. Option TP2 – Install and Coagulation/Flocculation System. Refer to the attached figure for a conceptual site plan of this option.

For Option TP1, we would like confirmation from the MECP on the amount of TP loading that would need to be offset from the system.

- The current system has a TP limit of 1.0 mg/L at a rated capacity of 2,110 m3/day, for a total annual loading of 770.15 kg.
- Correspondences during the Master Plan / ACS process identified that "extending the discharge period for the Casselman facility to the Summer months would require higher level treatment and more stringent effluent limits for TP. The resulting annual TP limit that was developed was 0.3 mg/L, which is equivalent to a total annual TP loading limit of 476 kg/year based on an average annual discharge volume of 4,347 m3/day (incl. net precipitation).
- Option TP1 would not include a new coagulation/flocculation system for enhanced TP removal. TP treatment would be similar to the existing treatment (alum dosing with disc filter polishing). An analysis was completed to assess TP treatment for the existing system. Based on this analysis, we suggest that the existing system can meet a TP concentration of 0.5 mg/L, and therefore, accordingly, less TP loading would need to be offset.
- **Please review the below analysis (part of the ESR) and confirm whether the MECP is in agreement with our proposed TP offsetting calculation. Can the MECP also identify if there is an opportunity to increase the allowable future annual loading (e.g., maintain 0.3 mg/L limit during summer months, but increase TP limits for other months of the year)?**

  As noted in Section 4.2.2, wastewater systems discharging to the South Nation River have the option to participate in the TPM program, which allows for the offset of TP, rather than the removal of TP. To determine the TP loading that is expected to be offset, a review was undertaken to assess the effluent TP that is being achieved by the current system.

  The current system relies on alum dosing (to the raw sewage forcemain via a precast alum injection maintenance hole) and a tertiary disc filter for TP removal. The alum dosing system consists of a 30,000 L alum storage tank and diaphragm pump with 290 L/hr capacity. The existing chemical feed system functions on a set speed and must be manually adjusted in accordance with flow rates pumped from the Main SPS. Refer to Table 15 for a review of the TP removal performance of the existing system based on alum dosage. Note that, as noted in Section 2.1.1.2, the Casselman STS only began operating normally in Spring 2022. Data highlighted in yellow indicates that data was calculated/estimated based on available data. Note that alum dosage was not tracked prior to June 2021 and in 2022.

  Table 15: Casselman STS - Historical (2021 - 2024) TP Removal Performance

	Influent	Influent	Influent			Effluent
Date	Raw Sewage / Raw Flow for PAR - m^3/d	Raw Sewage / Mean Total Phosphorus (TP)	Raw Sewage / Mean Coagulant Dosage (Alum)			Treated Sewage / Mean Total Phosphorus (TP)
Month-Year		mg/L	mg/L	kg/day	L/day	mg/L
May-21	1222	6.40	-	-	-	0.20
Jun-21	1099	8.07	145.6	175.7	142.7	-
Jul-21	1262	6.71	140.0	186.5	151.7	-
Aug-21	1087	5.05	142.6	156.0	127.0	-
Sep-21	1153	4.57	132.9	175.7	143.4	-
Oct-21	1309	5.09	147.4	205.9	168.2	0.35
Nov-21	1509	5.31	150.3	239.7	197.2	0.27
Dec-21	1539	4.63	143.2	228.7	187.6	0.28
Jan-22	1088	8.86	-	-	-	0.23
Feb-22	1181	8.30	-	-	-	0.42
Mar-22	2099	3.11	-	-	-	0.48
Apr-22	2122	5.32	-	-	-	0.47
May-22	1570	6.16	-	-	-	0.25
Jun-22	1398	6.72	-	-	-	-
Jul-22	1204	7.79	-	-	-	-
Aug-22	1337	8.86	-	-	-	-
Sep-22	1359	7.97	-	-	-	-
Oct-22	1099	7.37	-	-	-	0.41
Nov-22	1173	11.30	-	-	-	0.38
Dec-22	1678	6.50	-	-	-	0.43
Jan-23	1557	4.10	175.4	273.0	222.9	0.36
Feb-23	1626	9.14	191.7	311.7	254.5	0.47
Mar-23	1976	6.29	187.7	370.9	302.8	0.36
Apr-23	2305	3.73	191.0	440.3	359.5	0.51
May-23	1546	6.42	162.6	251.4	205.3	0.44
Jun-23	1231	9.22	92.3	113.6	92.7	-
Jul-23	1554	7.24	126.8	197.1	160.9	-
Aug-23	1444	4.06	84.5	122.0	99.6	-
Sep-23	1201	5.17	84.8	101.9	83.2	-
Oct-23	1210	11.40	64.5	78.0	63.7	0.09
Nov-23	1282	9.95	73.1	93.7	76.5	0.08
Dec-23	1738	10.70	63.1	109.7	89.6	0.06
Jan-24	1477	6.21	128.14	189.3	154.5	0.10
Feb-24	1586	4.71	112.90	179.1	146.2	0.20
Mar-24	1937	5.45	86.81	168.2	137.3	0.21
Apr-24	1942	6.52	70.30	136.5	111.4	0.18
May-24	1645	7.40	57.16	94.0	76.8	0.40
Jun-24	1576	5.86	53.23	83.9	68.5	-
Jul-24	1862	5.74	58.61	109.1	89.1	-
Aug-24	1794	5.65	64.94	116.5	95.1	-
Sep-24	1328	6.34	77.10	102.4	83.6	-
Oct-24	1232	4.92	77.56	95.6	78.0	0.20
Nov-24	1159	5.70	78.21	90.6	74.0	0.18
Dec-24	1360	6.18	80.58	109.6	89.5	0.26
Average:	**1479**	**6.64**	**111.1**	**171.2**	**139.8**	**0.30**
Max:	**2305**	**11.40**	**191.7**	**440.3**	**359.5**	**0.51**
Min:	**1087**	**3.11**	**53.2**	**78.0**	**63.7**	**0.06**

Table 3: Effluent

Parameter	Discharge Window
$CBOD_5$ (mg/L)	Fall (Oct. 1 to Dec. 31)
	Winter/Spring (Jan. 1 to May 15)
Total Suspended Solids (mg/L)	Fall (Oct. 1 to Dec. 31)
	Winter/Spring (Jan. 1 to May 15)
Total Phosphorous	Fall (Oct. 1 to Dec. 31)
	Winter/Spring

This table, along with Table 3, show that the existing alum dosing system, with or without the disc filter, has consistently produced an effluent that is below 0.5 mg/L, exceeding the treatment requirements for the existing system (1.0 mg/L limit and 0.8 mg/L objective).

As part of the Master Plan process, upgrades were also proposed for the Main SPS, which conveys all sewage from the municipality to the STS. Scheduled for Spring 2025 to late 2027, the SPS will undergo upgrades to increase its pumping capacity and conveyance to the STS, as well as improve the alum dosing system. Specifically related to the STS, the following upgrades will be completed:

- *New twin 400 mm forcemains will be installed along a new alignment, discharging to the existing splitter chamber.*
- *New alum dosing system will be installed with the same dosing capacity, but with additional instrumentation that will allow modulating of dosing pumps based on raw sewage flow. Note that no alum storage expansion is proposed as part of the upgrades.*

Based on the proposed upgrades to the Main SPS, it is expected that alum dosing will become more efficient and effective, likely increasing its effectiveness in removing TP and TSS. The implementation of baffles and an additional disc filter will also improve the effectiveness of TP removal and the resulting TP effluent concentration.

Based on a review of the existing TP removal performance, the planned upgrades to the alum dosing system, the addition of baffles and the addition of a new disc filter, we conclude that the STS should be able to consistently achieve an effluent TP concentration of 0.5 mg/L or lower. Without the disc filter, the system should also be able to achieve a TP limit of 0.5 mg/L or lower. Based on an average discharge flow of 4,347 m3/day (includes net precipitation) and a TP concentration limit of 0.5 mg/L, a total annual TP loading of 793.33 kg is expected to be discharged from the system at design build-out, only approx. 23.18 kg higher than the 770.15 kg that is currently allowed to be discharged to the South Nation River. Although 770.15 kg/year is the current annual allowable TP loading, as part of the Master Plan, a more stringent TP limit of 0.3 mg/L was established due to requiring a higher level of treatment due to discharge during the summer months. A resulting maximum allowable annual loading of 476 kg was established as part of the upgrades. Using the maximum allowable annual loading of 476 kg and a projected TP loading of 793.33 kg, 317.33 kg of TP would need to be offset. Applying the 4:1 offsetting ratio, approximately 1,270 kg of TP credits would need to be purchased to offset the exceedance in loading to the South Nation River. Pending approval from the MECP and the SNC of an updated STS TP limit of 0.5 mg/L and the proposed offsetting amounts, the estimated one-time cost of offsetting TP would be approximately $743,000, based on an offsetting unit cost of $585.00/kg TP.

This option is considered feasible and will be carried forward for further evaluation.

Note that the PIC will be scheduled shortly with notices being sent out in the coming weeks once timing is confirmed.

Thanks,

Nick Bialik, P.Eng. (he/him)
Environmental Engineer

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From: Nick Bialik <nbialik@jlrichards.ca>
Sent: Thursday, March 13, 2025 8:00 AM
To: Orpana, Jon (MECP) <Jon.Orpana@ontario.ca>; Kevin Cortez <kcortez@jlrichards.ca>

Cc: Baxter, Sarah (MECP) <Sarah.Baxter@ontario.ca>; Pierre-Paul Beauchamp <ppbeauchamp@casselman.ca>; Jordan Morrissette <jmorrissette@jlrichards.ca>; EA Notices to ERegion (MECP) <eanotification.eregion@ontario.ca>
Subject: RE: 16953-131 Casselman Lagoon Expansion Class EA - Phase 1 & 2 Background Summary

Hi Jon,

Not at this time. We will be working with Blue Sky to update the ACS within the next few weeks, at which point, we may reach out for feedback. We are working on the phasing approach / revised ACS as part of Phase 3 of the Class EA.

Thanks,

Nick Bialik, P.Eng. (he/him)
Environmental Engineer

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Sent: Wednesday, March 12, 2025 4:00 PM
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Cc: Baxter, Sarah (MECP) <Sarah.Baxter@ontario.ca>; Pierre-Paul Beauchamp <ppbeauchamp@casselman.ca>; Jordan Morrissette <jmorrissette@jlrichards.ca>; Nick Bialik <nbialik@jlrichards.ca>; EA Notices to ERegion (MECP) <eanotification.eregion@ontario.ca>
Subject: RE: 16953-131 Casselman Lagoon Expansion Class EA - Phase 1 & 2 Background Summary

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Thanks for this Kevin,

I acknowledge receipt and have added this to the file.

Is there any need to follow up with us regarding the ACS at this time?

Regards,

Jon

Jon K. Orpana
Regional Environmental Planner

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Ministry of the Environment, Conservation and Parks
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PO Box 22032, 1259 Gardiners Road
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From: Kevin Cortez <kcortez@jlrichards.ca>
Sent: Friday, March 7, 2025 1:37 PM
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Cc: Baxter, Sarah (MECP) <Sarah.Baxter@ontario.ca>; Pierre-Paul Beauchamp <ppbeauchamp@casselman.ca>; Jordan Morrissette <jmorrissette@jlrichards.ca>; Nick Bialik <nbialik@jlrichards.ca>; EA Notices to ERegion (MECP) <eanotification.eregion@ontario.ca>
Subject: 16953-131 Casselman Lagoon Expansion Class EA - Phase 1 & 2 Background Summary

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Good afternoon Jon,

Please note that we have completed a summary document of Phase 1 and Phase 2 the Casselman Lagoon Expansion Schedule 'C' Class EA, based on the information compiled in the Master Plan process. Within this summary, we have provided additional information for the below noted areas based on the MECP's "Areas of Interest" document and following feedback received from the Ministry of Natural Resources and Ministry of Citizenship and Multiculturalism.

- Air Quality, Dust and Noise
- Source Water Protection
- Climate Change
- Natural Environment (including areas of natural scientific interest)
- Contaminated Sites and Soils Management
- Cultural Heritage
- Geotechnical and Hydrogeological Conditions

The Municipality is now proceeding with Phase 3 of the Class EA. Please refer to the attached file for your records and let us know if you have any questions or issues accessing the file.

Best,
Kevin

Appendix D
Updated CORMIX Modelling Details

D.1. Updated January Modelling

- 7Q20 flow = 0.826 m^3/s, Effluent flow = 5,000 m^3/d (0.0579 m^3/s).
- Assumed channel depth = 1 m, and width = 20m.
- Assumed neutrally buoyant plume.
- CORMIX addresses multi-port diffusers with 3 or more ports, or submerged single port discharges. In this assessment, the two discharge pipes were replaced with three ports of equivalent total area.
- There is a significant difference between the effluent discharge velocity (~0.15 m/s) and the ambient stream velocity (0.03 m/s) resulting in potentially unreliable near-field CORMIX results. Replacing the three-port discharge approximation with an equivalent single port yielded similar results.
- Typical mixing results for January provided below. Completely mixed conditions achieved within the first 82 m.

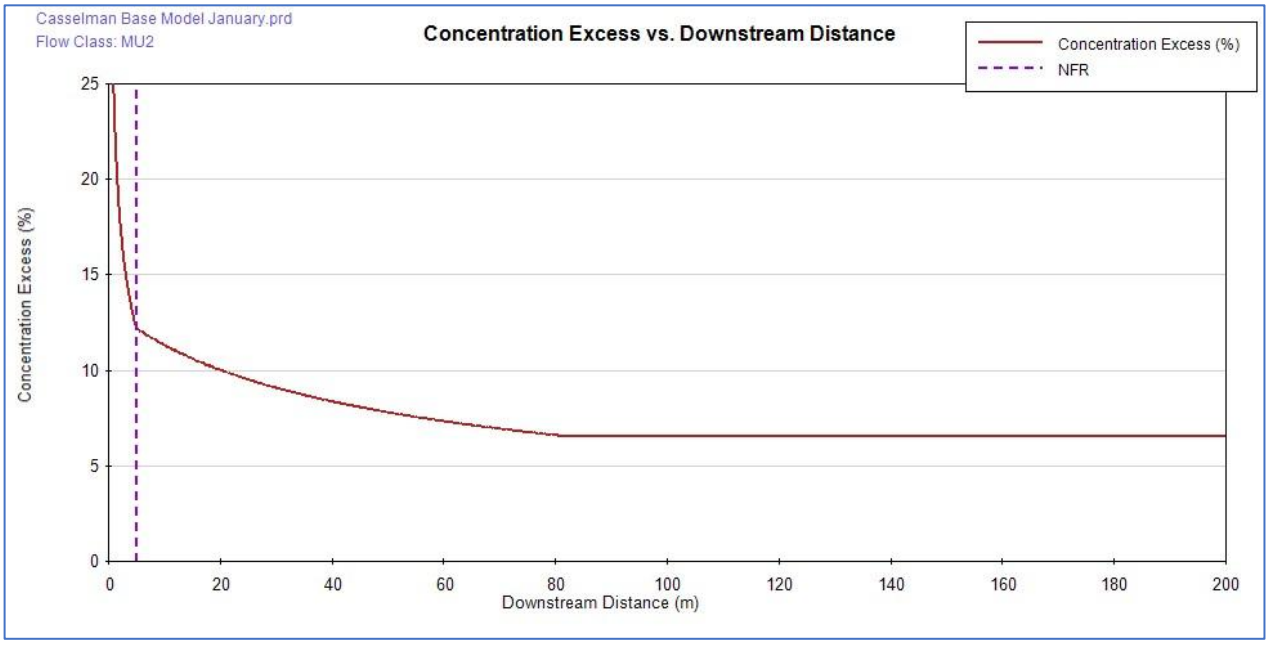


Figure D.1 – Updated CORMIX Results for January

D.2. Updated February CORMIX Modelling

- 7Q20 flow = 0.802 m^3/s, Effluent flow = 5,000 m^3/d (0.0579 m^3/s).
- Assumed channel depth = 1 m, and width = 20m.
- Assumed neutrally buoyant plume.
- In this assessment, the two discharge pipes were replaced with three ports of equivalent total area.
- As with January results, near-field predictions are potentially unreliable, however, far-field predictions acceptable.
- Typical mixing results for February provided below. Completely mixed conditions achieved within the first 85 m.

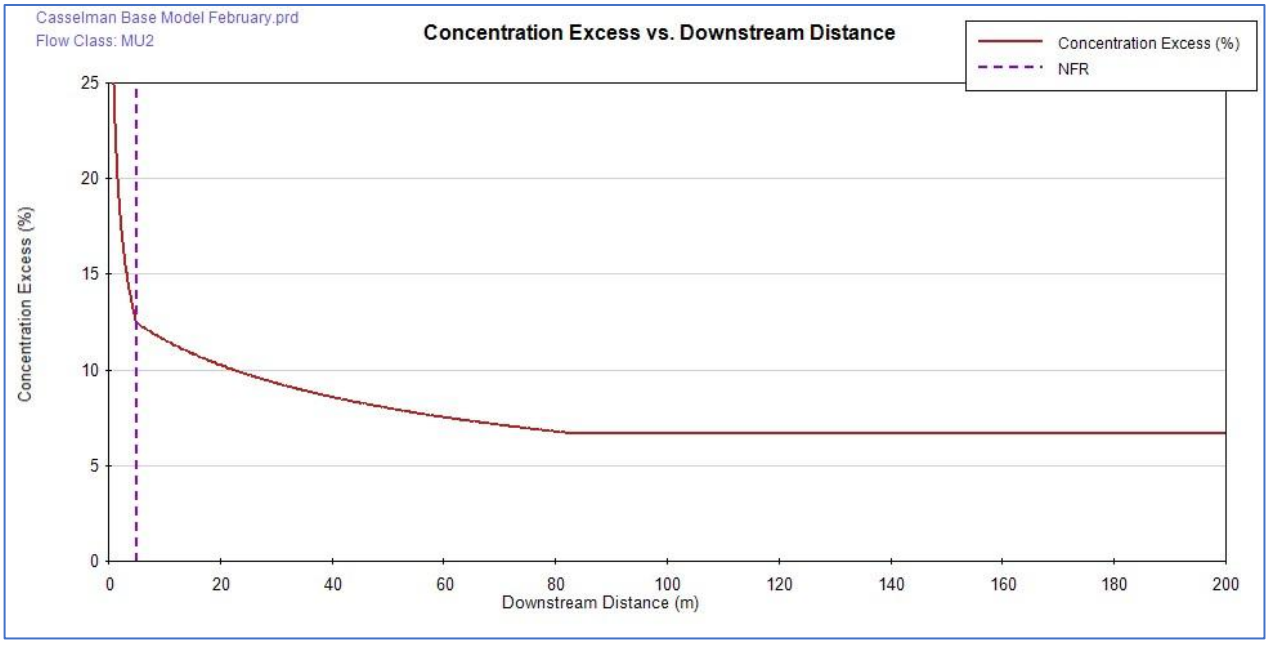


Figure D.2 – Updated CORMIX Results for February

D.3. Updated March CORMIX Modelling Results

- 7Q20 flow = 1.035 m3/s, Effluent flow = 5,000 m^3/d (0.0579 m^3/s).
- Assumed channel depth = 1.2 m, and width = 25 m.
- Assumed neutrally buoyant plume.
- In this assessment, the two discharge pipes were replaced with three ports of equivalent total area.
- As with January results, near-field predictions are potentially unreliable, however, far-field predictions acceptable.
- Typical mixing results for March provided below. Completely mixed conditions achieved within the first 118 m.

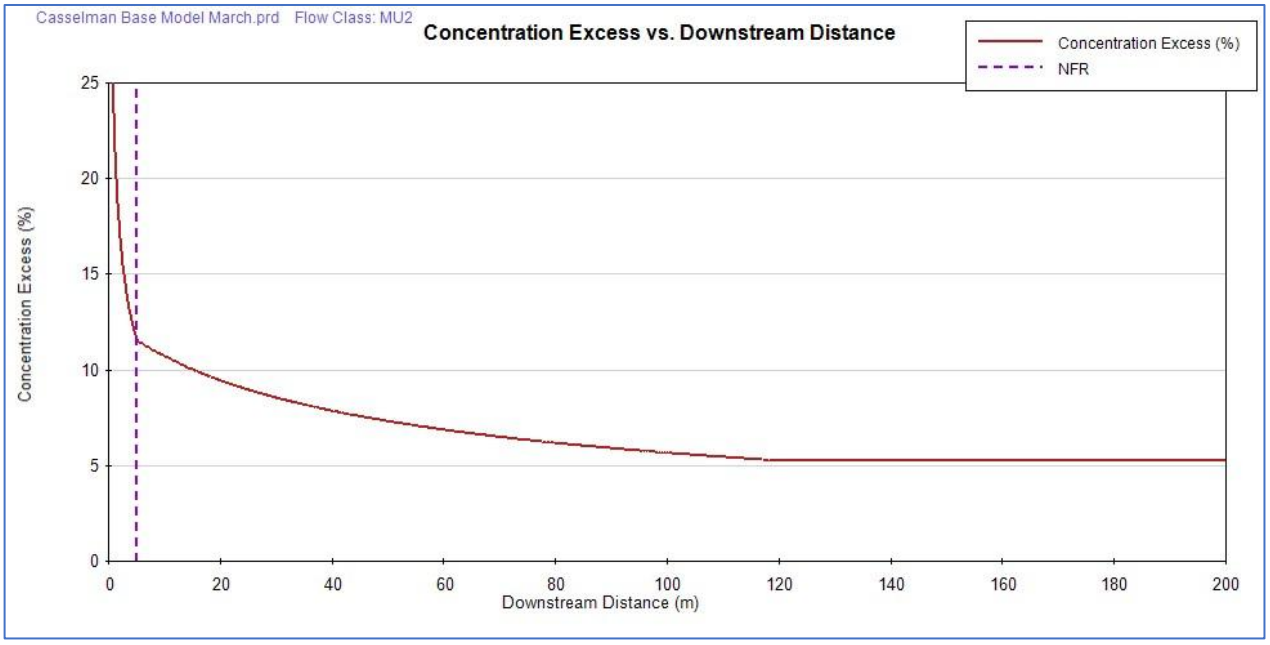


Figure D.3 – Updated CORMIX Results for March

D.4. Updated April CORMIX Modelling Results

- 7Q20 flow = 8.442 m^3/s, Effluent flow = 7,000 m^3/d (0.0810 m^3/s).
- Assumed channel depth = 2 m, and width = 60m.
- Assumed neutrally buoyant plume.
- Typical mixing results for April provided below. Completely mixed conditions achieved within the first 350m.

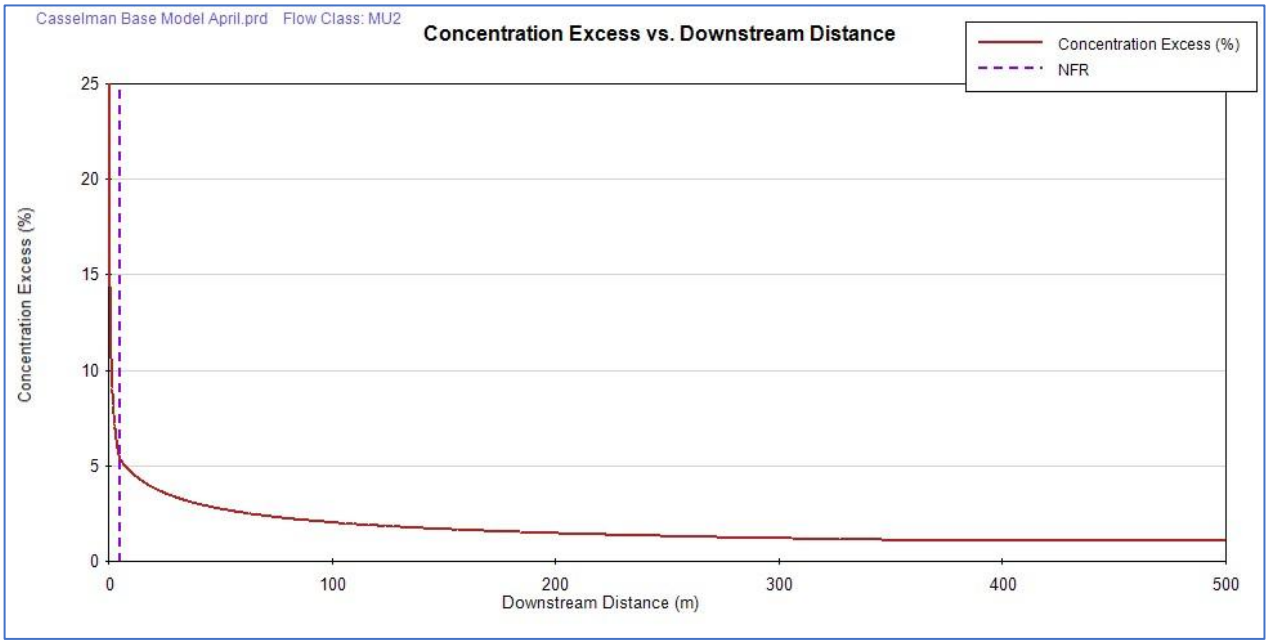


Figure D.4 – Updated CORMIX Results for April

D.5. Updated December CORMIX Modelling Results

- 7Q20 flow = 1.251 m^3/s, Effluent flow = 5,000 m^3/d (0.0579 m^3/s).
- Assumed channel depth = 1.2 m, and width = 25 m.
- Assumed neutrally buoyant plume.
- In this assessment, the two discharge pipes were replaced with three ports of equivalent total area.
- As with January results, near-field predictions are potentially unreliable, however, far-field predictions acceptable.
- Typical mixing results for October provided below. Completely mixed conditions achieved within the first 119 m.

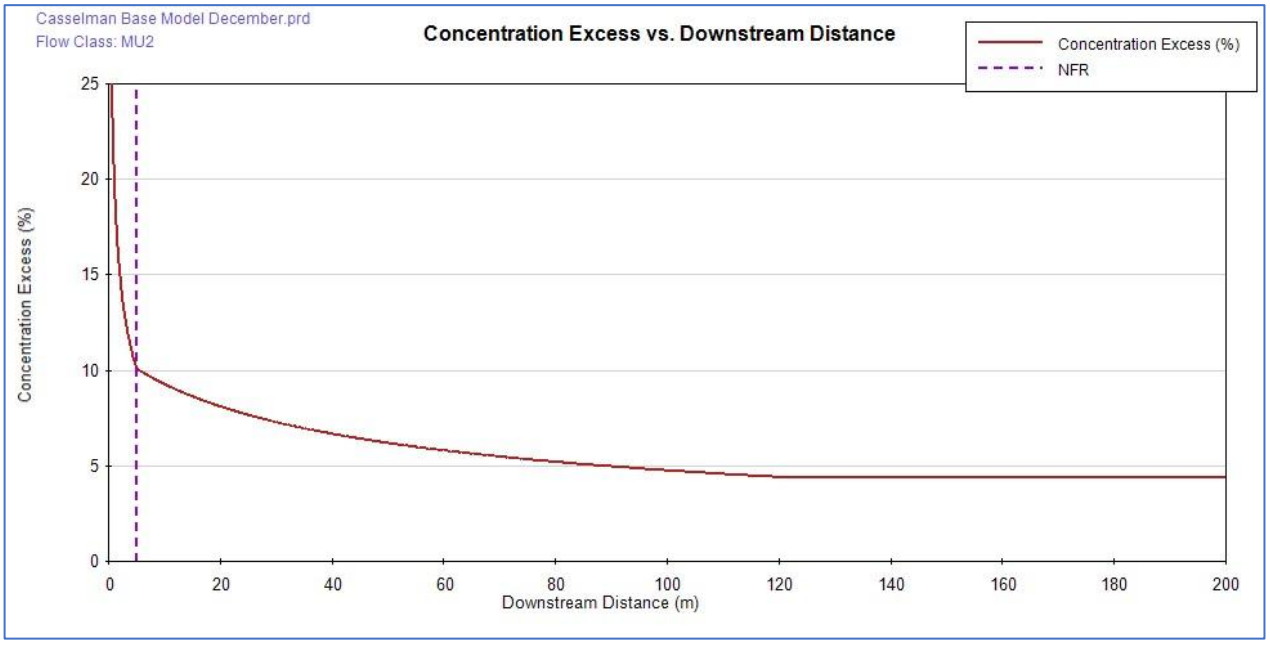


Figure D.5 – Updated CORMIX Results for December

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