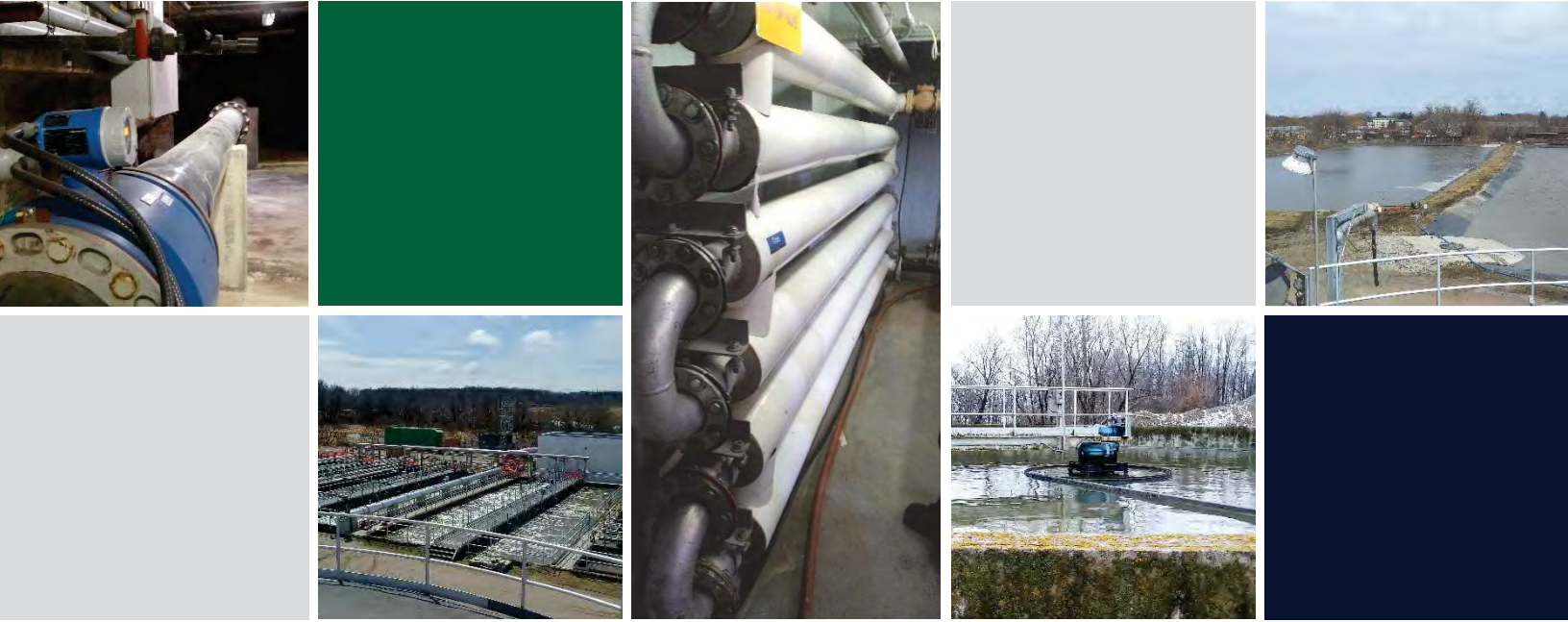


CITY OF ORILLIA WASTEWATER SYSTEM MASTER PLAN UPDATE

MASTER PLAN REPORT



FINAL

MARCH 2022



City of Orillia
WASTEWATER SYSTEM MASTER PLAN
UPDATE
MASTER PLAN REPORT

PROJECT NO. 118088

Prepared For:
THE CITY OF ORILLIA

Prepared By:



Preya Balgobin, P. Eng.

Reviewed By:



Zhifei Hu, P.Eng.

Ainley & Associates Ltd.
195 County Court Blvd., Suite 300
Brampton, ON L6W 4P7
Tel.: (905) 452-5172

www.ainleygroup.com

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EXECUTIVE SUMMARY

Background

The City of Orillia has embarked on an update to their existing Wastewater Servicing Master Plan (WWSMP), to identify requirements in their system for upgrades and/or expansions to continue to meet current needs as well as the future needs through the WWSMP study time frame of 30 years.

The WWSMP consisted of the following major elements:

- A condition assessment of the current condition of the sewage pumping stations (SPS), wastewater treatment centre (WWTC), and septage receiving station (SRS)
- An estimation of current and future wastewater flows
- Updating the City’s collection system modelling program (Hydra) and running under current and future conditions
- A capacity assessment of the collection system, SPS, WWTC, and SRS
- Identifying performance and capacity issues in the system
- Developing and evaluating alternative solutions for each identified issue
- Consultation with the public, agencies, indigenous groups, and other stakeholders

Condition Assessments

The results of the SPS condition assessment showed that a total of approximately \$5.5M of upgrades will be needed across all the pumping stations in the City’s collection system for the next 30-year period. The SPS condition assessment findings and cost estimates are summarized in the Table ES-1 below.

Table ES-1 - Sewage Pumping Station Upgrades Summary

Schedule of Upgrades	WWTC Unit Process	Capital Cost Estimate	SPS Recommended Upgrade
0 to 5 Years	SPS 1 - James Street	\$1,338,000	Hoist Replacement, Sluice Gate Replacement, Valving/Piping, Pump Replacement and Electrical Upgrades
	SPS 2 - Bayview Parkway	\$210,000	Electrical Upgrades
	SPS 3 - Couchiching Park	\$75,500	Access Safety Upgrades, Piping/Valving Replacement and Electrical Upgrades
	SPS 4 - Elgin Street	\$26,500	Access Safety and Electrical Upgrades
	SPS 5 - Couchiching Point	\$12,000	Access Safety and Electrical Upgrades
	SPS 7 - Royal Oak	\$47,000	Access Safety Upgrades and Piping/Valving Replacement
	SPS 8 - Tudhope Park	\$85,000	Access Safety Upgrades, Pump Replacement and Electrical Upgrades
	SPS 9 - Commerce Drive	\$10,000	Access Safety Upgrades
	SPS 10 - Victoria Crescent	\$82,500	Access Safety Upgrades, Electrical Upgrades, Piping/Valving and Pump Replacement

Schedule of Upgrades	WWTC Unit Process	Capital Cost Estimate	SPS Recommended Upgrade
0 to 5 Years cont'd.	SPS 11 - Shannon Street	\$13,000	Access Safety and Electrical Upgrades
	SPS 13 - Bridget & Maple	\$21,500	Access Safety, Electrical Upgrades and Gooseneck Vents Relocation
	SPS 14 - Forest Avenue North	\$10,000	Access Safety Upgrades
	SPS 16 - Forest Avenue South	\$554,200	Access Safety Upgrades, Electrical Upgrades, Addition of Third Pump for Redundancy, Piping/Valving and Pump Upgrades
	SPS 17 - Collins Drive	\$76,000	Access Safety Upgrades, Electrical Upgrades, Piping/Valving and Pump Upgrades
	SPS 18 - Fittons Road West	\$657,500	Electrical Upgrades, Piping/Valving and Pump Replacement
	SPS 19 - John Street	\$11,200	Access Safety and Electrical Upgrades
	SPS 20 - Broadview	\$11,200	Access Safety and Electrical Upgrades
	SPS 22 - Westmount Drive South	\$24,200	Access Safety and Electrical Upgrades
	SPS 24 - Leacock	\$70,000	Access Safety and Electrical Upgrades
Total Cost of 0 to 5 Year Upgrades		\$3,335,300	
5 to 10 Years	SPS 1 - James Street	\$354,000	Channel Grinders and Pump Replacement, and Electrical Upgrades
	SPS 8 - Tudhope Park	\$57,000	Piping/Valving Replacement
	SPS 11 - Shannon Street	\$50,000	Electrical Upgrades
	SPS 19 - John Street	\$110,000	Pump Replacement
	SPS 22 - Westmount Drive South	\$30,000	Pump Replacement
	SPS 24 - Leacock	\$43,000	Piping/Valving and Pump Replacement
Total Cost of 5 to 10 Year Upgrades		\$644,000	
10 to 15 Years	SPS 4 - Elgin Street	\$93,000	Piping/Valving and Pump Replacement
	SPS 22 - Westmount Drive South	\$43,000	Piping/ Valving Replacement
Total Cost of 10 to 15 Year Upgrades		\$136,000	
15 to 20 Years	SPS 11 - Shannon Street	\$50,000	Pump Replacement
	SPS 16 - Forest Avenue South	\$25,000	Pump Replacement
	SPS 17 - Collins Drive	\$18,000	Pump Replacement
	SPS 24 - Leacock	\$540,000	Pump Replacement
Total Cost of 15 to 20 Year Upgrades		\$633,000	
20 to 25 Years	SPS 2 - Bayview Parkway	\$120,000	Pump Replacement
	SPS 3 - Couchiching Park	\$60,000	Pump Replacement

Schedule of Upgrades	WWTC Unit Process	Capital Cost Estimate	SPS Recommended Upgrade
	SPS 5 - Couchiching Point	\$70,000	Pump Replacement
	SPS 13 - Bridget & Maple	\$80,000	Pump Replacement
Total Cost of 15 to 20 Year Upgrades		\$330,000	
25 to 30 Years	SPS 7 - Royal Oak	\$15,000	Pump Replacement
	SPS 20 - Broadview	\$30,000	Pump Replacement
	SPS 23 - Champlain	\$240,000	Pump Replacement (Contingent on not upgrading to grinder pumps)
Total Cost of 15 to 20 Year Upgrades		\$285,000	
30 to 35 Years	SPS 3 - Couchiching Park	\$30,000	Pump Replacement
	SPS 9 - Commerce Drive	\$80,000	Pump Replacement
	SPS 10 - Victoria Crescent	\$30,000	Pump Replacement
	SPS 14 - Forest Avenue North	\$50,000	Pump Replacement
Total Cost of 15 to 20 Year Upgrades		\$190,000	
Total Cost of Upgrades		\$5,553,300	

The results of the condition assessment of the WWTC identified approximately \$2.1M of recommended upgrades within the study period and are summarized in the Table ES-2 below.

Table ES-2 - WWTC Upgrades Summary

Schedule of Upgrades	WWTC Unit Process	Capital Cost Estimate	WWTC Recommended Upgrade
0 to 5 Years	WWTC Site & Admin Building	\$385,000	Electrical Upgrades
	Inlet/ Head Works	\$461,000	Monorail Removal, Weather Upgrades, Bar Screen Upgrades, Electrical Upgrades
	Primary Treatment	\$172,000	Bridge Refurbishments, Sludge Pumping Building Refinishing, Electrical Upgrades and Piping/Valving
	Secondary Treatment	\$40,000	Sluice Gate Replacement
	Secondary Clarifiers	\$271,300	Structural Repairs, RAS and Scum Pump Upgrades
	Sludge Digestion	\$31,000	Digester Tank Refurbishment, Digester Building Refinishing, Electrical Upgrades
	Chemical Dosing	\$28,000	Alum Tank Containment Structure Refinishing, Alum Tank Piping and Pump/Motor Upgrades
	Sludge Storage Lagoons	\$149,000	Clean Out and Repair Lagoon#1
Total Cost of 0 to 5 Year Upgrades		\$1,537,300	
5 to 10 Years	WWTC Site	\$35,000	Electrical Upgrades

Schedule of Upgrades	WWTC Unit Process	Capital Cost Estimate	WWTC Recommended Upgrade
	Inlet/ Head Works	\$100,000	Blower Upgrades
	Primary Treatment	\$55,000	Pump Upgrades
	Secondary Clarifiers	\$120,000	Electrical Upgrades
	Sludge Digestion	\$80,000.00	Electrical Upgrades
	Boiler Works	\$80,000.00	Electrical Upgrades
Total Cost of 5 to 10 Year Upgrades		\$470,000	
10 to 15 Years	Inlet/ Head Works	\$2,000	Electrical Upgrades
	Primary Treatment	\$100,000	Electrical Upgrades
Total Cost of 10 to 15 Year Upgrades		\$102,000	
Total Cost of Upgrades		\$2,109,300	

Flow Projection

The condition assessment of the septage receiving station revealed that, while there are some operational difficulties receiving large deliveries from festivals, the system is in good condition and operating within its rated capacity outside of large festival deliveries.

Historical flows to the WWTC were reviewed and used, along with the City's Official Plan, guidelines from the Ministry of the Environment Conservation and Parks (MECP), and other industry guidelines and standards, to project wastewater flow in the system in the year 2049. The evaluation estimates that the WWTC would receive approximately 21,625 m³/d of average day flow (ADF) in the year 2049.

The flow analysis conducted for this WWSMP showed that inflow and infiltration flows is approximately 31% above the metered water consumption, indicating that inflow and infiltration continues to be an issue for the City.

Capacity Assessments

The Hydra model was updated and run at current and future conditions to identify capacity issues within the collection system. The results of the modelling indicate that the existing system has sufficient capacity for current and the projected future flows.

A review of planned future development in the City showed that two sewer extensions will be needed within the WWSMP study period as listed below.

- A sewer extension will be needed to Old Barrie Road East and Line 15 North in order to service the business park/ industrial area at this intersection.
- A sewer extension will be needed to Line 15 North and Highway 11 in order to service in institutional development area at this location.

To assess the current capacity of the pumping stations in the system, draw-down tests were performed on the SPS where possible. The updated Hydra model was used to predict future flow at each SPS, which was compared against the results of the draw-down tests and the SPS rated capacities to determine if pumping station capacity upgrades will be needed. The results of the evaluation indicate that all existing pumping stations, with the exception of SPS 23 (Champlain)

have sufficient capacity to manage flows to the year 2049. The capacity of SPS 23 can be increased by adding a fourth pump, which the station is currently designed to accommodate.

In order to service the Old Barrie Road East and Line 15 North business park/ industrial area a new SPS will be needed, since gravity flow will not be possible in this area.

The rated capacity of the WWTC per its Environmental Compliance Approval (ECA) is 27,300 m³/d. The average day flow current received at the WWTC is 14,736 m³/d, which is 54% of the rated capacity. The projected year 2049 flow of 21,625 m³/d is below the WWTC's rated capacity and a WWTC capacity expansion will not be required within the study period. However, the capacity of the sludge stabilization system (anaerobic digesters) and the biosolids storage lagoons were both found to be insufficient for future projected sludge/biosolids production and capacity upgrades would be needed.

The WWTC is performing well, with effluent concentrations well below the plant's effluent limits.

While the SRS was found to have sufficient capacity for future septage flows, the study identified a deficiency with the lack of control of the rate at which septage is transferred to the WWTC. Bulk loading of septage to the WWTC could lead to overloading of the WWTC, especially as wastewater flows to the WWTC increases or if septage is transferred during times of high wastewater flow at the WWTC.

The Problem Statement

The problem statement was developed using the findings of the condition assessment, flow review, and capacity assessments. The problem statement is summarized by the following elements:

1. Inflow and infiltration
2. Condition and age of existing sewers
3. Limited capacities of sewage pumping stations
4. Future quantity of septage received at the WWTC
5. Limited capacity of the solids treatment train (digesters) at the WWTC
6. Future biosolids disposal and management

Alternative Solutions Evaluated

The alternative solutions evaluated for each of the elements of the problem statement are listed in the Table ES-3 below.

The alternative of hiring a biosolids management contractor was evaluated as a comparison to expanding both the digester and lagoon capacity. The alternative is viable as a combined solution to the insufficient digestion and biosolids storage capacity. Retaining a biosolids management contractor to haul unstabilized sludge to their off-site facility for stabilization has considerable capital cost benefits since the City would not need to construct a new digester or expand the lagoons. The City could also engage in a revenue sharing contract with the biosolids management contractor where the City would receive a portion of the revenues from marketing of the biosolids end-product. The end-product is typically a marketable fertilizer or soil amendments.

Table ES-3 – Alternative Solutions Evaluated

Issue	Proposed Alternative Solution
Inflow and infiltration	<ul style="list-style-type: none"> ▪ Alternative 1: Do Nothing ▪ Alternative 2: Identify and Correct I&I Issues
Condition and Age of Existing Sewers	<ul style="list-style-type: none"> ▪ Alternative 1: Do Nothing ▪ Alternative 2: Continue Sewer Rehabilitation Program and Implement Sewer Management Program
Limited capacities of sewage pumping stations	<ul style="list-style-type: none"> ▪ Alternative 1: Do Nothing ▪ Alternative 2: Construct Old Barrie Road SPS
Future quantity of septage received at the WWTC	<ul style="list-style-type: none"> ▪ Alternative 1: Do Nothing ▪ Alternative 2: Divert Festival Flows to Another Facility ▪ Alternative 3: Stagger Deliveries to SRS ▪ Install SRS Equalization/Storage Tank
Limited Capacity of the Solids Treatment Train (Digesters) at the WWTC	<ul style="list-style-type: none"> ▪ Alternative 1: Do Nothing ▪ Alternative 2: Expand Anaerobic Digester Capacity
Limited Capacity of Biosolids Storage Lagoons	<ul style="list-style-type: none"> ▪ Alternative 1: Do Nothing ▪ Alternative 2: Expand Lagoons ▪ Alternative 3: Construct Biosolids Storage Tanks
Limited Capacity of Sludge Stabilization and Biosolids Storage Lagoons (as a combined issue)	<ul style="list-style-type: none"> ▪ Alternative 1: Expand Anaerobic Digesters Capacity and Lagoon Capacity ▪ Alternative 2: Retain a Biosolids Management Contractor

The costs associated with paying the contractor to haul undigested sludge can be considerable. A sludge thickening facility was incorporated into this alternative to minimize haulage fees. Other factors that affect the lifecycle costs include market conditions at the time of production, sludge characteristics, sludge quantity processed, and the terms of agreement between the City and the Biosolids Contractor.

A life-cycle cost analysis was performed for this alternative and compared with the life-cycle costs associated with expanding both the digesters and lagoons. The net present value of expanding both the digesters and lagoons was \$14,440,000 and the net present value of hiring a biosolids management contractor was \$13,680,000.

Preferred Alternative Solutions

The preferred alternative solutions for each element of the problem statement are listed below:

Inflow and infiltration

Alternative 2 of identifying and correcting I&I issues in the system was the preferred alternative solution. This alternative can significantly decrease I&I in the collection system. An I&I study would be needed to determine what areas in the system are experiencing I&I issues. The zone with heaviest I&I can be targeted for upgrades first.

The estimated cost to perform an I&I study at a level of detail appropriate to the City's needs is \$250,000.

Condition and Age of Existing Sewers

Alternative 2 or developing a sewer management program was the preferred alternative solution. This alternative will involve development of a sewer management program that monitors age and condition of sewers and uses risk management tools, such as risk/consequence analysis, to predict when a sewer will need to be inspected and/or upgraded.

The City is currently in the process of developing a sewer management program as part of this Master Plan update.

Limited Capacities of Sewage Pumping Stations

The preferred alternative solution to addressing sewage pumping station capacity in the future was Alternative 2 of constructing a new SPS at Old Barrie Road and Line 15 to service future growth.

The estimated capital cost of this alternative is \$1,185,000.

Future Quantity of Septage Received at the WWTC

Alternative solution 4 of constructing an equalization tank at the septage receiving station was the preferred alternative solution. Septage flows would be stored in the equalization tank and metered to the WWTC at a flow that is proportional to WWTC flows at the time of transfer to prevent overloading the WWTC's processes. An equalization tank that is sized for flows that does not include septage from large festivals was carried forth.

The estimated capital cost of the septage equalization tank is \$2,130,000.

Limited Capacity of the Solids Treatment Train (Digesters) at the WWTC

Alternative 2 of expanding the digestion capacity by constructing a new primary anaerobic digester was the preferred general alternative solution. Since anaerobic digestion is the technology currently used at the WWTC for sludge stabilization and staff is familiar with its operation and management, the City's preference is to continue with anaerobic digestion at this time.

The estimated capital cost to construct a new primary digester is \$13,108,000.

Limited Capacity of Biosolids Storage Lagoons

Alternative solution 2 of expanding the lagoons was the preferred alternative solution for insufficient lagoon capacity. There is space available at the site to construct an additional lagoon of the appropriate size to carry the City through to the year 2049.

The estimated capital cost of constructing a lagoon of the required size is \$936,000.

Biosolids Management Contractor

The alternative of hiring a biosolids management contractor scored higher than expanding both the digester and the lagoons. However, since several time-dependent factors govern how much profit can be made from marketing a biosolids end-product and there are other sludge stabilization technologies that the City could implement themselves to produce a marketable end-product, it is recommended that the City conduct a Biosolids Option Study prior to establishing the best alternative for the City. A Biosolids Option Study is conducted similarly to a Schedule C Class EA, but focuses only on technologies for the solids management train of the WWTC.

The results of this study could provide the City with an alternative that will not only meet capacity needs but possibly put the City on a road towards being a net-zero energy facility. Technologies such as combined heat and power (CHP) systems, solar drying, on-site composting, and thermal drying would be evaluated, along with the biosolids management contractor. One advantage of the City producing a marketable biosolids product is that the City would retain 100% of the revenues.

Public Consultation

A database containing the contact information of stakeholders, review agencies, indigenous groups, and other interested parties was developed at the outset of the study to invite participation in the study. The contact list was regularly updated throughout the study as more individuals became aware of the study or provided feedback. Interested parties had the opportunity to be added to the contact list at any point during the study in order to receive public notices and newly available public information as well as the opportunity to attend upcoming public events.

To facilitate communication with all stakeholders and other interested parties throughout the Master Plan process, the City created a page on its website dedicated to the Master Plan. This page contained a description of the project, a status summary, copies of all issued notices, and the PIC materials.

Three notices were issued during the course of the Master Plan as listed below:

- Notice of Commencement – Issued on November 1, 2018 by publication in the Orillia Today paper, posting on the City’s website, and through individual emails to those in the study’s contacts database.
- Notice of PIC #1 – Issued on October 14, 2020 by publication in the Orillia Today paper, posting on the City’s website, and through individual emails to those in the study’s contacts database.
- Notice of Completion – Issued on June 16, 2021 by publication in the Orillia Today paper, posting on the City’s website, and through individual emails to those in the study’s contacts database.

There was one PIC held during the Master Plan. Since the PIC was conducted during the Covid pandemic and large public gatherings were discouraged, the PIC was held digitally. PIC display boards were made available to the public on the City's website (orillia.ca/wastewatermasterplan). The PIC outlined the scope of work, overall study process, and provided results of the condition and capacity assessments. PIC materials included forecasted wastewater flow rates and potential servicing populations, the alternative solutions, preliminary evaluations, and preliminary recommended preferred alternative solutions to address the current and future needs of the wastewater servicing system.

Additionally, emails with the PIC materials were sent directly to the key stakeholders in the project's contact database.

The PIC boards were posted for 30 days during which comments or questions could be submitted to the study team.

Future Spending Projections

The costs estimate for all elements discussed in the WWSMP are captured and presented in Table ES-4 (Projected Annual Future Spending). Table ES-4 presents the costs for condition upgrades and/or capacity upgrades in the year they are expected to be needed within the study's 30-year time frame.

Table ES-4-Projected Future Spending

SCHEDULE OF WORKS	Class EA Schedule	FORECASTED ANNUAL SPENDING (Thousand Dollars-Year 2020 Dollars)																																	
		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	2048	2049	2050	TOTAL		
Wastewater Collection System Rehabilitation*	A	\$825	\$825	\$825	\$825	\$825	\$825	\$825	\$825	\$825	\$825	\$825	\$825	\$825	\$825																		\$10,725		
Inflow and Infiltration Study	N/A				\$250																												\$250		
Inflow and infiltration Control Program**	A	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100																		\$1,300		
Old Barrie Road / Line 15 Extension	A																						\$93	\$372											
SPS 1 - James Street Upgrade	A			\$134	\$536				\$71	\$284																							\$891		
SPS 2 - Bayview Parkway	A			\$42	\$168																	\$24	\$96										\$288		
SPS 3 - Couchiching Park Upgrade	A			\$13	\$52																	\$12	\$48										\$112		
SPS 4 - Elgin Street Upgrade	A			\$2	\$8							\$19	\$76																				\$103		
SPS 5 - Couchiching Point Upgrade	A			\$2	\$8																	\$14	\$56										\$80		
SPS 7 - Royal Oak Upgrade	A			\$9	\$36																							\$3	\$12				\$51		
SPS 8 - Tudhope Park Upgrade	A			\$14	\$56				\$11	\$44																							\$125		
SPS 9 - Commerce Drive Upgrade	A			\$2	\$8																												\$10		
SPS 10 - Victoria Crescent Upgrade	A			\$16	\$64																												\$64		
SPS 11 - Shannon Street Upgrade	A			\$13	\$52				\$10	\$40								\$10	\$40														\$152		
SPS 13 - Bridget & Maple Upgrade	A			\$4	\$16																		\$16	\$64									\$96		
SPS 14 - Forest Avenue North Upgrade	A			\$2	\$8																												\$8		
SPS 16 - Forest Avenue South Upgrade	A			\$111	\$444													\$5	\$20														\$469		
SPS 17 - Collins Drive Upgrade	A			\$15	\$60													\$4	\$16														\$80		
SPS 18 - Fittons Road West Upgrade	A			\$133	\$532																													\$532	
SPS 19 - John Street Upgrade	A			\$2	\$8					\$22	\$88																							\$120	
SPS 20 - Broadview Upgrade	A			\$2	\$8																								\$6	\$24				\$40	
SPS 22 - Westmount Drive South Upgrade	A			\$2	\$8					\$6	\$24				\$9	\$36																		\$85	
SPS 23 - Champlain Upgrade (incl. fourth pump in 2045/2046)	A			\$80	\$320																										\$68	\$272		\$660	
SPS 24 - Leacock Upgrade	A			\$14	\$56					\$9	\$36							\$108	\$432															\$641	
Existing WWTC Upgrades	A		\$307	\$1,230				\$94	\$376				\$20	\$80																				\$2,107	
Septage Receiving Capacity: Construct Equalization Tank	B							\$213	\$1,917																									\$2,130	
WWTC Sludge Stabilization Capacity: New Primary Digester and Control Building	A+					\$2,621	\$10,486																											\$13,107	
Biosolids Storage Capacity: Expand Lagoons	B							\$187	\$749																									\$936	
Biosolids Option Study	N/A				\$180																														\$180
Wastewater System Master Plan Updating	N/A						\$200					\$200						\$200				\$200						\$200					\$200	\$1,200	
TOTAL OF WORK ANNUALLY		\$925	\$1,232	\$2,767	\$3,803	\$3,546	\$11,611	\$1,419	\$4,096	\$1,441	\$925	\$1,144	\$1,021	\$1,014	\$961	\$0	\$327	\$508	\$0	\$0	\$0	\$266	\$357	\$372	\$0	\$0	\$277	\$308	\$0	\$0	\$0	\$200	\$36,542		

* Cost taken from the 2013 Master Plan update since pipe condition assessments were not part of the scope of this Master Plan Update.

**Costs taken from the 2013 Master Plan update. A more accurate estimate will be possible after completion of an I&I study.

Excluded Items:

1. Woodland Drive and Memorial Avenue Servicing: Collection system extension and a new SPS for institutional servicing in this area has been excluded since the property owner would be responsible for all the costs and timing
2. SPS No.2 – Bayview Parkway: The City has advised that the wet well at this station is small and requires upgrades. However, determining the required size for the wet well is out of the scope of this Master Plan update. Therefore, a cost analysis for the expansion of the wet well was not included in the condition assessment costs
3. SPS 16 - Forest Ave South: The cost of a basic upgrade to this station's control system was carried through the study. A more sophisticated electrical upgrade would require a new wireless radio transmitter and receiver via a new antenna, would cost between \$25,000 to \$50,000, depending on the wireless signal paths, and was excluded in the summary of costs
4. SPS 16 - Forest Ave South: The City indicated that, due to flooding in the area of the Forest Avenue South station, the wet well will need to be redesigned to ensure there is enough capacity during high flow conditions. In order to estimate the cost to resize the wet well, a complete review of the pumping station's design, historical flows, and I&I impacts would be required, which was outside the scope of this assessment. Redesign of the wet-well has been excluded from the costs to upgrade this pump station
5. WWTC Headworks: Most of the headworks area is classified as either a Class 1, Division 1 or Class 1, Division 2 hazardous area per the NFPA 820 standard. The headworks building is currently grandfathered, however, when upgrades are implemented in the building, it may no longer be grandfathered, depending on the upgrade, and modifications to meet the NFPA 820 standard may be required at that at time. The extent and costs of these items need to be assessed at the time of upgrades

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1 Introduction

The City of Orillia Wastewater System Master Plan (WWSMP) update has been undertaken to complete a comprehensive plan for the maintenance, expansion, and rehabilitation for the City's wastewater infrastructure. The WWSMP consisted of a condition assessment of existing infrastructure, a review of historical flows, a projection of wastewater flows through the 30-year study period, and capacity assessments of the collection system and WWTC to identify the needs of the system to meet the project 30-year (year 2049) wastewater flows. For those system components that do not have sufficient capacity to support the year 2049 flows possible alternative solutions were developed and evaluated against relevant criteria to select the preferred alternative solution. The WWSMP also develops costing for each alternative solution and presents a proposed forecasted future spending, including recommended upgrades from the condition assessment, at the end of the study.

The City of Orillia's study area for their WWSMP includes the City's downtown core and surrounding residential, institutional, commercial, and industrial zones. The Orillia settlement boundary also includes potential developable greenfield and infill sites. The City's Official Plan, finalized in 2013, was used to identify the types of development planned across the City. In 2017, Hemson Consulting Limited conducted a Development Charges Background Study (D.C. Study) report for the City of Orillia in support of new development charge by-law. As part of the D.C. Study, the Hemson report determined the City's forecasted total 20-year population, which was used in this WWSMP update to project future wastewater flows. This WWSMP update is intended to plan for a 30-year horizon. To achieve this, the population projection for the 20-year horizon from the DC report was prorated to 2049 assuming the same growth rate. As a result of the anticipated population growth projections, the wastewater collection and treatment system will experience an increase in average day sewage flows.

Consultation with stakeholders is an integral part of the Master Plan and updating process to ensure that recommendations provided in the update are reflective of and incorporate the concerns and interests of the community and potentially impacted stakeholders and that the governing regulatory bodies are consulted throughout the process.

1.1 Purpose and Background

This WWSMP update is an update of the 2013 WWSMP. This study illustrates the current asset, flow and capacity conditions of the City's existing wastewater infrastructure and aims to support the recommended upgrades necessary to meet current and future wastewater flow demands for the next 30 years (to year 2049). The City of Orillia's wastewater collection and treatment system currently services a population of 31,166 people (2016 census) and is projected to grow to a population of approximately 51,041 people by 2049.

This WWSMP update will be used to establish alternative solutions to identified challenges in the wastewater infrastructure in supporting the City through the study period. The results of the WWSMP will help in the development of maintenance, expansion, and rehabilitation plans for the City's wastewater infrastructure. The results of the asset condition assessments, current and future wastewater flow estimates, and system capacity studies were used to confirm and update the problem statement and alternative solutions of the previous Master Plan update. Phase 2 of

the Master Plan included establishing preferred alternative solutions to meet the existing community's wastewater servicing needs and support future population growth and development.

1.2 Objectives

The purpose of this Master Plan update is to update the condition of the existing wastewater infrastructure and wastewater flow projections and assess the capacity of the system in light of the updated flows, regulations and guidelines since the 2013 Master Plan update. The Master Plan process followed the Master Plan approach, as defined in the Municipal Class Environmental Assessment (Class EA) document, dated October 2000 (as amended in 2007 and 2011). The process addresses the first two phases of the Class EA planning and design process, following Approach 1 of the Master Plan process.

This Master Plan Report presents the work completed as part of Phase 1 and Phase 2 of the Class EA process. The report outlines the findings of condition assessments conducted on the existing wastewater infrastructure, updates of current and projected wastewater flows, results of capacity assessment on the collection system, pumping stations, septage receiving station, and the WWTC. The second half of the report presents the Phase 2 work of developing and evaluating alternative solutions for identified issues for each component of the wastewater collection and treatment infrastructure, including cost estimates and proposed implementation timing.

1.2.1 Establish Existing Asset Conditions

Asset condition assessments of the City's pumping stations, septage receiving station, and WWTC were conducted to determine the condition of the structural, electrical and process mechanical components of the various wastewater facilities. The City's operations staff was present during the condition assessments and provided valuable insight into the performance of the wastewater facilities. The objective of the asset condition assessment is to provide an overview of asset age and physical condition to develop a proposed schedule of asset upgrades. The schedule of upgrades provides a high-level guideline of which assets to replace on the 20-year horizon. The schedule of upgrades will be used to facilitate the plan for the maintenance, rehabilitation, and expansion of the City's wastewater infrastructure.

1.2.2 Verification of Wastewater Flows

Since an extensive flow analysis of the City's wastewater flows has not been performed since the first Master Plan was prepared, this update conducted a complete review of existing flows, using historical water and wastewater flow data from years 2014 to 2018. Existing wastewater flows were determined through the City of Orillia's flow monitoring at the WWTC. The flows measured at this location are inclusive of inflow and infiltration, as well as contributions from the septage receiving station. To calculate future wastewater flows, a Development Charges Background Study (D.C. Study), conducted by Hemson Consulting Limited, was used to develop a projected population for 2049 by determining the amount of growth within infill and new development sites inside the City's development limits. The projected population for 2049 was used to determine the projected wastewater flow, which was compared to the WWTC's rated capacity.

1.2.3 Review of System Capacity

The City of Orillia's wastewater system and treatment capacity was determined by splitting the analysis into four parts: (1) the sanitary sewers, (2) the sewage pumping stations, (3) the WWTC, and (4) the Septage Receiving Station. The following summarizes the procedures for determining the system's overall capacity.

1.2.3.1 Collection System and Sewage Pumping Stations

The City of Orillia currently uses the Hydra Storm and Sanitary Sewer Modeling Software to model the collection system, including pumping stations. The Hydra model was reviewed and calibrated to reflect current conditions, such as per capita flow and estimates of inflow and infiltration.

Additionally, drawdown tests were performed on the pumping stations where feasible.

Once the Hydra model had been calibrated such that its calculated flows matched measured flows, the model was run to establish capacities of the collection system and SPS under current flow conditions.

The model was run once more under future (year 2049) projected flow conditions to assess the capacity of the collection system and pumping stations at that time.

1.2.3.2 Wastewater Treatment Centre

The objective of the WWTC capacity review is to determine whether the plant has the necessary hydraulic capacity for current and projected future flows. Historical plant data and future flow projections were compared to determine the required capacity under current and future conditions. The WWTC consists of the following major treatment systems:

- Headworks
- Primary Clarifiers
- Secondary Treatment
- Secondary Clarifiers
- Sludge Pumping
- Chemical Dosing
- Digester Complex
- Tertiary Treatment
- UV Disinfection
- Sludge Storage Lagoons

Per the facility's Environmental Compliance Approval (ECA #7355-B43NAS, dated October 10, 2018), the WWTC's rated average day flow (ADF) capacity is 27,300 m³/d.

1.2.3.3 Septage Receiving Station

The purpose of the Septage Receiving Station (SRS) review is to determine whether the WWTC plant can receive additional loading from local activities such as large music festivals. City staff indicated that, due to operational challenges and SRS capacity issues, they stopped receiving flows from large festivals in 2016.

As reported in the KMK Design Brief (2006), the SRS has a rated capacity of 2,160 m³/d. The station is composed of the following components:

- Receiving Tank
- Rock Trap
- Grinder
- Actuated Inlet Valve
- Auger Screen

Historical flows to the SRS were reviewed as well as loading to the WWTC from the SRS. These factors were used to assess whether the WWTC can accept additional loads from the SRS.

1.3 Related Documents

Several documents were relied on to support the WWSMP update. Each document was reviewed for pertinent information related to this project. They are described in brief in the following subsections.

1.3.1 Terms of Reference

The study is being conducted in accordance with the Terms of Reference (TOR) as outlined in the Request for Proposal issued by the City of Orillia on June 21, 2018.

1.3.2 Wastewater System Master Plan Update (2013)

The previous WWSMP update was completed in 2013, with the goal to develop appropriate strategies for community planning and municipal servicing, consistent with current provincial, county and municipal planning policies. The 2013 WWSMP update includes discussions from the original WWSMP and updates on the works completed since the original WWSMP. The 2013 WWSMP update includes revised population and flow projections and advises on additional works not included in the original document. The WWSMP process followed the Master Plan approach, as defined in the Municipal Class Environmental Assessment (Class EA) document, dated October 2000 (as amended in 2007 and 2011). Master Plans address the first two phases of the Class EA planning and design process, following Approach 1 of the Master Plan process.

1.3.3 City of Orillia Official Plan

The Official Plan of the City of Orillia, developed in 2011 and finalized in 2013, contains information pertaining to the City's land use designations and policies for the physical development and redevelopment of the City. The Plan was used to identify the types of development planned across the City, thereby facilitating the development's projected wastewater flows.

1.3.4 Hemson Study

The 2017 Development Charges Background Study (D.C. Study) completed by Hemson Consulting Limited was used to estimate the rate of residential population growth over the 2017-2026 planning period. The rates assumed within the D.C. Study were extrapolated to reach the end of the planning period covered by this Master Plan. The D.C. Study projected the City will

grow by 2,650 additional residential units over the 2017-2026 planning period and a total growth of 4,290 additional residential units by 2031. The density of development anticipated into the future is expected to be approximately 50 persons/ha based on the targets of the City's Official Plan. The study assumes a density of 2.41 persons per residential unit.

In terms of employment, the D.C. Study projects an additional 1,140 jobs over the 2017-2026 planning period and 1,872 additional jobs over the 2017-2031 planning period.

1.3.5 Operations Manuals and Flow Data

The City of Orillia's WWTC and SPS Operations manuals provide detailed information on the equipment and capacity of each WWTC process and pump station. The manuals include ECA information for various components of the collection and treatment system, process descriptions, plant and station data, operating procedures, inspection/repair/maintenance programs and monitoring programs.

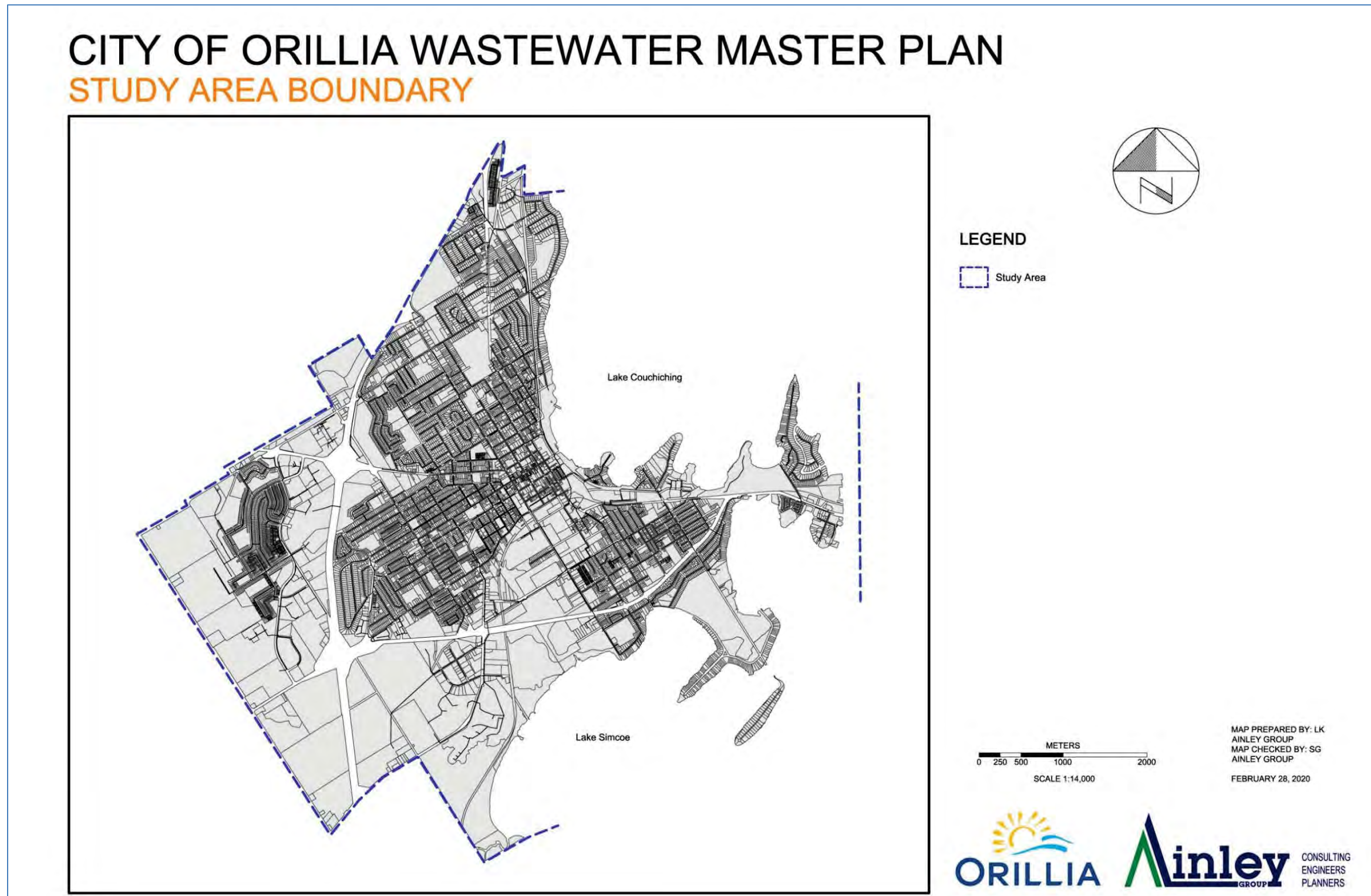
Moreover, the City's sewer model and WWTC flow data provided insight into the existing wastewater flows experienced by the City's wastewater collection and treatment system. The model allows for future wastewater flow projections to be run, determining whether the current system capacity will be adequate for the 30-year horizon.

1.4 Study Area

The City of Orillia is an urban community nestled between Lake Simcoe and Lake Couchiching in Simcoe County. The City is bordered by the lakes to the east, and rural Simcoe County to the north, south and west. The City is known for its expansive lake access and cultural events.

Figure 1 shows the study area for the City's WWSMP as set out in the TOR. The study area focused on the urban centre of Orillia and the Orillia Settlement Area Boundary.

Figure 1: Wastewater System Master Plan Update Study Area



PHASE 1

2 Existing Conditions

The population of the City of Orillia, per the most recent census (2016) is 31,166; an increase of 598 from the 2011 census population of 30,586. At the time of the previous WWSMP update, the projected growth rate was 1%, which would have translated to a 2016 population of 32,146. However, the actual growth rate between 2011 and 2016 was approximately 0.4%, notably lower than the predicted 1%.

The City’s wastewater infrastructure is comprised of the collection system, a septage receiving station, and the WWTC. The collection system is series of approximately 175 kilometres of gravity sewers and forcemains (163km of gravity sewers and 12km of forcemains). There are 21 City-owned sewage pumping stations (SPS) in the system, plus one privately-owned SPS, which is operated by the City of Orillia. Collected wastewater is pumped to the WWTC via SPS 1 (James Street SPS), where it is treated and discharged to Lake Simcoe via Ben’s Ditch.

The septage receiving station is located at the James Street SPS site. The septage station receives septage from septage haulage trucks and transfers it to the WWTC for treatment.

This WWSMP update included a condition assessment of the pumping stations, WWTC, and septage receiving station.

2.1 Collection System

A physical condition assessment of the existing collection system was beyond the scope of this WWSMP update. However, the 2013 WWSMP update cited that approximately 95% of the 163 km of piping in the system at that time has been inspected using Closed Circuit Television (CCTV). Using the findings of the CCTV investigation and an Overall Condition Index (OCI) rating for each sewer, the 2013 WWSMP update developed a recommendation for sewer replacements over the upcoming 20-year period. Table 1 below is taken from the 2013 WWSMP update and shows the recommended sewer replacements by sewer size for the 20-year period following the update.

Table 1 – Sewer Replacements Recommended in 2013 WWSMP Update

Sewer Diameter (mm)	Replacement in Metres		
	Within 3 Years (by 2016)	Within 10 Years (by 2023)	Within 20 Years (by 2033)
200	2,138	4,363	4,355
225		895	736
250	575	1,484	2,671
300	158	589	438

Sewer Diameter (mm)	Replacement in Metres		
	Within 3 Years (by 2016)	Within 10 Years (by 2023)	Within 20 Years (by 2033)
350			75
375		111	347
525		436	173
600	82	365	714
675		32	133
750		229	231
900			99
TOTAL	2,950	8,504	9,972

The City has been implementing the recommended sewer replacements since that time. According to the City's records, the sewer replacements shown in Table 2 below have been completed since the last WWSMP update.

Table 2 – Sewer Replacements Completed Since the 2013 WWSMP Update

Sewer Diameter (mm)	Recommended Replacements by 2023 (m)	Replacements Completed Since 2013 (m)
200	4,363	1,303
225	895	
250	1,484	1,356
300	589	197
350		
375	111	
450		185
525	436	
600	365	121
675	32	
750	229	
900		
TOTAL	8,504	3,162

2.1.1 Review of City of Orillia’s Sewer Design Standard

As part of the Master Plan, a review of section 4.3.2 (Sanitary Drainage System) of the City of Orillia’s Engineering Design Criteria document was conducted. All clauses were evaluated against either a documented regulation, guideline, or standard. Where no regulation, guideline, or standard exists, the clause was evaluated against standard industry practice. If there is no standard industry practice then the design item is classed as “Owner’s preference” meaning that the Owner can use whatever parameters they wish for that particular item. The table below lists items in the Design Criteria document that are either not in line with a relevant industry regulation, design guideline/standard, or a practice or have no industry requirement. Items that have no industry requirement are listed in the table as “owner’s preference”. All other clauses in the Design Criteria document not mentioned in the table below were found to be in-line with the applicable regulation, guideline/standard, or industry practice.

Table 3 – City of Orillia Sewer Design Standards that Do Match a Guideline, Standard or Standard Industry Practice

City of Orillia Design Criteria	Review Finding						
<u>Residential Sewage Flows</u>							
1. An average daily per capita flow of 350 L/c/d shall be used for areas older than 10 years old.	1. No age-based guidelines or typical industry practice exist.						
2. The value of peak extraneous flow shall be 3.46 cu.m./ha.d.	2. No specific guidelines exist. Owner specific.						
3. The peaking factor shall be calculated based on the Harmon formula. <ul style="list-style-type: none"> ◦ Maximum M – 4.0 ◦ Minimum M – 1.5 	3. Per the MECP design guidelines for sewage works, the minimum permissible peaking factor M is 2.0.						
4. For areas where the lands are zoned for specific residential use, but detailed planning information is not available, the following population densities shall apply for calculation of sewage flows only:	4. Per the MECP design guidelines for sewage works, if no official plan or draft plan exist, the designer should size sanitary sewers for population densities of at least 25 persons per gross hectare. This minimum level of population density will generally be suitable for rural municipalities only. If the municipality already has higher population densities, the designer should use similar or higher densities for new growth areas.						
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;"><u>Type of Housing</u></th> <th style="text-align: center;"><u>Units/Hectare</u></th> </tr> </thead> <tbody> <tr> <td>Single Family Residential</td> <td style="text-align: center;">12</td> </tr> <tr> <td>Multiple Residential</td> <td style="text-align: center;">42</td> </tr> </tbody> </table>		<u>Type of Housing</u>	<u>Units/Hectare</u>	Single Family Residential	12	Multiple Residential	42
<u>Type of Housing</u>		<u>Units/Hectare</u>					
Single Family Residential	12						
Multiple Residential	42						
5. When the number and type of housing units within a proposed development are known, the	5. No guidelines or typical industry practice. Owner specific.						

City of Orillia Design Criteria	Review Finding								
<p>calculation of population for the proposed development shall be based on the following:</p>									
<table border="1"> <thead> <tr> <th><u>Type of Housing</u></th> <th><u>Person/Unit</u></th> </tr> </thead> <tbody> <tr> <td>Single Family Dwelling</td> <td>2.95</td> </tr> <tr> <td>Semi-detached & Duplex</td> <td></td> </tr> <tr> <td>Townhouse Apartment</td> <td>2.95</td> </tr> </tbody> </table>	<u>Type of Housing</u>	<u>Person/Unit</u>	Single Family Dwelling	2.95	Semi-detached & Duplex		Townhouse Apartment	2.95	
<u>Type of Housing</u>	<u>Person/Unit</u>								
Single Family Dwelling	2.95								
Semi-detached & Duplex									
Townhouse Apartment	2.95								
<p><u>Commercial Sewage Flows</u></p>									
<p>1. A peak design flow of 0.10 L/s/ha shall be used for infiltration.</p> <p>2. The area shall be based on the gross lot area.</p>	<p>1. No specific guidelines exist. Ainley typically uses 0.2-0.4 L/s/ha as a standard, but tailors the value to the specific client's system where data permits.</p> <p>2. No guidelines or typical industry practice. Owner specific.</p>								
<p><u>Industrial Sewage Flows</u></p>									
<p>1. The area shall be calculated using the gross area included in the industrial block or development.</p> <p>2. Peak flow and infiltration factors shall be applied as per the MOE Design Guidelines.</p> <p>3. The City through its Planning Policies encourages the establishment of only those industries which have low sewage requirements (dry industries).</p>	<p>1. No guidelines or typical industry practice. Owner specific.</p> <p>2. No MECF guidelines exist. Industrial peak flow factor is usually 1.6-2.0 L/s/ha.</p> <p>3. No guidelines or typical industry practice. Owner specific.</p>								
<p><u>Institutional Sewage Flows</u></p>									
<p>1. A peak design flow of 0.10 L/s/ha shall be used for infiltration.</p> <p>2. The area shall be calculated using the gross area included in the school or institutional site.</p>	<p>1. No specific guidelines exist. Owner specific. Ainley typically uses 0.2-0.4 L/s/ha and tailors to the specific client's system.</p> <p>2. No guidelines or typical industry practice. Owner specific.</p>								

City of Orillia Design Criteria	Review Finding
<p><u>Pipe Capacities</u></p> <p>1. For all types of pipe a roughness coefficient of $n=0.013$ shall be used.</p>	<p>1. Per the MECP design guidelines for sewage works, a roughness coefficient (n) of no lower than 0.013 is recommended for all smooth-walled pipe materials.</p>
<p><u>Depth of Sanitary Sewers</u></p> <p>1. In all instances, the proposed sanitary sewer shall be installed at a depth sufficient to also service lands external to the site as determined by the City.</p>	<p>1. No guidelines or typical industry practice. Owner specific.</p>
<p><u>Location</u></p> <p>1. All sanitary sewers shall be located as shown on the typical City roadway cross sections. In general, this location is 1.5 m south or west of the centerline of the roadway. A minimum horizontal clearance of 3.0 m is required between the sanitary sewer and water main.</p>	<p>1. This is not a regulated parameter. Sanitary sewers are generally located at or near the centreline of roads to allow buildings on both sides of the street to be serviced with approximately the same lengths of building sewers. Municipalities generally have standards on the preferred location of services.</p>
<p><u>Materials</u></p> <p>1. Sanitary sewers shall be constructed of reinforced concrete pipe, Polyvinyl Chloride (PVC) pipe or polyethylene.</p> <p>2. Reinforced concrete pipe shall be used for sewers 600 mm diameter or larger. PVC pipe may only be used for sanitary sewers up to and including 600 mm in diameter.</p> <ul style="list-style-type: none"> ◦ Reinforced Concrete Pipe shall be street reinforced and conform to OPSS 1820. ◦ Polyvinyl Chloride Pipe (PVC) shall conform to OPSS 1841. ◦ Dimensions ratio (DR) of PVC sewer pipe shall not exceed 35. ◦ Polyethylene pipe shall conform to OPSS 1840. 	<p>1. Use of reinforced concrete pipe and PVC pipe is in line with standard industry practice. Use of polyethylene pipe is not common.</p> <p>2. Depends on preference of the municipality or system owner. PVC pipe larger than 600 mm diameter is used for sanitary sewers but requires more careful placement of embedment material than concrete pipe. Polyethylene pipe is not commonly used.</p>

City of Orillia Design Criteria	Review Finding
<u>Infiltration Test</u>	
<p>1. The infiltration shall not exceed the following calculated allowable infiltration for the section tested:</p> <ul style="list-style-type: none"> ◦ 0.75 L/mm of diameter/100 meters of sewer/hour 	<p>1. In accordance with OPSS 410, allowable leakage is calculated as 0.075 L/mm diameter/100 metres of sewer pipe/hr.</p>
<u>Exfiltration Test</u>	
<p>1. The allowable leakage for the test section shall not exceed the following:</p> <ul style="list-style-type: none"> ◦ 0.75 L/mm of pipe diameter/100 meters of sewer/hour 	<p>1. In accordance with OPSS 410, allowable leakage is calculated as 0.075 L/mm diameter/100 metres of sewer pipe/hr.</p>
<u>Video Record</u>	
<p>1. At the direction of the City, flushing, cleaning, additional video inspections and records may be required prior to “Final Acceptance”.</p>	<p>1. No guidelines or typical industry practice. Owner specific.</p>
<u>Maintenance Hole Details</u>	
<p>1. If the design of the sewer system is such that the difference in elevation between the maintenance hole inlet and outlet exceeds 0.9 m, then a drop structure will be required.</p>	<p>1. A drop pipe should be provided for a sewer entering a manhole at an elevation of 610 mm (24 in) or more above the manhole invert.</p>
<p>2. When the upstream flow velocity exceeds 1.5 m/s, the drop required through a maintenance hole shall be calculated using the standard calculation sheet, “Hydraulic Calculations for Manholes” found in the MOE Design Guidelines.</p>	<p>2. The referenced calculation sheet is not present in current (2008) version of the MECP Design Guidelines for Sewage Works.</p>
<p>3. For all junction and transition maintenance holes, the drop required shall be calculated using the standard calculation sheet “Hydraulic Calculations for Manholes” found in the MOE Design Guidelines.</p>	<p>3. The referenced calculation sheet is not present in current (2008) version of the MECP Design Guidelines for Sewage Works.</p>
<p>4. When any dimension of a maintenance hole exceeds those on the Standard Drawings, the maintenance hole must be individually designed and detailed.</p>	<p>4. No guidelines or typical industry practice. Owner Specific.</p>

City of Orillia Design Criteria	Review Finding
<p>5. Whenever practical, a safety grating shall be located 0.5 m above the drop structure inlet pipe.</p>	<p>5. No guidelines or typical industry practice Owner Specific.</p>
<p><u>Location of Service Connections</u></p>	
<p>1. The proposed locations for the sanitary sewer service connections shall be shown on the plan and profile drawings and shall be in accordance with the locations specified on the Standard Drawings.</p>	<p>1. No guidelines or typical industry practice Owner specific.</p>
<p>2. Residential connections shall terminate at the center of the property line with a test fitting, 125 mm x 100 mm reducer, plug suitably braced to withstand test pressures and 89 mm x 38 mm marker placed from the invert of the connection to 600 mm above grade painted green.</p>	<p>2. Typical industry practice for new construction. For existing built-up areas it may not be suitable to locate the connection at the centre of the property. Typically, it would be installed at a location that best suits the existing building plumbing and which avoids obstructions on the property, based on input from the property owner.</p>
<p><u>Connection of Service Connections to Main</u></p>	
<p>1. A maintenance hole shall be installed on the main sewer at the intersection of a service connection, which has a size greater than half the diameter of the main sewer except as provided below:</p> <ul style="list-style-type: none"> ◦ A 150 mm service connection will be permitted to connect to a 200 mm or 250 mm main sewer providing an approved manufactured tee is installed and providing the invert of the service connection is above the springline of the main sewer. 	<p>1. Standard industry practice is to provide a maintenance hole where a service connection 200 mm or larger connects to the main sewer.</p>
<p><u>Depth of Service Connections</u></p>	
<p>1. Risers shall be used when the depth to obvert of the sewer main exceeds 4.50 m. The riser connection shall not exceed 3.0 m in depth.</p>	<p>1. Per the MECP design guidelines for sewage works, risers required at depths of 4.0m. Service risers from main sewers buried more than 4.0 m (13 ft) should be taken off at an angle not less than 45° from the vertical, moved to the vertical by an appropriate elbow and the vertical section provided with a slide fitting. Alternatively, where the main sewer depth is greater than</p>

City of Orillia Design Criteria	Review Finding
	4.0 m (13 ft), the use of a shallow “local” collector sewer could be considered with service connections made to the shallow sewer. The designer should consult the municipality for local design requirements.

Grade of Service Connections

1. The minimum and maximum grades for sanitary sewer service connections shall be as follows:

Size of Connection (mm)	Min. Grade (%)	Max. Grade (%)
125	2.0	8.0
150	1.0	6.0
200	0.5	6.0

1. Minimum per MECP guidelines is 1%.
Sanitary Sewer Service Connection Grades:

- Recommended Grade 2%; and
- Minimum Grade 1%.

2.2 Sewage Pumping Stations

Ainley staff completed site investigations of the City’s sewage pumping stations to identify the condition of pumping station assets and ascertain their ability to meet existing flow conditions and to identify any upgrades that may be required to meet the long-term capacity requirements of Orillia’s wastewater collection system. Condition assessments were performed on the pumping stations to establish what upgrades in equipment and assets may be needed to ensure functionality of the SPS through the Master Plan study period.

The condition assessment was conducted on a visual basis only. No confined space entries were conducted as an aspect of this assessment. As such, assets situated within confined spaces, such as wet-wells, and not visible from the outside were not inspected. Cost estimates for assets being replaced are in 2020 dollars.

A detailed technical memorandum of the findings and cost estimates for the SPS condition assessment can be found in **Appendix A**.

2.2.1 Sewage Pumping Station No. 1 – James Street

Sewage Pumping Station No. 1 (SPS1) is located at 125 James Street West. This pumping station began servicing the collection system in 1973 as the main pumping station. The station consists of a wet well and dry well, which are housed in the pumping station building. All wastewater collected in the City’s collection system comes to this SPS through two trunk sewers of 1050mm and 1200mm diameter. The trunk sewers discharge into maintenance hole #1 in the parking lot to the North of the pumping station and flows from the maintenance hole enter the wet-well through two wet-well sluice gates. The wastewater is discharged from the SPS through two twin 600mm ductile iron, concrete lined forcemains to Orillia’s Wastewater Treatment Centre (WWTC) on Kitchener Street. This station is equipped with two (2) manual bar screens, two (2) inlet grinder

pumps, and four wastewater pumps and motors with VFDs. This station is also equipped with a standby Cummins diesel generator which was installed in 2010. The following upgrades are recommended for SPS No. 1:

2.2.1.1 Building Mechanical

The wet well has two 1,500kg hoists for removing the grinder pumps for servicing. The hoists are in moderate condition and are advised to be replaced within 0-5 years. The cost estimate for two new hoists is \$25,000.

2.2.1.2 Process Mechanical

There are two inlet sluice gates, one for each side of the divided wet well. Moreover, the wet well division wall has a sluice gate to allow for each side of the wet well to be isolated. The sluice gates appear to be in good condition. It is recommended to replace the sluice gates in 0-5 years. The cost to replace the two sluice gates is estimated to be \$24,000.

Downstream of the sluice gates are two manual bar screens, one for each side of the wet well. The bar screens in place are used only when the grinders fail and are out of service.

There are two inlet channel Muffin Monster Grinder channel grinders in the basement of the wet well. The grinders were originally installed in 2005, with a new grinder installed in 2016. The grinders and motors appeared to be in good condition. It is advised to replace the grinders in 5-10 years due to reaching end of expected service life. The cost to replace the grinder pumps is estimated to be \$200,000.

The piping and valve system in the wet well are in moderate condition with minimal oxidation occurring at connections. Replace piping, valves, and equipment supports in 0-5 years. The cost to replace the valves and piping in the pumping station is estimated to be \$164,000.

The dry well houses four wastewater pumps and motors as described below:

- Pumps #1 and #4 are Fairbanks Morse 5710 (1150rpm, 355L/s, 18.3m) pumps that are equipped with VFDs. Pumps #1 and #4 were installed in 1972. The motors for pumps #1 and #4 are Electric Machinery (575V, 60 Hz, 125Hp, 1180 rpm) motors and were installed with the pumps in 1972.
- Pump #2 is also a Fairbanks Morse 5710 (705rpm, 710L/s, 18.3m) pump that is equipped with a VFD. The motor is a Reliance motor (575V, 60Hz, 250Hp, 705rpm). Pump and motor assembly were installed in 1972.
- Pump #3 is an Aurora 612A (585rpm, 695L/s, 18.5m) pump with a G.E. (575V, 60Hp, 250Hp, 600rpm) motor. This pump/motor assembly was installed in 1995.

All pumps appeared to be in moderate to poor condition. There is rusting at all the pump connections. It is recommended that pump and motors #1, #2, and #4 be replaced in 0-5 years, and pump and motor #3 be replaced in 5-10 years due to the age of these assets. The estimated cost to replace pumps #1 and #4 and motor assemblies is \$500,000 (approximately \$250,000 each). The estimated cost to replace the pumps and motors #2 and #3 is approximately \$500,000 and \$120,000, respectively.

2.2.1.3 Electrical

The James Street station is equipped with a substation transformer and outdoor switch gear that are in working condition. However, the transformer and switch gear were installed in the 1980's and have reached the end of their useful life. The estimated cost to replace the transformer and switch gear is \$55,000.

The station has a Square D MCC that was originally installed in 2000. The MCC is in fair condition with an estimated remaining useful life of 10 years. The estimated cost to replace the MCC is \$80,000.

There is also a Siemens 125 hp PowerFlex that appears to be in working condition. The PowerFlex was installed in 2000 and has a remaining useful life of 0-5 years. The cost estimate to replace the unit is \$20,000.

The station has a Square D lighting panel that was installed in 2000 and is in fair condition. It is recommended that the panel is replaced in the next 5-10 years. The estimated cost to replace the panel is \$4,000.

2.2.2 Sewage Pumping Station No. 2 – Bayview Parkway

Sewage Pumping Station No. 2 (SPS2) is located at 406 Bayview Parkway. This pumping station was constructed in the late 1940's (approximately 1947). A 300mm diameter gravity sewer from the Forest Avenue South and Collins Drive Pumping Stations feed into common maintenance hole #1507. Wastewater from the maintenance hole enters SPS2 through a 380mm diameter pipe. Wastewater is discharged from this station through a 200mm diameter forcemain into maintenance hole #88 at James Street and Forest Avenue. The area that this SPS services is low lying which results in higher-than-normal peak flows during spring runoff and storm events. A 1140 m³ equalization chamber was constructed in 1987 which has eliminated bypass events. In addition to the equalization tank, the station is equipped with two (2) pumps and motors with VFDs. The following upgrades are recommended for this station:

2.2.2.1 Structural

The City has advised that the wet well at this station is small and requires upgrades. However, determining the required size for the wet well is out of the scope of this Master Plan update. Therefore, a cost analysis for the expansion of the wet well was not included in the condition assessment costs.

2.2.2.2 Process Mechanical

SPS2 has two (2) Fairbanks Morse B5414 (1170rpm, 70L/s, 30.0m TDH) pumps that are equipped with VFDs. Pumps #1 and #2 were installed in 2007, with pump #2 being rebuilt in 2019. The motors for both pumps are US Motors Type RVI (600V, 60Hz, 30Hp) and were also installed in 2007.

Considering the age and condition of the station's assets, it is recommended that the pumps and motors be replaced in 20-25 years. The estimated cost to replace the pumps and motors at this station is \$120,000.

2.2.2.3 Electrical

SPS2 is equipped with a Klockner-Moeller Series 200 MCC that was installed in 1989. The MCC's built-in ATS has failed with a temporary portable generator attached. It is recommended that the MCC is replaced immediately for an estimated cost of \$80,000.

The station's PLC was installed in 1996 and is in fair condition. However, the PLC has approached the end of its useful life and production of this PLC has been discontinued. It is recommended to be replaced in the next 0-5 years for an estimated cost of \$50,000. The VFD's for Pump 1 and 2 are in good condition. There are no recommended upgrades for the VFDs at this time.

The back-up diesel generator for the station was installed in 1989. The generator has reached the end of its useful life and is in poor condition. It is recommended that the generator is replaced within the next 0-5 years. The approximate cost to replace the generator is \$80,000.

The magnetic flow meter for this station was installed in 2013. The flow meter is located in a confined space, it is assumed that the flow meter is in good condition

2.2.3 Sewage Pumping Station No. 3 – Couchiching Park

Sewage Pumping Station No. 3 (SPS3) is located at 200 Jarvis Street. This station was built in 1930 and demolished in 1978, and the wet well was converted into a submersible station. Wastewater enters the station through a 200mm diameter gravity sewer. Wastewater is discharged from the station through a 200mm diameter forcemain to maintenance hole #47 on Jarvis Street. This station is equipped with two (2) submersible pumps and motors. The following upgrades are recommended for SPS No. 3:

2.2.3.1 Structural

There are two metal access hatches for the wet well in this station. The access hatch is in good condition with minimal rusting. The hatch, however, is not equipped with safety grating. It is recommended the hatch is upgraded to include safety grating in the next 0-5 years. The cost to upgrade the hatches is approximately \$10,000.

2.2.3.2 Process Mechanical

SPS3 is equipped with two submersible pumps. Pumps and motors #1 and #2 were replaced in 2019 and 2008, respectively. Total Dynamic Head for the station pumps was approximated using the inlet-outlet elevations and assumed friction losses from the Hydra model.

- Pump #1 and #2 are Flygt (1800rpm, 16L/s, 9.0m TDH) pumps that are each equipped with Flygt (5hp, 1730rpm, 60 Hz, 208V) motors. Considering the age of the pumps and motors, pump #1 and #2 should be replaced in 20-25 years. The estimated cost to replace the pumps and motor sets is estimated to be \$60,000.

What could be observed of the piping and valve system is in moderate condition with corrosion present at connections. Replace piping, valves, and equipment supports in 0-5 years. The cost to replace the valves and piping in the pumping station is estimated to be \$53,500.

2.2.3.3 Electrical

The electrical controls are located in a Flygt duplex pump controller in an above ground panel adjacent to the station. The controller at this station is set to automatically alternate the lead and lag pumps after each cycle. The station's double-throw switch (Square D, 100A, 240V) and generator power receptacle were installed in 2016. However, the Flygt pump control panel has exceeded its remaining life and will require to be replaced in the next 0-5 years. The cost to replace the control panel is estimated to be \$12,000.

2.2.4 Sewage Pumping Station No. 4 – Elgin Street

Sewage Pumping Station No. 4 (SPS4) is located at 100 King Street. This station was built before 1956 and was retrofitted to a submersible station in 1998. The inlet gravity sewer has a diameter of 200mm and discharges through a forcemain of 150mm diameter to maintenance hole #33 on Elgin Street. This station is being replaced as part of an upgrade projection on Centennial Street. The station is equipped with two (2) submersible pumps and motors. The City has advised that this station is slated for replacement. If the station is not replaced, the following upgrades are recommended for SPS4:

2.2.4.1 Structural

The metal access hatches to the wet well have significant corrosion and no safety grating. It is advised that the metal access hatches be replaced in 0-5 years. The approximate cost to replace the metal access hatches is \$10,000.

2.2.4.2 Process Mechanical

SPS4 has two submersible ABS (35 L/s, 7m) pumps equipped with motors (6hp, 1780rpm, 60Hz, 575V) and installed during the 1998 station retrofit. Considering the age of the pumps and motors, these assets should be replaced in 10-15 years. The cost estimate to replace these pumps and motors is \$40,000.

What could be observed of the piping and valve system is in moderate condition with corrosion present at connections. Replace piping, valves, and equipment supports in 10-15 years. The cost to replace the valves and piping in the pumping station is estimated to be \$53,000.

2.2.4.3 Electrical

The electrical controls are located in an ABS pump control panel adjacent to the station. The controller and fused disconnect switch (100A, 600V) at this station were installed in 1998. The station is also equipped with an electronic level transducer. The control panel, disconnection switch, and level transducer are approaching the end of their useful life and will require to be replaced in the next 0-5 years. The cost to replace the control panel and switch is estimated to be \$16,500.

2.2.5 Sewage Pumping Station No. 5 – Couchiching Point

Sewage Pumping Station No. 5 (SPS5) is located at 598 Couchiching Point. The original station was a Smith and Loveless station with a dry well and wet well. which was initially constructed in 1966. The Smith and Loveless station was replaced in 2009 with a submersible station. The

submersible station is equipped with two (2) submersible pump and motor sets. Before entering the station, two 250mm gravity sewers converge in maintenance hole #318, which then feeds into the station wet well. Wastewater from this station is discharged through a 250mm forcemain to maintenance hole #88 at James Street and Forest Avenue. The following upgrades are recommended for SPS5:

2.2.5.1 Structural

The fiberglass exterior of the submersible station is in excellent condition. The access hatches, however, are missing safety gratings. It is recommended that the access hatches be retrofitted with safety gratings within 0-5 years. The cost to upgrade the access hatches is estimated to be \$10,000.

2.2.5.2 Process Mechanical

SPS5 has two submersible Flygt (38.9L/s, 12.7m TDH) pumps equipped with motors (10hp, 60Hz, 1740rpm) that were installed in 2009. Considering the age of the pumps and motors, these assets should be replaced in 20-25 years. The cost estimate to replace these pumps and motors is \$70,000.

2.2.5.3 Electrical

SPS5 dry well is equipped with an outdoor power control panel, manual transfer switch, Pump 1 and 2 starters, and an Allen-Bradley PLC Panel. All components are in good condition.

The junction boxes were observed to be rusted with evidence of water penetration. It is recommended that the junction boxes be replaced with NEMA 4X type boxes with EYS seals for conduits as per ESA immediately. The cost to replace the boxes and seals is estimated to be \$2,000.

2.2.6 Sewage Pumping Station No. 6 – Hughes Road

As identified in the previous Wastewater System Master Plan Update, the Hughes Road sewage pumping station (SPS6) is no longer in service. As a result, SPS6 was not considered for this condition assessment.

2.2.7 Sewage Pumping Station No. 7 – Royal Oak

The control building for Sewage Pumping Station No. 7 (SPS7) is located at 91 Laclie Street. This pumping station was built in 1962, with a new pump installed in 1985. Maintenance hole #1208 serves as this station's wet well and has an inlet gravity sewer of 200mm diameter and a discharge forcemain of 200mm. The discharge forcemain feeds a 300mm diameter gravity sewer at maintenance hole #1116 (Neywash St. and Laclie St. intersection), which then flows by gravity to maintenance hole #2008. This station is equipped with one (1) pump and motor.

The City has advised that, during Phase 2 of the Front Street construction, a portion of the new infrastructure that is installed will ultimately allow elimination of SPS7. Additionally, the remainder of the infrastructure will be installed during the Centennial Drive reconstruction in 2022, at which point the Laclie Street sewer will be connected by gravity to the new Centennial Drive infrastructure.

The following upgrades are recommended for SPS7:

2.2.7.1 Structural

The metal access hatch and rung ladder on maintenance hole #1208 has significant corrosion. It is recommended that the hatch and the ladder be replaced in 0-5 years. The cost to replace the hatch and ladder is estimated to be \$13,000.

2.2.7.2 Process Mechanical

SPS7 has one Flygt C3085 MT (8.0L/s, 3.3m TDH) pump and motor (1.6hp, 1700rpm, 230V) set. A new pump and motor were installed in 2013. It is recommended that the pump and motor be replaced in 25-30 years. The estimated replacement cost of the pump and motor estimated as \$15,000. Operations staff advise that that a new pump is on order for this station.

What could be observed of the piping and valve system appears to be in moderate condition with corrosion present on piping and valves. Replace piping, valves, and equipment supports in 0-5 years. The cost to replace the valves and piping in the pumping station is estimated to be \$34,000.

2.2.8 Sewage Pumping Station No. 8 – Tudhope Park

The control building for Sewage Pumping Station No. 8 (SPS8) is located at 450 Atherley Road. This station is a submersible pump station, which was originally constructed in 1969, and was upgraded in 1991. This station has an inlet gravity sewer with 100mm diameter from maintenance hole #1822. Wastewater is discharged from this station through a 100mm diameter forcemain to maintenance hole #1512 on Atherley Road. This station consists of two (2) pump and motor sets. The following upgrades are recommended for SPS8:

2.2.8.1 Structural

The metal access hatch at this station is missing safety grating. It is recommended that the station be retrofitted with safety grating in 0-5 years. The cost of an access hatch with safety grating is estimated to be \$10,000.

2.2.8.2 Process Mechanical

SPS8 is equipped with two Flygt C-3102 (14.2L/s, 16m TDH) pump and motor (6hp, 3450rpm, 60Hz, 600V) set. The pumps and motors were installed in 1991 and are recommended to be replaced in 0-5 years. The cost estimate to replace the pump and motor sets is \$60,000.

What could be observed of the piping and valve system appears to be in good condition with minimal corrosion present on piping and valves. Replace piping, valves, and equipment supports in 5-10 years. The cost to replace the valves and piping in the pumping station is estimated to be \$57,000.

2.2.8.3 Electrical

The electrical controls for this station are located on an electrical pole adjacent to the station. Float level indicators are used to control the pumps through a Flygt MPC-88 Duplex Pump Control. The manual transfer switch for this station was replaced in 2016 and is in good condition. The Flygt pump control panel, fused disconnect switch, and float level indicators for this station have

reached the end of their useful life and are recommended to be replaced in the next 0-5 years. The cost to replace the control panel and the switch is estimated to be \$15,000.

2.2.9 Sewage Pumping Station No. 9 – Commerce Drive

The control building for Sewage Pumping Station No. 9 (SPS9) is located at 25 Commerce Drive. The original pumping station was a Smith and Loveless station with a dry well, which was first built in 1974. In 2016, the pumping station was retrofitted. For the retrofit, the dry well was decommissioned and the wet well was refitted. Due to a system failure which resulted in sewage entering the dry well in 2005, the MCC for the station was relocated above ground with Milltronics ultrasonic level control. A 200mm gravity sewer flows from maintenance hole #1349 and connects with the 200mm gravity sewer that services the Orillia SPCA at maintenance hole #1351. The sewer continues to the station's wet well, which is maintenance hole #1355. A second 200mm diameter gravity sewer enters the wet well from the Kubota foundry. This station discharges wastewater through a 150mm forcemain to maintenance hole #1348. This station has two (2) pump and motor sets. The following upgrades are recommended for SPS9:

2.2.9.1 Structural

There is one metal access hatch to the wet well that is not equipped with safety grating. The access hatch is in excellent condition; however, it is recommended that the hatch be retrofitted with safety grating in 0-5 years. The estimated cost to retrofit a hatch with safety grating is \$10,000.

2.2.9.2 Process Mechanical

SPS9 is equipped with two (2) Flygt BP-3153HT (14.2L/s, 16m TDH) pump and motor (12hp, 1765rpm, 60Hz, 208V) sets. The pumps and motors were installed in 2016 and are recommended to be replaced in 30-35 years. The cost estimate to replace the pump and motor sets is \$80,000.

2.2.9.3 Electrical

An Allen-Bradley PLC, UPS, Pump 1 and 2 starters and generator switch are located in an exterior electrical panel enclosure a few meters from the wet well. All of the electrical components are in good condition. No upgrades are recommended at this time.

The wet well for SPS9 houses an ultrasonic level transducer and two (2) float level indicators. A desktop review of the level indicating equipment was conducted due to it being located in a confined space. It is assumed that the level indicating equipment is in good condition.

2.2.10 Sewage Pumping Station No. 10 – Victoria Crescent

The control building for Sewage Pumping Station No. 10 (SPS10) is located at 160 Victoria Crescent. This station is a submersible station which was originally built in 1970; the station was upgraded and pumps were replaced in 1996. Wastewater from Lankin Boulevard and Shannon Street flows through individual 250mm gravity sewers to maintenance hole #151, which flows to maintenance hole #152 and the station's wet well. This station discharges its wastewater through a 150mm forcemain. This station is equipped with two (2) pump and motor sets. The following upgrades are recommended for SPS10:

2.2.10.1 Structural

The top of the wet well is a large, painted, metal covering with built-in access hatches. The exterior of the access hatches appears to be in good condition; however, the inside of the hatches is severely corroded. The access hatches are also missing the safety grating. It is recommended that the access hatches be replaced in 0-5 years with hatches that have safety gratings. Access hatches with safety gratings are estimated to cost \$10,000.

2.2.10.2 Process Mechanical

This station has two (2) ABS AF30-4 (11.36L/s, 10.76m TDH) pump and motor (4hp, 1750rpm, 60Hz, 575V) sets. Pump/motor set #1 and #2 were installed in 1974 and 2019 respectively. The pump replacement in 2019 is a Flygt pump retrofitted with an ABS bracket. It is advised that Pump/motor set #1 be replaced in 0-5 years, and pump/motor set #2 be replaced in 30-35 years. The total cost to replace the pumps and motors is estimated to be \$50,000.

What could be observed of the piping and valve system appears to be in poor condition with significant corrosion on valves and piping. It is recommended to replace piping, valves, and equipment supports in 0-5 years. The cost to replace the valves and piping in the pumping station is estimated to be \$47,500.

2.2.10.3 Electrical

SPS10 is equipped with a Klockner Moeller Pump Control Panel with was installed in 1994. Due to the age of the asset, it is recommended that the control panel is replaced within the next 0-5 years. The estimated cost to replace the control panel is \$5,000.

The station also has a Square D disconnect switch and double-throw disconnect switch. Both switches are in good condition and do not require upgrades

2.2.11 Sewage Pumping Station No. 11 – Shannon Street

Sewage Pumping Station No. 11 (SPS11) is located at 25 Kitchener Street. The original station was built in 1966 and was a canister station (Smith and Loveless). In 2004, the station was upgraded to a submersible Flygt station. Wastewater enters the wet well of the station from maintenance hole #101 through a 250mm diameter gravity sewer. The station discharges wastewater through a 150mm diameter forcemain. This station is equipped with two (2) submersible pump and motor sets. The pumps in this station are controlled by a Milltronics Multiranger 100 signaling an Allen Bradley CompactLogix L36ERM Programmable Logics Controller housed in a Duplex Control Panel above ground outside the wet well. The following upgrades are recommended for SPS No. 11:

2.2.11.1 Structural

The metal access hatches are in good condition; however, they do not have safety grating. It is recommended that the access hatches be retrofitted to include safety grating. The cost to retrofit the access hatches is estimated to be \$10,000.

2.2.11.2 Process Mechanical

SPS11 has two (2) Flygt (28.5L/s, 4.7m TDH) pump and motor (3hp, 1700rpm, 60Hz, 208V) sets. Both pump and motor sets were installed in 2004. It is recommended that the sets be replaced in 15-20 years. The total cost to replace the pumps and motors is estimated to be \$50,000.

2.2.11.3 Electrical

The electrical panel enclosure for SPS11 is in good condition. However, it was observed that water has entered the panel. It is recommended that the gasket seal for the panel is replaced immediately. The estimated cost to replace the gasket seal is \$1,500.

The power to the station is controlled using a main power switch, double-throw switch and a portable generator switch. All of the switches were installed in 2004 and appear to be in good condition.

The station is also equipped with two pump starters. The pump starters were installed in 2004 and appear to be in good condition.

SPS11 has an Allen-Bradley PLC and Summa PLC panel. The PLC and its panel are in good condition. It is recommended that the PLC and panel be replaced within the next 5-10 years. The estimated cost to replace the panel and the PLC is \$50,000.

The level transducer and the four (4) float level indicators appear to be in good condition. No upgrades are recommended.

The electrical conduits between the panel and the wet well are in good condition. However, the EYS seals should be installed immediately according to ESA standards. The cost to install the EYS seals is estimated to be \$1,500.

2.2.12 Sewage Pumping Station No. 12 – Fittons Road East

Sewage Pumping Station No. 12 (SPS12), located at 267 Fittons Road East, is a prefabricated Smith and Loveless canister dry well station that was built in 1969. Wastewater enters the wet well manhole through a 250mm diameter gravity sewer from the west and a 200mm diameter gravity sewer from the north. Wastewater is discharged from the canister station via 150mm diameter forcemain, where it connects to the North Orillia Trunk sewer at maintenance hole #60. This station has two (2) pump and motor sets. The City has indicated that this station is being fully upgraded. No upgrades are recommended as part of this Master Plan update.

2.2.13 Sewage Pumping Station No. 13 – Bridget & Maple

Sewage Pumping Station No. 13 (SPS13) is located at 68 Bridget Drive. This station was built in 1969, with upgrades to convert the station to a submersible station beginning in 2009 and finishing in 2010. The station receives its wastewater from a 250mm and 300mm diameter gravity sewers. The station discharges its wastewater through a 250mm diameter forcemain into maintenance hole #70. The following upgrades are recommended for SPS13:

2.2.13.1 Structural

The metal access hatch to the wet well appears in good condition, however, the hatch is missing safety gratings. It is recommended that the access hatch is retrofitted to include safety grating. \$10,000 is the estimated cost to retrofit the access hatch.

2.2.13.2 Process Mechanical

This station is equipped with two (2) Flygt (37.85L/s, 14.20m TDH) pumps and motors (12hp, 1765rpm, 60Hz, 208V). The pumps and motors were installed in 2010. It is recommended that the pumps and motors be replaced in 20-25 years. The estimated cost to replace the pumps and motors in the station is \$80,000

2.2.13.3 Electrical

The electrical panel enclosure for SPS13 is in good condition. However, it was observed that water has been leaking into the panel. It is recommended that the gasket seal for the panel be replaced immediately. The estimated cost to replace the gasket seal is \$1,500.

The power to the station is controlled by the main power switch, a double-throw switch and a portable generator switch. All of the switches were installed in 2010 and appear to be in good condition. No upgrades are recommended for the switches.

The station's two (2) pump starters and PLC were also installed in 2010. The equipment is in good condition with no recommended upgrades at the time of inspection.

The four (4) inch gooseneck ventilation pipes are too close to the electrical panel. According to OESC/ESA the vents should be three (3) or more feet away from the panel. It is recommended that the vents or panel be moved immediately to allow for the minimum spacing requirement of three (3) feet. Moving the vents is the more cost-effective option with an estimated cost of \$10,000.

2.2.14 Sewage Pumping Station No. 14 – Forest Avenue North

Sewage Pumping Station No. 14 (SPS14) is located at 350 Forest Avenue North. This station was a Smith and Loveless canister station that was built in 1969 and was upgraded to submersible station in 2017. Wastewater enters the station through an inlet gravity sewer with a diameter of 200mm. The station discharges its wastewater through a 150mm diameter forcemain that feeds a gravity sewer at maintenance hole #304. This station is equipped with two (2) pump and motor sets. The following upgrades are recommended for SPS14:

2.2.14.1 Structural

The metal access hatch to the wet well is in excellent condition, however, it is missing safety gratings. It is advised that the access hatch be retrofitted and safety gratings be installed immediately. The cost to retrofit the access hatch with safety grating is estimated to be \$10,000.

2.2.14.2 Process Mechanical

This station is equipped with two (2) Flygt (28L/s, 6m TDH) pumps and motors (12hp, 1765rpm, 60Hz, 208V). The TDH for this station was estimated by using inlet-outlet elevations within the

Hydra model. The pumps and motors were installed in 2017; it is recommended that the pumps and motors be replaced in 30-35 years. The estimated cost to replace the pumps and motors in the station is \$50,000

2.2.14.3 Electrical

The electrical equipment for SPS14 is housed in an electrical panel enclosure, which was installed in 2017. The electrical equipment appeared to be in good condition. The station is equipped with the following:

- Electrical Panel and accessories;
- Siemens Main power switch;
- Eaton double-throw switch;
- Portable generator switch;
- Two (2) pump starters;
- Allen-Bradley PLC and Summa PLC panel;
- Siemens lighting panel;
- Discharge flow meter;
- Two (2) Flygt float level indicators; and
- Ultrasonic level transducer.

There are no recommended upgrades for the electrical equipment at SPS14 that were noted during the time of inspection.

2.2.15 Storm Pumping Station No. 15 – James Street West

The James Street West pumping station is a stormwater pumping station and therefore not included in this wastewater system Master Plan.

2.2.16 Sewage Pumping Station No. 16 – Forest Avenue South

Sewage Pumping Station No. 16 (SPS16) is located at 456 Forest Avenue South. This station was built in 1970, with an upgrade to a submersible station in 1987 using the original wet well. This station receives its wastewater through a 250mm diameter gravity sewer. Wastewater is discharged through a 150mm diameter forcemain into a gravity sewer at maintenance hole #272 (Forest Avenue and Collins Drive intersection). Moreover, this station is in a low-lying area in Orillia and has a history of high inflow and infiltration rates. This station is equipped with two (2) pump and motor sets. The following upgrades are recommended for SPS No. 16:

2.2.16.1 Structural

The metal access hatches are also in good condition; however, the access hatches are missing safety gratings. It is recommended that the access hatches be retrofitted with safety gratings within 0-5 years. \$10,000 is the approximate cost to retrofit the access hatches with safety gratings.

The City has indicated that due to flooding in the area of the Forest Avenue South station the wet well will need to be redesigned to ensure there is enough capacity during high flow conditions. In order to estimate the cost to resize the wet well, a complete review of the pumping station's design, historical flows, and I&I impacts would be required, which was outside the scope of this assessment. These costs have been excluded from the costs to upgrade this pump station.

2.2.16.2 Process Mechanical

This station has two (2) Flygt CP310MT (15.77L/s, 7.01m TDH) pumps and motors (4hp, 1750rpm, 60Hz, 230V). Pump/motor #2 was installed in 2019 with the submersible station upgrades and pump/motor #1 was replaced in 2003. Considering the age of these assets, it is recommended that pump/motor sets #1 and #2 be replaced within 20-25 years, and 30-35 years respectively. It is estimated to cost \$50,000 to replace the pumps and motors at this station.

The City has advised that a third pump is required for redundancy in high flows. The estimated cost for the third pump is \$35,000, with some modifications to the station anticipated.

What could be observed of the piping and valve system appears to be moderate condition with minimal corrosion on valves and piping. It is recommended to replace piping, valves, and equipment supports in 0-5 years. The cost to replace the valves and piping in the pumping station is estimated to be \$47,500.

2.2.16.3 Electrical

All of the electrical equipment at the station appears to be in good condition. It was observed however that the conduits between the pump control panel and the wet well require EYS seals to be installed immediately as per ESA standards. The estimated cost to install the EYS seals is \$1,200.

The City has advised that this station requires a new control system and SCADA. The estimated cost to upgrade the system to provide either new Pribusin units on both ends via the exiting dedicated phone line or to provide cellular units on both ends via a wireless network is \$8,000. A more sophisticated upgrade that would require a new, wireless, radio transmitter and receiver via a new antenna would cost between \$25,000 to \$50,000, depending on the wireless signal paths, and has been excluded in the summary of costs shown in Table 4 (Sewage Pumping Station Upgrades Cost Estimate Summary).

2.2.17 Sewage Pumping Station No. 17 – Collins Drive

Sewage Pumping Station No. 17 (SPS17) is located at 372 Collins Drive. This station is a prefabricated submersible station that was constructed in 1975. This station is in a low-lying area in Orillia and has a history of high inflow and infiltration rates. This station is equipped with two (2) submersible pump and motor sets. The following upgrades are recommended for SPS17:

2.2.17.1 Structural

The two (2) metal access hatches to the wet well are in good condition; however, the hatches do not have safety gratings. It is recommended that the access hatches be retrofitted with safety gratings. The approximate cost of retrofitting the access hatches with safety gratings is \$10,000.

The ladder that is currently in the wet well has significant corrosion. It is recommended the current ladder be replaced with an aluminum ladder within 0-5 years. The estimated cost to upgrade the current ladder with an aluminum ladder is \$3,000.

2.2.17.2 Process Mechanical

SPS17 is equipped with two (2) pump and motor sets. It is estimated to cost \$36,000 to replace the pump and motor sets.

Pump #1 is a Flygt CP3082MT (11.92L/s, 3.66m TDH) pump and motor (2.5hp, 1750rpm, 60Hz, 230V) that was installed with the original station in 1975. Considering the age of the assets, it is recommended this pump and motor combination be replaced within 0-5 years. The estimated cost to replace this pump set is \$18,000.

Pump #2 is a Flygt NP3085 (11.92L/s, 3.66m TDH) pump and motor (2.4hp, 1710rpm, 60Hz, 230V) that was installed in 2004. It is recommended to replace this pump and motor set in 15-20 years. The estimated cost to replace this pump set is \$18,000.

What could be observed of the piping and valve system appears to be moderate condition with corrosion on valves and piping. Replace piping, valves, and equipment supports in 0-5 years. The cost to replace the valves and piping in the pumping station is estimated to be \$33,000.

2.2.17.3 Electrical

SPS17 is equipped with a Flygt pump control panel that was installed in 1974. The panel is in poor condition and has surpassed its useful service life. It is recommended that the panel is replaced within the next 0-5 years. The estimated cost to replace the panel is \$12,000.

2.2.18 Sewage Pumping Station No. 18 – Fittons Road West

Sewage Pumping Station No. 18 (SPS18) is located at 160 Fittons Road West. This station was built in 1975 as a wet well/dry well vertical shaft station, which is housed in a building. The wet well receives its wastewater through a 400mm diameter gravity sewer from the east and a 200mm diameter gravity sewer from the west. Wastewater is discharged from this station through a 300mm diameter forcemain into a gravity sewer at maintenance hole #1058 (Fittons Road West and Leach Street intersection). The following upgrades are recommended for SPS18:

2.2.18.1 Process Mechanical

SPS18 is equipped with three (3) identical pump and motor sets with Allen Bradley VFDs. The pumps at this station are Fairbanks Morse 5413 (41L/s, 32.21m TDH) pumps and motors (40hp, 1800rpm, 60Hz, 600V) that were installed with the original building in 1975. Considering the age of these assets, it is recommended that the pump and motor sets be replaced in 0-5 years. The total cost to replace the pump and motor sets is estimated to be \$450,000 (approximately \$150,000 each).

Due to the nature of this station, it was not possible to observe the piping or valves. From a desktop review of the piping and valve system, it is recommended the pipes and valves be replaced in 0-5 years due to the age of the assets. The cost to replace the pipes and valves is estimated at \$47,500.

2.2.18.2 Electrical

SPS18 has a Square D MCC that was originally installed in 1975. The MCC has surpassed its useful life and it is recommended to be replaced immediately. The estimated cost to replace the MCC unit is \$80,000.

The station's back-up power is supplied by a Stamford Diesel Generator. The generator was also installed in 1975 and has surpassed its useful life. It is recommended that the generator is replaced immediately. The cost estimate to replace the generator is \$80,000.

The fiberglass diesel storage tank for the generator fuel was replaced with a 935L double-walled stand-alone fuel tank in 2018.

The Allen-Bradley VFDs for Pumps 1, 2 and 3, as well as the Allen-Bradley PLC are in good condition. No upgrades were recommended at the time of inspection.

2.2.19 Sewage Pumping Station No. 19 – John Street

Sewage Pumping Station No. 19 (SPS19) is located at 59 Westmount Drive North. This station was originally constructed as a Smith and Loveless canister station in 1974. The canister was removed in 2012 and replaced with two Flygt submersible pumps in the existing wet well. An electrical panel enclosure was constructed to house the VFDs and control panel. Wastewater enters the wet well through three gravity sewers; a 250mm diameter sewer from the south, a 300mm diameter sewer from the north, and a 200mm diameter gravity sewer from maintenance hole #1802. Wastewater is discharged from this station to maintenance hole #783 on Westmount Drive through a 250mm diameter forcemain and gravity sewer. The following upgrades are recommended for SPS19:

2.2.19.1 Structural

The two (2) metal access hatches to the wet well are in good condition; however, the hatches do not have safety gratings. It is recommended that the access hatches be retrofitted with safety gratings. The approximate cost of retrofitting the access hatches with safety gratings is estimated to be \$10,000.

2.2.19.2 Process Mechanical

This station is equipped with two (2) identical pump and motor sets. The pumps at this station are refurbished Flygt CP 3201HT (33L/s, 41.0m TDH) pumps and motors (47hp, 1750rpm, 60Hz, 600V) that were installed in 2012. Considering the age of these assets is unknown, it is recommended that the pump and motor sets be replaced in 5-10 years. The total cost to replace the pump and motor sets is estimated to be \$110,000

2.2.19.3 Electrical

The electrical panel enclosure for SPS19 was initially installed in 2013. Although the panel is in good condition, it was observed that water has been leaking into the panel through the gasket seals. It is recommended that the gasket seals be replaced immediately. The estimated cost to replace the seals is \$1,200.

All of the electrical equipment in the John Street electrical panel was installed in 2013 and appeared to be in good condition. The electrical panel equipment is as follows:

- Eaton main power switch;
- Eaton double-throw switch;
- Portable generator switch;
- Allen-Bradley pump starter;
- Allen-Bradley PLC with Summa PLC panel; and a
- Cutler-Hammer/ Eaton lighting panel.

Within the wet well of the station, there are two Flygt float level indicators and an ultrasonic level transducer. All of the level sensing equipment appeared to be in good condition with no upgrades recommended at the time of inspection

2.2.20 Sewage Pumping Station No. 20 – Broadview

Sewage Pumping Station No. 20 (SPS20) is located at 752 Broadview Avenue. This station is a submersible station that was originally constructed in 1976. The station was upgraded with pumps, electrical works and SCADA in 2014. This station receives its waste through a 250mm diameter gravity sewer from the north and discharges its wastewater through a 200mm diameter forcemain that feeds a 250mm diameter gravity sewer at maintenance hole #390. No confined space entries were conducted during this site inspection. The following upgrades are recommended for SPS20:

2.2.20.1 Structural

The metal access hatches to the wet well are in good condition; however, the hatches do not have safety gratings. It is recommended that the access hatches be retrofitted with safety gratings. The approximate cost of retrofitting the access hatches with safety gratings is estimated to be \$10,000.

2.2.20.2 Process Mechanical

SPS20 is equipped with two (2) Flygt CG 3085MT (7.88L/s, 3.38m TDH) pumps and motors (2.4hp, 1710rpm, 60Hz, 230V) that were installed in 2014. Considering the age of these assets, it is recommended that the pump and motor sets be replaced in 25-30 years. The total cost to replace the pump and motor sets is estimated to be \$30,000.

2.2.20.3 Electrical

The electrical equipment at SPS20 is housed in an electrical panel enclosure, which was installed in 2014. All the electrical equipment appeared to be in good condition. The electrical equipment for this station includes:

- Electrical panel and accessories;
- Eaton main power switch;
- Eaton double-throw switch;
- Portable generator power switch;

- Two (2) pump starters;
- Allen-Bradley PLC and Summa PLC panel;
- Two (2) Flygt float level indicators; and
- Ultrasonic level transducer.

There are no recommended upgrades for the electrical equipment at the time of inspection. However, water was observed to have leaked into the electrical panel. It is recommended that the gasket seal on the electrical enclosure doors be replaced. The estimated cost to replace the gasket seals is \$1,200.

2.2.21 Sewage Pumping Station No. 21 – Cedarmere Road

2.2.21.1 Description

As identified in the previous Wastewater System Master Plan Update, the Cedarmere Road sewage pumping station is no longer in service. This station was not considered for the condition assessment.

2.2.22 Sewage Pumping Station No. 22 – Westmount Drive South (Ridge Road)

Sewage Pumping Station No. 22 (SPS22) is located at 245 Westmount Drive South. This station is a submersible station that was originally constructed in 1995. This station has a 200mm diameter inlet gravity sewer, and a 75mm diameter discharge forcemain. The forcemain feeds a 200mm diameter gravity sewer at maintenance hole #642. The following upgrades are recommended for SPS22:

2.2.22.1 Structural

The two (2) metal access hatches to the wet well are in good condition; however, the hatches do not have safety gratings. It is recommended that the access hatches be retrofitted with safety gratings. The approximate cost of retrofitting the access hatches with safety gratings is estimated to be \$10,000.

2.2.22.2 Process Mechanical

SPS22 is equipped with two (2) Flygt C-3985MT (2.71L/s, 7.32m TDH) pumps and motors (2.4hp, 1700rpm, 60Hz, 230V), installed in 1995. Considering the age of these assets, it is recommended that the pumps and motors are replaced in 5-10 years. The estimated cost is \$30,000 to replace the pump and motor sets.

What could be observed of the piping and valve system appears to be in good condition, with minimal corrosion on valves and piping. It is recommended to replace piping, valves, and equipment supports in 10-15 years. The cost to replace the valves and piping in the pumping station is estimated to be \$43,000.

2.2.22.3 Electrical

The electrical controls are located in a Flygt Automatic Duplex Control Panel adjacent to the station. The pumps in this station are controlled by float level indicators that are hard-wired to the

panel. The manual transfer switch and generator receptacle was replaced in 2016 and is in good condition. The Flygt control panel, fused disconnect switch (100A, 240V) and float level indicators have reached the end of their useful life. It is recommended to replace the control panel, disconnect switch and float level indicators within the next 0-5 years at an estimated cost of \$14,200.

2.2.23 Sewage Pumping Station No. 23 – Champlain

Sewage Pumping Station No. 23 (SPS23) is located at 24 Mulcahy Crescent. The original station was constructed in 1994, however due to significant growth in the West Ridge area, the pump station was retrofitted in 2011. This station is now a wet well/ dry well station inside of a building. The inlet sewer for this station is a 900mm diameter gravity sewer. Wastewater is discharged through either a 300mm or 600mm diameter forcemain to maintenance hole #1600 (north of Laurentian Drive and Arthur Street intersection). This station is equipped with three (3) submersible pumps, a channel grinder unit on the primary channel and a manual bar screen on the by-pass channel. The following upgrades are recommended for SPS23:

2.2.23.1 Process Mechanical

This station is equipped with three (3) identical ABS ME 860/6-5360 (120.0L/s, 37.98m TDH) pumps and motors (600V, 60Hz, 123Hp, 1175rpm) with VFD's. All three pumps were installed in 2011. It is recommended that the existing pumps and motors be replaced in 25-30 years. The cost to replace the pump and motor sets is estimated to be \$240,000.

2.2.23.2 Electrical

The electrical equipment at SPS23 was installed in 2009 and appears to be in good condition. The electrical equipment at the station includes:

- Pioneer power transformer;
- Two (2) Moeller MCCs;
- MTU diesel generator;
- Allen-Bradley PLC;
- MSA gas detection system;
- Muffin Monster grinder pump controls;
- Six (6) float level indicators; and
- Two (2) ultrasonic level transducers.

There were no recommended upgrades for the electrical equipment at the time of inspection.

2.2.24 Sewage Pumping Station No. 24 – Leacock

Sewage Pumping Station No. 24 (SPS24) is located at 40 Museum Drive. This station is a privately-owned station for the Villages of Leacock Point Condominiums. The station was originally constructed in the early 1990's, with the City of Orillia entering a contract to operate and maintain the station in 2004. The station has its electrical works housed in a building on site with

a submersible wet well station to the east of the building that has two (2) submersible pumps. The following upgrades are recommended for SPS24:

2.2.24.1 Structural

The three (3) metal access hatches to the wet well are in good condition; however, the hatches do not have safety gratings. It is recommended that the access hatches be retrofitted with safety gratings. The approximate cost of retrofitting the access hatches with safety gratings is estimated to be \$15,000.

2.2.24.2 Process Mechanical

SPS24 is equipped with two (2) Flygt NP-3102.160-1188 pumps and motors (5hp, 1745rpm, 60Hz, 600V) that were installed in 2017. It is recommended to replace the pumps and motors within 15-20 years. The cost for replacement is estimated to be \$50,000.

What could be observed of the piping and valve system appears to be in good condition, with minimal corrosion on valves and piping. It is recommended to replace piping, valves, and equipment supports in 5-10 years. The cost to replace the valves and piping in the pumping station is estimated to be \$43,000.

2.2.24.3 Electrical

SPS24's main power disconnection switch and power distribution panel were originally installed in 1993. The switch and panel are in fair condition, however they are approaching the end of their useful life. It is recommended that the switch and the panel are replaced within the next 0-5 years for an estimated cost of \$9,000.

The lighting transformer and panel at the station were also installed in 1993 and appear to be in good condition. However, due to the age of the assets, it is recommended that the transformer and panel are replaced within the next 0-5 years. The total estimated cost to replace the lighting transformer and panel is \$6,000.

The back-up power for SPS24 is provided by a Leroy Somer diesel generator that is equipped with a Thomson generator transfer switch. The generator and transfer switch were installed in 1993 and are approaching the end of their useful life. The generator control panel however, was replaced in 2017 and is in good condition. It is recommended that the generator and the transfer switch are replaced within the next 0-5 years at an estimated cost of \$40,000.

The station's duplex pump control panel, four (4) float level indicators, and ultrasonic level transducer are in good condition. There were no recommended upgrades for this equipment at the time of inspection

2.2.25 Schedule of Upgrades

The recommended upgrades and estimated costs over the next 35-year period are presented in Table 4 below.

Table 4 – Sewage Pumping Station Upgrades Cost Estimate Summary

Schedule of Upgrades	SPS Number and Name	Capital Cost	WWTC Asset Refurbishment
0 to 5 Years	SPS 1 - James Street	\$1,338,000	Hoist Replacement, Sluice Gate Replacement, Valving/Piping , Pump Replacement and Electrical Upgrades
	SPS 2 - Bayview Parkway	\$210,000	Electrical Upgrades
	SPS 3 - Couchiching Park	\$75,500	Access Safety Upgrades, Piping/Valving Replacement, and Electrical Upgrades
	SPS 4 - Elgin Street	\$26,500	Access Safety Upgrades and Electrical Upgrades
	SPS 5 - Couchiching Point	\$12,000	Access Safety and Electrical Upgrades
	SPS 7 - Royal Oak	\$47,000	Access Safety Upgrades and Piping/Valving Replacement
	SPS 8 - Tudhope Park	\$85,000	Access Safety Upgrades, Pump Replacement, and Electrical Upgrades
	SPS 9 - Commerce Drive	\$10,000	Access Safety Upgrades
	SPS 10 - Victoria Crescent	\$82,500	Access Safety Upgrades, Electrical Upgrades, Piping/Valving and Pump Replacement
	SPS 11 - Shannon Street	\$13,000	Access Safety and Electrical Upgrades
	SPS 13 - Bridget & Maple	\$21,500	Access Safety, Electrical Upgrades and Gooseneck Vents Relocation
	SPS 14 - Forest Avenue North	\$10,000	Access Safety Upgrades
	SPS 16 - Forest Avenue South	\$554,200	Access Safety Upgrades, Electrical Upgrades, Addition of Third Pump for Redundancy, Piping/Valving and Pump Upgrades
	SPS 17 - Collins Drive	\$76,000	Access Safety Upgrades, Electrical Upgrades, Piping/Valving and Pump Upgrades
0 to 5 Years cont'd.	SPS 18 - Fittons Road West	\$657,500	Electrical Upgrades, Piping/Valving and Pump Replacement
	SPS 19 - John Street	\$11,200	Access Safety and Electrical Upgrades
	SPS 20 - Broadview	\$11,200	Access Safety and Electrical Upgrades

Schedule of Upgrades	SPS Number and Name	Capital Cost	WWTC Asset Refurbishment
	SPS 22 - Westmount Drive South	\$24,200	Access Safety Upgrades and Electrical Upgrades
	SPS 24 - Leacock	\$70,000	Access Safety and Electrical Upgrades
Total Cost of 0 to 5 Year Upgrades		\$3,335,300	
5 to 10 Years	SPS 1 - James Street	\$354,000	Channel Grinders and Pump Replacement, and Electrical Upgrades
	SPS 8 - Tudhope Park	\$57,000	Piping/Valving Replacement
	SPS 11 - Shannon Street	\$50,000	Electrical Upgrades
	SPS 19 - John Street	\$110,000	Pump Replacement
	SPS 22 - Westmount Drive South	\$30,000	Pump Replacement
	SPS 24 - Leacock	\$43,000	Piping/Valving and Pump Replacement
Total Cost of 5 to 10 Year Upgrades		\$644,000	
10 to 15 Years	SPS 4 - Elgin Street	\$93,000	Piping/Valving and Pump Replacement
	SPS 22 - Westmount Drive South	\$43,000	Piping/ Valving Replacement
Total Cost of 10 to 15 Year Upgrades		\$136,000	
15 to 20 Years	SPS 11 - Shannon Street	\$50,000	Pump Replacement
	SPS 16 - Forest Avenue South	\$25,000	Pump Replacement
	SPS 17 - Collins Drive	\$18,000	Pump Replacement
	SPS 24 - Leacock	\$540,000	Pump Replacement
Total Cost of 15 to 20 Year Upgrades		\$633,000	
20 to 25 Years	SPS 2 - Bayview Parkway	\$120,000	Pump Replacement
	SPS 3 - Couchiching Park	\$60,000	Pump Replacement

Schedule of Upgrades	SPS Number and Name	Capital Cost	WWTC Asset Refurbishment
	SPS 5 - Couchiching Point	\$70,000	Pump Replacement
	SPS 13 - Bridget & Maple	\$80,000	Pump Replacement
Total Cost of 20 to 25 Year Upgrades		\$330,000	
25 to 30 Years	SPS 7 - Royal Oak	\$15,000	Pump Replacement
	SPS 20 - Broadview	\$30,000	Pump Replacement
	SPS 23 - Champlain	\$240,000	Pump Replacement (Contingent on not upgrading to grinder pumps)
Total Cost of 25 to 30 Year Upgrades		\$285,000	
30 to 35 Years	SPS 3 - Couchiching Park	\$30,000	Pump Replacement
	SPS 9 - Commerce Drive	\$80,000	Pump Replacement
	SPS 10 - Victoria Crescent	\$30,000	Pump Replacement
	SPS 14 - Forest Avenue North	\$50,000	Pump Replacement
Total Cost of 30 to 35 Year Upgrades		\$190,000	
Total Cost of SPS Upgrades		\$5,553,300	

In essence, a majority of the immediate upgrades (0-5 years) are a result of the stations being non-compliant with safety codes. Many of the stations do not have safety gratings under their hatches for fall prevention, which should be addressed immediately. Moreover, several stations are using assets that are beyond their service life and should be upgraded. The total upgrade cost across all 21 operating pumping stations for the next 0 to 35 years is estimated to be \$5,553,300.

2.3 Wastewater Treatment Plant

The Orillia Wastewater Treatment Centre (WWTC) is located at 40 Kitchener Street, Orillia, Ontario. The plant is a tertiary treatment facility that utilizes a conventional activated sludge process and discharges into Lake Simcoe.

The addition of the tertiary treatment system was a recommendation in the 2013 WWSMP update, resulting from anticipated changes to the WWTC's phosphorus effluent limit due to changing regulations, which came into effect.

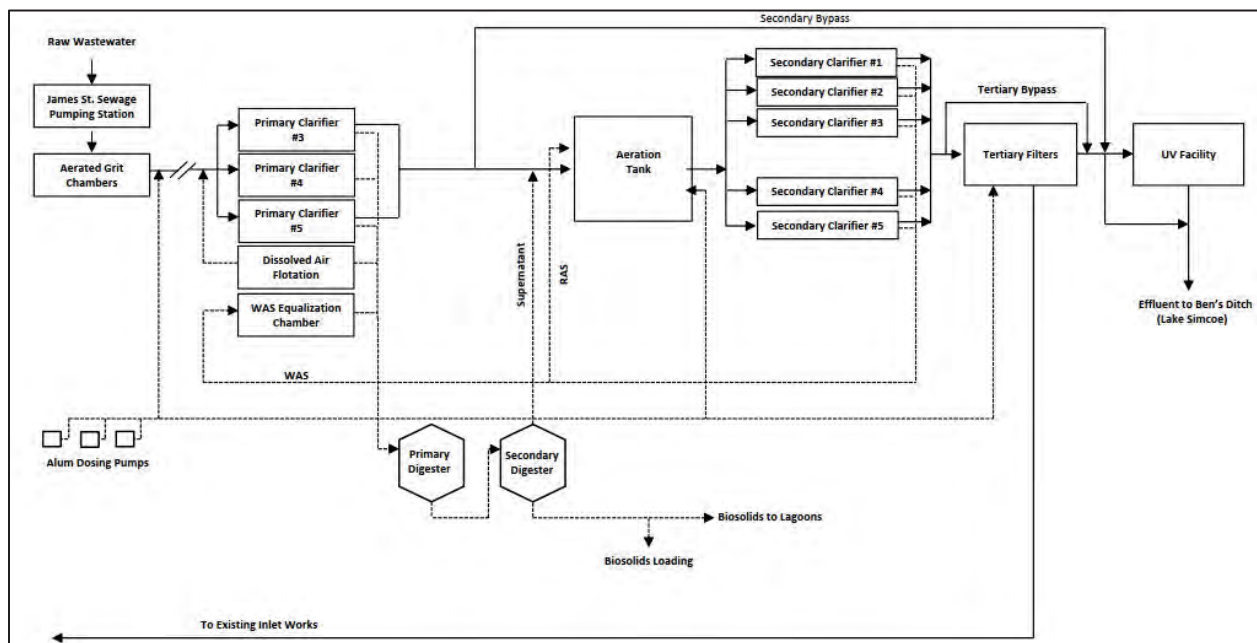
Per the plant's Environmental Compliance Approval (ECA), the plant has a rated capacity of 27,300 m³/d.

The WWTC receives all of its flows from the James Street SPS, where all flow from the collection system is directed. The facility consists of the following major treatment units or systems:

- Headworks
- Primary Clarifiers
- Biological Treatment (Aeration)
- Secondary Clarifiers
- Tertiary Treatment
- UV Disinfection
- Chemical Dosing for Phosphorous Removal
- Sludge (WAS) Thickening
- Anaerobic Digester Complex
- Sludge Storage Lagoons
- Emergency Standby Power

Figure 2 presents the WWTC's current process flow diagram.

Figure 2: WWTC Process Flow Diagram



Ainley staff conducted a condition assessment of the WWTC as part of the WWSMP. The City's WWTC operations staff were present during the assessment and provided insight into the plant's current operational challenges.

The following sections summarize the major assets and asset categories (site works, structural, process mechanical, and power and controls/instrumentation) within each component of the

treatment system, the timeline in which the asset is recommended for replacement or upgrade, and estimated costs. Buried piping and submerged equipment were not evaluated as part of the condition assessment.

A detailed technical memorandum of the findings and cost estimates for the WWTC condition assessment can be found in **Appendix B**.

2.3.1 WWTC Site and Administration Building

The WWTC has an asphalt driveway that leads to the administration building and a parking lot. The building has a grey brick exterior and membrane roof. The lot is enclosed with an eight-foot chain link fence. The interior of the building is painted concrete brick with tile flooring. The following upgrades are recommended for the WWTC site and administration building:

2.3.1.1 Power and I&C

A Federal Pioneer power distribution switch board (1200A, 600V, 800AT) is installed in the administration building in the electrical room. The asset has a remaining useful service life of 7 years and should be replaced by the end of its useful life. The cost to replace the switch board is estimated to be \$35,000.

A Cutler-Hammer Motor Control Center (MCC) (400A, 600V) is located in the workshop of the administration building. The MCC has a remaining lifespan of 3 years and should be replaced within this time. The cost to replace this MCC is estimated to be \$150,000.

The WWTC is equipped with a Kohler outdoor stand-by diesel power generator with a water proof enclosure. The generator is in good condition and no upgrades are recommended at this time.

The WWTC is also equipped with an outdoor Westinghouse Switchgear (600/347V, 2000A) substation that is housed in a walk-in enclosure. New breakers were recently installed at the station. However, due to the overall condition, it is recommended that the station be replaced within the next five (5) years. The cost to replace this station is estimated at \$200,000.

2.3.2 Headworks

The inlet works uses two aerated grit tanks for grit removal and two manually cleaned bar screens for the removal of larger objects and floatables. The grit tanks are 10.7m x 4.9m x 4.3m SWD. Aeration is provided to the two tanks by two rotary lobe blowers. Grit that has accumulated in the chambers is removed by vacuum truck. The following upgrades are recommended for the headworks:

2.3.2.1 Structural

The metal monorail above the plant inlet channels is in poor condition with visible heavy corrosion on its surface. However, the crane device is out of service. It can be removed. The metal guardrail is in good condition, but does not conform to the current building code. The railing and post are undersized and there is no kick plate on the guard rail. It is recommended the overhead crane be removed within 1-5 years. The estimated cost for removal is \$5,000.

The screen building is in good condition. The roof, metal hatches and interior walls are in good condition with only minor hair cracks on the floor. The metal door is in good condition, except the

weather-stripping has deteriorated. The exterior concrete platform is also in good condition even though the surface is rough under exposed condition. Some areas of the exterior wall cladding have dents likely caused by accidental impact from a heavy object. It is recommended that the weather stripping on the door be replaced within 1 year. Replacing the weather-stripping refinishing is estimated to cost \$2,000.

2.3.2.2 Process Mechanical

There are two manual bar screens, each 0.9m long, with 3mm bars at 30mm spacing. The screens appear to require considerable manual efforts to keep clean. It is recommended that the manual bar screens be replaced with automated screens to reduce manual efforts. The manual bar screens are recommended to be replaced with automatic screens in 5 years. The approximate cost to replace the two bar screens is \$300,000, excluding required building modifications.

Two (2) Roots blowers and Brook Electric motors (10hp, 1150rpm, 575V, 60Hz) aerate the grit chamber. The blowers appear to be in moderate condition with mild corrosion present on the blower silencers. New blowers and blower motors were installed in 2017 and 2019 and are expected to function well for the next 20 years, after which they should be replaced. The cost to replace the blower system is estimated to be \$100,000.

Blower pipes and valves within the blower room are in poor condition with significant corrosion present. It is recommended that the blower piping and valves be replaced in five years. It may be cost-effective to replace the blower system at the same time that the piping is replaced. The estimated cost for pipe and valve replacement is included in the costs to replace the blower systems above.

2.3.2.3 Power and I&C

A Cutler-Hammer Motor Control Center (MCC) (150A, 600V) is located in the headworks/screen building. This MCC has a remaining lifespan of three years and should be replaced within this time. The cost to replace this MCC is estimated to be \$150,000.

There are two lighting panels:

- Lighting Panel A (LPA) is a Square D 1P3W (100A, 120/240V) panel with a remaining useful life of three years and should be replaced. The cost to replace this panel is estimated to be \$4,000.
- Lighting Panel B (LPA) is a Square D 1P3W (60A, 120/240V) panel and is in good condition and is expected to last another 13 years. The cost to replace this panel is estimated at \$2,000.

Most of the headworks area is classified as either a Class 1, Division 1 or Class 1, Division 2 hazardous area per the NFPA 820 standard. The headworks building is currently grandfathered, however, when upgrades are implemented in the building, such as replacing the bar screen, it may no longer be grandfathered and modifications to meet the NFPA 820 standard may be required. These would need to be assessed at the time of upgrades.

2.3.3 Primary Clarifiers

Primary treatment at the Orillia WWTC consists of three circular clarifiers. Wastewater flows are proportionately distributed to each clarifier through a flow division chamber. One clarifier has a diameter of 18.2m and 3.3m SWD, the other two clarifiers are both 22m in diameter and have 4.6m SWD.

Four raw sludge pumps are used to remove sludge from the clarifiers. The sludge pumps are located in a primary sludge pumping building and discharge to the sludge digesters. The 150mm diameter primary sludge line is equipped with an inline grinder pump and a by-pass line. The following upgrades are recommended for the primary clarifiers:

2.3.3.1 Structural

The metal bridges of the clarifiers have corrosion in many places. It is recommended that the bridges be sandblasted and repainted in the next 1 to 5 years. The cost of repainting is estimated to be \$25,000.

The metal roof of the primary sludge pumping station is in fair condition. There is a hole at the eave location of the roof on the west side of the building. The interior block wall is in good condition. On the wall beside the stairs to the basement, there are vertical concrete cracks. The floor tile, the metal grating and the round concrete columns and the peripheral concrete wall in the basement are in good condition. It is advised that the leaking concrete and metal roof be repaired in a year. The cost for repairs is estimated at \$3,000.

The primary sludge pumping basement tunnel running northward is in good condition. The piping penetrations through the east wall of this tunnel section show evidence of leakage at all the pipe penetration locations. A section of this tunnel turns west at the north end. The section going west is in good condition. It is advised to replace the link-seals at all pipe penetration locations within the next five years. The cost to replace the link-seals is estimated to be \$4,000.

2.3.3.2 Process Mechanical

Four raw sludge pumps are used to remove the raw sludge from the three clarifiers. Buried piping and submerged equipment were not considered as part of this assessment. No required upgrades are noted at this time.

The in-line grinder pump connected to the primary sludge line appears to be in moderate condition with minimal corrosion present on the pump discharge. It is recommended that this pump be replaced within the next 5-10 years. The cost to replace the in-line grinder pump is estimated to be \$55,000.

The pipes and valves that could be observed are generally in good condition. However, a section of piping in the north end of the basement is in poor condition. It is recommended this section of piping be replaced within the next 0-5 years at an estimated price of \$40,000.

2.3.3.3 Power and I&C

A Klockner Moeller 42KIA MCC (600V, 600A, 150AT) is located within the primary pumping building. The MCC has a remaining useful life of five (5) years. The estimated cost to replace this MCC is \$100,000.

The primary pumping building also houses an Allen-Bradley PLC and panel. The PLC and panel set have a remaining useful life of 16 years and upgrades are not required until that time. No upgrades were recommended at the time of inspection

2.3.4 Secondary Treatment

The secondary treatment system consists of one, six-pass aeration tank. This tank was to be upgraded along with the tertiary upgrades, however due to the existing structural conditions of the tank the upgrades were not feasible. The tanks provide a total combined capacity of 4,414 m³. Each tank is equipped with a fine-bubble aeration diffuser. Three high speed blowers (2 duty, 1 standby) supply air at a rated capacity of 6,100 m³/hr at 51kPa. The following upgrades are recommended for the secondary treatment system:

2.3.4.1 Process Mechanical

The City advised that the three (3) sluice gates at the aeration splitter box for the secondary treatment aerated channels are seized and require replacement. The estimated cost to replace the three (3) sluice gates is estimated to be \$40,000.

The secondary treatment aerated channels are equipped with two blowers (125Hp, 575V, 115A, 3560rpm, 60Hz). The blowers appear to be in good condition; however, they have been upgraded as part of the tertiary upgrades and are not recommended for upgrades as part of this assessment.

2.3.5 Secondary Clarifiers

The Orillia WWTC has a total of five secondary clarifiers. Wastewater flows to the clarifiers is divided proportionately through a distribution chamber. Two of the five clarifiers are square and measure 13.7m x 13.7m x 3m SWD. The third clarifier is square and has dimensions of 18.3m x 18.3m x 3m SWD. The fourth and fifth clarifiers are circular, center-feed clarifiers with diameters of 30.5m with a 4.6m SWD. A secondary pumping building is houses three RAS and two scum pumps. The following upgrades are recommended for the secondary clarifiers:

2.3.5.1 Structural

The superstructure of the Clarifier Building located in between the two Clarifiers is in good shape. The concrete platform at the building entrance, which is the roof of the basement structure has suffered from weathering.

The basement structure of is in good conditions except the following:

Leaking vertical cracks on the exposed clarifier walls;

The mid-level concrete platform has ponding water likely from the leaking digester wall; and

There is a vertical crack on the wall beside the stair, but the crack has previously repaired by injection.

There is spalling concrete in the secondary clarifiers 1 to 3. It is recommended to repair the spalling concrete on the clarifier walls in the immediate future. The estimated cost to repair the walls is \$8,000.

2.3.5.2 Process Mechanical

The sludge pumping room is equipped with three RAS Fairbanks pumps and GEC Canada Ltd. motors (40Hp, 575V). Two of three of the RAS pumps were fully refurbished in 2019. It is recommended that the third pump and motor set be replaced within the next five years. The estimated cost to replace the three pump and motor sets is \$83,300. The City has advised that it plans to refurbish third RAS pump in 2021. The costs associated with replacement of these pumps have been carried forth in the Master Plan.

The City identified that clarifier drive supports for clarifiers 3 and 5 require additional inspection, re-anchoring, and repair within the next 0-5 years. The estimated cost to complete this work for both clarifiers is estimated to be \$100,000.

What could be observed of the RAS piping and valve system show that they are in moderate condition but with significant corrosion present at connections. Replacement of piping, valves, and equipment supports in five years is recommended. It would be cost-effective to replace the piping system when the pumps are being replaced and the cost to replace the valves and piping is included in the cost for the pumps and motors above.

In addition to the RAS pumps, there are two scum pumps (15hp, 1756rpm, 60Hz, 575V, 14.8A) in the secondary pumping building. There is no date on the name plate but visual inspection determined that the pumps are in moderate condition. The pump and motor sets are in good condition, with minimal corrosion present. It is recommended to replace the scum pump and motor within five years. The estimated cost to replace this system is \$80,000.

What could be observed of the scum piping and valve system showed that they are in moderate condition with some corrosion present at connections. Replacement of piping, valves, and equipment supports is recommended within five (5) years. The estimated cost to replace the valves and piping is included in the scum pump and motor costs above.

2.3.5.3 Power and I&C

The secondary clarification treatment system is controlled by an Allen-Bradley 42KIA MCC (600V, 400Amp). It is advised to replace this MCC within eight years. The estimated replacement cost for this MCC is \$120,000.

The secondary clarification PLC is an Allen-Bradley MicroLogix PLC Controller. The PLC has a remaining useful life of 16 years and no upgrades are required until that time.

2.3.6 Sludge Thickening

The Orillia WWTC uses dissolved air floatation (DAF) for WAS thickening. This process includes an aerated WAS equalization tank. Process air is supplied by a 550 m³/hr positive displacement blower connected to a fine bubble aeration assembly. The system has two feed pumps that are equipped with VFDs. The thickened WAS from the DAF tank is pumped to the anaerobic digester by positive displacement pumps. All of the structural, process mechanical, and power and instrumentation/control assets appear to be in good condition. No upgrades are recommended at this time.

2.3.7 Chemical Dosing

The Orillia WWTC uses a skid-mounted, three-pump system. Pump #1 delivers aluminium sulfate(alum) to the primary clarifiers, pump #2 is dedicated to delivering alum to the tertiary system lift station, and pump #3 delivers alum to the aeration system. The new pumps have a total design flow rate of 101 L/hr. alum is stored in two fibreglass tanks. The following upgrades are recommended for the chemical dosing system:

2.3.7.1 Structural

The alum tank concrete containment structure is in fair shape. There is concrete spalling at the locations where the alum discharges. There is no concrete protection coating for the containment surface. It is recommended that a protective coating be applied the concrete containment area within a year. The estimated cost for the protective coating is \$25,000.

2.3.7.2 Process Mechanical

The insulating jacket on the discharge piping of the alum tank has been crushed. It is recommended that the jacket be replaced within five years. It is estimated to cost \$3,000 to replace the insulating jacket, assuming there is no damage to the discharge pipe.

There are three electrically-driven chemical metering pumps. The entire chemical dosing system was replaced as part of the tertiary upgrades. No recommended upgrades at this time.

2.3.8 Tertiary Treatment

The tertiary filter lift station was constructed in 2019 and incorporates two tertiary cloth disk filters (one duty, one standby) that have a rated capacity of 89,000m³/d. The system is also equipped with the following:

Four 37.5kW vertical turbine pumps (3 duty and 1 standby), each pump equipped with VFD and dual-set point to provide 27,300m³/d at 6.3m TDH or 89,000m³/d at 8.2m TDH.

Two duty backwash pumps rated at 65.6 L/s at 50 m TDH. The backwash pumps include VFDs.

Alum dosing is provided to trim dose of alum when the soluble phosphorus levels are too high.

A new plant bypass chamber that directs flows to the tertiary lift station, with excess flows diverted to the UV system.

A new manhole (MH#9), downstream of MH#4, receives the bypass/excess flows from the tertiary treatment system bypass chamber and secondary treatment bypass and directs it to the UV facility.

This system is a recent addition to the WWTC, therefore no upgrades are recommended.

2.3.9 UV Disinfection

The UV disinfection channel was installed in 2007/2008 and is equipped with two UV banks connected in series. Each UV bank has ten modules that contain eight bulbs per module. The WWTC UV system is rated for a peak capacity of 72,700 m³/d. All structural, process mechanical,

and power and instrumentation/controls assets appear to be in good condition. There are no recommended upgrades at this time.

2.3.10 Digester Complex

The digester complex consists of a primary and secondary anaerobic digestion system that feeds two sludge storage lagoons. The primary digester has a diameter and depth of 15.2m and 6.68m SWD, respectively. The primary digester has a fixed insulated cover with two external draft tube mixers. The secondary digester has a diameter and depth of 15.1m and 6.41m SWD respectively, and is equipped with a floating cover. From the secondary digester, two submersible pumps direct supernatant to the transfer box. From here, the supernatant can be directed to the head of the aeration tank or to the sludge storage lagoons.

In this report, the term sludge is used to represent unstabilized solids from the treatment process and biosolids represents stabilized sludge. Sludge from the primary digester is heated by a gas fired boiler that exhausts through a heat stack. The complex includes a digester waste gas flare with a maximum flow rate of 50 m³/hr. Biosolids from the secondary digester are discharged to the two on-site storage lagoons. The following upgrades are recommended for the digester complex:

2.3.10.1 Structural

There are vertical leaking cracks on the exterior surface of the digester and the concrete foundation wall of the digester building, particularly at the joints where the digester building is abutting the two digesters. It is recommended that the concrete cracks be sealed on the exposed digester wall within a year. It is estimated to cost \$10,000 to seal the cracks in the wall.

The metal platform at the top of the digesters is in good condition. The flat roof of the Digester Building has ponding water, indicating that the roof drain has plugged and the roof does not have positive drainage to the roof drain. It is advised to replace and clean the roof drain within a year. Moreover, it is recommended to refinish the flat roofing on the digester building to create positive drainage within a year. The cost to refinish the plugged drain valve and roof refinishing is estimated to be \$13,500.

The basement structure of the Digester Building is in good condition with only minor vertical cracks and minor leaks. There is spalling concrete on one of the concrete columns, the underside of a beam and the roof slab. It is recommended that the concrete spalling in the basement be repaired within one to five (5) years. It is estimated to cost \$4,500 to repair the spalling.

The exterior concrete stairs are in fair condition. Concrete spalling present on the stairs is recommended to be refinished within a year. The estimated cost to refinish the stairs is \$3,000.

2.3.10.2 Power and I&C

The Digester Complex has two MCCs:

- There is one Square D 42KIA MCC (600V, 100A), that should be replaced within the next five (5) years. The cost estimate to replace this MCC is \$35,000.
- There is one Allen-Bradley 42KIA MCC (600V, 100A), that should be replaced within the next eight (8) years. The approximate cost to replace this MCC is \$80,000.

2.3.11 Sludge Storage Lagoons

The capacity of the lagoons was increased in 2015, as a result of recommendations in the 2013 WWSMP update. The two lagoons currently have a combined storage capacity of approximately 24,705 m³. Lagoon #1 has dimensions of approximately 134m x 48m x 1.7m, and lagoon #2 has dimensions of 151m x 48m x 1.9m. The visible elements of the sludge storage lagoons generally appear to be in good condition. However, the City advised that the liner in the lagoon #1 is torn and needs to be repaired immediately. This would involve cleaning the lagoon to allow City staff to make the necessary repairs. The estimated cost to clean the lagoon #1 and repair the liner is \$149,000.

2.3.12 Schedule of Upgrades

The WWTC condition assessment considered the physical condition and age of the assets included in each of the above processes. A schedule of upgrades was developed to illustrate which assets shall be replaced within a 15-year horizon and the estimated cost. Table 5 below summarizes the anticipated timeline and costs associated with upgrading major assets within the WWTC:

Table 5 – Schedule of WWTC Upgrades

Schedule of Upgrades	WWTC Unit Process	Capital Cost	WWTC Asset Refurbishment
0 to 5 Years	WWTC Site & Admin Building	\$ 385,000	Electrical Upgrades
	Inlet/ Head Works	\$ 461,000	Monorail Removal, Weather Upgrades, Bar Screen Upgrades, Electrical Upgrades
	Primary Treatment	\$ 172,000	Bridge Refurbishments, Sludge Pumping Building Refinishing, Electrical Upgrades and Piping/Valving
	Secondary Treatment	\$ 40,000	Sluice Gate Replacement
	Secondary Clarifiers	\$ 271,300	Structural Repairs, RAS and Scum Pump Upgrades
	Sludge Digestion	\$ 31,000	Digester Tank Refurbishment, Digester Building Refinishing, Electrical Upgrades
	Chemical Dosing	\$ 28,000	Alum Tank Containment Structure Refinishing, Alum Tank Piping and Pump/Motor Upgrades

Schedule of Upgrades	WWTC Unit Process	Capital Cost	WWTC Asset Refurbishment
	Sludge Storage Lagoons	\$ 149,000	Clean Out and Repair Lagoon#1
Total Cost of 0 to 5 Year Upgrades		\$ 1,537,300	
5 to 10 Years	WWTC Site	\$ 35,000	Electrical Upgrades
	Inlet/ Head Works	\$ 100,000	Blower Upgrades
	Primary Treatment	\$ 55,000	Pump Upgrades
	Secondary Clarifiers	\$ 120,000	Electrical Upgrades
	Sludge Digestion	\$ 80,000	Electrical Upgrades
	Boiler Works	\$ 80,000	Electrical Upgrades
Total Cost of 5 to 10 Year Upgrades		\$ 470,000	
10 to 15 Years	Inlet/ Head Works	\$ 2,000	Electrical Upgrades
	Primary Treatment	\$ 100,000	Electrical Upgrades
Total Cost of 10 to 15 Year Upgrades		\$ 102,000	
Total Cost of Upgrades		\$ 2,109,300	

It is recommended that the assets be upgraded as per the Schedule of Upgrades above. It is essential that the assets be replaced during the suggested timelines to maintain the functionality of the WWTC. The total cost of all WWTC recommended upgrades over the next 15-years is \$2,109,300.

2.4 Septage Receiving Station

The Septage Receiving Station (SRS) is located at 125 James Street West. The SRS has a rated capacity of 2,160 m³/d and discharges septage to the James Street SPS, which is adjacent to the SRS.

A condition assessment was conducted at the SRS by Ainley staff. The City's WWTC operations staff were present during the assessment and provided insight into the operational challenges. The condition assessment reviewed the process mechanical equipment within the SRS. The major process mechanical components of the SRS include:

- Rock Trap
- Grinder
- Actuated Inlet Valve
- Auger Screen

The condition assessment found the equipment within the SRS to be in good condition. No upgrades are recommended at this time. However, City staff have indicated that cleaning the

rock trap is operationally intensive. Operations staff believe that the rock trap may be undersized. The rock trap access could potentially be modified to make cleaning easier through use of a vacuum truck, if feasible, or increasing the size of rock trap itself.

City staff also reported that operational difficulties arose during festival events. When the City was accepting septage from large festivals, there are numerous additional trucks, resulting in long line-ups and long unloading times at the SRS.

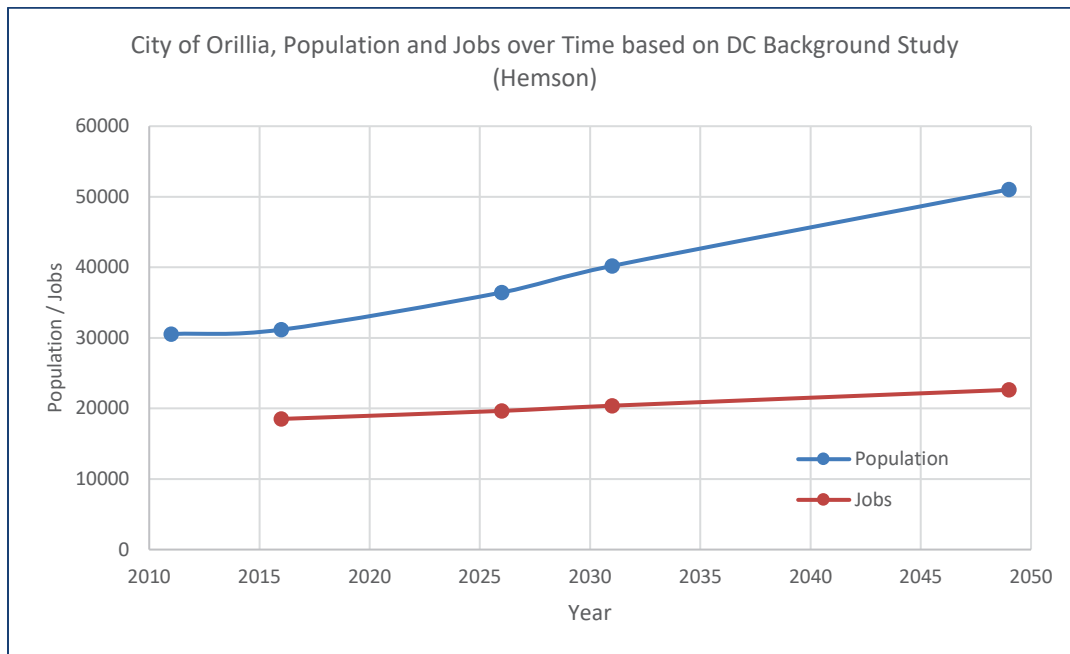
3 Current and Projected Wastewater Flows

3.1 Population

The residential population assumptions and projections provided herein are taken primarily from the 2017 Development Charges Background Study (D.C. Study) completed by Hemson Consulting Limited. The D.C. Study projects the City will grow by 2,650 additional residential units over the 2017-2026 planning period and a total growth of 4,290 additional residential units by 2031. The study assumes a density of 2.41 persons per residential unit. In terms of employment the D.C. Study projects an additional 1,140 jobs over the 2017-2026 planning period and 1,872 additional jobs over the 2017-2031 planning period.

For the purposes of this study, which seeks to plan for a 30-year time horizon, the D.C. Study projections have been prorated out to 2049. This assumes that the City grows at the same rate of growth from 2016 to 2031, extrapolated to 2049. The resulting projections are shown graphically in Figure 3.

Figure 3 – Orillia Population Projections



A detailed technical memorandum of the development of the projected future flows can be found in **Appendix C**.

3.2 Wastewater Flow Design Basis

Since the last in-depth flow analysis of the City’s wastewater flows was performed over fifteen years ago, in the 2004 WWSMP, this Master Plan update included a complete flow analysis of historical flows as well as a review of all parameters, such as per capita flows, inflow and infiltration estimates, etc., used to update the projected future wastewater flows.

3.2.1 Flows from Existing Orillia Service Area

The flow trends for the City of Orillia were reviewed over the 2013-2018 time period. The flow data used in this analysis was the “WWTC Daily Flows” data as presented in the WWTC Annual Compliance Reports.

Over the 2013 – 2018 time period the City has experienced an average day flow (ADF) of 14,736 m³/d, with a corresponding average per capita flow rate of 473 L/cap/day including extraneous flows (inflow and infiltration). The 2013 WWSMP cited an average daily wastewater flow at the WWTC between 2007 and 2011 as 17,880 m³/d. The current ADF is a decrease from the ADF reported in the 2013 WWSMP update, despite the increase in population. This decrease in wastewater flow to the WWTC is likely due to a reduction in I&I from the City’s I&I reduction efforts in the period following the 2013 update.

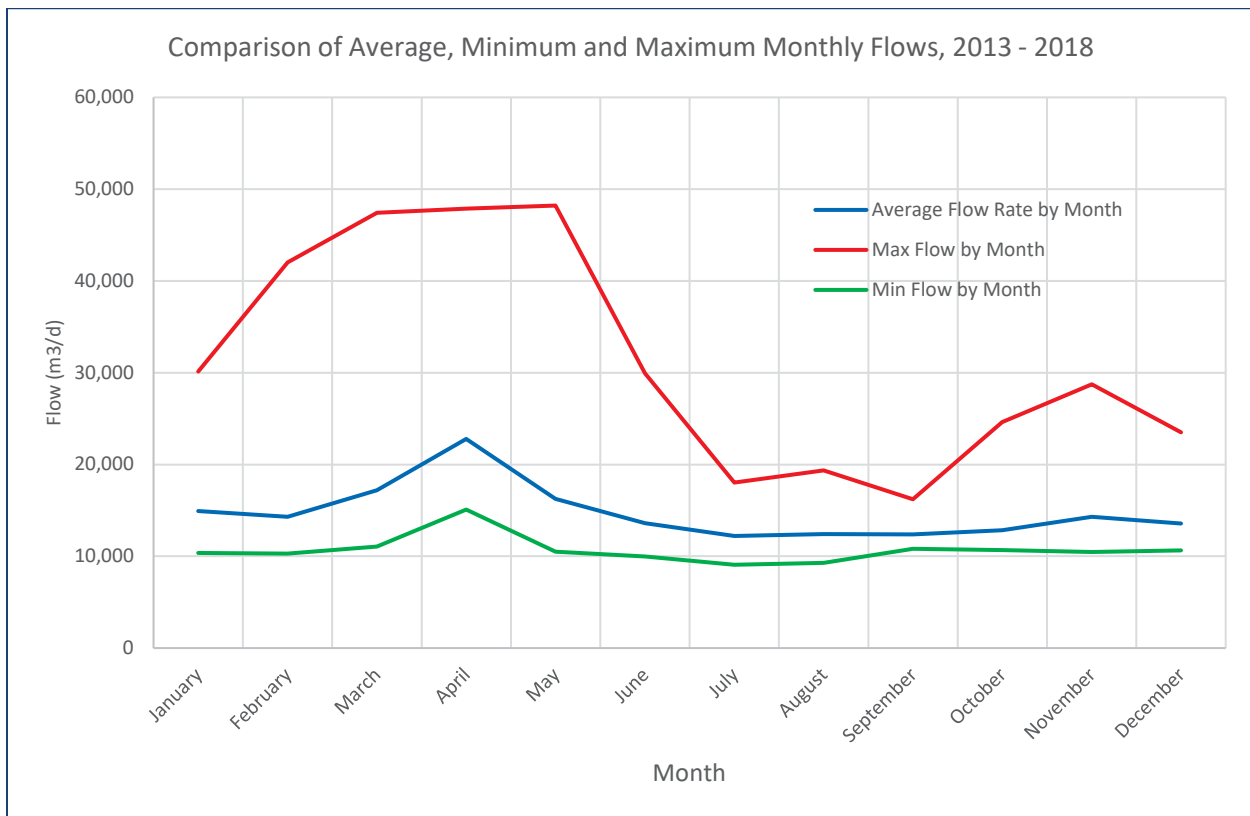
Nonetheless, the current observed average day flow rate is on the high-end of expected average day flow rates for new development. The MECP Design Guideline for Sewage Works section 5.5.2.1 specifies a range of 225 – 450 L/cap/day as a standard design assumption, the calculated rate of flow in the City exceeds the high end of the standard assumptions range. The average day flow rate varied significantly over the time period, a summary of the flow data for this period is presented in Table 6.

Table 6 – Orillia Wastewater Flow Data Summary, Flow Units: m³/d

Year	Population	ADF	ADF/ Cap	Peak Day Flow	Peak/ Cap
2013	30,709	14,650	0.477	45,011	1.466
2014	30,797	15,414	0.500	47,889	1.555
2015	30,837	13,324	0.432	27,759	0.900
2016	31,166	14,012	0.450	47,430	1.522
2017	31,595	15,784	0.500	48,215	1.526
2018	32,020	15,236	0.476	44,495	1.390
Avg.		14,736	0.473	48,215	1.393

In order to clearly show the general flow trends within the City, a plot of the aggregated monthly averages over the time period is presented in Figure 4. Figure 4 also shows the maximum and minimum daily flows by month over the time interval. From Figure 4 it can be seen that peak flows occur predominantly during the spring freshet period with peak day factors in the range of 3 - 3.25. The overall peak day factor for the City is greater than the design peak day factor of the WWTC (2.66) and is therefore not sustainable since the WWTC would be unable to manage peak flow events before the ADF capacity of the facility is expended. The high peak factor may indicate that the existing collection infrastructure has a problem with inflow and infiltration. However, peak factors typically decrease as the service population increases so the trend should be monitored to establish whether or not excessive peak flows will be an issue in the future.

Figure 4 – Aggregated Monthly Flow Trends, 2013-2018



The daily flow data to the Orillia Wastewater Treatment Centre over the 2013-2018 time period is presented in Figure 5. Over the past 6 years, the average daily flow has remained very stable with differences in year-to-year averages driven primarily by the frequency and severity of peak flow events during the spring months. Overall, the average flow rate has shown a slight decrease over time, however, this effect is insignificant. During the time interval examined, average day flows have been approximately 54% of the WWTC ADF capacity and peak flows have reached 66% of the peak flow capacity. Generally, an expansion of wastewater treatment capacity is triggered when ADF flows reach 85% of the plant ADF capacity.

From Figure 5 it can be seen that there is significant divergence between distributed water and wastewater flows which is most pronounced during the spring periods. The divergence seen is attributed to extraneous flows into the wastewater collection system. Without extraneous flow, wastewater flows would always be below the distributed water total flow. As mentioned, the discrepancy in flows is most pronounced during the spring season, suggesting that melting snow is entering the collection system. The winters of 2014/2016 are more typical of past winters with a shorter duration of spring runoff in April. The winter of 2017 exhibited higher wastewater flows over a longer period from January to May, reflecting changes to weather patterns causing multiple thaw events as well as rain storms. The intense peak flow experienced over a short period indicates that there are likely many inflow sources to the collection system, including roof leaders, connected sump pumps, and catch basins.

Figure 5 shows the average daily water use, based on pumped data from the WTP, plotted alongside the wastewater flow data. The difference between base rate water use and the daily wastewater flow is identified as a high-level estimation of the inflow and infiltration to the collection system. Based only on the average difference in distributed water and wastewater flow, it is estimated that on an average day basis, 3,496 m³/d of the current wastewater flow is due to inflow and infiltration to the system. However, this phenomenon is primarily occurring during the spring freshet. The estimated I&I rate represents 24% of the overall wastewater flows during a year and is approximately 31% greater than the base water use, including unmetered water.

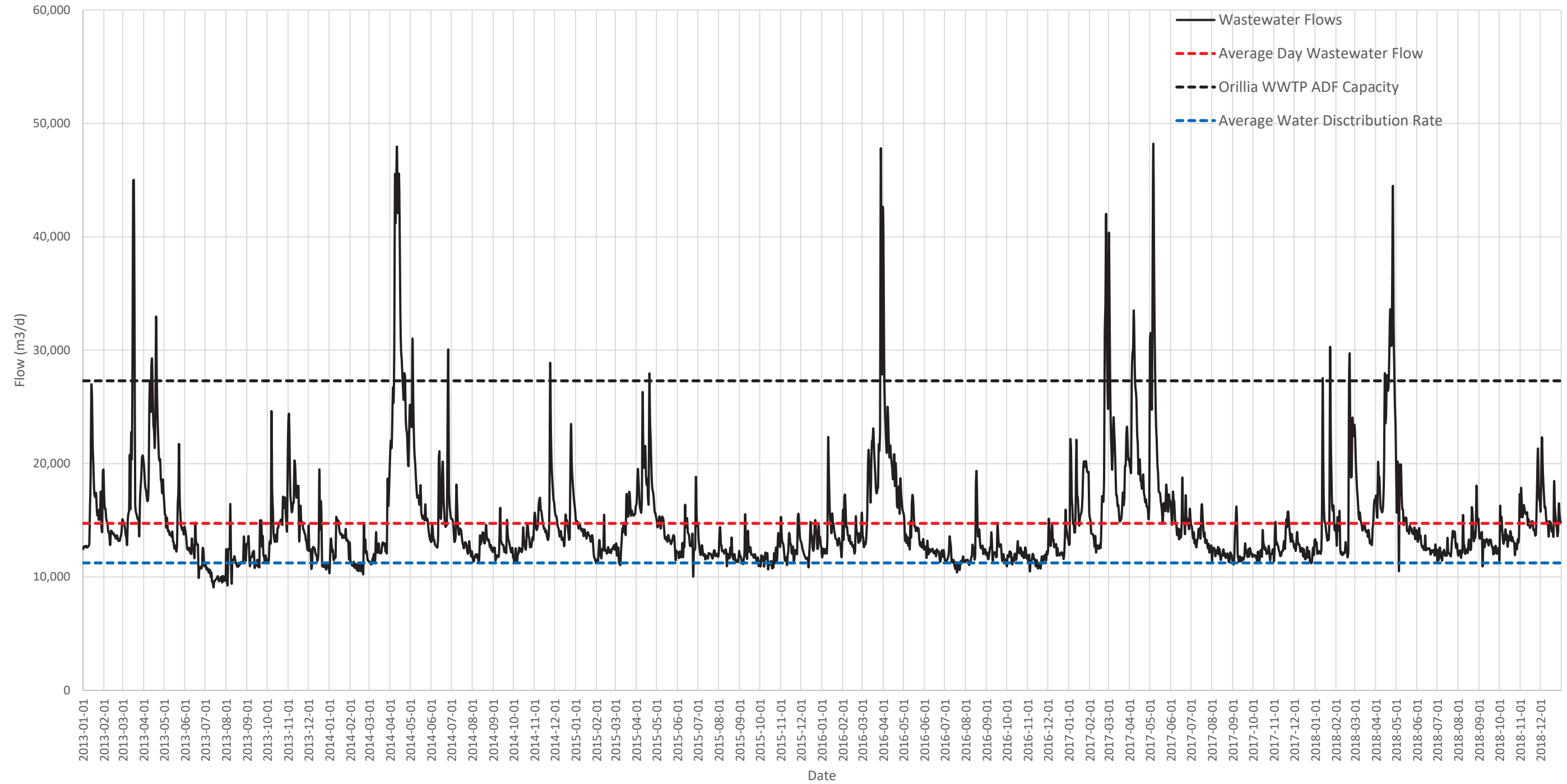
The approach used to approximate I&I, using water distributed water volumes rather than metered water volumes, does not account for water losses from the distribution system. Performing the same evaluation with metered water rates yields a higher estimate for the portion of flow attributable to I&I, since metered water volume will always be lower than distributed water volume. Using metered water data, the same calculation approximates that 40% of total wastewater flow is resulting from I&I. The true percentage is likely between the two estimates, as metered water will not account for unbilled authorised consumption and apparent/commercial losses (customer meter under-registration and theft). A true understanding of the I&I rates would best be determined through flow monitoring data, rather than analysis of high-level daily flow averages. The estimated rate of 24% will be carried through the report but all recommendations will be made under the understanding that the I&I rate may be as high as 40%.

Table 7 – Derivation of Total Flow Rate Assumptions, ICI included

Year	Pop. Avg.	Base Water Use (m ³ /d)	ADF (m ³ /d)	Est. I&I (m ³ /d)	Est. Per Cap WW (m ³ /cap/d)	Est. Per Cap I&I (m ³ /cap/d)
2013-2018	31,189	11,240	14,736	3,496	0.360	0.112

Figure 5 – City of Orillia Wastewater Flow Trend (2013 - 2018)

Daily Wastewater Flow, 2013-2018



The per capita flow rates in Table 6 do not separately take into account the total flow volume generated by industrial, commercial and institutional (ICI) activity within Orillia, as such, the flow values are inflated for approximating flow from new residential development. Based on the 2013 Master Plan Update, the current wastewater flow generated from ICI sources is approximately 43% of total flows in the City. Assuming the proportion of flow from ICI has remained relatively stable, the portion of ADF that comes from ICI sources has been extracted from the residential portion, and the resulting flow rate assumptions are presented in Table 7.

Table 8 – Derivation of Residential Flow Rate Assumptions (approximate ICI flow removed)

Year	Pop. Avg.	Res ADF (m ³ /d)	ICI ADF (m ³ /d)	Est. I&I (m ³ /d)	Est. Per Cap WW (m ³ /cap/d)	Est. Per Cap I&I (m ³ /cap/d)
2013-2018	31,189	6,407	4,833	3,496	0.205	0.112

It is standard design practice to allow for a degree of inflow and infiltration to a sanitary collection system. Typically, inflow and infiltration rate assumptions come in two forms, an allowance for infiltration on the basis of “area” or “per capita” allowances. Assumptions commonly used in Ontario to estimate average I&I would be 0.01-0.02 L/s/ha of development or 90-150 L/cap/day. From the analysis provided, a rate of 110 L/cap/day appears to be appropriate for Orillia, slightly rounded down from the calculated 112 L/cap/day.

Also based on the flow rate analysis above, it is suggested that a residential wastewater flow rate of 205 L/cap/d may be appropriate for Orillia. The actual calculated residential wastewater generation rate (including average I&I) is 317 L/c/d. The design residential per capita ADF currently in place for the City of Orillia is 300 L/c/d, as established in Report to Council Committee No. PD-02-038 on April 14, 2003.

The MECP’s recommended per capita flow rate is 225 - 450 L/c/d. Table 9 shows several example Ontario locations and their respective per capita flow rates. Based on the result of this WWSMP’s analysis and the per capital flow rates used by other municipalities, a per capita flow rate 230 L/c/d is recommended for the City of Orillia. This rate represents the lowest allowable flow per the MECP plus a marginal 12% increase to be conservative and is within the range of design standards used by various locations within southern Ontario.

Table 9 – Sewage Generation Assumptions, Southern Ontario

Design Standard	Residential Flow Rate
City of Barrie	225 L/c/d
Proposed Assumption	230 L/c/d
Region of Halton	275 L/c/d
Region of Peel	303 L/c/d
Region of Waterloo	350 L/c/d
MECP (design guidelines)	225 - 450 L/c/d

Table 10 (Flow Assumptions for Preliminary Design) outlines the assumptions which will be used to generate the estimated average daily flow for new residential, institutional, commercial and industrial development, including inflow and infiltration from development in Orillia. The residential flow assumptions are as derived in this section of the report. The ICI flow assumptions are standard assumptions, commonly used throughout Ontario. It should be noted that the proposed industrial flow rate represents a deviation from the historical design standards for the City of Orillia, which carry 36 m³/ha/d for industrial flow sources, however, the reduced assumption is more in line with other municipalities in Ontario.

Table 10 – Flow Assumptions for Preliminary Design

Design Standard	Residential Flow Rate
Residential Flow	230 L/c/d
Inflow and Infiltration	110 L/c/d
Industrial Flow	28 m ³ /ha/d
Commercial Flow	28 m ³ /ha/d
Institutional	28 m ³ /ha/d

The volume of wastewater generation from new development areas and infill areas of Orillia, presented in the following sections, are calculated on an area-by-area basis using the per capita flows established herein. Average daily flows and peak flows were calculated by area. Peak flows were calculated using the Harmon Peaking Factor calculation.

3.2.2 Build-out of Available Land

The build-out of the City is defined as complete development of all available parcels within the settlement area boundary. Growth areas are designated in the City’s Official Plan (OP). These areas are illustrated in Figure 6.

The City’s Official Plan (OP) states that 40% of new residential development should be intensification occurring within the City’s “Built Boundary”. The OP defines the density of development as shown in Table 11. The density targets specified in the OP were used to estimate the total population of the City under the full build-out scenario.

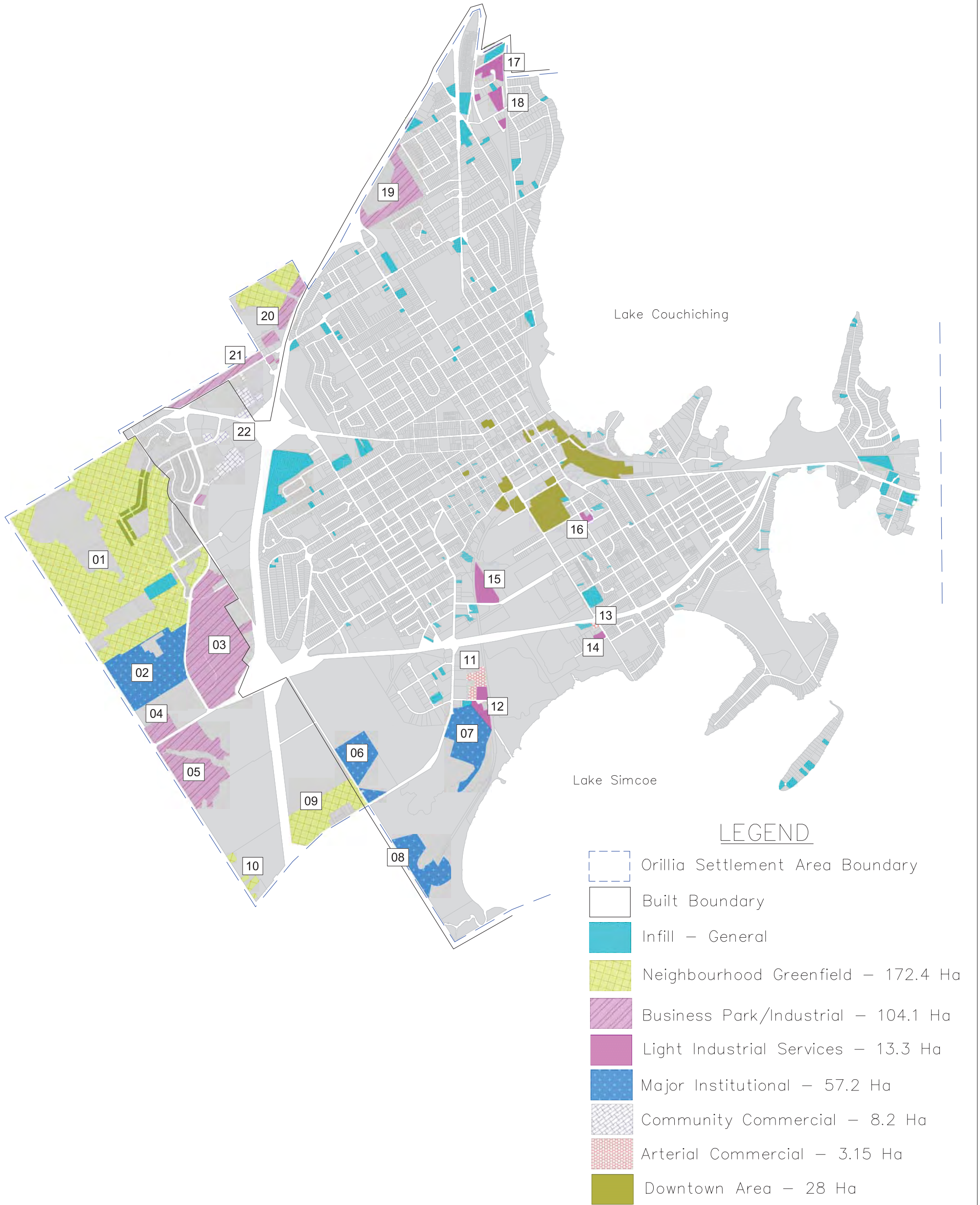
Table 11 – Official Plan Density Targets

Development Type	Target
Designated Greenfield Areas (Lands Outside of the Built Boundary)	42 persons and/or jobs/ha (This represents the average minimum density target of the Greenfield Designations identified below)
Neighborhood Greenfield	50 persons/ha
Business Park/ Industrial	25 jobs/ha
Major Institutional	50 jobs/ha
Community Commercial	50 jobs/ha

Figure 6 – Potential Development Land in Orillia

CITY OF ORILLIA

ZONING AND DEVELOPABLE LANDS



The number of people occupying each residential unit is assumed to be 2.4, based on the findings of the D.C. Study.

Flow contributions from institutional/commercial/industrial growth areas are shown with an equivalent residential population. Equivalent population is determined by calculating the flows based on the flow assumptions outlined in Table 10 and then dividing by the per capita flow contribution of 345 L/c/d (residential ADF and I&I). The growth areas considered within the analysis are listed in Table 12 and are reflected in Figure 7.

Flow estimates are calculated on the following basis:

$$ADF = Area * Housing Density * Occupants Per Unit * Per Capita Flow$$

Table 12 – Wastewater Flows from New Growth Areas

Identification	Area (Ha)	Eq. Population	ADF Estimate (m ³ /d)
Neighbourhood Greenfield	172.4	8,620	2,973.9
Neighbourhood Greenfield - Intensification	69.0	3,450	1,190.3
Light Industrial Services	13.3	1,079	372.4
Major Institutional	74.1	5,936	2,074.8
Community Commercial	8.2	665	229.6
Arterial Commercial	3.15	256	88.2
Downtown Area	42.7	3,465	1,195.6
Total:	382.85	23,471	8,124.8

3.2.3 30-Year Wastewater Flow Projection

An estimation of wastewater flow over time is provided in Figure 7. The total wastewater flow is based on the population projections outlined in the D.C. Study up to the year 2031. Growth between 2031 and 2049 is assumed to follow the same growth rate projected to 2031 of 265 additional housing units year over year.

A range of projected average day flows is presented in Figure 7, which is based on the variance in average day flows experienced between 2013 and 2018. The high-end projection uses the high flow experienced in 2017 as a baseline for projecting flows in the future. The low-end projection assumes the 2015 flows as a baseline.

Based on current projections the Orillia WWTC would receive a total of 21,625 m³/d ADF by 2049, which corresponds to a population of approximately 51,041 people. The projected 2049 ADF equates to 79% of the WWTC’s rated capacity and would not trigger the need for a plant expansion.

The peak day factors currently being experienced by the City are up to 3.25, resulting in a projected peak flow of 70,280 m³/d, which is nearing the peak day capacity of the WWTC (72,620 m³/d).

3.2.4 Full Build-Out Summary

The total wastewater flows generated from the full build-out of the existing settlement area boundary is summarized in Table 13. Based on the estimated growth trend from the D.C Study, as shown in Figure 8, the full build-out of the existing settlement area boundary would be reached in year 2084, assuming development continues at a consistent pace.

Figure 7 – Wastewater Flow over Time

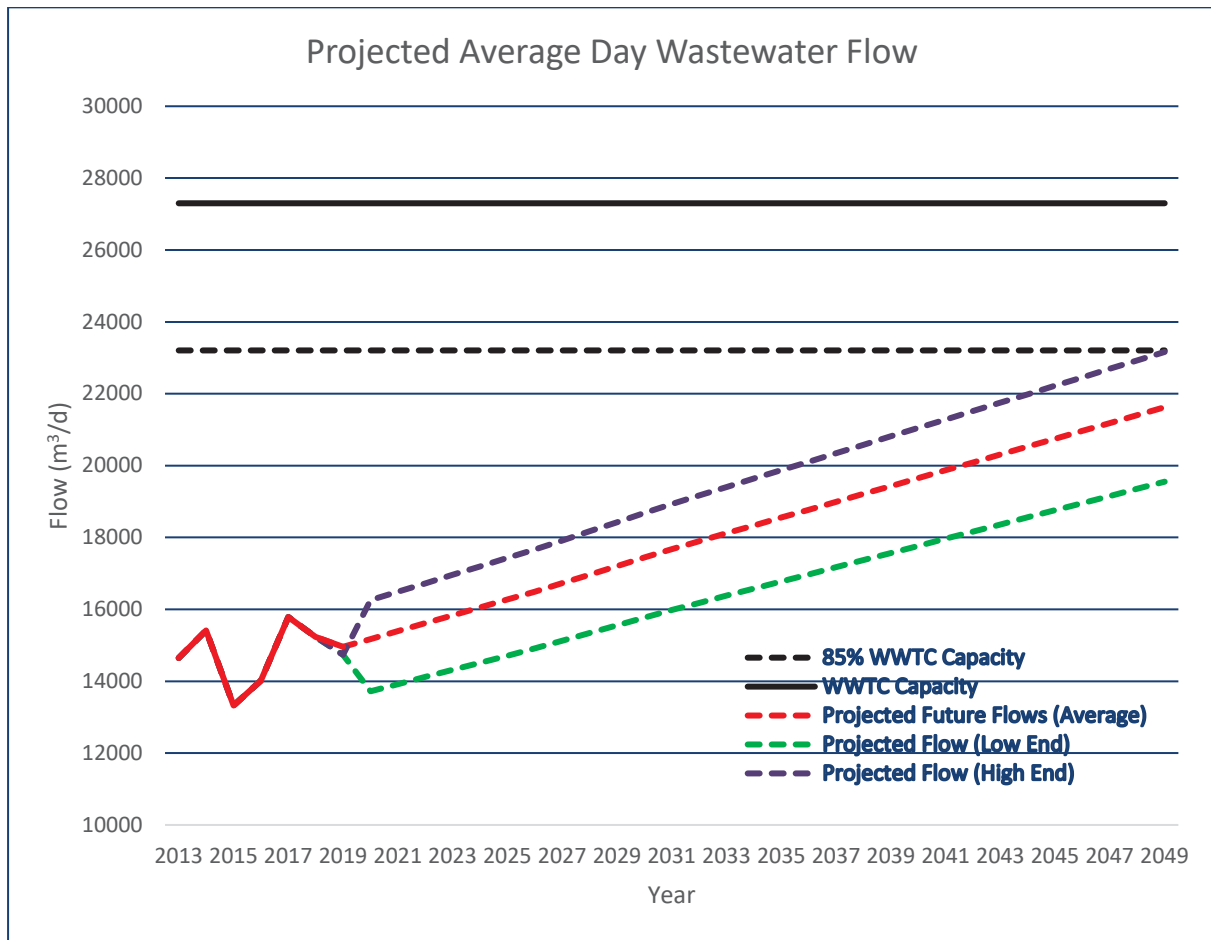


Table 13 – Wastewater Flow Summary for Build-out Development

	Population	ADF (m³/d)	Peak Day Flow (m³/d)
Existing System (2018)	32,020	15,236	44,495
New Growth	23,471	8,125	20,963
Total:	55,491	23,361	65,456

Note: Future flow projection includes 1,190 m³/d assumed for infill and intensification within areas marked by blue in Figure 6.

As shown in Table 13, the average flow to the WWTC at full build-out would be 23,361 m³/d, which is greater than the WWTC's rated capacity. The plant would not be expanded to accommodate the full build-out flows until sometime nearing year 2084. Generally, an expansion of wastewater treatment capacity is triggered when ADF flows reach 85% of the plant's ADF capacity. For the Orillia WWTC this is expected to occur by approximately year 2053 based on Figure 7.

3.2.5 Commentary on Hydra Modelling Updates

Simulation of wastewater flows within a collection system can be optimised to provide an estimation of actual conditions of a collection system by calibrating results to observed data. This is best accomplished by comparison with real-time flow data collected from within the sewer network with more accuracy obtained by measurement at multiple nodes throughout the system. The value of simulating existing conditions is limited, as existing problems and system limitations are likely to be known by operations and engineering staff either by noticing that a station is unable to meet demands during peak flows or from customer complaints if there is flooding. Model simulations are most useful to determine the limits at which system capacity becomes a problem, as such, more conservative approaches to modeling are recommended. Peak-flow scenarios can be used to determine the rate of flow through a section of the collection system required to cause sewer back-ups and flooding, these breaking points can be compared to existing and projected peak flows to understand how severe an inflow/infiltration event would need to be, in comparison to observed peaks, to cause flooding/backups.

Pumping simulation in Hydra is not dynamic, discharge simulated is based on input flows. Discharge flows are equal to input flows, up to the point of reaching pump capacity, the model does not simulate wetwell fill and discharge cycles as would be expected in a realistic situation. The model cannot be set up to emulate level controls and lead/lag pump operation.

The Hydra file for the City includes a range of diurnal curves which can be applied to the system flows. The curves available in the model are typical of model assumptions for other municipalities, however, best practice is to develop diurnal curves specific to the system being analysed. These curves do not amplify the volume of flow through the system, they only allocate the total daily flow in different proportion to different time steps. The diurnal curves cover a wide range of scenarios and cover a typical day flow scenario ranging from 25%-175% ADF and a peak hour scenario ranging from 25%-415% ADF. There are eighteen curves saved in the model that provide variations on the same themes, however the DEFAULT and INST curves provide enough functionality for the City's needs. The preserve peak function is recommended for observing worst-case model results and evaluation of potential limitations however it does not provide realistic results. The preserve volume function will provide the most accuracy to actual conditions in the collection system as it accounts for the natural diffusion of waves as the sewage flows down the pipes.

3.2.6 Climate Change Impacts

Climate encompasses all aspects of weather, including: temperature, precipitation, air pressure, humidity, wind speeds, and cloudiness. Weather and climate are not static processes and variability is often normal. Weather, for example, changes on a daily and sometimes hourly basis.

Weather can also change on a monthly basis, through the changing of seasons. When climate changes on a global scale, it is referred to as Climate Change.

Since the beginning of the industrial revolution in the 18th century, excessive emission of greenhouse gases, like carbon dioxide and methane, have been released through human activities, causing an increased percentage of solar radiation to be trapped in our atmosphere. In recent decades the effect of this on climate has become clearer. As more energy is retained within the atmosphere, a general increasing trend in global temperatures has occurred.

The effects of climate change are anticipated to extend beyond a simple increase in temperature. Climate models project an increase in extreme weather events, a rise in sea levels, and changes to inland water levels. The effects of global warming differ region to region, and therefore different adaptation strategies are more appropriate to different geographical areas. Table 14 provides a listing of climate changes that have been documented in Canada as well as the projected changes that are anticipated to occur over the coming years:

Table 14 – Documented and Project Climactic Changes in Canada

Parameter	Observed Climactic Change	Projected Change
Temperature	<ul style="list-style-type: none"> Average air temperature has increased 1.5C from 1950-2010 Frequency of hot summer days increased and cold summer nights decreased. 	<ul style="list-style-type: none"> Warming will continue and affect winter months most. Magnitude of warming varies substantially based on the emissions scenario, Heat waves projected to occur more frequently and become more intense.
Precipitation and Snow Cover	<ul style="list-style-type: none"> Increase in precipitation over recent decades Annual snowfall decreased in southern Canada and increased in northern Canada 	<ul style="list-style-type: none"> Projected decrease in summer precipitation in southern Ontario Snow cover projected to decrease in southern Ontario and increase in northern Ontario Rare extreme precipitation events projected to increase in frequency by 100% by mid-century
Permafrost	<ul style="list-style-type: none"> Permafrost temperatures at many sites across Canada have increased over the past three decades. 	<ul style="list-style-type: none"> Slow thaw of permafrost over time. Colder permafrost will take decades to centuries to thaw.
Relative Sea Level	<ul style="list-style-type: none"> Relative sea level rising in Atlantic Canada (3mm/year), rising less significant on the Pacific coast. (1.6mm/year average) 	<ul style="list-style-type: none"> Estimated rise in sea level up to 1 m in coastal areas

Parameter	Observed Climactic Change	Projected Change
	<ul style="list-style-type: none"> Amplification of storm surges and coastal erosion Relative sea level has been falling in areas that are rising from post-glacial rebound 	<ul style="list-style-type: none"> Decrease in relative sea level up to 1 m in areas that are rising from post-glacial rebound
Sea Ice	<ul style="list-style-type: none"> Minimum ice levels decreased by 13% (1979-2010) Maximum sea level ice decreased 2.6% each decade 	<ul style="list-style-type: none"> Some models predict ice-free summer before mid-century in Arctic ocean Summer sea ice may persist in Canadian arctic archipelago
Lake and River Ice	<ul style="list-style-type: none"> Trending towards earlier ice-free dates in lakes and ice break-up in rivers. 	<ul style="list-style-type: none"> Continuous trends towards earlier ice-free and ice break-up dates.
Inland Water Levels	<ul style="list-style-type: none"> Great Lakes water levels below long-term average from 1997-2012 Water levels higher than long-term average 2013-2014 	<ul style="list-style-type: none"> Episodes of low water levels expected to become more frequent Long term trend towards reduced water levels in the Great Lakes.

Source: *From Impacts to Adaptation: Canada in a Changing Climate* (Warren and Lemmen 2014)

While mitigation of climate change is outside of the scope of this study, it is recognised that design codes and guidelines are being revised to account for changing climate. Canadian Standards Institute (CSA) is working on a tool to assess the potential impact of climate change on wastewater treatment plants and there has been an increase in studies by Cities aimed at mitigating the potential effects of climate change on their infrastructure. The design of the wastewater system should take into account potential adaptive measures for the anticipated changes and should establish the potential impact on Orillia during the detailed design phase of a project. The goal is to decrease the vulnerability of the system to the anticipated climate change effects in Orillia. Due to the temperate climate in Canada, many of the challenging conditions presented by a changing climate are already considered within the design of wastewater systems. At the design stage, consideration should be made for the possibility of the following conditions in increasing frequency and/or severity:

- Blowing snow/ blizzard
- Cold wave
- Drought/ dry periods
- Extreme diurnal temperature variation
- Freeze/ thaw
- High wind
- Freezing rain/ ice storm
- Heavy fog
- Heavy rain
- Heavy snowfall
- Hurricane
- High temperature
- Lightning/ thunderstorm
- Low temperature
- Snow accumulation

- Hail storm
- Heat wave
- Tornado

In general, wastewater facilities are classed as “Post-Disaster Buildings” in Ontario under the Ontario Building Code. A post-disaster building means a building, and its ancillary infrastructure, that are expected to remain functional and accessible after a rare climatic or seismic event. As such, the design of wastewater treatment facilities already takes into account additional factors of safety for extreme events.

In addition to the requirements already outlined in the OBC, reasonable risk reduction measures should be investigated at the design stage to manage the additional challenges presented by climate change. Simple examples of risk reduction measures would include the provision of site space for snow storage, placing sensitive process components within enclosures to shield them from higher temperatures and ice, more robust insulation, and increased fuel storage for power generation. In addition, site design measures can be considered such as the establishment of berms and tree stands to minimize the impacts of blowing snow.

The collection system should be designed to eliminate extraneous flows entering the system from roofs and sump pumps and should also include sealed manholes where there is a threat of local flooding.

In a general sense for wastewater collection systems, best efforts should be maintained to prevent the entry of extraneous flows from entering the collection system. Inflow and infiltration is a pervasive problem with the potential to be exacerbated by the potentialities of climate change. In the current case, the City has a problem with extraneous flows, and these have been taken into account with the proposed design criteria. The potential for more extreme events leading to quick inflow events overwhelming the collection system exist, however the most extreme projections and claims of the climate models should not be taken as inevitable outcomes. The fundamental governing problem at the center of climate change is increased radiative forcing resulting from an increase in atmospheric gas concentrations of greenhouse gasses, typically simplified into CO₂ equivalents. The rate of radiative forcing due to GHG concentrations operates as a logarithmic function, which is to say that the concentration of GHG in the atmosphere must rise in a parabolic fashion in order to maintain a linear growth in temperature change. Several feedback mechanisms have been proposed as potential sources for exponential increase in atmospheric GHG increase, such as methane release from permafrost in the arctic and a reduced assimilative capacity of GHGs in the oceans. However, there are also countervailing forces to reduce GHG emissions such as the change in energy sources used by major emitters like China away from coal power and towards nuclear energy and other less GHG intensive sources.

4 Capacity Assessments

4.1 Future Development Extensions and Collection System Capacity Assessment

4.1.1 System Extensions Required for Future Development

4.1.1.1 Old Barrie Road East

Sewers will need to be extended to Old Barrie Road East and Line 15 North in order to service the business park/ industrial area at this intersection. Due to the topography in this area, it is

anticipated that a pumping station will be needed (discussed in subsequent sections) and a 150mm diameter forcemain is recommended along Old Barrie Road East connecting to the existing sewer on University Avenue requiring an approximately 620m extension.

A budgetary cost estimate for a new forcemain to Old Barrie Road East is \$465,000.

Since the pumping station will only service the subject property and adjacent properties, the pumping station and forcemain would be funded by the property owners and the timeline for construction would be contingent on the development of the property and the property owners meeting all necessary requirements. The City has noted that this development is also contingent on water servicing being provided in this area.

4.1.1.2 Woodland Drive and Memorial

Sanitary servicing will need to be extended to the institutional area on Woodland Drive, south-east of Memorial Avenue. Gravity flow is not possible in this area and a 100 diameter forcemain is recommended with the most likely routing along Woodland Drive connecting to the existing sewer on Memorial Avenue requiring an approximately 1,050 km extension.

A budgetary cost estimate for the Woodland Drive forcemain is \$750,000, excluding road rehabilitation works.

Since the pumping station will only service the subject property, the pumping station and forcemain would be funded by the property owner and the timeline for construction would be contingent on the development of the property and the property owner meeting all necessary requirements.

4.1.2 Collection System Capacity

The City's Hydra model was used to perform capacity assessments of the collection system under current flow conditions and projected future flow conditions. The model was updated using the parameters presented in the previous sections for per capita flows, I&I estimates, etc.

Based on the findings of the sewer analysis using the Hydra modeling software, no system upgrades are required for existing or future conditions under the current development planning,

It should be noted that the flows predicted by Hydra for existing conditions did not match actual measured flows, which suggested an issue with the model. In order to force Hydra to produce flows that matched measured flows, the I&I estimates for each catchment were adjusted until the flows matched. Standard I&I assumptions were used for the projection of future flows, not the inflated I&I values used to ensure a match between current model assumptions and observed flows.

The previous model update had errors in the invert elevations for many manholes and pipes throughout the collection system. These were corrected as part of this WWSMP update.

Lastly, the current Front Street Extension project was incorporated into the model. However, the model returned many significant errors that were unresolvable by Ainley's project team as well as the City's modeler. The software developer was contacted for support and they were able to incorporate the updates.

This will be problematic for future additions to the model. In discussion with the software developer, he advised the project team that the City's use of the modeling software is outside the of the software's originally intended functionality. The Hydra software was intended for the modeling of trunk sewers and pumping stations only and not for detailed modeling of subdivisions. The scale of the model as it currently exists is believed to be the source of the breakdown in the software's ability to update the model space when changes are made in CAD. It is recommended that the City consider using an updated modeling software, such as SewerGEMS or InfoSewer / InfoWorks, which are much better equipped to handle large, detailed models. The newer software comes with the added benefit of much more user-friendly interfaces and better analytics.

4.2 Pumping Station Capacity Assessment

Where possible, draw-down testing was conducted to determine the capacity of a given sewage pumping station. In the absence of influent flow monitoring, a baseline flow rate (Q_i) was determined for each station by measuring the change in water level (ΔE) in the well over a time interval (ΔT) and multiplying the change in water elevation by the wet well area (A) as shown in Equation 1.

Equation 1 – Influent Flow Rate

$$Q_i = \frac{\Delta E * A}{\Delta T}$$

Discharge flow rates (Q_o) were measured in the same fashion, however the influent flow rate was added to the calculated rate of discharge.

Equation 2 – Discharge Flow Rate

$$Q_o = \frac{\Delta E * A}{\Delta T} + Q_i$$

The discharge flow rate was measured one minute after the pump started to determine the capacity of the pump while operating at full speed.

Due to various reasons, of the 21 operating pumping stations in the system, a draw-down test was not conducted on ten of these. The stations which were not assessed and the rationale for the draw-down test not being performed is provided in Table 16.

Table 15 – Additional Wastewater Flow from New Development

Designation	Area (Ha)	ADF (m ³ /d)	Equivalent Population	PDF (m ³ /d)	Input Description (Figure 6 reference #)
Light Industrial:	0.2	5.6	16.23	8.96	Huron Rd (17)
	1.7	47.6	137.97	76.16	Hughes Rd (18)
	0.4	11.2	32.46	17.92	Precision Dr (18)
	4.3	120.4	348.99	192.64	James St W (15)
	0.6	16.8	48.70	26.88	Matchedash St S & Cochrane St (16)
	1	28	81.16	44.80	United Dr (12)
	1.8	50.4	146.09	80.64	United Dr (12)
	0.6	16.8	48.70	26.88	West St S & Kitchener St (14)
Business Park:	11.6	324.8	941.45	519.68	Commerce Rd (19)
	1.7	47.6	137.97	76.16	Fittons Rd W and Dancy Dr (20)
	3.4	95.2	275.94	152.32	Fittons Rd W and Dancy Dr (20)
	1.3	36.4	105.51	58.24	Fittons Rd W and Dancy Dr (20)
	6	168	486.96	268.80	Murphy Rd and W Ridge Blvd (21)
	0.65	18.2	52.75	29.12	W Ridge Blvd and Vanessa Dr (21)
	48.4	1355.2	3928.12	2,168.32	Near Lakehead University (3)
	4.2	117.6	340.87	188.16	Near Lakehead University (4)
	26.4	739.2	2142.61	1,182.72	Near Lakehead University (3)
Institutional:	33.8	946.4	2,743.19	1,514.24	Near Lakehead University (2)
	10	280	811.59	448.00	Memorial Ave and Woodland Dr (6)

Designation	Area (Ha)	ADF (m ³ /d)	Equivalent Population	PDF (m ³ /d)	Input Description
Institutional:	16.9	473.2	1371.59	757.12	Memorial Ave and Woodland Dr (7)
	12	336	973.91	537.60	Memorial Ave and Woodland Dr (8)
Community Commercial:	0.2	5.6	16.23	8.96	Monarch Dr and Hwy 12 (22)
	2	56	162.32	89.60	Monarch Dr and Hwy 12 (22)
	0.31	8.68	25.16	13.89	Monarch Dr and Hwy 12 (22)
	0.66	18.48	53.57	29.57	Monarch Dr and Hwy 12 (22)
	0.44	12.32	35.71	19.71	Monarch Dr (22)
	0.8	22.4	64.93	35.84	Monarch Dr (22)
	3.8	106.4	308.41	170.24	Mulcahy Ct (22)
Arterial Commercial:	2.9	81.2	235.36	129.92	United Dr (11)
	0.26	7.28	21.10	11.65	West St S near Hwy 12 (13)
Neighbourhood Greenfield:	141	2,432	7,050	7,539	University Ave and Diana Dr (1)
	18.3	315.7	915	1,206	E of Memorial Ave and Woodland Dr (9)
	0.4	6.9	20	30.2	E of Memorial Ave and Woodland Dr (10)
	0.2	3.5	10	15.4	E of Memorial Ave and Woodland Dr (10)
	0.8	13.8	40	59.75	E of Memorial Ave and Woodland Dr (10)
	0.1	1.7	5	7.55	E of Memorial Ave and Woodland Dr (10)

Table 16 – Stations Without Full Draw-Down Test

Station Name	Rationale
SPS 1 – James Street	No wet well drawings to allow calculation of well area
SPS 3 – Couchiching Park	No flow to the station during assessment
SPS 4 – Elgin Street	Station to be replaced in the near future
SPS 7 – Royal Oak	No flow to the station during assessment
SPS 8 – Tudhope Park	No flow to the station during assessment
SPS 12 – Fittons Road East	Controls within a confined space
SPS 16 – Forest Avenue South	No digital water level read-out
SPS 17 – Collins Drive	No digital water level read-out (measurements still taken)
SPS 22 – Ridge Road	No flow to the station during assessment
SPS 24 – Leacock	No wet well drawings to allow calculation of well area

4.2.1 Sewage Pumping Station No. 1 – James Street

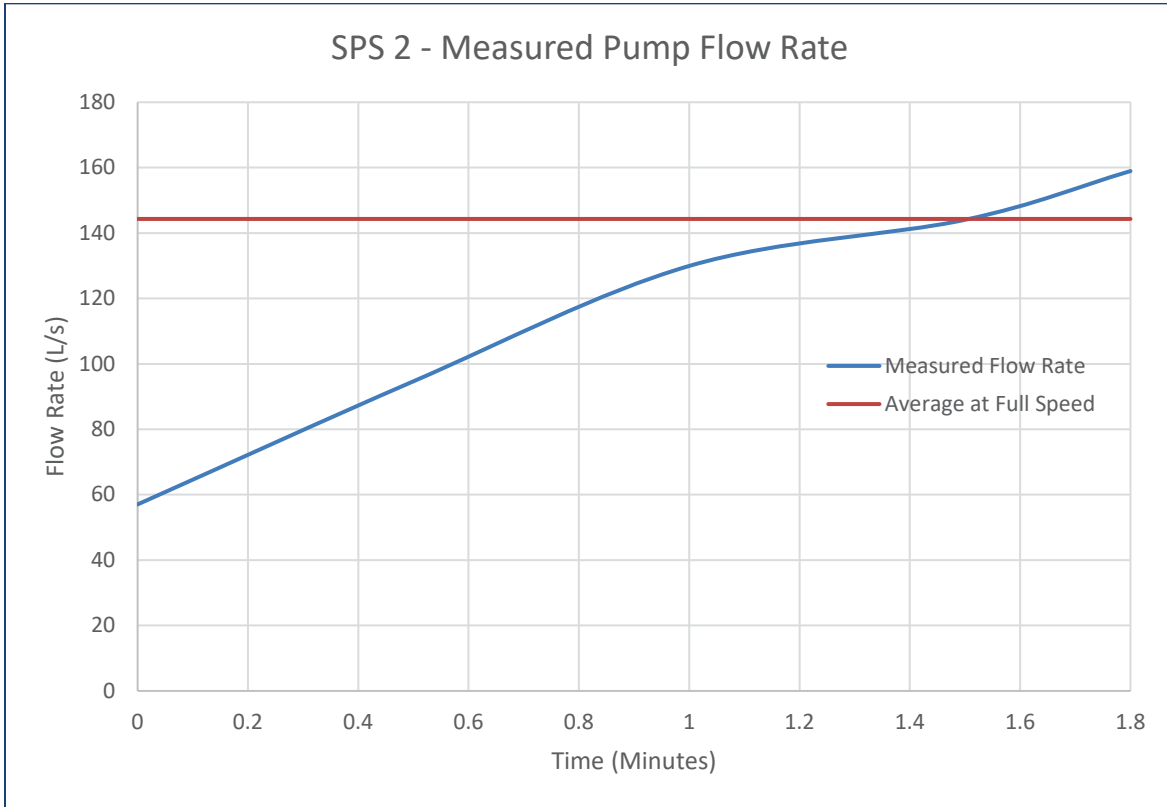
Drawings provided for this station did not have clear dimensions of the wet well. As a result, flow volumes for the draw down test could not be produced at this time. Moreover, the previous Wastewater System Master Plan does not include a review of this station’s flow capacity.

4.2.2 Sewage Pumping Station No.2 – Bayview parkway

A wet-well draw down test was conducted at SPS 2. The average influent flow rate was measured to be 57 L/s over a 2-minute time interval. The average discharge flow rate was measured to be 144 L/s with one pump in operation. The discharge flow rate was measured while the pump was operating at partial speed (45 Hz/ 60 Hz). It should be noted that the measured discharge flow rate does not correspond to the pump capacity of 70 L/s at 29.5m TDH as listed in the ECA. Based on the findings of the draw-down test, the TDH seen by the pumps at this station is significantly lower than 30m, allowing the pumps to produce a greater discharge flow rate.

As identified in the previous Wastewater System Master Plan Update, it was determined that SPS No. 2 operates at 26% and 48% of its rated capacity as per peak flow conditions and 2012 Hydra model respectively.

Figure 8 - SPS 2 Draw-Down Test Results



4.2.3 Sewage Pumping Station No. 3 – Couchiching Park

Due to the limited catchment area for this pump station, there was insufficient wastewater flow available to conduct a draw-down test. According to the 2013 WWSMP update, SPS No. 3 was operating at 27% of its rated capacity (15.8 L/s), based on measured peak flows of (4.3 L/s), or at 18% of its rated capacity (15.8 L/s) based on the 2012 Hydra model results (2.9 L/s).

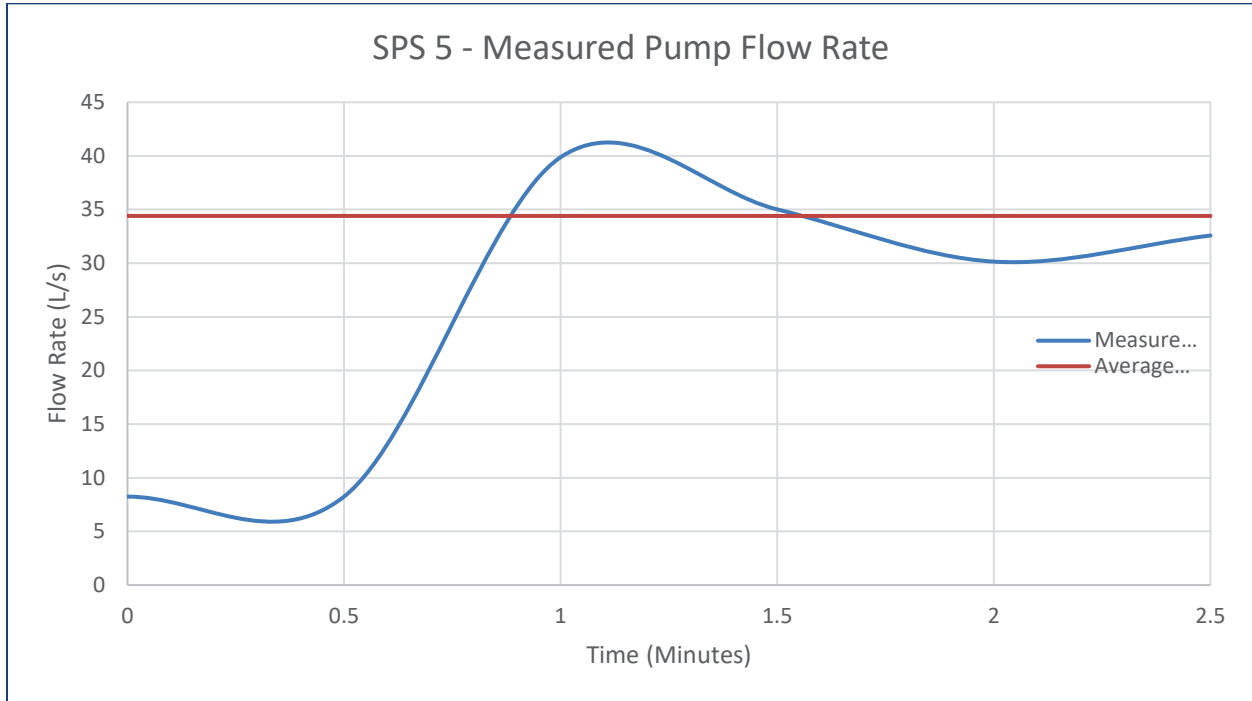
4.2.4 Sewage Pumping Station No. 4 – Elgin Street

The City of Orillia is currently in the process of replacing this pumping station with a new station on Cedar Island Road. As such, a draw-down test was not considered necessary at this station and was not conducted.

4.2.5 Sewage Pumping Station No. 5 – Couchiching Point

A wet-well draw down test was conducted at SPS 5. The influent flow rate was measured to be 24.3L/s on average over a 2.5-minute time interval. The discharge flow rate was measured to be 34.4L/s with one pump in operation. The discharge flow rate was measured while the pump was operating at full speed on a constant speed drive. The pump did not reach the full capacity of 42.3 as identified in the ECA, suggesting some fouling in the forcemain. However, the discrepancy may be due to the imprecise nature of the measurement methodology.

Figure 9 – SPS 5 Draw-Down Test Results



The previous Wastewater System Master Plan Update assessed SPS No. 5 as operating at 81%, 46%, and 32% of its rated capacity based on peak flow (31.4 L/s), Flo-tote (17.9 L/s) and Hydra model (12.4 L/s) results, respectively

4.2.6 Sewage Pumping Station No. 6 – Hughes Road

This station was decommissioned since the time of the 2013 WWSMP update.

4.2.7 Sewage Pumping Station No. 7 – Royal Oak

Due to the limited catchment area for this pump station, there was insufficient wastewater flow available to conduct a draw-down test.

The 2013 Master Plan Update assessed that this station operated at 0.5 L/s, which is 6% of its rated capacity of 8.1 L/s based on peak flow and hydra model results.

4.2.8 Sewage Pumping Station No. 8 – Tudhope Park

Due to the limited catchment area for this pump station there was insufficient wastewater flow available to conduct a draw-down test.

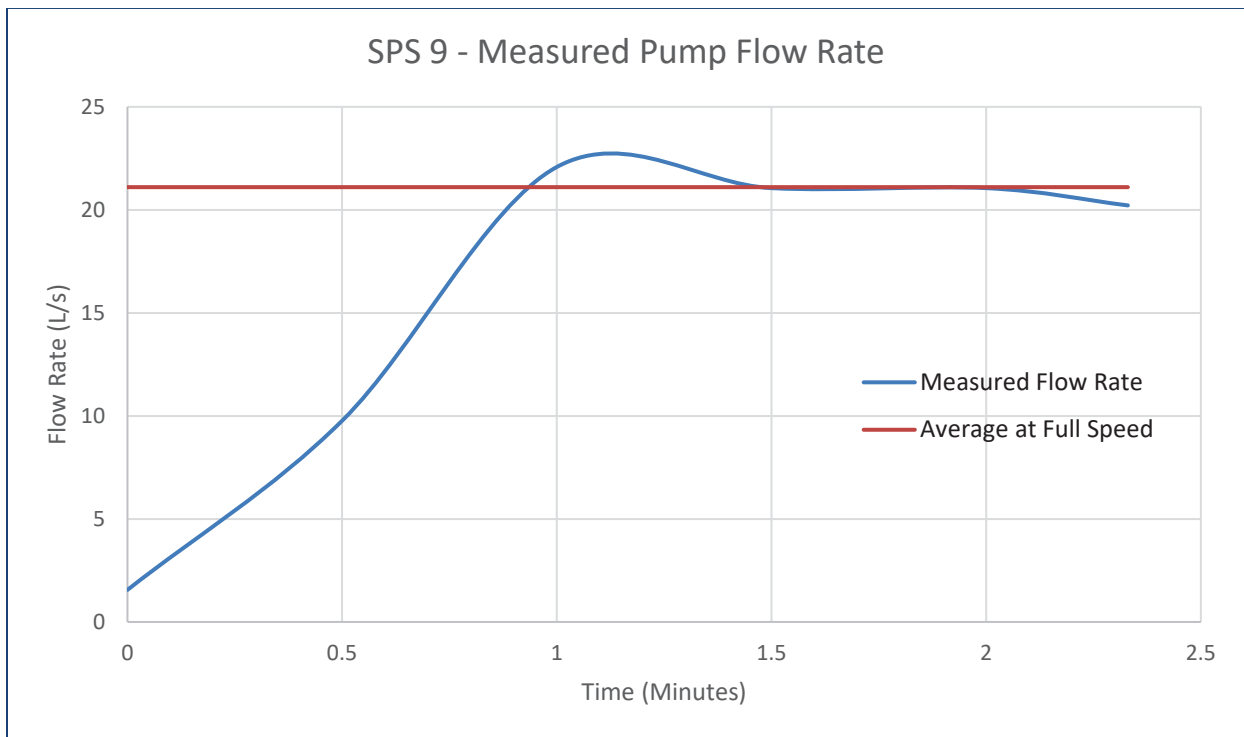
The 2013 Master Plan update assessed that this station operated at 36% and 4% of its rated capacity (14.2 L/s) based on peak flow (5.1 L/s) and the 2012 Hydra model results (0.6 L/s), respectively

4.2.9 Sewage Pumping Station No. 9 – Commerce Drive

A wet-well draw down test was conducted at SPS 9. The influent flow rate was measured to be 1.5 L/s on average over a 15-minute time interval. The discharge flow rate was measured to be 21.1L/s with one pump in operation. The discharge flow rate was measured while the pump was operating at full speed on a constant speed drive. The pump rated capacity listed in the ECA is 20 L/s. The results of the draw-down test are shown graphically in Figure 10.

The 2013 Master Plan update indicates that this station operated at 29% and 12% of its rated capacity (36.1 L/s) based on peak flow (10.6 L/s) and the 2012 Hydra model results (4.3 L/s), respectively.

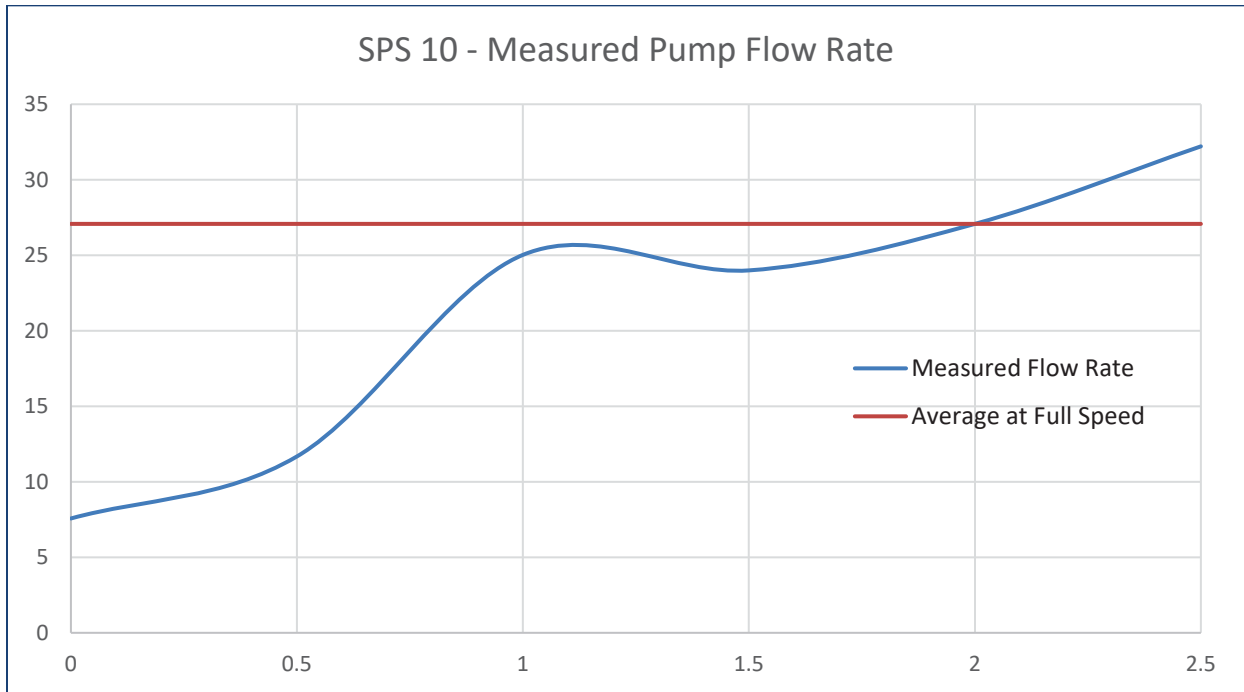
Figure 10 – SPS 9 Draw-Down Test Results



4.2.10 Sewage Pumping Station No. 10 – Victoria Crescent

A wet-well draw down test was conducted at SPS 10. The influent flow rate was measured to be 24.6 L/s on average over a 2.5-minute time interval. The discharge flow rate was measured to be 27L/s with one pump in operation. The discharge flow rate was measured while the pump was operating at full speed on a constant speed drive. The ECA lists a design flow rate for the pumps at this station as 11.36L/s at 10.76m TDH. Based on the findings of the flow test, the TDH seen by the pumps at this station is significantly lower than 10.76m, resulting in the pumps producing a much greater discharge flow rate. The results of the draw-down test are shown graphically in Figure 11.

Figure 11 – SPS 10 Draw-Down Test Results



The 2013 Master Plan update indicates that this station operated at 61%, 83% and 45% of its rated capacity (11.4 L/s) based on peak flow (7.0 L/s), Flo-tote results (9.5 L/s) and 2012 Hydra model results (5.1 L/s), respectively.

4.2.11 Sewage Pumping Station No. 11 – Shannon Street

A wet-well draw down test was conducted at SPS 11. The influent flow rate was measured to be 9.4 L/s on average over a 3-minute time interval. The discharge flow rate was measured to be 18.8L/s with one pump in operation. The discharge flow rate was measured while the pump was operating at full speed on a constant speed drive. The pump did not reach the full capacity of 28.5 L/s at 4.7m TDH as identified in the ECA, suggesting some fouling in the forcemain, however, the discrepancy may be due to the imprecise nature of the measurement methodology. The results of the draw-down test are shown graphically in Figure 12.

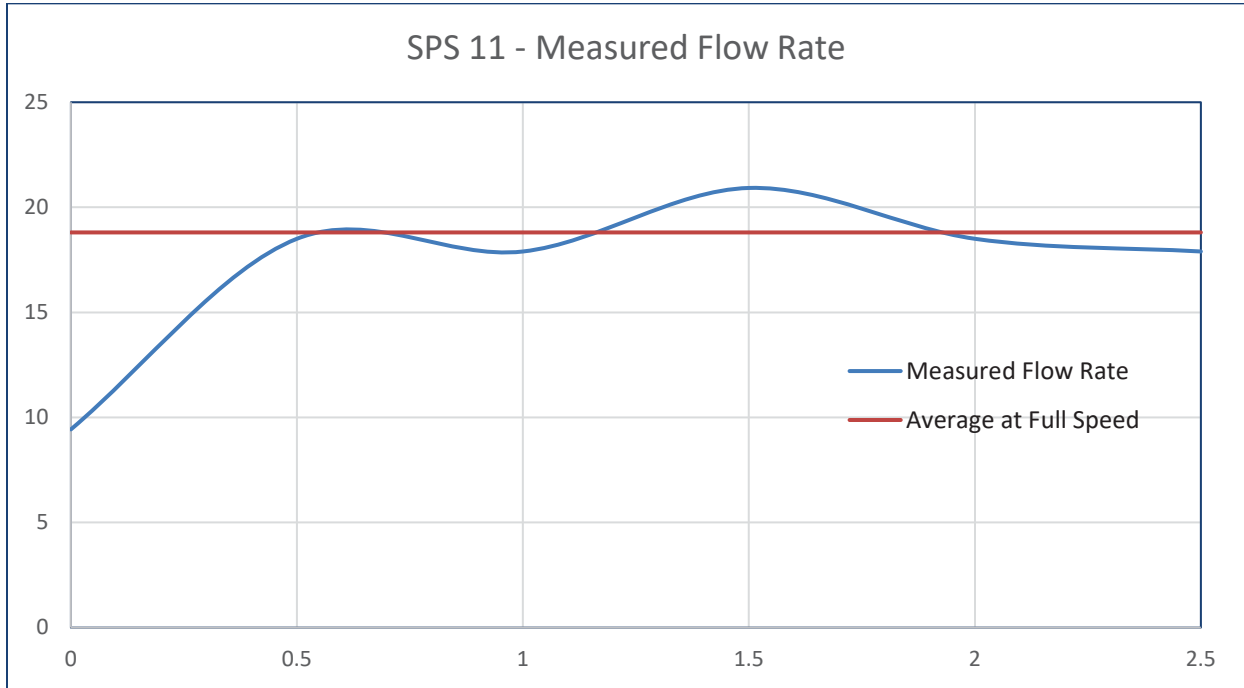
The 2013 Master Plan update indicates that this station operated at 64%, 65% and 22% of its rated capacity based on peak flow (14.6 L/s), Flo-tote results (14.8 L/s) and the 2012 Hydra model results (5.1 L/s) respectively.

4.2.12 Sewage Pumping Station No. 12 – Fittons Road East

The controls for this station were located within a confined space. As a result, a draw-down test was not conducted at this station.

The 2013 Master Plan update indicates that this station operated at 23% and 16% of its rated capacity (15.8 L/s) based on peak flow (3.6 L/s) and the 2012 Hydra model results (2.5 L/s), respectively

Figure 12 – SPS 11 Draw-Down Test Results

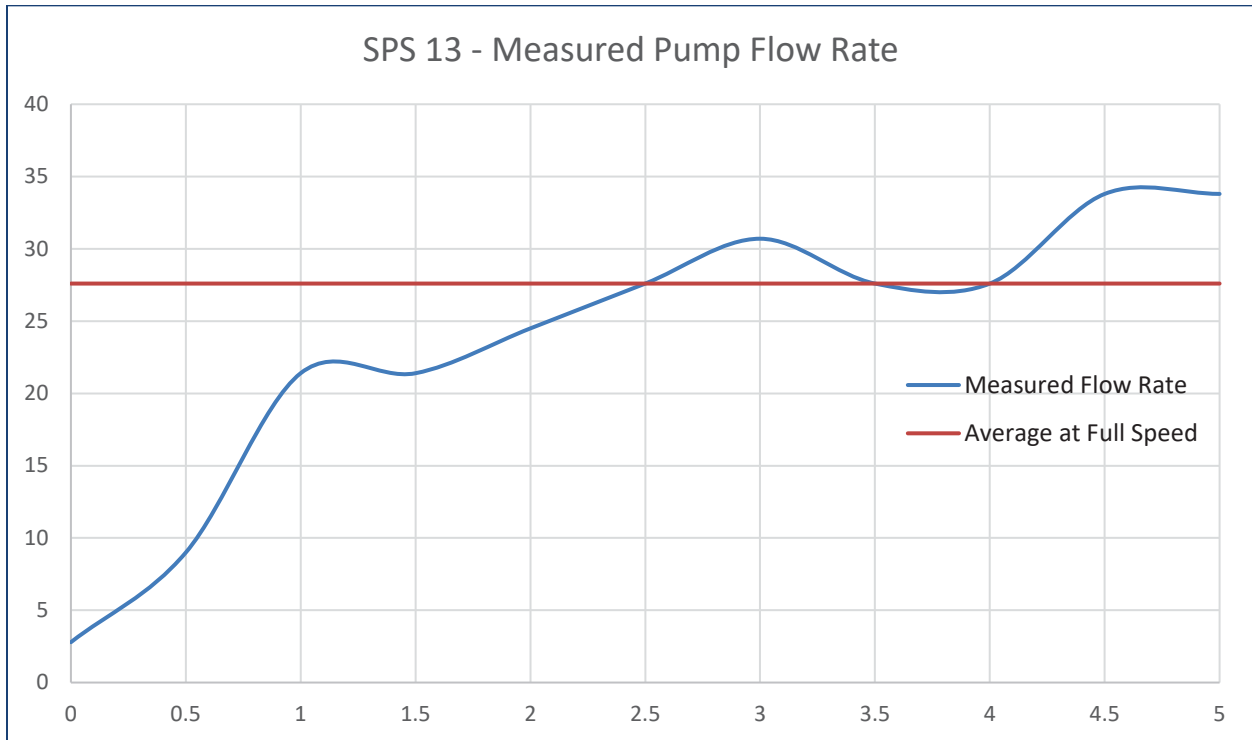


4.2.13 Sewage Pumping Station No. 13 – Bridget & Maple

A wet-well draw down test was conducted at SPS 13. The influent flow rate was measured to be 2.8 L/s on average over a 5-minute time interval. The discharge flow rate was measured to be 27.6L/s with one pump in operation. The discharge flow rate was measured while the pump was operating at full speed on a constant speed drive. The pump did not reach the full capacity of 35 L/s at 14.0m TDH as identified in the ECA, suggesting some fouling in the forcemain, however, the discrepancy may be due to the imprecise nature of the measurement methodology. The results of the draw-down test are shown graphically in Figure 13.

The 2013 Master Plan update indicates that this station operated at 23% and 14% of its rated capacity based on peak flow (8.0 L/s) and the 2012 Hydra model results (4.8 L/s) respectively.

Figure 13 – SPS 13 Draw-Down Test Results



4.2.14 Sewage Pumping Station No. 14 – Forest Avenue North

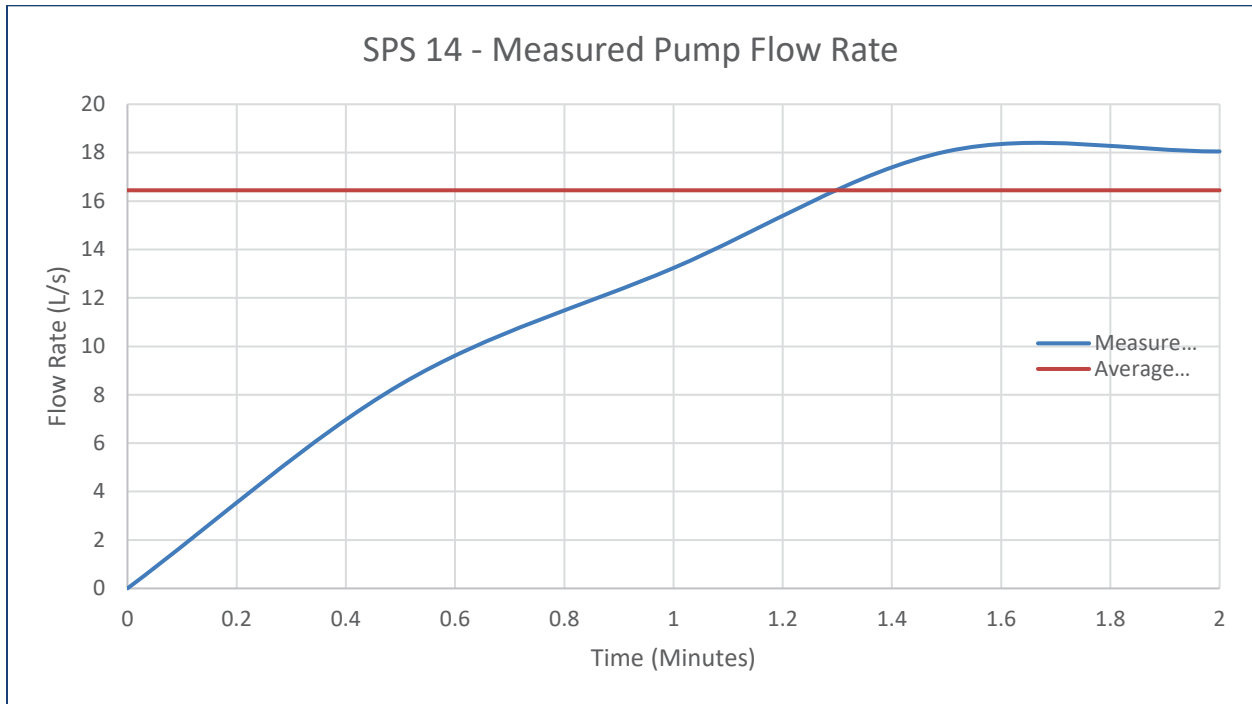
A wet-well draw down test was conducted at SPS 14. The influent flow rate was negligible, with no appreciable change in volume witnessed over a 10-minute interval. The discharge flow meter measured a discharge flow rate of 17.55L/s. The discharge flow rate was measured to be 20 L/s with one pump in operation based on the drawdown test analysis. The discharge flow rate was measured while the pump was operating at full speed on a constant speed drive. The results of the draw-down test are shown graphically in Figure 14. The pump achieved its rated capacity of 20.9 L/s as cited in the SPS’s ECA (a TDH is not cited in the ECA)

The 2013 Master Plan update indicates that this station operated at 8% and 4% of its rated capacity (14.2 L/s) based on peak flow (1.1 L/s) and the 2012 Hydra model results (0.6 L/s) respectively.

4.2.15 Sewage Pumping Station No. 15 – James Street West

This station is a stormwater pumping station and was not included in this Wastewater Servicing Master Plan.

Figure 14 – SPS 14 Draw-Down Test Results



4.2.16 Sewage Pumping Station No. 16 – Forest Avenue South

The Forest Avenue South pumping station is not equipped with a digital water level read-out. As a result, a reliable draw-down test could not be conducted.

The 2013 Master Plan update indicates that this station operated at 56% and 45% of its rated capacity (18.9 L/s) based on peak flow (10.5 L/s) and 2012 Hydra model results (8.5 L/s) respectively.

4.2.17 Sewage Pumping Station No. 17 – Collins Drive

The Collin’s Drive pumping station is not equipped with a digital water level read-out. As a result, a reliable draw-down test could not be conducted.

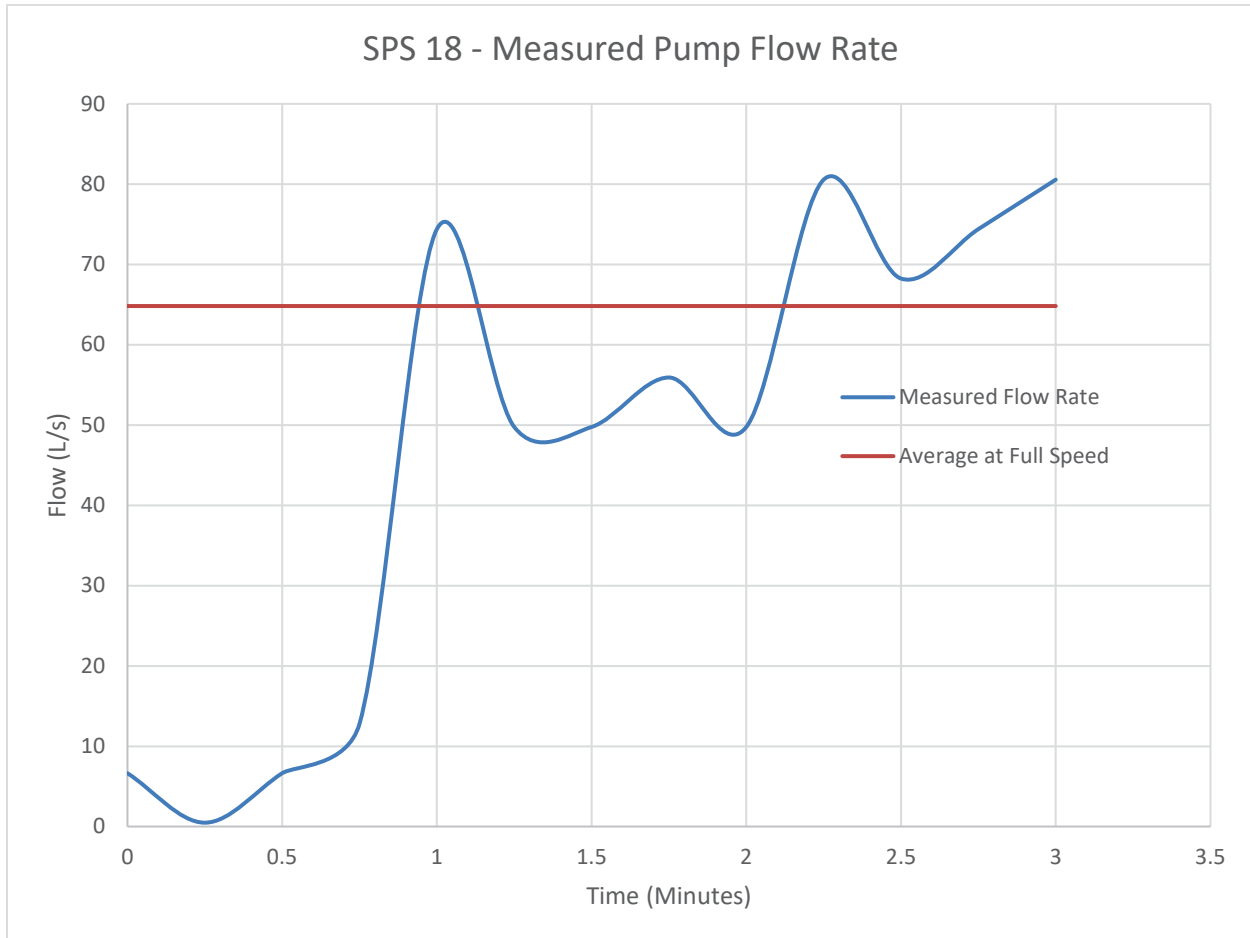
The 2013 Master Plan update indicates that this station operated at 13% and 11% of its rated capacity (6.3 L/s) based on peak flow (0.8 L/s) and the 2012 Hydra model results (0.7 L/s), respectively.

4.2.18 Sewage Pumping Station No. 18 – Fittons Road West

A wet-well draw down test was conducted at SPS 18. The influent flow rate was measured to be 6.6 L/s on average over a 9-minute time interval. This is a 3-pump system. With one pump in operation, the discharge flow rate was measured to be 44.75L/s. This discharge flow rate was measured while the pump was operating at full speed on a VFD. The firm capacity of a 3-pump SPS is the flow developed with the two smallest pumps operating simultaneously. The drawdown test with two pumps running simultaneously produced a flow of 64.8 L/s.

The ECA does not provide the firm capacity of this SPS, but states that each of the three pumps have a capacity of 41 L/s (no TDH is listed in the ECA). Based on the results of the drawdown test, the capacity of this pump station is 64.8 L/s. The results of the draw-down test are shown graphically in Figure 15.

Figure 15 – SPS 18 Draw-Down Test Results

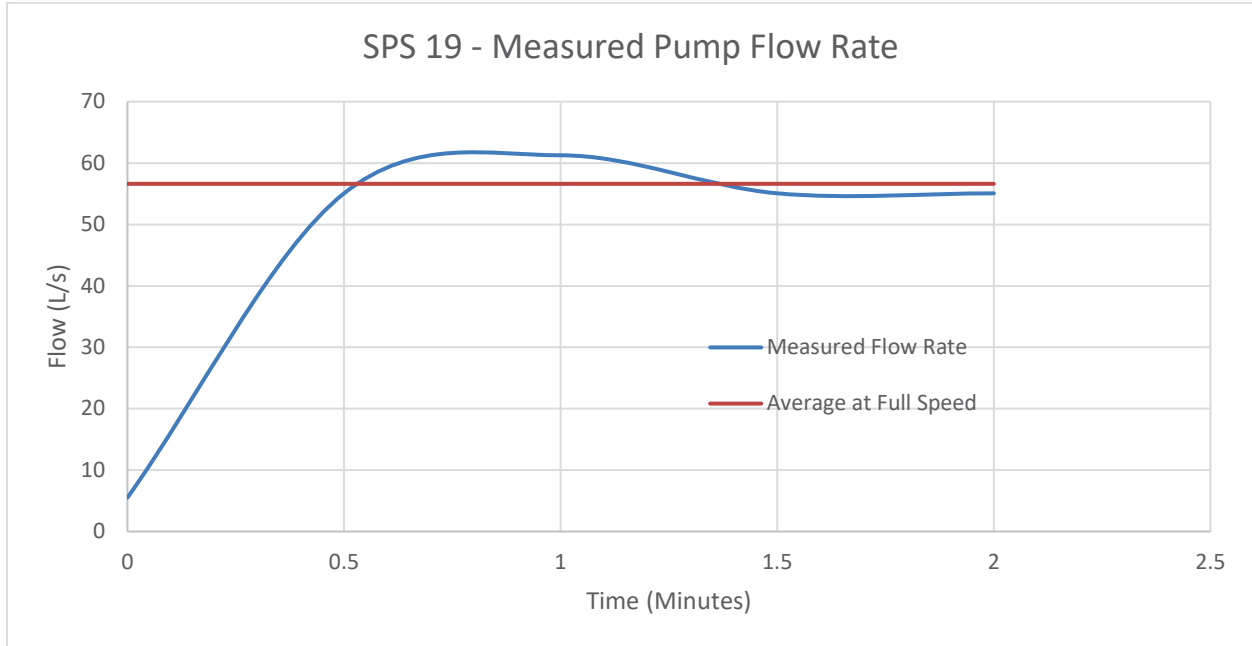


4.2.19 Sewage Pumping Station No. 19 – John Street

A wet-well draw down test was conducted at SPS 19. The influent flow rate was measured to be 5.5L/s on average over a 3-minute time interval. The discharge flow rate was measured to be 56.6L/s with one pump in operation. The discharge flow rate was measured while the pump was operating at full speed on a constant speed drive. The ECA lists a design flow rate for the pumps at this station as 45/s at 41m TDH. Based on the findings of the drawdown test, the TDH seen by the pumps at this station is lower than 41m, allowing the pumps to produce a much greater discharge flow rate. The results of the draw-down test are shown graphically in Figure 16.

The 2013 Master Plan update indicates that this station operated at 49%, 18% and 40% of its rated capacity (59.3 L/s) based on peak flow (29.1 L/s), Flo-tote results (10.7 L/s) and 2012 Hydra model results (23.6 L/s), respectively.

Figure 16 – SPS 19 Draw-Down Test Results

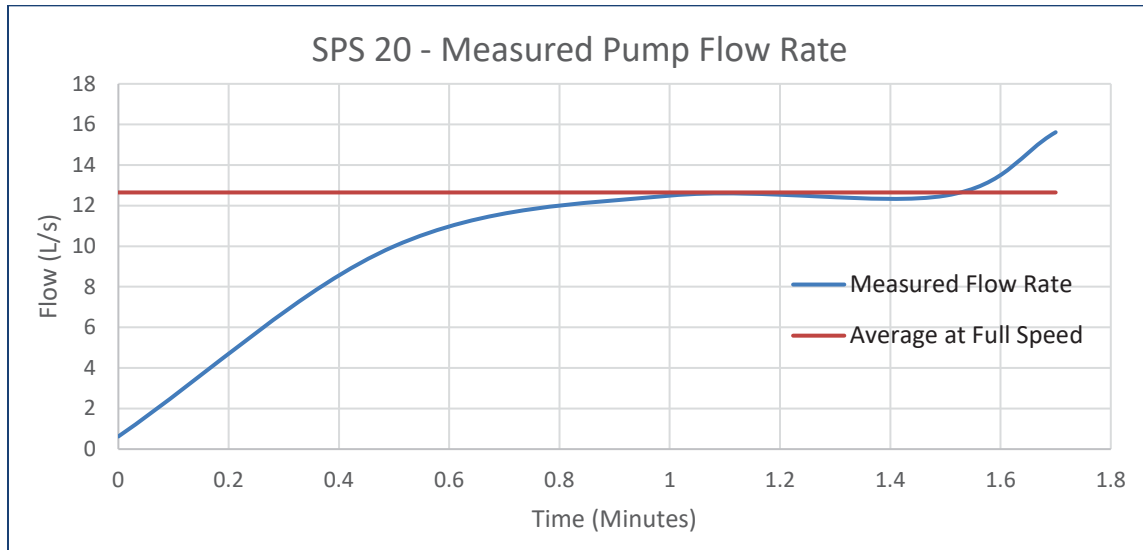


4.2.20 Sewage Pumping Station No. 20 – Broadview

A wet-well draw down test was conducted at SPS 20. The influent flow rate was measured to be 0.62L/s on average over a 16-minute time interval. The discharge flow rate was measured to be 12.6L/s with one pump in operation. The discharge flow rate was measured while the pump was operating at full speed on a constant speed drive. The operations manual lists a design flow rate for the pumps at this station as 7.88L/s at 3.38m TDH. Based on the findings of the flow test, the TDH seen by the pumps at this station is slightly lower than 3.38m, allowing the pumps to produce a greater discharge flow rate. The results of the draw-down test are shown graphically in Figure 17.

The 2013 Master Plan update indicates that this station operated at 14% and 9% of its rated capacity (7.9 L/s) based on peak flow (1.1 L/s) and the 2012 Hydra model results (0.7 L/s), respectively.

Figure 17 – SPS 20 Draw-Down Test Results



4.2.21 Sewage Pumping Station No. 21 – Cedarmere Road

This station was decommissioned since the time of the 2013 WWSMP update.

4.2.22 Sewage Pumping Station No. 22 – Westmount Drive

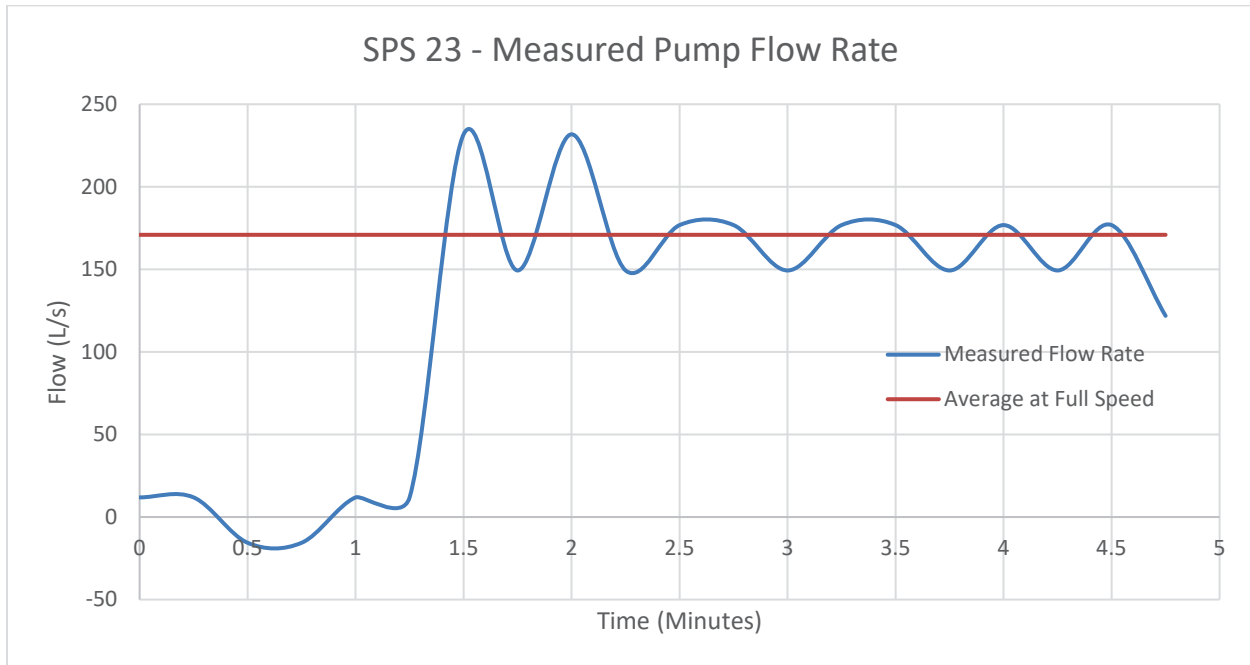
Due to the limited catchment area for this pump station, there was insufficient wastewater flow available to conduct a draw-down test.

The 2013 Master Plan update indicates that this station operated at 10% and 3% of its rated capacity (3.0 L/s) based on peak flow (0.3 L/s) and the 2012 Hydra model results (0.1 L/s), respectively.

4.2.23 Sewage Pumping Station No. 23 – Champlain

A wet-well draw down test was conducted at SPS 23. The influent flow rate was measured to be 11.9L/s on average over a 15-minute time interval. SPS 23 is a three-pump station, and the firm capacity would be that achieved by two smaller pumps running and the largest pump out of service. With one pump in operation, the discharge flow rate was measured to be 77 L/s. This discharge flow rate was measured while the pump was operating at full speed on a VFD. With the two smallest pumps operating, the flow developed was 170.9 L/s. It should be noted that the firm capacity cited in this SPS’s CofA is 360 L/s. However, the City advised that 360 L/s would be the capacity with four pumps installed. Per the results of the drawdown test, the capacity of SPS 23 is be 170.9 L/s. The results of the draw-down test are shown graphically in Figure 18.

Figure 18 – SPS 23 Draw-Down Test Results



4.2.24 Sewage Pumping Station No. 24 – Leacock

Drawings for this station were not available at the time of the draw-down test. As a result, flow volumes in the wet well for the draw down test could not be produced at this time.

The 2013 Master Plan update does not include this station.

4.2.25 Inch Farm Pumping Station

There is a development proposed for the Inch Farm area that received an approved site plan in 1989. The developer performed a Class EA in 2012 for the SPS needed to service Inch Farm area, adjacent developable lands, Smart Centres, and a business park that is owned by the City. There has been no notable progress since then, so the City has embarked on a Class EA for a temporary pumping station to service the Smart Centres and the City’s business park. When the Inch Farm development is completed, the temporary SPS will be replaced by a permanent Inch Farm SPS, which will become a City asset after construction.

As this pumping station is being addressed in a separate Class EA, it has not been incorporated in this WWSMP evaluations.

4.2.26 Old Barrie Road Pumping Station (Future)

Sanitary servicing will need to be extended to Old Barrie Road East and Line 15 North in order to collect wastewater from the business park/ industrial area at this intersection. Based on planning projections, a peak flow of 15.9 L/s is anticipated from development in this area. A 25% design safety factor has been assumed for the design of a local pumping station (assume 20 L/s design) in order to transmit collected wastewater to the existing sewer on University Avenue. The

connection will require a forcemain approximately 620m in length. A 150mm diameter forcemain has been assumed.

4.2.27 Woodland Drive Pumping Station (Future)

Sanitary servicing will need to be extended to service the institutional area on Woodland Drive, south-east of Memorial Avenue. Based on planning projections, a peak flow of 6.2 L/s is anticipated from development in this area. A 25% design safety factor has been assumed for the design of a local pumping station (assume 8 L/s design) in order to transmit collected wastewater to the existing sewer on Memorial Avenue.

4.3 Summary of Sewage Pumping Station Capacity

The results of the drawdown tests performed are summarized in Table 17 below.

Of the ten pumping stations tested, the pumps at SPS 2, SPS 10, SPS 18, SPS 19, and SPS 20 showed a notable higher capacity than cited in the ECA potentially due to the actual total dynamic head (TDH) being lower than the rated TDH or information in the ECA being out of date.

The pumps at SPS 5, SPS 11, SPS 13, and SPS 14 did not achieve the capacity as listed in the ECA. This could have been due to fouling in the system or the inherent inaccuracy of the test method or a combination of these. SPS 18 (Fittons Road West) and SPS 23 (Champlain) are both triplex stations, however, the drawdown tests were done with only one pump in operation. As a result, the capacities from the drawdown tests are lower than the firm capacity of these two pumping stations.

Table 17 – Results of SPS Drawdown Tests

SPS	Pump Capacity per SPS ECA	Drawdown Test Discharge Flow Rate	Difference
	L/s	L/s	%
SPS 2 – Bayview Parkway	70	144	106%
SPS 5 – Couchiching Point	42.3	34.4	-19%
SPS 9 – Commerce Drive	20	21.1	6%
SPS 10 – Victoria Crescent	11.36	27	138%
SPS 11 – Shannon Street	28.5	18.8	-34%
SPS 13 – Bridget & Maple	35	27.6	-21%
SPS 14 – Forest Avenue North	20.9	17.55	-16%
SPS 18 – Fittons Road West	41 ¹	64.8	N/A ¹
SPS 19 – John Street	45	56.6	26%
SPS 20 – Broadview	7.88 ²	12.6	60%
SPS 23 – Champlain	360 ³	170.9	N/A ³

SPS	Pump Capacity per SPS ECA	Drawdown Test Discharge Flow Rate	Difference
	L/s	L/s	%

¹ECA for SPS 18 states that the capacity of one pump is 41 L/s (650 USGPM), but not a firm capacity for this triplex SPS.

²Capacity not stated in ECA. Listed capacity is from the O&M.

³ECA for SPS 23 states the firm capacity is 360 L/s. However, the City advises that 360 L/s is the capacity with four pumps.

Using the Hydra model and flow projections for the 30-year study period, the required capacity of each SPS was determined for year 2049 flows. Table 18 below presents the current firm capacity of each SPS, as listed in their ECA, and the required capacity in year 2049, per the results of the updated Hydra model for each pumping station.

Figure 19 presents the updated system map with sewers, pump stations, the WWTC, and current and future required sewer and SPS upgrades

Table 18 – Required SPS Capacity in Year 2049

SPS	SPS Current Firm Capacity (L/s)	2049 Peak Day Flow (L/s)	2049 Peak Instantaneous Flow (L/s)
SPS 1 – James Street	1263	751	1,027
SPS 2 – Bayview Parkway	70	15.7	33.1
SPS 3 – Couchiching Park	4.3	0.9	1.7
SPS 4 – Elgin Street	41	2.5	4.7
SPS 5 – Couchiching Point	42.3	13.1	19.2
SPS 7 – Royal Oak	8.0 ¹	0.1	0.2
SPS 8 – Tudhope Park	14.2	0.3	0.5
SPS 9 – Commerce Drive	20	3.1	6.2
SPS 10 – Victoria Crescent	11.36	1.5	3.2
SPS 11 – Shannon Street	28.5	6.2	8.2
SPS 12 – Fittons Road East	3.6	0.8	1.8
SPS 13 – Bridget & Maple	35	7.7	19.5
SPS 14 – Forest Avenue North	20.9	0.2	2.8
SPS 16 – Forest Avenue South	10.5	2.8	5.7
SPS 17 – Collins Drive	6.3	0.6	0.9
SPS 18 – Fittons Road West	64.8 ²	14.7	28.6
SPS 19 – John Street	45	6.6	13.4

SPS	SPS Current Firm Capacity (L/s)	2049 Peak Day Flow (L/s)	2049 Peak Instantaneous Flow (L/s)
SPS 20 - Broadview	7.88*	0.2	0.50
SPS 22 – Westmount Drive South (Ridge Road)	2.71	0.01	0.03
SPS 23 - Champlain	170.9 ³	128.8	250.1
SPS 24 - Leacock	23.0	3.8	5.1
SPS 25 – Old Barrie Road E. (Future)	N/A	TBD	20.0
SPS 26 – Woodland Dr. (Future)	N/A	TBD	6.2

¹Per SPS operating and maintenance manual

²This is a 3-pump SPS. The ECA does not state the firm capacity for SPS 18. Capacity listed above is the result of the drawdown test.

³ The ECA does not state the correct firm capacity for SPS 23. Capacity listed above is the result of the drawdown test.

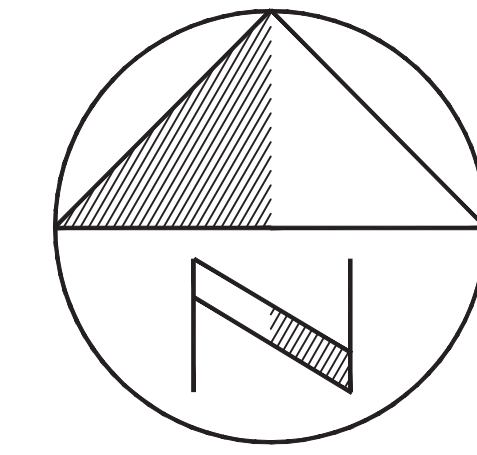
The model results indicate that all of the pumping stations, with the exception of SPS 23, have sufficient capacity to handle the projected future flows. SPS 23 is designed to accommodate a fourth pump, which will need to be installed in approximately 2046 to meet the projected future flow requirements.

Since these capacity assessments were performed, a few development scenarios for SPS #18 that were unknown or inactive at the time became active. As a result, the projected future flow (2049 Peak Instantaneous Flow in Table 18) for SPS #18 will be affected.
















The City has embarked on a separate assignment to establish the future flows that will result from the new development scenarios in order to identify the future required capacity for SPS #18.

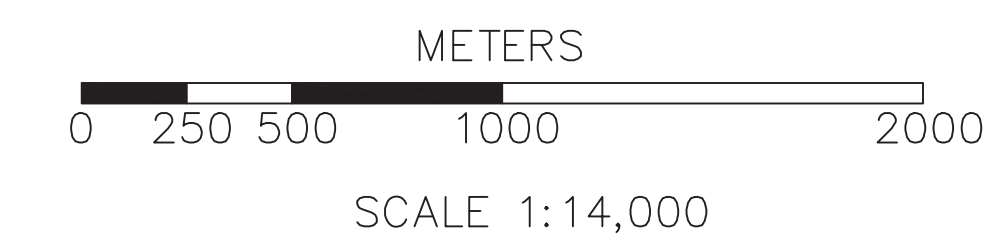
CITY OF ORILLIA WASTEWATER MASTER PLAN

WASTEWATER COLLECTION SYSTEM NEEDS



LEGEND

-  Orillia Settlement Area Boundary
-  Built Boundary
-  Neighbourhood Greenfield – 172.4 Ha
-  Business Park/Industrial – 104.1 Ha
-  Light Industrial Services – 13.3 Ha
-  Major Institutional – 74.1 Ha
-  Community Commercial – 8.2 Ha
-  Arterial Commercial – 3.15 Ha
-  Downtown Area – 42.7 Ha
-  Wastewater Treatment Center
-  Sanitary Sewers
-  Sanitary Forcemain – Upgrades Required for Future Development
-  Pumping Station
-  Pumping Station – Upgrades Required for Future Development
-  Sanitary Sewers – Potential Upgrades Required for Current Flows(field verification required)



MAP PREPARED BY: LK
AINLEY GROUP
MAP CHECKED BY: SG
AINLEY GROUP

APRIL 01, 2021

4.4 Wastewater Treatment Centre Capacity Assessment

4.4.1 Flows and Effluent Limits

4.4.1.1 Raw Sewage Flows

Historical WWTC data (2013-2018) indicates that the WWTC is operating at an average day flow of 14,736 m³/d and a peak day flow of 48,215 m³/d. Per the WWTC’s Environmental Compliance Approval (ECA), the plant has a rated capacity of 27,300 m³/d. The current average daily flow is 54% of the plant’s rated capacity. Based on the flow projections discussed previously, the 30-year flow projection indicates that the Orillia WWTC would receive a total ADF of 21,625 m³/d by the year 2049, which is within the WWTC’s current rated capacity. The projected peak day flow is 70,280 m³/d, which is also within the plant’s rated peak flow.

4.4.1.2 Effluent Requirements

The Orillia WWTC is required to meet the effluent limits set by the MECP in the ECA at all times throughout the year. The current effluent limits set forth in the WWTC’s ECA are presented in Table 19 below.

Table 19 - Current Effluent Limits

Parameter	Average Concentration (mg/L)	Average Loading (kg/yr)
CBOD ₅	15 (monthly)	-
Total Suspended Solids	15 (monthly)	-
Total Phosphorus	0.18 (annual) ²	996 ¹
pH	Maintained within 6.0 – 9.5 inclusive, at all times	
<i>E. Coli</i>	< 200 organisms/ 100 mL (<i>Geometric Mean Density</i>)	

¹Lake Simcoe Phosphorus Reduction Strategy Effluent Limit

²Lake Simcoe Phosphorus Reduction Strategy Effluent Limit for Total Phosphorus is 0.10 mg/L.

Based on the review of the WWTC’s historical performance data, the WWTC has been consistently achieving all effluent limits mandated in the ECA. Table 20 below shows the average effluent concentrations achieved by WWTC between 2014-2018.

Table 20 – Historical Effluent Characteristics (2014-2018)

Parameter	Average Concentration (mg/L)
CBOD ₅	3.5 (monthly)
Total Suspended Solids	4.0 (monthly)
Total Phosphorus	0.08 (annual)
pH	Maintained within 6.0 – 9.5 inclusive, at all times

Parameter	Average Concentration (mg/L)
<i>E. Coli</i>	< 9.2 organisms/ 100 mL (<i>Geometric Mean Density</i>)

The effluent objectives listed in the WWTC’s ECA are shown in Table 21 below.

Table 21 - Current Effluent Objectives

Parameter	Objective (mg/L)
CBOD ₅	10 (monthly average)
Total Suspended Solids	10 (monthly average)
Total Phosphorus	0.1 (monthly average) ¹
Total Ammonia Nitrogen (TAN)	13 mg/L (June 1 – Oct. 31) 17 mg/L (Nov. 1 – May 31)
<i>E. Coli</i>	100 CFU/100 mL
pH	6.5 – 8.5 inclusive

¹Lake Simcoe Phosphorus Reduction Strategy Effluent Limit for Total Phosphorus is 0.10 mg/L.

While there is not an effluent limit for TAN set for the WWTC, there is an objective of 13 mg/L in the summer months (June 1 to Oct. 31) and 17 mg/L in the winter months (Nov. 1 to May 31). An effluent objective is a level that the facility is to attempt to reach through the existing system, operational optimizations, etc., but is not legally required to achieve. Effluent limits are levels that a WWTP is legally required to consistently achieve and are set at higher values than objectives.

When a TAN effluent limit is set for the Orillia WWTC, the plant’s performance should be reviewed at that time to assess whether or not modifications will be needed to achieve those limits.

The plant currently measures effluent total Kjeldahl nitrogen (TKN) concentration. Since TKN measures ammonia nitrogen plus organic nitrogen, it is expected that TAN concentrations in the effluent are lower than the TKN levels. The WWTC’s historical performance in terms of effluent TKN is summarized in Table 22 below.

Table 22 - Historical Effluent TKN Concentration (2014-2018)

Year	TKN Concentration in WWTC Effluent (mg/L)			
	Summer (Jun 1 – Oct 31)		Winter (Nov 1 – May 31)	
	Average	Max	Average	Max
2014	1.48	2.17	10.76	17.88
2015	8.90	13.7	9.55	16.12

Year	TKN Concentration in WWTC Effluent (mg/L)			
	Summer (Jun 1 – Oct 31)		Winter (Nov 1 – May 31)	
	Average	Max	Average	Max
2016	9.90	19.63	10.28	15.53
2017	1.78	2.36	7.75	12.65
2018	5.98	8.33	10.36	14.03

The data shows that historical average effluent TKN levels have consistently been below the TAN objectives in both the summer and winter months. There were four instances over the five-year period where the TKN levels were greater than the TAN objectives, with the highest reading being 19.63 in July 2016.

Based on the plant’s effluent levels of TKN and using that as a metric for effluent TAN concentrations, the plant seems to be achieving the current TAN objectives and is likely to meet future TAN effluent limits since those will likely be higher than the current objectives. As noted previously, once a TAN effluent limit is set, the WWTC’s performance should be reviewed in light of those limits to assess whether upgrades will be required.

4.4.2 Orillia WWTC

4.4.2.1 Headworks

The inlet works consists of two aerated grit tanks for grit removal, and two manually raked bar screens. The grit removal tanks are each 10.7 m x 4.9 m x 4.3 m SWD and aeration is provided by two rotary lobe blowers. Accumulated grit in the system is removed by vacuum truck. Two (2) aerated grit tanks provide a total volume of 451 m³ which corresponds to a detention time of 9 minutes at a peak flow rate of 72,700 m³/d. Per MECP design guidelines for sewage works, the detention time in the aerated grit tanks should be between 2-5 minutes at peak hourly flows. The longer detention time provides additional benefit in the form of pre-aeration. The grit tanks have sufficient capacity to handle projected future raw sewage flows.

The blower capacity was unknown at the time of writing this report. Per MECP design guidelines for sewage works, air supply for each grit tank should be between 4.7 to 12.4 L/(m.s).

4.4.2.2 Primary Clarifiers

Primary treatment at the WWTC is accomplished by three circular clarifiers: one clarifier measuring 18.2m in diameter with 3.3m SWD, and two clarifiers each measuring 22m in diameter with 4.6 SWD. MECP design guidelines recommend surface loading rates between 30-50 m³/(m².d) for average flows and 80-120 m³/ (m².d) for peak flows. The primary clarifiers at the WWTC have sufficient capacity to treat a plant ADF of approximately 35,715 m³/d ADF (at a 35 m³/m²/d surface overflow rate) and 81,633 m³/d peak flow (at 80 m³/m²/d surface overflow rate). The primary clarifiers are sized adequately to treat the current and projected future flows.

4.4.2.3 Secondary Treatment (Aeration System)

The aeration tanks are hydraulically designed to handle a peak hourly flow of 89,000 m³/d. New blowers (3 blowers, total: 2 duty, 1 standby) to be installed under the current upgrades will have a total capacity of 14,000 m³/hr (each blower 7,000 m³/hour @ 53.8 kPa). Secondary treatment equipment is adequately sized for current and projected future flows to the WWTC.

4.4.2.4 Secondary Clarifiers

The plant has a total of five secondary clarifiers that provide a combined total surface area of 2,172 m². The clarifiers provide treatment for a peak flow rate of 80,364 m³/d based on the MECP guideline of 37 m³/m²/d maximum for surface overflow rate. The clarifiers are adequately sized to handle current and projected future flows to the WWTC.

4.4.2.5 Tertiary Treatment

The tertiary treatment at the plant consists of a Tertiary Filter Lift Station and two tertiary cloth filters; the pump station and the filtration units are each rated for an average day flow rate of 27,300 m³/d and a peak flow rate of 89,000 m³/d. Each filtration unit is equipped with a filter backwash pump for cleaning the cloth disks. Filter backwash and reject is pumped to the aerated girt chambers.

This system was installed and commissioned in 2019/2020 in response to the Lake Simcoe Phosphorus Reduction Strategy.

The tertiary treatment system has been sized for current and future flows to the WWTC and no capacity upgrades are required.

4.4.2.6 Chemical Dosing

The plant utilizes skid-mounted three pump system alum addition process for phosphorus removal. One pump is dedicated for the aeration system, one pump dedicated to the primary clarification system and one stand-by pump that will be used for dosing the planned tertiary filtration system. The new pumps have a design flow rate of 101 L/hr. Chemical dosing is sufficiently sized for current and future raw sewage flows.

4.4.2.7 Sludge Pumping

An activated sludge pumping station for return activated sludge (RAS) and waste activated sludge (WAS) pumps the settled sludge from the secondary clarifiers to the dissolved air flotation thickener (DAF). RAS pumping is achieved by means of three non-clog pumps, each driven by 30 kW motors with VFD controls. The capacity of the RAS pumps was unknown at the time of writing this report. Since the plant is undergoing an upgrade, it is expected that the sizing of the RAS pumps have been reviewed as part of the upgrades and are sufficiently sized for the aeration tanks, which have been sized to accommodate future raw sewage flows at the WWTC.

WAS from the secondary clarifier is thickened in the DAF tank and discharged to the primary digester. A WAS equalization tank is used to feed the DAF tank. Future flows at the facility are not expected to impact the WAS pumping operation at WWTC.

4.4.2.8 UV Disinfection

The disinfection system consists of a UV disinfection channel equipped with two UV banks installed in series. The UV system is rated for a peak capacity of 72,700 m³/d. The UV disinfection system is sufficiently sized for current and future raw sewage flows.

4.4.2.9 Digester Complex

Per the MECP design guidelines for sewage works, the nominal minimum hydraulic retention time (HRT) in the primary digester should be at least 15 days. The existing digester complex at the WWTC consists of a two-stage anaerobic digestion system. Based on historical plant data from 2014-2018, on average 33,284 m³/year or 91 m³/d of sludge (raw sludge + thickened sludge) is discharged to the primary digester. Maximum month sludge production from 2014 - 2018 is 150 m³/d. Per the MECP design guidelines for sewage works, the digester HRT should be based on maximum month sludge production. Based on maximum month sludge production, the volume of primary digester required to achieve a retention time of 15 days, should be at least 2,250 m³. The existing primary digester has a volume of 1,322 m³ which means it is able to accommodate only 88 m³/d of sludge production to meet 15-day HRT. Based on historical sludge production rates, it can be prorated that sludge production will be 88 m³/d at a raw sewage flow of 14,267 m³/d, which means that the existing primary digester is undersized to operate at its current average flowrate (14,736 m³/d).

By prorating the flows, approximately 220 m³/d (maximum month) of sludge will be generated at the projected future plant average daily flow of 21,625 m³/d. At plant rated capacity (27,300 m³/d), it is estimated that the maximum month sludge production will be 277 m³/d. The prorated sludge generation rate is consistent with the 2008 MECP design guidelines. Per these guidelines, typical sludge generation rate from an activated sludge plant with anaerobic digester (with phosphorus removal) is 220 g of dry solids per cubic meter of treated sewage. Assuming 2.2% solids concentration in the digested sludge (varies from 2-6% per MECP design guidelines); this is equivalent to approximately 273 m³/d of sludge at the plant rated capacity. At plant rated capacity, the existing primary digester will provide a hydraulic retention time of less than 5 days which does not comply with the MECP guidelines. Additional digestion capacity will be required for future wastewater flow to meet 15 days HRT at future plant average daily flow and at plant rated capacity.

Plant operations has noted that the DAF system's performance has been "limited" over the past few years and improvements may be possible through operational controls. If its DAF system's performance is improved, the recommendations in this WWSMP should be revisited in light of any achieved improvement in performance. The results of this capacity assessment indicate that improvements in the DAF system's performance would need to result in a 50% reduction of flow to the digester in order to meet the MECP's design guidelines for HRT. A thicker raw sludge also means more volatile suspended solids (VSS) being transferred to the digester, which will increase the digester's VSS loading rate. VSS loading rate, along with HRT, is a digester design parameter cited in the MECP's design guidelines. The VSS loading rate would also need to be verified for compliance with the MECP's design guideline.

4.4.2.10 Sludge Storage Lagoons

Based on the historical data (2014-2018), on average 33,507 m³ of biosolids are produced annually, which corresponds to 92 m³/d of biosolids production. Available storage volume in the lagoons (24,705 m³) provide storage for approximately 268 days prior to clean out. The storage

available in the secondary digester has not been included in the calculation of available sludge storage capacity since it is negligible.

At the plant’s rated capacity of 27,300 m³/d, approximately 170 m³/d of biosolids will be generated (prorating the flows). The prorated biosolid generation rate is consistent with the 2008 MECP design guidelines. Per these guidelines, typical biosolids generation rate from an activated sludge plant with anaerobic digester (with phosphorus removal) is 150 g of dry solids per cubic metre of treated sewage. Assuming 2.4% solids concentration in the digested sludge (varies from 2-6% per MECP design guidelines), this is equivalent to approximately 170 m³/d of biosolids being discharged to the lagoons. Expected average biosolids generation at various flows is shown in Table 23.

Table 23 - Expected Biosolids Flow from Raw Sewage and Retention Time in Lagoons.

Raw Sewage Flow Rate (m ³ /d)	Biosolids Produced (m ³ /d)	Retention Time in Lagoons (days)
Current Average Daily Flow (14,736 m ³ /d)	92	268
30-year Average Daily Flow (21,625 m ³ /d)	135	183
Plant Rated Capacity (27,300 m ³ /d)	170	145

At the projected 30-year ADF, the lagoons will have capacity to store biosolids for almost 180 days (six months). The *Nutrient Management Act* requires on-site storage for 240 days (8 months) for facilities where land application is the only method of disposal. This eight-month time-frame is based on the requirement for land application to only take place when the ground is not frozen and, with under the most conservative estimate, that would be the four months from May to September. Hence, storage for the remaining eight months of the year is required. As such, the WWTC lagoons do not have sufficient capacity to support the projected 30-year flows. Since the available storage is 180 days, the lagoons will have to be expanded by approximately 8,000 m³ to provide the additional 60 days of storage or alternate arrangements will need to be in place to manage those 60 days’ worth of biosolids production.

4.5 Septage Receiving Station

A septage receiving station (SRS), located at the James Street SPS site, discharges septage to the James Street SPS. The SRS was constructed in 2007 and includes a rock trap, a grinder, an actuated inlet valve, and an auger screen. Grit removal is not provided at the SRS.

In general, the design capacity of an SRS should be sufficient to allow the discharge of approximately 10 m³ (typical size of a haulage truck) in 10 minutes or 1,443 m³/d (16.7 L/s). Therefore, the design flow through the receiving station flow train (including motorized shutoff valve, flow meter and ancillary devices such as grinders) should be a minimum of 16.7 L/s.

During the local festivals/events, the James Street SRS has received hauled waste trucks of capacity of up to 32 m³ (three times the amount of a typical haulage truck). Based on the data provided by the City, it takes approximately 30 minutes to unload a 32 m³ haulage truck, which

corresponds to a flow rate of 1,529 m³/d (17.7 L/s). The James Street SRS is capable of handling a peak flow of 2,160 m³/d or 25.0 L/s (KMK Design Brief, 2006), which is greater than the amount received during festivals. The existing SRS is sized adequately for current flows and has minimal spare capacity to accept additional septage load.

During previous correspondences with the City, it was noted that cleaning of the rock trap is a maintenance issue and operations staff believe the rock trap may be undersized. Typical installations require removal of cover bolts etc. to provide access inside the traps for cleaning. To facilitate rock removal, it is recommended that the design of the rock trap at the SRS be modified to allow for cleaning using vacuum trucks, if feasible. Alternately, a larger rock trap can be installed to reduce the frequency of the cleanings.

4.5.1 Septage Flow

Historical data (2014-2018) indicates that the average flow of septage received at the SRS is approximately 49.5 m³/d as shown below in Table 24.

Table 24 – Flow Data Summary, 2014-2018

Year	Total Annual Flow (m ³)	Average Daily Flow (m ³ /d)
2014	18,112	50.0
2015	18,599	51.0
2016	16,688	46.0
2017	19,980	55.0
2018	16,304	45.0
Average	17,936	49.4

4.5.2 Impact of Septage on WWTC Processes

In 2016, the City conducted a “*Septage and Hauled Receiving Station Proposed Equalization Tank Assessment Study*”, which discussed the impact of septage discharge on the WWTC processes. Recent data (2016-2018) obtained from the City of Orillia, indicates that the current septage flows and characteristics are similar to flows and characteristics used in the 2016 study. Therefore, the recommendations and conclusions of the previous study are applicable. The study concluded the following:

Based on average (2008-2016) septage characteristics, 315 m³/d (3.6 L/s) of septage can be discharged into the WWTC without limiting the liquids train’s capacity at its current WWTC average daily flow of 14,736 m³/d. This translates to approximately 13 m³/h of septage if the WWTC’s flow at the time that the septage is discharged into the WWTC is equal to or greater than its current observed ADF. If WWTC flows are less than its current ADF, the amount of septage that the plant would be able to treat would be proportionately lower.

2019 Update: The 2016 study assumed that the total capacity of the new blowers being installed in the tertiary treatment upgrades would be 12,200 m³/d, which was based on the preliminary design report from CIMA+. Using the current ECA and the updated detailed design brief provided by the City, the actual total capacity of the new blowers is 14,000

m³/d. This blower capacity allows the WWTC treat 400 m³/d (4.6 L/s) and 150 m³/d (1.7 L/s) of septage flow at the current WWTC ADF and future ADF (30 year projected flows), respectively, without negatively affecting the liquids train's treatment capacity. There is a reduction in the amount of septage that can be treated at the future flow compared with current flows because the increased pollutant loadings to the WWTC from a larger population reduces the amount of loading that can be added to the WWTC from septage.

Major bottlenecks for septage treatment at the WWTC include the blower capacity, primary digester capacity (<15 days), coloured effluent (reduced UV intensity), and sludge storage volumes (reduced retention time in Lagoons). To avoid discharging coloured effluent to Lake Simcoe, it is recommended that a dye-free, non-formaldehyde deodorizer be used in portable toilets at the music festivals.

Additional sludge produced from septage will increase the biosolids production and reduce the retention time in the existing lagoons.

2019 Update: Additional biosolids storage capacity to provide 240 days of storage as recommended by the MECP in the lagoons or an alternative method of handling sludge/biosolids will be required if septage is introduced at the 30-year project future flows.

The 2016 study recommended constructing/installing an equalization tank with flow control to transfer septage to the WWTC at a rate that is proportional to the domestic wastewater flows at the WWTC to avoid shock loading to the plant. A Schedule B Class Environmental Assessment (EA) would be required to construct a new equalization tank.

2019 Update: The 2016 recommendation of constructing an equalization tank is still applicable under the WWSMP update since the WWTC will no longer be able to accept the same amount of septage it currently does once wastewater flows to the WWTC reach the 30-year projected ADF. The system will have a higher sensitivity to septage loadings and a method of controlling the rate of septage addition to the WWTC should be implemented such that septage flows are paced with wastewater flows.

A detailed description of the WWTC and septage receiving station capacity assessment findings can be found in **Appendix D**.

4.5.3 Review of the Costs of Treating Septage at the Orillia WWTC

The WWSMP study included an estimation of the costs for treating septage received at the WWTC and a comparison of the City's rate for septage against the fees levied by similar Ontario municipalities as well as a commentary on procedures of similar Ontario municipalities.

The estimated operational cost for the City of Orillia to treat septage is \$12.33/m³. This does not take into account capital infrastructure asset management. Refer to **Appendix E** for details of the estimate.

The City of Orillia levies a fee of \$31.00/m³ for septage received at the SRS and a \$50 fee for card set up or replacement. For comparison, the septage rates of three Ontario cities with similar populations as the City of Orillia as well as the rate used across the Region of Durham are presented in the Table 25 below.

Table 25 – Septage Rates for Similar Sized Ontario Cities

City/Town/Municipality	Septage Rate (per m ³)
Barrie	\$26.00
Peterborough	\$22.77
Sudbury	\$32.00
Region of Durham ¹	\$19.56

¹Standard rate at all Region of Durham wastewater treatment plants that accept septage.

The septage receiving stations at the Barrie, Peterborough, and Sudbury treatment plants incorporate a septage holding/equalization tank and pumps that transfer the septage to the wastewater treatment plant. The Sudbury and Peterborough SRS use a screen, while the City of Barrie uses an in-line grinder and no screen. The Barrie SRS includes an aeration system to minimize odour generation in their equalization tank, while the City of Peterborough use mixers. The treatment plants in the Region of Durham that accept septage (Courtice, Corbett Creek, and Duffin Creek) do not have a septage receiving station. Septage is transferred directly to the plant’s headworks facility. However, it should be noted that these plants have rated capacities of 66,200 m³/d (Courtice), 84,350 m³/d (Corbett), and 630,000 m³/d (Duffin), significantly higher than the Orillia WWTC and, thus, have a larger dilution capability for septage that prevents overloading of the treatment processes at the plants.

The septage holding tank at the Peterborough WWTP’s SRS incorporates pumps that are controlled by the operator through the SCADA system to run for a certain amount of time and frequency, i.e., run for 1 minute every 5 minutes. The septage addition is not paced with wastewater flow received at the plant, however, the operators attempt to set the timings to spread septage transfer over periods of lower wastewater flow to the plant.

At the City of Barrie, septage is dosed over a full day based on the previous day’s volume in the septage holding tank. This volume is discharged to the plant in small, calculated amounts each hour. The septage pumps start and stop automatically. Septage addition is not paced with wastewater flow to the treatment plant.

At the Sudbury WWTP, the pumps in the septage equalization / holding tank operate automatically based on levels in the tank. Septage addition is not paced with wastewater flow to the WWTP.

Some cities have a flow meter and card-reading system to track the amount of septage delivered to the SRS and some cities manually record septage deliveries, i.e. the hauler writes the amount of septage in a log book and is invoiced based on the log.

5 Problem Statement

The 2013 WWSMP update established that the problem statement presented in the original Master Plan was appropriate for the 2013 update. The previous problem statement identified the following major areas of concern:

1. Inflow and infiltration

2. Condition and age of existing sewers
3. Limited capacities of existing trunk sewers
4. Limited capacities of existing sewage pumping stations
5. Limited capacity of the existing Wastewater Treatment Centre
6. Operational issues with the unit processes at the WWTC
7. Quantity and quality of septage received at the WWTC
8. Future biosolids disposal and management
9. Treated effluent discharge quality standards

This update of the WWSMP reviewed the status of each issue identified in the previous update and, due to changes made to the treatment system and evolving conditions within the system as a whole, some of the previous concerns have been addressed, some have been revised, and others still exist.

The following sections describe the updated problem statement and reasoning behind the updates in this WWSMP update.

5.1 Inflow and Infiltration

Inflow and infiltration continue to be an issue for the City's wastewater infrastructure. The previous WWSMP showed that inflow and infiltration resulted in flow to the WWTC being 36% higher than metered water consumption. The flow analysis conducted for this WWSMP update showed that inflow and infiltration flows has been reduced to approximately 31% above the metered water consumption. In a perfectly sealed system, the amount of water going to the wastewater treatment facility would be approximately 20% less than the metered water consumption, due to the fact that not all water usage ends up in the sanitary sewers. For example, water consumed for lawn care or driveway cleanings is collected in the storm sewers not the sanitary sewers.

The issue of inflow and infiltration is retained as part of the problem statement.

5.2 Condition and Age of Existing Sewers

The previous WWSMP update was completed in January 2013 and recommended that 2,950m of sewer be replaced by 2016, 8,504 m be replaced by 2020, and 9,972 m be replaced by 2033. Since the previous update, the City has replaced approximately 3,162 metres of sewer, which is approximately 212 metres more than the amount recommended for replacement by 2016. However, considering that seven years have passed since the previous WWSMP update and it recommended that 8,504m of sewer be replaced within ten years of the update, the City seems to be behind on the recommended replacements as there are approximately 5,342 m yet to be replaced within the next three years.

It is noted that, concurrently with this WWSMP update, the City is having a sewer management plan developed to manage sewer replacements.

This issue is retained as part of the updated problem statement.

5.3 Limited Capacity of the Existing Sewers

Based on the results of the City's Hydra model, all existing sewers have sufficient capacity to handle projected flows to year 2049. No capacity upgrades are needed.

This issue has been removed from the updated problem statement.

5.4 Limited Capacities of Existing Sewage Pumping Stations

A new pumping station will be needed at Old Barrie Road as described previously to support development in that area.

A new pumping station will also be needed at Woodland Drive as described previously to support development in that area.

Additionally, SPS 23 (Champlain) will need to be upgraded to have a fourth pump in order to meeting projected future flows.

This issue has been retained as part of the updated problem statement.

5.5 Limited Capacity of the Solids Treatment Train at the WWTC

The Orillia WWTC is currently operating at approximately 54% of its ECA average rated capacity of 27,300 m³/d. Based on current projections, the WWTC would receive a total of 21,625 m³/d ADF over the next 30 years (by year 2049). The projected flow equates to approximately 79% of the WWTC's rated capacity and corresponds to a population of approximately 51,041 people. The peak day factors currently being experienced by the City are up to 3.25, resulting in a projected peak flow of 70,280 m³/d in year 2049, which is nearing the peak day capacity of the WWTC (72,620 m³/d), but would be still below it.

It is generally suggested that planning for expansion of a wastewater treatment facility begin once ADF flows reach 85% of the plant's rated capacity. The projections in this WWSMP update suggest that ADF flows won't reach 85% of the WWTC capacity until 2050 at the earliest and 2068 at the latest, which means that the facility's liquid treatment train would not need an expansion.

However, the digester complex, while sized appropriately for current flows, does not have sufficient capacity for the WWTC's rated flow. The digesters are currently at capacity and will need to be expanded in the immediate future to provide sludge treatment for any additional flows to the WWTC.

Due to the digester capacity, this issue has been retained part of the updated problem statement, but modified to reflect that it relates only to the solids treatment train.

5.6 Operational Issues with the Unit Processes at the WWTC

Operational issues cited in the 2013 WWSMP update were related to the manually raked bar screen in the headworks, diminishing lagoon capacity due to biosolids accumulation in the lagoons, and SCADA upgrades at the pumping stations to allow remote monitoring, reducing the frequency of going to the stations for status checks.

The state of the manually raked bar screen is unchanged from the previous update. The screens require cleaning twice daily and over the weekends debris builds up on the screens and eventually

bypasses into the primary clarifiers. This situation could result in failure or a reduction in service life of equipment downstream of the primary clarifiers. Upgrade of the bar screen to motorized/mechanically cleaned units is included as a recommendation of the WWTC's condition assessment.

The lagoons have been cleaned out and rehabilitated and this issue has been addressed.

There have been no SCADA upgrades at the pumping stations. Upgrading the stations to have SCADA would allow more immediate feedback on the status of the pumping stations, however, the lack of SCADA at all pumping stations is not seen as a hindrance to the system's functionality.

This concern has been removed from the updated problem statement.

5.7 Quantity and Quality of Septage Received at the WWTC

The capacity of the septage receiving station is adequate to handle current septage flows, including flows from the local festivals. The SRS is designed with sufficient capacity to receive 2,160 m³/d (25.0 L/s) of septage. During festival events, the SRS receives up to 1,529 m³/d (17.7 L/s) of septage. The SRS is operating at 70% of its design capacity. However, the WWTC is unable to withstand the shock-loading associated with large septage deliveries, specifically, septage addition at a rate greater than 4.6 L/s when the WWTC's flow is lower than the current ADF of 14,736 m³/d could lead to process overload.

As previously noted, as domestic wastewater flows to the WWTC increase due to population growth and development, the amount of septage that the WWTC will be able to treat, without causing a system upset, will decrease.

As there is currently no metering of septage flows to the WWTC, at future flows, the SRS has the potential to overload the liquid treatment process and cause the WWTC to exceed its effluent limits. The recommendation of the 2016 "*Septage and Hauled Receiving Station Proposed Equalization Tank Assessment Study*," to construct an equalization tank and meter septage flows to the WWTC to avoid shock-loading of the plant is still applicable.

This issue has been revised to capture future management of septage flows to the WWTC as part of the updated problem statement.

5.8 Future Biosolids Disposal and Management

The lagoon upgrades completed since the 2013 WWSMP update have provided the WWTC with sufficient biosolids storage capacity to meet the regulatory requirement of a minimum 240 days of storage. However, at the projected 30-year future flow, the storage capacity is reduced to 183 days. The lagoons will need to be expanded by an estimated 8,000 m³ or alternate arrangements will need to be in place to manage the remaining 57 days of the WWTC's biosolids production by year 2028.

This issue has been retained as part of the updated problem statement.

5.9 Treated Effluent Discharge Quality Standards

The expansion of the WWTC to include tertiary treatment for enhanced phosphorous removal adequately addresses this concern of the previous WWSMP update and no further review is needed.

This issue has been removed from the updated problem statement.

5.10 Updated Problem Statement

The updated problem statement encompasses the following major areas of concern:

1. Inflow and infiltration
2. Condition and age of existing sewers
3. Limited capacities of sewage pumping stations
4. Future quantity of septage received at the WWTC
5. Limited capacity of the solids treatment train at the WWTC
6. Limited Capacity of Biosolids Storage Lagoons

PHASE 2

6 Phase 2 General Alternative Solutions

6.1 General Alternative Solutions for Inflow and Infiltration

6.1.1 Alternative 1: Do Nothing

The “Do Nothing” solution would be a decision not to address the I&I problem and allow increasing I&I into the system. The alternative would translate into additional flows being transferred to the WWTC, which could cause the WWTC to reach its capacity in advance of the date predicted by this WWSMP.

6.1.2 Alternative 2: Upgrade Collection System to Address I&I Issues

Alternative 2 would require that the City identify areas of high I&I via an I&I study and implement upgrades needed to reduce or eliminate I&I in those key areas.

Approximate costs of performing an I&I study range from \$80,000 for a basic investigation, where areas with I&I are known in advance to \$1,500,000 or more for a highly detailed investigation that includes surveying every manhole in the system. The estimated cost for an I&I study of the appropriate scope for the of City of Orillia’s needs is \$250,000

6.2 General Alternative Solutions for Condition and Age of Existing Sewers

6.2.1 Alternative 1: Do Nothing

The “Do Nothing” alternative for managing the condition and age of the existing sewers would result in continued deterioration of the collection system and eventual failure of at-risk sewers or forcemains. Depending on the type and size of pipe, a pipe failure could have significant negative impacts on the system and the environment.

6.2.2 Alternative 2: Continue Sewer Rehabilitation Program and Implement Sewer Management Program

The City has implemented a sewer rehabilitation program as recommended in the 2013 WWSMP, aimed at upgrading areas of immediate concern. To augment this program, the City has started developing a Sewer Management Framework, which will allow them to monitor the condition of the collection system and identify those sewers and forcemains that need upgrading due to age, condition, or other selected parameters in a proactive rather than reactive manner.

6.3 Limited Capacities of Sewage Pumping Stations

A new pumping station at Old Barrie Road and Line 15 will be needed to support development in that area.

6.3.1 Alternative 1: Do Nothing

The “Do Nothing” alternative is required for consideration and means not constructing the pumping stations, which would translate to no development in those areas.

6.3.2 Alternative 2: Construct/Upgrade Required Pumping Stations

For the Old Barrie Road pumping station, the second alternative is to construct the required new pumping station to transfer wastewater to the collection system. The estimated capital cost to construct this pumping station is approximately \$1,185,000, including engineering and contingency. A breakdown of the cost estimate is presented in Table 26 below.

Table 26 – Cost Estimate for Old Barrie Road SPS

Item	Cost Estimate (2020 \$)
Structural	\$450,000
Process (Pumps, Piping, Valves, etc.)	\$337,500
Electrical	\$262,500
I&C / SCADA	\$75,000
Site Works	\$60,000
TOTAL ESTIMATED CAPITAL	\$1,185,000

For the proposed Woodland Drive pumping station, the alternative is to construct the required new pumping station to transfer wastewater to the collection system. The estimated capital cost to construct this pumping station is approximately \$750,000, including engineering and contingency. A breakdown of the cost estimate is presented in Table 27 below. However, as noted previously, the costs associated with this SPS would be borne by the property owner in this area and have been excluded from the WWSMP.

Table 27 – Cost Estimate for Woodland Drive SPS

Item	Cost Estimate (2020 \$)
Structural	\$285,000
Process (Pumps, Piping, Valves, etc.)	\$225,000
Electrical	\$150,000
I&C / SCADA	\$52,500
Site Works	\$37,500
TOTAL ESTIMATED CAPITAL	\$750,000

SPS 23 (Champlain) will need to have a fourth pump installed to meet future flows. The estimated cost to install the fourth pump is \$100,000.

6.4 Limited Capacity of Septage Receiving Station

6.4.1 Alternative 1: Do Nothing

The “Do Nothing” alternative would allow the septage receiving station and WWTC to function adequately for several years. However, as flows to the WWTC increase the WWTC capacity to accept septage will decrease and may lead to overloading the WWTC treatment process.

6.4.2 Alternative 2: Divert Festival Flows to Another Facility

Alternative 2 involves diverting flows received at the septage receiving facility, especially during large festivals, to another facility that has the ability to accept septage. This would prevent the operational difficulties associated with unloading times and long lineups at the SRS.

6.4.3 Alternative 3: Stagger Deliveries to SRS

Alternative 3 would have the festivals stagger when their portable toilets are emptied into two or three shifts through the day. This would avoid the long line-ups and delays during truck unloading at SRS. It would also help avoid overloading the WWTC by having all of the day’s delivery made at one time.

6.4.4 Alternative 4: Install SRS Equalization/Storage Tank

This alternative is the recommended solution cited in the City’s 2016 “*Septage and Hauled Receiving Station Proposed Equalization Tank Assessment Study*” and involves constructing an equalization tank at the SRS site to store septage until it can be safely transferred to the WWTC for treatment without overloading the WWTC.

The WWTC can currently accommodate septage addition up to a rate of 4.6L/s, provided that the wastewater flows at the WWTC is equal to or less than 14,736 m³/d at the time that the septage is being transferred to the WWTC. If this amount of septage is transferred to the WWTC at a time when the plant’s flow is less than 14,736 m³/d, the system could suffer an overload. As flows to the WWTC increases, the amount of septage that the WWTC is able to accommodate without a system upset will decrease to approximately 1.7 L/s within the WWSMP study period.

There is currently no means of controlling the rate of septage addition to the WWTC. An equalization tank would be equipped with controls that monitor WWTC wastewater flows and with metering pumps that are programmed to transfer septage only when plant flows were low enough to accept septage. Additionally, the equalization tank’s control system would always limit the rate of septage transfer by pacing it with the WWTC’s wastewater flow so that the proportion of septage to wastewater is always below the level at which overloading would occur. These controls would mean that operator monitoring, input, and modification would not be required to prevent system overload from septage addition.

The estimated cost to construct an equalization tank is between \$2,130,000 and \$3,980,000, depending on whether capacity is included to accommodate septage from large festivals or not. The costing carried through the WWSMP is \$2,130,000 since there are currently significant logistical issues related to accepting septage from large festivals. The lagoons will reach capacity by the year 2028 and it is recommended that the SRS equalization tank be constructed prior to that. However, lagoon capacity is not the driving factor for construction of a septage equalization

tank. If the WWTC starts experiencing overloading due to the addition of septage prior to 2028, this solution may need to be implemented earlier.

6.5 Limited Capacity of Sludge Stabilization/Digester

6.5.1 Alternative 1: Do Nothing

The “Do Nothing” alternative would allow the WWTC to continue to operate without increasing the sludge stabilization capacity. This alternative would result in the digesters being overloaded as wastewater flow to the WWTC increases, which would lead to inadequate treatment and subsequent failure to meet the requirements for land application. The City would then need to secure another method of disposing of the unstabilized sludge.

6.5.2 Alternative 2: Expand Anaerobic Digester Capacity

Alternative 2 would be to increase the WWTC’s sludge stabilization capacity by constructing another primary anaerobic digester of sufficient capacity to meet the projected year 2049 flow. The MECP does not require two secondary digesters when there are two or fewer primary digesters.

The expansion would require a new digester, digester control building, sludge heat exchanger and waste gas burner. There will likely be upgrades required for the gas handling system to meet current codes and standards, such as the NFPA 820 Standard. A new boiler would not be needed since the existing boilers have sufficient capacity to service a second primary digester.

Figure 20 shows the proposed location and approximate diameter of the new primary digester. The area to the southeast of the existing secondary digester is feasible due to land availability and the proposed size of the digester.

The existing site road would need to be rerouted around the new digester as shown in Figure 20. A new digester control building would be needed to house the new pumps and heat exchanger. The digester could also be made narrower and taller to fit in the area to northeast of the secondary digester. Exact configuration and location would be determined during the detailed design phase.

There are many underground piping interferences in the areas surrounding the existing digester complex, which would make construction more complex.

The exact location of the new primary digester and the control building would be determined during the detailed design phase.

The estimated capital cost for the proposed digestion capacity expansion is \$13,108,000. This cost estimate of this alternative considered installing the sludge and gas piping overground rather than through tunnels. This approach would avoid underground interferences with existing infrastructure and minimize NFPA 820 compliance issues

Figure 20 – Possible Location of the New Digester and Control Building



6.5.3 Alternative 3: Retain Biosolids Management Contractor

Alternative 3 involves the City issuing a Request for Proposal for the services of a Biosolids Management Contractor to haul unstabilized sludge to the Contractor’s independent facility for treatment and subsequent disposal or marketing. The City would have the opportunity to participate in revenue sharing from the Contractor’s marketing of the CFIA registered fertilizer end-product.

Two firms in Ontario that currently provide this type of service are Lystek International and Walker Industries.

This alternative is considered independently in Section 7.7 “Evaluation of Retaining a Biosolids Management Contractor” since this alternative would be a solution for both the sludge stabilization capacity problem and the biosolids storage capacity problem.

6.6 Limited Capacity of Biosolids Storage Lagoons

6.6.1 Alternative 1: Do Nothing

The Do Nothing option would be adequate until approximately year 2028 when the lagoons will no longer have sufficient capacity to store the biosolids generated at the WWTC. This would be problematic, especially in the winter when land application is not possible. The City would need to make alternate arrangements for disposal of the biosolids.

6.6.2 Alternative 2: Expand Lagoons

Alternative 2 involves expanding the capacity of the existing lagoons to accommodate projected future biosolids production. The WWTC has sufficient available land to construct the required 8000 m³ lagoon. Figure 21 shows the proposed location and approximate size of the lagoon expansion.

The estimated capital cost associated with the proposed expansion is \$936,000.

Figure 21 – Proposed Location of the Lagoon Expansion



6.6.3 Alternative 3: Construct Biosolids Storage Tanks

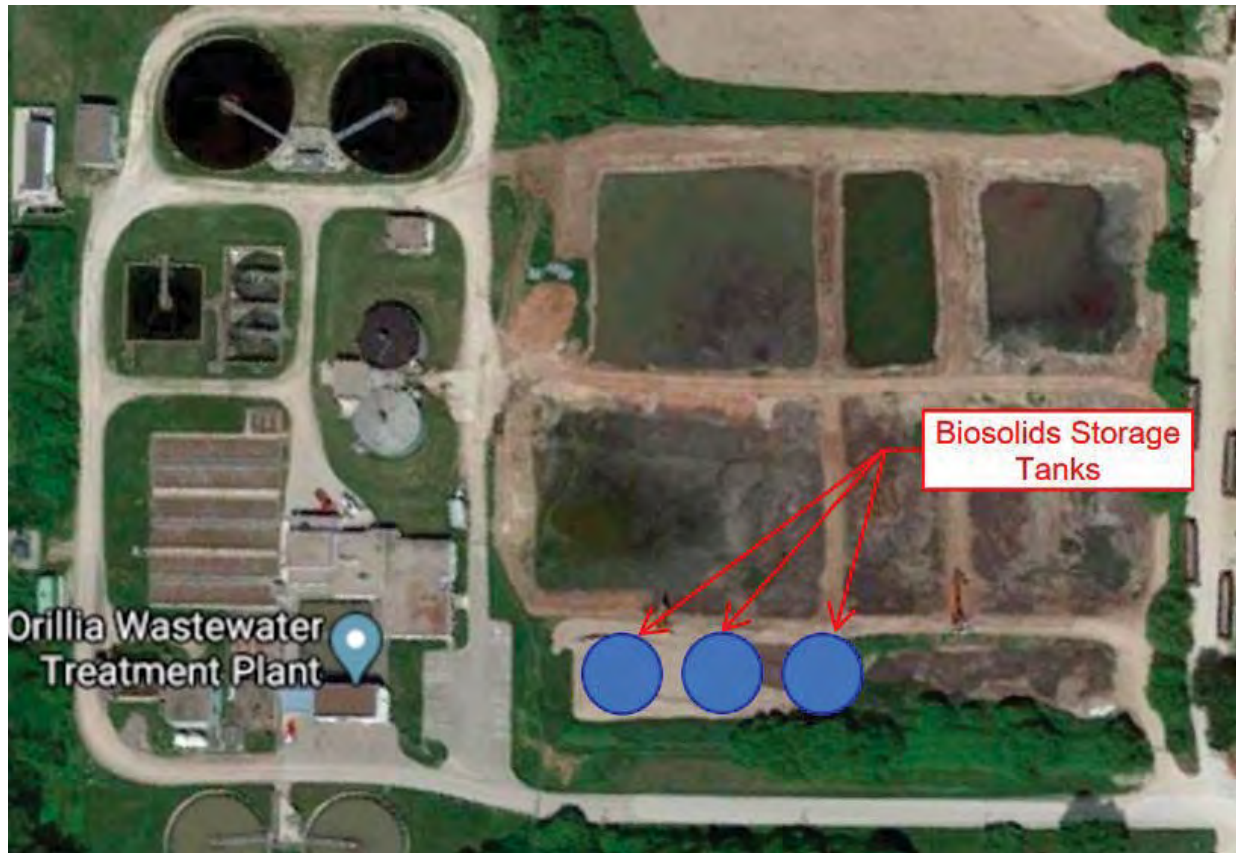
This alternative involves construction of biosolids storage tanks to store the additional biosolids. The storage tank alternative was considered since storage tanks minimize land use and would leave space available for future uses beyond year 2049.

Figure 22 shows the proposed location and approximate diameter of the proposed biosolids storage tanks.

The estimated capital cost associated of this alternative is \$3,373,000.

In terms of operation and maintenance costs of the two alternatives, the storage tanks require a mixing system and sludge transfer pumps, which are not required for the lagoons. The storage tanks would be a more energy and maintenance intensive process than the lagoons, resulting in a higher lifecycle cost. The advantage of the storage tanks compared with a lagoon expansion is the smaller footprint. The storage tanks would leave space available for future tanks whereas the lagoon expansion would use all of the available footprint at the plant.

Figure 22 – Proposed Location of Biosolids Storage Tanks



6.6.4 Alternative 4: Retain a Biosolids Management Contractor

This alternative is described in detail and evaluated in Section 7.7 “Evaluation of Retaining a Biosolids Management Contractor” since this alternative would be a solution for both the sludge stabilization capacity problem and the biosolids storage capacity problem.

6.7 Alternatives that Address Sludge Digestion and Biosolids Capacity Simultaneously

The alternative of hiring a Biosolids Management Contractor (BMC) could address capacity issues for both sludge stabilization and biosolids storage capacity. A BMC can accept stabilized and unstabilized sludge from the WWTC. If the City entered into a contract where a BMC hauled unstabilized sludge from the WWTC for off-site processing, the City would not need to expand the sludge digestion or the biosolids storage systems.

For this alternative, the City would retain the services of a BMC to haul undigested sludge to the BMC’s facility for treatment. A BMC can produce compost or a marketable fertilizer product and offer revenue sharing with clients from marketing of the stabilized end-product.

Two firms in Ontario that provide this type of service are Lystek International and Walker Industries.

The final product produced by these firms is a marketable CFIA registered fertilizer product (fertilizer or compost/soil amendment) that the Biosolids Contractor markets through their

marketing network. A portion of the revenues generated from end-product sales would be shared with the City. The amount of revenue generation depends on market conditions at the time of production, sludge characteristics, sludge quantity processed, and the terms of agreement between the City and the Biosolids Contractor.

To make this alternative economically viable, the City would need to construct a dewatering facility to dewater the sludge to approximately 20%-25% solids content to reduce haulage costs.

Figure 23 shows the proposed location and configuration of the dewatering facility. The system would include dewatering equipment, housed in a dewatering building, an unthickened sludge storage tank, and a thickened sludge storage tank. The two storage tanks were sized with sufficient capacity for one week of dewatered sludge production.

Figure 23 – Proposed Location of the Dewatering Facility



The following parameters were used in evaluating the capital cost associated with this alternative:

- Approximately 34,000 m³/yr. of raw sludge at 3% would be transferred to Contractor's facility. This is the current sludge production at the WWTC.
- Raw sludge would be dewatered to 25% total solids before hauling to Contractor's facility.
- The dewatering technology used in this WWSMP's evaluation is centrifuges, which are the most energy intensive. Other alternatives are available and a more detailed evaluation during the detailed design phase would be needed to select the appropriate technology for the City.

Based on the above parameters, the estimated capital cost associated with this alternative is \$3,310,000. A lifecycle cost comparison is presented in Section 7.7 as part of evaluation of this alternative.

6.7.1 Alternative 5: Perform a Biosolids Option Study

This option was not evaluated as an alternative solution for sludge stabilization or biosolids storage capacity issues. However, it is a recommendation of this WWSMP as a step to be taken before implementing the preferred general alternative solution for sludge stabilization and biosolids storage as its outcome would have a bearing on both.

A Biosolids Option Study is similar to a Schedule C Class EA, but specifically focused on strategies for both sludge stabilization and biosolids storage, incorporating potential cost off-setting through revenue generation and/or a combined heat and energy recovery system.

This recommendation is discussed in section 8.0 (Biosolids Option Study).

7 Evaluation of Alternative Solutions

7.1 Evaluation of Inflow and Infiltration Alternatives

7.1.1 Do Nothing

If the current I&I issues are not addressed, the issues will increase with time and potentially drive flows to the WWTC beyond its rated capacity. The result could be inadequate treatment and/or the need to bypass more frequently. As such this is not a viable solution in long the term and was eliminated as an alternative.

7.1.2 Identify and Correct I&I Issues

This alternative can significantly decrease I&I in the collection system. An I&I study would be needed to determine what areas in the system are experiencing I&I issues. The zone with heaviest I&I can be targeted for upgrades first.

This alternative is a proactive and viable approach to addressing the I&I issues observed in the City's collection system as was selected as the preferred general alternative solution for addressing the I&I problem.

7.2 Evaluation of Condition and Age of Existing Sewers Alternatives

7.2.1 Do Nothing

This is not a viable alternative in the long term as it does not address the needs of the City and could lead to negative environmental impacts due to leaks in the system. As such it was eliminated as an alternative.

7.2.2 Develop and Implement a Sewer Management Program

This alternative will involve development of a sewer management program that monitors age and condition of sewers and uses risk management tools, such as risk/consequence analysis, to predict when a sewer will need to be inspected and/or upgraded.

This alternative is the preferred alternative solution to address the problem of condition and age of the existing sewers.

7.3 Capacities of Sewage Pumping Stations

7.3.1 Do Nothing

The Do Nothing alternative would limit development in this area and not adequately address the City's needs.

This alternative was removed from consideration.

7.3.2 Construct New SPS at Old Barrie Road

This alternative was selected as the preferred alternative solution to support development in this area.

7.4 Evaluation of Limited Capacity of Septage Receiving Station Alternatives

7.4.1 Do Nothing

The City's SRS system is adequate for the short term. When sewage flows to the WWTC increases, the WWTC will become more sensitive to the rate at which septage is added to it and the frequency of system upsets could increase.

As such this is not a viable alternative in the long term since it does not address the needs of the City and could lead to overloading of the WWTC in the future. This alternative was removed from consideration.

7.4.2 Stagger Septage Deliveries from Festivals

This alternative involves having the festival organisers agree to stagger deliveries to SRS to avoid the long line-ups and delays during truck unloading at SRS. The City previously requested staggering deliveries, but it could not be accommodated by the festival organizers. As such, this alternative could not be implemented and was eliminated as an alternative solution.

7.4.3 Divert Festival Flows to another Facility

The City has implemented this option and has not accepted flows from festivals since 2016, which has alleviated operational issues. However, as sewage flows to the WWTC increase, the WWTC will become more sensitive to the addition of septage and the frequency of system upsets could increase. A method of controlling the timing and amount of septage transfer to the WWTC will be needed. Diverting festival flows alone is not a complete solution in the long term and was eliminated from the evaluation.

7.4.4 Construct Equalization Tank and Meter Septage Flow to WWTC

This alternative involves constructing an equalization tank at the SRS, as recommended in the 2016 "*Septage and Hauled Receiving Station Proposed Equalization Tank Assessment Study*". Septage flows would be stored in the equalization tank and metered to the WWTC at a flow that is proportional to WWTC flows at the time of transfer to prevent overloading the WWTC's processes.

This alternative adequately addressed the problem of capacity of the Septage Receiving station and was selected as the preferred alternative solution.

Construction of an equalization tank would be a Schedule B Class EA.

7.5 Evaluation of Limited Capacity of Sludge Stabilization/Digester Alternatives

7.5.1 Do Nothing

This alternative does not address the problem since the digesters are undersized for the plant's current flows and additional sludge produced from an expanded future population will need to be treated and/or managed.

As such this is not a viable solution in the long term to address the issue with the limited capacity of the digesters and was eliminated from the evaluation.

7.5.2 Expand Anaerobic Digester Capacity

The City advised that since anaerobic digestion was the technology currently used at the WWTC for sludge stabilization and staff is familiar with its operation and management, the City's preference is to continue with anaerobic digestion at this time.

The City also noted that this decision could be revised depending on if a Biosolids Option Study is implemented and the results of that study produce a different preferred alternative for sludge stabilization at the site.

Expanding the existing anaerobic digestion capacity was selected as the preferred general alternative solution.

7.6 Evaluation of Limited Capacity of Biosolids Storage Lagoons Alternatives

7.6.1 Do nothing

The lagoons are adequately sized to accommodate biosolids production until approximately year 2027, after which they will need to be expanded to meet year 2049 projected flows. As such this alternative is not viable in the long term and was eliminated from the evaluation.

7.6.2 Evaluation of Expanding Lagoons vs. Constructing Biosolids Storage Tanks

Advantages and disadvantages of the alternative to expand the lagoons are presented in Table 28.

Table 28 – Advantages and Disadvantages of Expanding Lagoons

Advantages	Disadvantages
<ul style="list-style-type: none"> Expands existing system, which is well understood by operations staff Low capital and operating costs 	<ul style="list-style-type: none"> Does not minimize footprint Uses all of available land at site and no space remaining for future expansion if needed

Advantages and disadvantages of the alternative to construct biosolids storage tanks are presented in Table 29.

Table 29 – Advantages and Disadvantages of Expanding Lagoons

Advantages	Disadvantages
<ul style="list-style-type: none"> Minimizes footprint and leaves land available for future expansion Less likelihood of odours because biosolids are in covered tanks 	<ul style="list-style-type: none"> Higher capital and life-cycle costs

The criteria selected for screening and evaluation of the biosolids storage capacity alternatives along with the evaluation scores are presented in Table 30. Expanding the lagoons received a score of 14.7 and constructing biosolids storage tanks received a score of 14.1. The results of the evaluation indicate that the preferred alternative is to expand the lagoons.

Table 30 – Biosolids Storage Capacity Alternatives Evaluation Criteria

PRIMARY CRITERIA	SECONDARY CRITERIA	ALTERNATIVE SOLUTIONS	
		Alternative 1 Expand Lagoons	Alternative 2 Biosolids Storage Tanks
		SCORE*	SCORE*
Social/Culture	Aesthetic Impacts (plant appearance)	3	2
	Effect on Residential Properties	3	3
	Effect on Businesses/Commercial Properties	3	3
	Effect on Industrial Properties	3	4
	Impact on Archaeological and/or Cultural Heritage	3	3
Average Score		3.0	3.0
Technical	Solves or Improves Technical/Capacity Problem in the Long Term	3	5
	Constructability	3	4
	Ease of Operation & Maintenance Complexity	5	4
Average Score		3.7	4.3
Environmental	Effect on Habitat/Wildlife	3	3
	Effect on Vegetation/Wetlands	3	3
	Effect on Groundwater	3	4
	Effect on Surface Water	3	3
	Public Health and Safety	3	4
Average Score		3.0	3.4
Economic	Capital Cost	5	3
	Operation and Maintenance Costs	5	4
	Net Present Value	5	3
Average Score		5.0	3.3
TOTAL SCORE**		14.7	14.1
*Score is a number from 1 to 5, with 5 being the most favorable effect.			
**Sum of average scores for each set of criteria			

7.7 Evaluation of Retaining a Biosolids Management Contractor

This alternative could address the sludge stabilization capacity and biosolids storage capacity problems simultaneously. Rather than the City constructing a new digester and expanding the lagoons.

This option is presented for comparison using current costs and market values. However, final details would depend on market conditions at the time of setting up a contract with a contractor. The amount of revenue generation depends on market conditions at the time of production, sludge characteristics, sludge quantity processed, and the terms of agreement between the City and the BMC. The City would issue an RFP for the desired biosolids management services to obtain competitive bids.

The parameters below were used in evaluating the life-cycle costs of this alternative. The values for haulage fees and revenue sharing were quotes received from an Ontario BMC.

- Approximately 34,000 m³/yr. of raw sludge at 3% would be transferred to Contractor's facility.
- Raw sludge would be dewatered to 25% total solids before hauling to Contractor's facility.
- Contractor's haulage and tipping fees at \$95/tonne.
- Revenue sharing is quoted at \$1.25/tonne based on fertilizer being sold at \$7.50/tonne.
- The amount of polymer required in the dewatering operations was estimated based on typical values. A sludge settleability test using various polymers would need to be performed on sludge from the WWTC to establish the actual amount of polymer that would be needed.
- Revenue sharing is quoted at \$1.25/tonne based on fertilizer being sold at \$7.50/tonne.

The followings are the key variables of this alternative:

- The amount of revenue generation depends on the market value of the end-product at the time of sales as well as the negotiated terms between the City and the BMC
- The exact terms of contract, such as revenue split with the City, would need to be negotiated with the Contractor.

Table 31 presents advantages and disadvantages of the alternative to hire independent BMC.

Table 31 – Advantages and Disadvantages of Retaining Biosolids Management Contractor

Advantages	Disadvantages
<ul style="list-style-type: none"> • City would not have to finance the construction and operation of a second digester and expanded lagoon. • City could garner profit from sludge production • City would not need to manage marketing of biosolids end-product. • Revenue from end-product sales would off-set a portion of the operating costs of the dewatering facility. 	<ul style="list-style-type: none"> • City would not receive 100% of the revenue generated. • City would be relying on a third-party, which carries risks if third party goes out of business or ceases operation for any reason. • City would forego opportunity of implementing an on-site technology (solar drying, composting, CHP.) that produces a marketable biosolids product to retain 100% of the revenues.

The life cycle cost analysis was conducted for a 50-year period to compare with the alternative of expanding the digester and lagoons versus the alternative of hiring a BMC. The lifecycle analysis used an interest rate of 5%, inflation rate of 2%, and 25% for contingency and engineering. Unknown factors such removal and disposal of contaminated soils are excluded. The results of the life-cycle cost analysis are presented in Table 32.

Table 32 – Life Cycle Cost Analysis of Retaining Biosolids Management Contractor vs. Expanding Digesters and Lagoons

Life Cycle Cost Analysis		
	Expanded Digester and Lagoons	Independent Contractor
Capital Cost Present Value	\$13,690,000	\$3,310,000
Annual Operation and Maintenance Cost Present Value	\$750,000	\$10,370,000
Net Present Value	\$14,440,000	\$13,680,000

Table 33 presents the evaluation criteria and scoring for these alternatives.

Table 33 – Evaluation Matrix for Retaining Biosolids Management Contractor vs. Expanding Digesters and Lagoons

PRIMARY CRITERIA	SECONDARY CRITERIA	ALTERNATIVE SOLUTIONS	
		Alternative 1 Expanded Anaerobic Digestion & Lagoon Capacity	Alternative 2 Retain Biosolids Contractor
		SCORE*	SCORE*
Social/Culture	Aesthetic Impacts (plant appearance)	3	4
	Effect on Residential Properties	3	4
	Effect on Businesses/Commercial Properties	5	5
	Effect on Industrial Properties	4	3
	Impact on Archaeological and/or Cultural Heritage	3	3
Average Score		3.6	3.8
Technical	Solves or Improves Technical/Capacity Problem in the Long Term	4	3
	Constructability	4	5
	Ease of Operation & Maintenance Complexity	4	5
Average Score		4.0	4.3
Environmental	Effect on Habitat/Wildlife	4	3
	Effect on Vegetation/Wetlands	4	3
	Effect on Groundwater	3	4
	Effect on Surface Water	4	3
	Public Health and Safety	3	3
Average Score		3.6	3.2
Economic	Capital Cost	2	4
	Operation and Maintenance Costs	4	2
	Net Present Value	3	3.5
Average Score		3.0	3.2
TOTAL SCORE**		14.2	14.5
*Score is a number from 1 to 5, with 5 being the most favorable effect.			
**Sum of average scores for each set of criteria			

The evaluation shows a score of 14.2 for expanding the anaerobic digestion capacity and the lagoon capacity and a score of 14.5 for hiring a Biosolids Management Contractor. The results show that the alternative of hiring an independent biosolids contractor is the proposed preferred general alternative solution when compared against an expansion of both the digesters and

lagoons. Due to the high life-cycle costs of alternative 2, it would not be the preferred alternative when compared against a digester expansion alone or lagoon expansion alone. Additionally, before implementing this alternative, it is recommended that a biosolids option study be performed. The biosolids options study would evaluate all potentially viable alternatives that could produce a marketable CFIA registered fertilizer biosolids and/or heat/power for the facility. Implementing a resource recovery system would move the WWTC towards being a net-zero facility.

8 Biosolids Option Study

A Biosolids Option Study is similar to a Schedule C Class EA process, but is specifically focused on strategies for sludge stabilization and management. This study would review and compare all potentially viable sludge stabilization technologies and biosolids storage technologies.

The study provides an in-depth review of all aspects of each strategy (capital costs, land requirements, haulage/tipping fees, revenue generation, energy consumption, impacts to social, environmental, and cultural assets, life-cycle cost analysis) and will more clearly define the potential for the City to generate revenue from various sludge management technologies. There are several technology options for sludge/biosolids management that can return a revenue in the form of marketable biosolids product and/or recovered heat and energy from the anaerobic digestion system.

8.1 Technology Options to Manage Sludge/Biosolids with a Potential for Revenue Generation

Biosolids can be processed to a level where they are suitable for commercial marketing and generate revenue. Typically, additional treatment systems are required after the sludge stabilization stage to produce a biosolids end-product of quality that meets the regulations as a commercially marketable product.

There are two options available to the City for generating a marketable biosolids product:

The first option consists of constructing an on-site treatment system to produce a CFIA registered fertilizer biosolids end-product that the City would market directly.

The second option is to retain the services of an independent Biosolids Management Contractor to haul away, stabilize, and market the biosolids end-product.

The first option would require the capital expenditure of constructing a biosolids processing system, but would have the benefit that 100% of the revenue would go to the City.

The second alternative would not require the City to finance the construction and operation of an expanded sludge stabilization and biosolids storage systems. However, only a portion of the revenues from sales of the biosolids end-product would come back to the City.

The amount of revenue generation that is possible from commercially marketing biosolids from a wastewater treatment facility is dependent on the following factors:

1. Quantity of the biosolids.
2. Characteristics of the biosolids (nutrient profile).
3. Market value of the biosolids end-product at the time of marketing.

4. The life-cycle costs associated with the technology used to produce the biosolids product.

Commercially marketable biosolids are either fertilizers or soil amendments, such as compost. There are several viable technologies that produce a biosolids product that can be marketed in Ontario, such as solar drying, on-site composting, and thermal drying. In addition, a combined heat and power (CHP) system can also return revenue by generating heat and/or electricity that can be used on site or sold back to the grid. These technologies are described in more detail below along with advantages and disadvantages of each.

8.1.1 Solar Drying

Solar drying involves stabilization of the biosolids using the sun’s energy as the heat source. Stabilized sludge is spread across the floor of drying greenhouses, where the heat of the sun stabilizes and dries the biosolids. The greenhouses are equipped with a mechanical system to mix and turn the biosolids bed while gradually moving biosolids from the inlet end of the greenhouse to the discharge end.

The end-product is a pelletized fertilizer which is approved for unrestricted use in Ontario on lawns, gardens, agriculture amendments, etc.

A thickening system will be needed upstream of the solar dryer to reduce the water content in the biosolids. A pellet cooling system may not be required with this technology, as it is with other thermal drying technologies, since the heat applied for drying is significantly less than with traditional thermal drying technologies.

Since the heat applied is low, the process takes longer and, thus, requires a large footprint to expose all of the biosolids to the sun. The lagoons could be replaced by the solar drying beds if there is sufficient land space.

This technology would incorporate supplemental heating to provide heat during the winter months during periods where there is reduced levels of sunlight and the ambient temperature is low.

Table 34 presents the advantages and disadvantages of the solar drying technology.

Table 34 – Advantages and Disadvantages of Solar Drying Technology

Advantages	Disadvantages
<ul style="list-style-type: none"> • Reduced energy costs compared to traditional thermal drying methods • Fertilizer product is high in nutrients, such as nitrogen and phosphorous – increased value as fertilizer • Product easily packed for marketing • Does not require the addition of chemicals or other bulking agents – reduce traffic to and haulage costs from facility 	<ul style="list-style-type: none"> • Large footprint. • Requires supplemental heating for periods of low-sunshine • Potential for fugitive odours

8.1.2 On-Site Composting

Composting is a process in which organic material undergoes biological degradation, generating a stabilized end product. The composting process naturally heats the material by microbial decomposition to temperatures of 50 to 65°C. At this temperature range, pasteurization of the biosolids will take place.

Typically, bulking agents are added to the biosolids to improve the structural integrity of the mixture. Bulking agents can be wood chips, straw, or sawdust. Other organic composting materials are possible, such as food scraps, yard trimmings, and paper products. The choice of bulking agent is dictated by the type of composting used.

There are three major types of composting: aerated windrow composting, aerated static pile composting, and in-vessel composting. Aerated windrow composting and aerated static pile involve making piles or windrows of the material to be composted and aerating it to support the micro-organisms that decompose the material. In windrow composting the composting piles are mixed, whereas in aerated static pile composting the compost piles are not mixed.

The mixing in windrow composting tends to release odours. To control fugitive odours, windrows can be covered with a semi-permeable geotextile material, which allows the passage of oxygen molecules but prevents passage of larger molecules, including odorous compounds.

In-vessel composting is performed within an enclosed container (tank, silo, concrete lined trench, etc.). The vessel includes mixing to keep the material aerated. In-vessel composting is versatile in that it can accept almost any type of organic waste (meat, animal manure, biosolids, food scraps). Other advantages include less potential for nuisance odours, smaller footprint than other composting methods, and faster processing times.

Table 35 presents the advantages and disadvantages of on-site composting technology.

Table 35 - Advantages and Disadvantages of On-Site Composting Technology

Advantages	Disadvantages
<ul style="list-style-type: none"> • Reduced energy costs compared to other stabilization methods • High level of flexibility, robustness, and lower labour costs possible with in-vessel composting method • Compost product marketable, especially to local residents 	<ul style="list-style-type: none"> • Large footprint • Precipitation can slow down the degradation process of organics due to excessive moisture and evaporative cooling (except for in-vessel) • High potential for fugitive odours (except for in-vessel) • Windrow and static pile are labour intensive

8.1.3 Thermal Drying

Thermal drying involves heating the biosolids to further reduce its pathogen levels, reduce its water content to almost zero, and achieve the quality required for commercial marketing. The end-product is a pelletized fertilizer which is approved for unrestricted use. The fertilizer pellets can be sold for residential use, such as direct application to lawns or gardens. They can also be directly applied in public areas, used as agricultural amendments, or mixed with other ingredients prior to application.

Heating can be either through direct heating or indirect. Technologies used for thermal drying include rotary dryers, fluidized beds, hollow-flight dryers, and steam dryers. This option would require incorporating a thickening system upstream of the thermal dryer to reduce the water content from approximately 96% to 75%, thus reducing the amount of energy required to dry the biosolids.

In addition, a cooling system will be needed to prevent ignition of the dried pellets when they are being stored.

Table 36 presented the advantages and disadvantages of thermal drying technology.

Table 36 – Advantages and Disadvantages of Thermal Drying Technology

Advantages	Disadvantages
<ul style="list-style-type: none"> • Fertilizer product is high in nutrients, such as nitrogen and phosphorous – increased value as fertilizer • Product easily packed for marketing • Small footprint compared with other technologies • Achieves the highest volume reduction (pellets are at least 90% solids) – reduced trucking traffic • Does not require the addition of chemicals or other agents – reduced traffic to and from facility 	<ul style="list-style-type: none"> • Higher energy consumption than other technologies • High capital cost • Dust generated in drying process creates an explosion hazard • Systems are complex and require skilled operations staff • Potential for odours

8.1.4 Combined Heat and Power (CHP)

A CHP system would convert the biogas produced in the anaerobic digester(s) to heat and electricity. Expanding the WWTC’s digestion capacity could make a CHP system cost effective. These systems typically use reciprocating engines, micro-turbines, or fuel cells. The heat generated through a CHP system can be used to heat buildings at the WWTC and excess electricity produced can be sold back to the grid.

A 2011 Study by the US EPA (*Opportunities for Combined Heat and Power at Wastewater Treatment Facilities*) indicates that CHP systems become profitable for plants operating above approximately 19,000 m³/d (5 MGD). Orillia’s projected year 2049 flow is 21,625 m³/d. The cost to generate electricity using a CHP system at a wastewater treatment facility is between \$0.01 USD to \$0.083 USD per kWh, according to the EPA study.

Table 37 presents the advantages and disadvantages of CHP technology.

Table 37 – Advantages and Disadvantages of CHP Technology

Advantages	Disadvantages
<ul style="list-style-type: none"> • Cost to produce power is less than cost of retail electricity – costs savings for facility • CHP are high efficiency systems • Would move the facility towards being a net-zero facility • Energy produced by CHP systems have lower greenhouse gas emissions compared with electricity grids 	<ul style="list-style-type: none"> • Very high capital cost • Heat not used in the summer may go to waste

It is recommended that the City conduct a Biosolids Options Study prior to implementing the proposed recommended alternative solutions for sludge stabilization or biosolids storage. The Biosolids Option Study should be conducted within the next two years, in time to start implementing the preferred alternative before the WWTC’s digestion capacity is exceeded.

9 Recommended General Alternative Solutions

Problem Statement	Recommended General Alternative Solution
Inflow and Infiltration	Perform an I&I Study and Continue I&I Reduction Efforts with a Focus on Zones with Identified High I&I
Condition and Age of Existing Sewers	Develop and Implement a Sewer Management Program
Limited Capacity of Sewage Pumping Stations	Construct an Old Barrie Road East Pumping Station
Future Capacity and Flow Control at Septage Receiving Station	Construct a Septage Equalization Tank and Control Septage Flows to the WWTC
Limited Capacity of Sludge Stabilization / Digestion at the WWTC	Construct a Second Primary Digester (preceded by a Biosolids Options Study)
Limited Capacity of Biosolids Storage (Lagoons)	Expand Lagoons (preceded by a Biosolids Options Study)
Combined Limited Capacity of Sludge Stabilization and Biosolids Storage	Retain a Biosolids Management Contractor

10 Public Consultation

Public engagement and input are integral components of the Master Planing process and assist in ensuring that anyone with an interest in the study has the opportunity to provide input as the study proceeds.

A database containing the contact information of stakeholders, review agencies, indigenous groups, and other interested parties was developed at the outset of the study to invite participation in the study. The contact list was regularly updated throughout the study as more individuals became aware of the study or provided feedback. Interested parties had the opportunity to be added to the contact list at any point during the study in order to receive public notices and newly available public information as well as the opportunity to attend upcoming public events. The study's contact list is provided in Table 38.

To facilitate communication with all stakeholders and other interested parties throughout the WWSMP, the City created a page on its website dedicated to the WWSMP. This page contained a description of the project, a status summary, copies of all issued notices, and the PIC materials.

Table 38 – Agency, Stakeholder, and Public Contact List

Title	First	Last	Title	Company	Town
Provincial & Federal Agencies					
Mr.	Rob	Dobos	Manager, Environmental Assessment Section	Environment Canada - Environmental Protection Operations Division - Ontario Region	Burlington, ON
Ms.	Chunmei	Liu	Environmental Resource Planner & EA Coordinator - Air, Pesticides and Environmental Planner (<i>Barrie, Orillia & County of Simcoe</i>)	Central Region - Ministry of the Environment, Conservation and Parks	North York, ON
Ms.	Cindy	Hood	District Manager	Barrie District Office - Ministry of the Environment, Conservation and Parks	Barrie, ON
Mr.	Shawn	Carey	District Manager	Midhurst District - Ministry of Natural Resources and Forestry	Midhurst, ON
Ms.	Anjala	Puvananathan	Director Ontario Region	Canadian Environmental Assessment Agency	Toronto, ON
Mr.	Mike	Walters	Chief Administrative Officer	Lake Simcoe Region Conservation Authority	Newmarket, ON
Mr.	Dan	Minkin	Heritage Planner	Ministry of Tourism, Culture and Sport - Culture Division	Toronto, ON
Ms.	Jocelyn	Beatty	Rural Planner	Ontario Ministry of Agriculture, Food and Rural Affairs	Elora, ON
Mr.	Teepu	Khawja	Regional Director	Ministry of Transportation, Central Region	Toronto, ON
Mr.	Tim	Haldenby	Municipal Planning Advisor - Team Lead-Central Ontario	Ministry of Municipal Affairs and Housing	Toronto, ON
Mr.	Chris	Gauer	Executive Vice President Major Projects, Roads & Transit	Infrastructure Ontario	Toronto, ON
Local Government, Adjacent Municipalities & Other Agencies					
Mr.	Dave	Parks	Director, Planning, Development & Tourism	County of Simcoe	Midhurst, ON
Mr.	Andrew	Plunkett	Director of Corporate Services/Clerk Treasurer	Township of Severn	Orillia, ON
Mr.	Robin	Dunn	Chief Administration Officer	Township of Oro-Medonte	Oro-Medonte, ON
Ms.	Jennifer	Connor	Acting Chief Administration Officer	Township of Ramara	Brechin, ON
Ms.	Lisa	Thomson-Roop	Manager, Marketing and Public Affairs	Downtown Orillia Management Board	Orillia, ON
Dear Sir or Madam				Simcoe Muskoka District Health Unit	Orillia, ON
Ms.	Barb	Fox	Planning Officer	Simcoe Muskoka Catholic District School Board	Barrie, ON
Ms.	Holly	Spacek	Planning Officer	Simcoe County District School Board	Midhurst, ON
Ms.	Bonnie	Branch	Transportation Coordinator	Simcoe County Student Transportation Consortium	Barrie, ON
Emergency Services					
Mr.	JC	Gilbert	Deputy Chief Operations	County of Simcoe Paramedic Services	Midhurst, ON
Mr.	Ralph	Dominelli	Fire Chief	City of Orillia Fire Department	Orillia, ON
Ms.	Veronica	Eaton	Inspector	Ontario Provincial Police	Orillia, ON
Interest Groups					
Mr.	Allan	Lafontaine	Managing Director	Orillia Chamber of Commerce	Orillia, ON
Ms.	Robin	Cadeau	Assistant Clerk/Committee Coordinator	City of Orillia Active Transportation Committee	Orillia, ON
Mr.	Henry	Glavic		Charter Construction	
Mr.	Lawrence	Saltzman		Titan Homes	
Mr.	Dennis	Bottero		Laden Homes	
Indigenous Communities and Agencies					
Att: Consultation Unit				Ministry of Indigenous Relations & Reconciliation (MIRR)	Toronto, ON
Mr.	Brian	Tucker	Manager of Way of Life Framework	The Metis Nation of Ontario	Ottawa, ON
Mr.	Tony	Muscat	President Interim	Moon River Metis Council	Beaverton, ON
Mr.	Dave	Dusome	President	Georgian Bay Metis Council	Midland, ON
Ms.	Lynette	Davis	Director of Operations	Metis National Council	Ottawa, ON
Ms.	Joselyn	Keeshig	Manager	Saugeen Ojibway Nation Environment Office	Neyaashiinigming, ON
Chief	Guy	Monague		Beausoleil First Nation	Cedar Point, ON
Chief	Donna	Big Canoe		Chippewas of Georgina Island First Nation	Sutton West, ON
Chief	Rodney	Noganosh		Chippewas of Rama First Nation	Rama, ON

Title	First	Last	Title	Company	Town
Chief	Philip	Franks		Wahta Mohawks (Mohawks of Gibson)	Bala, ON
Ms.	Karry	Sandy-McKenzie	Coordinator	Williams Treaties First Nations	Barrie, ON
Utilities					
Mr.	Eric	Lockett		Union Gas Limited	North Bay, ON
Mr.	Neil	Kennerney	System Planner	Rogers Communications	Barrie, ON
Ms.	Carol	O'Brien		Bell Canada	Barrie, ON
Mr.	Grant	Hipgrave	President & CEO	Orillia Power Distribution Corporation	Orillia, ON
Other:					
Mr.	Henry	Glavic		Charter Construction	
Mr.	Lawrence	Saltzman		Titan Homes	
Mr.	Dennis	Bottero		Laden Homes	

Three notices were issued during the course of the WWSMP as listed below:

- Notice of Commencement – Issued on November 1, 2018 by publication in the Orillia Today paper, posting on the City’s website, and through individual emails to those in the study’s contacts database.
- Notice of PIC #1 – Issued on October 14, 2020 by publication in the Orillia Today paper, posting on the City’s website, and through individual emails to those in the study’s contacts database.
- Notice of Completion – Issued on June 16, 2021 by publication in the Orillia Today paper, posting on the City’s website, and through individual emails to those in the study’s contacts database.

There was one PIC held during the WWSMP. Since the PIC was conducted during the Covid pandemic and large public gatherings were discouraged, the PIC was held digitally. PIC display boards were made available to the public on the City’s website (orillia.ca/wastewatermasterplan). The PIC outlined the scope of work, overall study process, and provided results of the condition and capacity assessments. PIC materials included forecasted wastewater flow rates and potential servicing populations, the alternative solutions, preliminary evaluations, and preliminary recommended preferred alternative solutions to address the current and future needs of the wastewater servicing system.

Additionally, emails with the PIC materials were sent directly to the key stakeholders in the project’s contact database.

The PIC boards were posted for 30 days during which comments or questions could be submitted to the study team.

A copy of all public notices, PIC materials, and correspondences during the study can be found in **Appendix F**.

10.1 Consultation with Indigenous Groups

The following consultation activities were implemented to ensure broad participation from the indigenous groups and to obtain their feedback and concerns associated with the study. The indigenous groups listed in the study contact list were contacted by the Project Team at key milestones throughout the study process.

As mentioned before a Notice of Commencement was issued on November 1, 2018 in both the City of Orillia website and the Orillia Today newspaper. Individual emails were also sent to all the indigenous groups in the study contact list. The indigenous groups contacted during the study are listed below:

- The Metis Nation of Ontario
- Moon River Metis Council
- Georgian Bay Metis Council
- Metis National Council
- Saugeen Ojibway Nation (SON) Environment Office

- Beausoleil First Nation
- Chippewas of Georgina Island First Nation
- Chippewas of Rama First Nation
- Wahta Mohawks (Mohawks of Gibson)
- Williams Treaties First Nations

Following the Notice of Commencement, a comment was received from the Chippewas of Rama First Nation. They advised that they were interested in seeing this study upon completion and asked to be kept updated on the project as it proceeds. On November 6, 2018, the study team confirmed with Chippewas of Rama First Nation via email that the study team will continue to provide them notices and documents related to the study and continue to engage with them throughout. No other comments related to the Notice of Commencement were received from indigenous groups.

The Notice of PIC #1 was issued on October 14, 2020 by publication in the Orillia Today newspaper, posting on the City’s website, and through individual emails to all the indigenous groups in the study contact list. Following the Notice of PIC #1, the Beausoleil First Nation and the SON Environment Office requested that certain members of their group be added to the contact list. Those members were added to the contact list.

The Notice of Completion, including a link to the draft Master Plan Report, was issued on June 16, 2021 by publication in the Orillia Today newspaper and posting on the City’s website. The Notice of Completion was emailed directly to each indigenous group in the contact list on June 22, 2021. The SON Environment Office advised that the project was outside of their traditional territory and they did not need to be consulted.

On July 6, 2021, ten days prior to the expiration of the 30-day review period, the study team sent a follow up email to the indigenous groups to check if they have any comments or outstanding concerns about the study or draft Master Plan Report before the study is finalized. The study team attempted to contact groups that did not respond to the follow-up email by telephone. Table X below summarizes the study team’s efforts to consult with the indigenous groups after the Notice of Completion was issued.

Table 39 – Record of Consultation Efforts Following Posting of Notice of Completion

Indigenous Group Name	First Follow Up	First Follow Up Outcome	Second Follow Up	Second Follow Up Outcome
The Metis Nation of Ontario	<ul style="list-style-type: none"> ▪ Sent a follow up email on June 22, 2021 @8:43am. 	<ul style="list-style-type: none"> ▪ Received delivery confirmation. 	<ul style="list-style-type: none"> ▪ Sent a follow up email on July 6, 2021. ▪ Left a voicemail on July 6 @ 1:13pm. 	<ul style="list-style-type: none"> ▪ Received delivery confirmation.
Moon River Metis Council	<ul style="list-style-type: none"> ▪ Sent a follow up email on June 22, 2021 @8:43am. 	<ul style="list-style-type: none"> ▪ Received delivery confirmation. 	<ul style="list-style-type: none"> ▪ Sent a follow up email on July 6, 2021. ▪ Called on July 6 @1:18pm. 	<ul style="list-style-type: none"> ▪ Received delivery confirmation. ▪ They confirmed that they had received the

Indigenous Group Name	First Follow Up	First Follow Up Outcome	Second Follow Up	Second Follow Up Outcome
				email and don't have any comments or concerns.
Georgian Bay Metis Council	<ul style="list-style-type: none"> Sent a follow up email on June 22, 2021 @8:46am. 	<ul style="list-style-type: none"> Received delivery confirmation. Received read receipt @10:04am. 	<ul style="list-style-type: none"> Sent a follow up email on July 6, 2021. Called on July 6, 2021. Sent an email to the new president on July 6, 2021. 	<ul style="list-style-type: none"> Received delivery confirmation. They noted that they have a new president. Received delivery confirmation @3:57pm.
Metis National Council	<ul style="list-style-type: none"> Sent a follow up email on June 22, 2021 @8:46am. 	<ul style="list-style-type: none"> Received delivery confirmation. 	<ul style="list-style-type: none"> Sent a follow up email on July 6, 2021. Left a voicemail on July 6, 2021. 	<ul style="list-style-type: none"> Received delivery confirmation.
Saugeen Ojibway Nation Environment Office	<ul style="list-style-type: none"> Sent a follow up email on June 22, 2021 @8:47am. 	<ul style="list-style-type: none"> Received delivery confirmation. Received an email on June 23, 2021 that the project is outside of their traditional territory and they do not need to be consulted. 	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> N/A
Beausoleil First Nation	<ul style="list-style-type: none"> Sent a follow up email on June 22, 2021 @12:13pm. 	<ul style="list-style-type: none"> Received delivery confirmation. 	<ul style="list-style-type: none"> Sent a follow up email on July 6, 2021. Called and talked to Mr. Lance Copegog on July 6, 2021. Left a voicemail for Ms. Dana Monague at 3:05pm. 	<ul style="list-style-type: none"> Received delivery confirmation. Received read receipt @11:03am. Mr. Copegog mentioned that if there are any comments, Mike Smith and Dana Monague, from their Lands Department will contact the project team.
Chippewas of Georgina Island First Nation	<ul style="list-style-type: none"> Sent a follow up email on June 22, 2021 @10:59am. 	<ul style="list-style-type: none"> Received read receipt. 	<ul style="list-style-type: none"> Sent a follow up email on July 6, 2021. 	<ul style="list-style-type: none"> Received read receipt @11:02 am.

Indigenous Group Name	First Follow Up	First Follow Up Outcome	Second Follow Up	Second Follow Up Outcome
			<ul style="list-style-type: none"> Left a voicemail on July 6, 2021 @3:22pm. 	
Chippewas of Rama First Nation	<ul style="list-style-type: none"> Sent a follow up email on June 22, 2021 @8:47am. 	<ul style="list-style-type: none"> Received delivery confirmation. Received read receipt @8:52am. 	<ul style="list-style-type: none"> Sent a follow up email on July 6, 2021. Called the number provided. The chief has been changed. Left a voicemail for their assistant @3:30pm. 	<ul style="list-style-type: none"> Received delivery confirmation. Received read receipt @11:12am.
Wahta Mohawks (Mohawks of Gibson)	<ul style="list-style-type: none"> Sent a follow up email on June 22, 2021 @8:44am. 	<ul style="list-style-type: none"> Received delivery confirmation. 	<ul style="list-style-type: none"> Sent a follow up email on July 6, 2021. 	<ul style="list-style-type: none"> Received delivery confirmation.
Williams Treaties First Nations	<ul style="list-style-type: none"> Sent a follow up email on June 22, 2021 @8:45am. 	<ul style="list-style-type: none"> Received delivery confirmation. 	<ul style="list-style-type: none"> Sent a follow up email on July 6, 2021. 	<ul style="list-style-type: none"> Received delivery confirmation.

The Moon River Metis Council responded to the follow-up phone call and advised that they had no concerns with the study recommendations.

11 Environmental Impacts

The preferred general alternative solution for the problems of Inflow and Infiltration and the Age and Condition of the Existing Collection System do not involve modification to existing facilities and will not have any environmental impacts.

The preferred alternative solution of constructing an equalization tank for the septage receiving facility, increasing the anaerobic digestion capacity, and expanding the lagoon capacity involve brownfield construction within the WWTC facility’s property boundary. The lands to be used for these three system expansions are currently developed and construction is not expected to have negative environmental impacts.

Depending on the location selected for the new SPS at Old Barrie Road/Line 15, an Environmental Impact Study (EIS) may be needed prior to construction. If the location is in an undeveloped area, an EIS will likely be needed.

12 Proposed Schedule of Works

The preferred general alternative solution to the problems of inflow and infiltration, age and condition of the existing sewers do not have Class EA elements since they entail studies. Expanding the anaerobic digestion capacity and increasing the capacity of an SPS through addition of a pump are both Schedule A+ Class EA endeavours. Constructing an equalization tank at the septage receiving facility and expanding the lagoon capacity through construction of

new cells are both Schedule B Class EA projects. Construction of a new pumping station (Old Barrie Road SPS) is also a Schedule B endeavour. However, since the new SPS is needed at a point in the future, the regulations in place at the time that the sewage pumping station is being planned should be consulted before the new SPS is constructed.

This WWSMP covers Phase 1 and Phase 2 of the Class EA process and satisfies the requirements for Schedule A, A+, and Schedule B projects, with the exception of the notice to the public when construction of these projects commence, which will be done once the construction contract is awarded.

13 Future Spending Projections

Using the cost estimates for required upgrades resulting from the condition assessment of the sewage pumping stations and the WWTC and the estimated capital cost of implementing the preferred general alternative solutions, a projection of the anticipated future spending was developed.

Table 39 (Projected Annual Future Spending) presents the annual spending forecast for each component of the wastewater servicing system that will require upgrades within the next 30 years. The costs shown for SPS and WWTC upgrades are based on the recommended time frames for upgrades as listed in the condition assessments. The forecast has been set up such that the cost for all recommended upgrades within a five-year period for a given asset have been allocated to the first year in that five-year period and the estimated costs for planning, engineering, etc. have been allocated to the year preceding the five-year span.

Condition assessment for sewers and forcemains was not included in the scope of this WWSMP. The costs shown in the Projected Annual Future Spending table for “Wastewater System Collection System Rehabilitation” were taken from the 2013 Master Plan update. Likewise, so were costs associated with the “Inflow and Infiltration Program”.

Due to various reasons cited in the WWSMP report, cost estimates for some items were excluded from the study and the Projected Annual Future Spending. Excluded items are described below.

- **Woodland Drive and Memorial Avenue Servicing:** Collection system extension and a new SPS for institutional servicing in this area has been excluded since the property owner would be responsible for all the costs and timing.
- **SPS No.2 – Bayview Parkway:** The city has advised that the wet well at this station is small and requires upgrades. However, determining the required size for the wet well is out of the scope of this WWSMP update. Therefore, a cost analysis for the expansion of the wet well was not included in the condition assessment costs.
- **SPS 16 - Forest Ave South:** The City indicated that, due to flooding in the area of the Forest Avenue South station, the wet well will need to be redesigned to ensure there is enough capacity during high flow conditions. In order to estimate the cost to resize the wet well, a complete review of the pumping station’s design, historical flows, and I&I impacts would be required, which was outside the scope of this assessment. Redesign of the wet-well has been excluded from the costs to upgrade this pump station.

- **SPS 16 - Forest Ave South:** The cost of a basic upgrade to this station's control system was carried through the study. A more sophisticated electrical upgrade would require a new wireless radio transmitter and receiver via a new antenna, would cost between \$25,000 to \$50,000, depending on the wireless signal paths, and was been excluded in the summary of costs.
- **WWTC Headworks:** Most of the headworks area is classified as either a Class 1, Division 1 or Class 1, Division 2 hazardous area per the NFPA 820 standard. The headworks building is currently grandfathered, however, when upgrades are implemented in the building, it may no longer be grandfathered, depending on the upgrade, and modifications to meet the NFPA 820 standard may be required at that at time. The extent and costs of these items need to be assessed at the time of upgrades.

14 Notice of Completion

The Notice of Completion was published in the Orillia Today paper and posted on the City of Orillia's website on June 16, 2021. The notice was also sent by email to all interested parties and review agencies.

The 30-day public review process commenced on June 16, 2021 and will end on July 16, 2021.

Table 39 – Projected Annual Future Spending

SCHEDULE OF WORKS	Class EA Schedule	FORECASTED ANNUAL SPENDING (Thousand Dollars-Year 2020 Dollars)																																	
		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	2048	2049	2050	TOTAL		
Wastewater Collection System Rehabilitation*	A	\$825	\$825	\$825	\$825	\$825	\$825	\$825	\$825	\$825	\$825	\$825	\$825	\$825	\$825																		\$10,725		
Inflow and Infiltration Study	N/A				\$250																												\$250		
Inflow and infiltration Control Program**	A	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100																		\$1,300		
Old Barrie Road / Line 15 Extension	A																						\$93	\$372											
SPS 1 - James Street Upgrade	A			\$134	\$536				\$71	\$284																							\$891		
SPS 2 - Bayview Parkway	A			\$42	\$168																	\$24	\$96										\$288		
SPS 3 - Couchiching Park Upgrade	A			\$13	\$52																	\$12	\$48										\$112		
SPS 4 - Elgin Street Upgrade	A			\$2	\$8						\$19	\$76																					\$103		
SPS 5 - Couchiching Point Upgrade	A			\$2	\$8																	\$14	\$56										\$80		
SPS 7 - Royal Oak Upgrade	A			\$9	\$36																							\$3	\$12				\$51		
SPS 8 - Tudhope Park Upgrade	A			\$14	\$56				\$11	\$44																							\$125		
SPS 9 - Commerce Drive Upgrade	A			\$2	\$8																												\$10		
SPS 10 - Victoria Crescent Upgrade	A			\$16	\$64																												\$64		
SPS 11 - Shannon Street Upgrade	A			\$13	\$52				\$10	\$40							\$10	\$40															\$152		
SPS 13 - Bridget & Maple Upgrade	A			\$4	\$16																	\$16	\$64										\$96		
SPS 14 - Forest Avenue North Upgrade	A			\$2	\$8																													\$8	
SPS 16 - Forest Avenue South Upgrade	A			\$111	\$444												\$5	\$20															\$469		
SPS 17 - Collins Drive Upgrade	A			\$15	\$60												\$4	\$16															\$80		
SPS 18 - Fittons Road West Upgrade	A			\$133	\$532																													\$532	
SPS 19 - John Street Upgrade	A			\$2	\$8					\$22	\$88																							\$120	
SPS 20 - Broadview Upgrade	A			\$2	\$8																								\$6	\$24				\$40	
SPS 22 - Westmount Drive South Upgrade	A			\$2	\$8					\$6	\$24			\$9	\$36																			\$85	
SPS 23 - Champlain Upgrade (incl. fourth pump in 2045/2046)	A			\$80	\$320																								\$68	\$272				\$660	
SPS 24 - Leacock Upgrade	A			\$14	\$56					\$9	\$36						\$108	\$432																\$641	
Existing WWTC Upgrades	A		\$307	\$1,230				\$94	\$376			\$20	\$80																					\$2,107	
Septage Receiving Capacity: Construct Equalization Tank	B							\$213	\$1,917																									\$2,130	
WWTC Sludge Stabilization Capacity: New Primary Digester and Control Building	A+					\$2,621	\$10,486																											\$13,107	
Biosolids Storage Capacity: Expand Lagoons	B							\$187	\$749																									\$936	
Biosolids Option Study	N/A				\$180																														\$180
Wastewater System Master Plan Updating	N/A						\$200					\$200					\$200					\$200						\$200					\$200	\$1,200	
TOTAL OF WORK ANNUALLY		\$925	\$1,232	\$2,767	\$3,803	\$3,546	\$11,611	\$1,419	\$4,096	\$1,441	\$925	\$1,144	\$1,021	\$1,014	\$961	\$0	\$327	\$508	\$0	\$0	\$0	\$266	\$357	\$372	\$0	\$0	\$277	\$308	\$0	\$0	\$0	\$200	\$36,542		

* Cost taken from the 2013 Master Plan update since pipe condition assessments were not part of the scope of this Master Plan Update.

**Costs taken from the 2013 Master Plan update. A more accurate estimate will be possible after completion of an I&I study.

Excluded Items:

1. Woodland Drive and Memorial Avenue Servicing: Collection system extension and a new SPS for institutional servicing in this area has been excluded since the property owner would be responsible for all the costs and timing
2. SPS No.2 – Bayview Parkway: The City has advised that the wet well at this station is small and requires upgrades. However, determining the required size for the wet well is out of the scope of this Master Plan update. Therefore, a cost analysis for the expansion of the wet well was not included in the condition assessment costs
3. SPS 16 - Forest Ave South: The cost of a basic upgrade to this station's control system was carried through the study. A more sophisticated electrical upgrade would require a new wireless radio transmitter and receiver via a new antenna, would cost between \$25,000 to \$50,000, depending on the wireless signal paths, and was excluded in the summary of costs
4. SPS 16 - Forest Ave South: The City indicated that, due to flooding in the area of the Forest Avenue South station, the wet well will need to be redesigned to ensure there is enough capacity during high flow conditions. In order to estimate the cost to resize the wet well, a complete review of the pumping station's design, historical flows, and I&I impacts would be required, which was outside the scope of this assessment. Redesign of the wet-well has been excluded from the costs to upgrade this pump station
5. WWTC Headworks: Most of the headworks area is classified as either a Class 1, Division 1 or Class 1, Division 2 hazardous area per the NFPA 820 standard. The headworks building is currently grandfathered, however, when upgrades are implemented in the building, it may no longer be grandfathered, depending on the upgrade, and modifications to meet the NFPA 820 standard may be required at that at time. The extent and costs of these items need to be assessed at the time of upgrades

City of Orillia Wastewater Servicing Master Plan Report Appendix – A

Sewage Pumping Station Condition Assessment Technical Memorandum

City of Orillia

Wastewater System Master Plan

Technical Memorandum

Pumping Station Condition Assessment

FINAL

March 2021



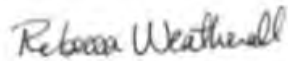
Wastewater System Master Plan

Technical Memorandum Site Inspection and Review of the Scope of Upgrades

Project No. 118088

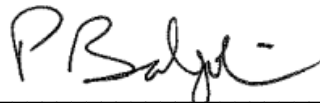
Prepared for:
The City of Orillia

Prepared By:



Rebecca Weatherall, E.I.T.

Reviewed by:



Preya Balgobin, P.Eng.

Ainley & Associates Limited.
195 County Court Blvd., Suite 300
Brampton, ON L6W 4P7
Phone: (905) 452-5172
Fax: (705) 445-0968
www.ainleygroup.com

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1.0 Introduction

The City of Orillia (City) retained the Ainley Group to provide engineering services for their Wastewater System Master Plan (WWSMP) update. The intention of the study is to prepare a comprehensive plan for the maintenance, expansion, and rehabilitation of the City's wastewater infrastructure. The EA will endeavor to define the capital projects needed to meet the demands of growth and rehabilitation/ replacement projects needed to maintain the functionality of the existing wastewater infrastructure.

This report documents Phase 1 of the Class EA Process and will provide the following:

- Problem Statement
- Profile of the Study Area
- Study Area issues and data collection
- Population projections and wastewater flows

2.0 Condition Assessment and Draw-Down Testing

As part of this project it was necessary to establish the condition of the existing facilities and this technical memorandum addresses this issue.

From April 1st to 3rd of 2019, Ainley Staff completed site investigations of the City's sewage pumping stations. The purpose of this investigation was to determine the condition of the pumping station buildings, process equipment and electrical works, and to document the current conditions. In conducting the site investigations, no entry was made into confined spaces.

The purpose of this Technical Memorandum is to identify the condition of pumping station assets to ascertain their ability to meet existing flow conditions and to identify what upgrades may be required to continue to meet this flow condition, while providing input into whether existing assets are suitable to meet the long term capacity of Orillia's wastewater collection system. This Technical Memorandum will assist with the development of alternative solutions to meet the long term capacity requirements from the City of Orillia's collection system.

This Technical Memorandum documents the findings of the site investigation and outlines the scope of upgrades required to maintain the plant in full compliance with its current Environmental Compliance Approval (ECA).

2.1 Approach

The condition assessment was conducted on a visual basis only. No confined space entries were conducted as an aspect of this assessment. As such, assets situated within confined spaces and not visible from the outside were not inspected.

Where possible, draw-down testing was conducted to determine the capacity of a given sewage pumping station. In the absence of influent flow monitoring a baseline flow rate (Q_i) was determined for each station by measuring the change in water level (ΔE) in the well over a time interval (ΔT) and multiplying the change in water elevation by the wet well area (A) as shown in Equation 1.

$$Q_i = \frac{\Delta E * A}{\Delta T}$$

Equation 1 – Influent Flow Rate

Discharge flow rates (Q_o) were measured in the same fashion, however the influent flow rate was added to the calculated rate of discharge.

$$Q_o = \frac{\Delta E * A}{\Delta T} + Q_i$$

Equation 2 – Discharge Flow Rate

The discharge flow rate was measured one minute after the pump started to determine the capacity of the pump while operating at full speed.

Due to various reasons, a draw-down test was not conducted at a number of the City's pumping stations. The stations which were not assessed and the rationale for the draw-down test not being performed is provided in Table 1.

Table 1 – Stations Without Full Draw-down Test

Station Name	Rationale
SPS 1 – James Street	No wet well drawings to allow calculation of well area
SPS 3 – Couchiching Park	No flow to the station during assessment
SPS 4 – Elgin Street	Station to be replaced in the near future
SPS 7 – Royal Oak	No flow to the station during assessment
SPS 8 – Tudhope Park	No flow to the station during assessment
SPS 12 – Fittons Road East	Controls within a confined space
SPS 16 – Forest Avenue South	No digital water level read-out
SPS 17 – Collins Drive	No digital water level read-out (measurements still taken)
SPS 22 – Ridge Road	No flow to the station during assessment
SPS 24 – Leacock	No wet well drawings to allow calculation of well area

2.2 Sewage Pumping Station No. 1 – James Street

2.2.1 Description

Sewage Pumping Station No. 1 is located at 125 James Street West. This pumping station began servicing the collection system in 1973 as the main pumping station. The station consists of a wet well and dry well, which are housed in the pumping station building. All wastewater collected in the City's collection system comes to this SPS through two trunk sewers of 1050mm and 1200mm diameter. The trunk sewers discharge into maintenance hole #1 in the parking lot to the North of the pumping station and flows from the maintenance hole enter the wet-well through two wet-well sluice gates. The wastewater is discharged from the SPS through two twin 600mm ductile iron, concrete lined forcemains to Orillia's Wastewater Treatment Centre (WWTC) on Kitchener Street. This station is equipped with two (2) manual bar screens, two (2) inlet grinder pumps, and four wastewater pumps and motors with VFDs. This station is also equipped with a standby Cummins diesel generator which was installed in 2010.

In addition to the pumping station, this location includes a septage receiving station. The septage receiving station is equipped with grinder pumps and a grit classifier and discharges into the James Street pumping station.



Figure 1 – Septage Receiving Station

2.2.2 Site Inspection Condition Assessment

2.2.2.1 Septage Receiving Station

Process Mechanical

- There is one rock collector within the septage receiving system. The collector appears to be in good condition. There are no upgrades recommended at this time.
- A Muffin Monster grinder pump is used to convert small objects and rocks that passed through the rock collection system into smaller particles. The grinder pump is in good condition with no upgrades required.
- A Muffin Monster grit classifier is used to remove the remaining grit from the received wastewater before discharging to the pumping station. The grit classifier appears to be in very good condition.
- The piping and valve system within the septage receiving station is in good condition. No upgrades are recommended.

2.2.2.2 Pumping Station Wet Well

Building Mechanical

- The wet well has two 1500kg hoists for removing the grinder pumps for servicing. The hoists are in moderate condition and are advised to be replaced within 0-5 years. The cost estimate for two new hoists is \$25,000.

Process Mechanical

- There are two inlet sluice gates, one for each side of the divided wet well. Moreover, the wet well division wall has a sluice gate to allow for each side of the wet well to be isolated. The sluice gates appear to be in good condition. It is recommended to replace the sluice gates in 0-5 years. The cost to replace the two sluice gates is estimated to be \$24,000.
- Downstream of the sluice gates are two manual bar screens, one for each side of the wet well. Since bar screen maintenance requires manual efforts from operations staff and there are Muffin Monster grinders downstream of the bar screens, it is recommended that the bar screens be removed. The cost to remove the bar screens is estimated to be \$20,000.
- There are two inlet channel Muffin Monster grinders in the basement of the wet well. The grinders were originally installed in 2005, with a new grinder installed in 2016. The grinders and motors appeared to be in good condition. It is advised to replace the grinders in 5-10 years due to reaching end of expected service life. The cost to replace the grinder pumps is estimated to be \$150,000.
- The piping and valve system in the wet well are in moderate condition with minimal oxidation occurring at connections. Replace piping, valves, and equipment supports in 0-5 years. The cost to replace the valves and piping in the pumping station is estimated to be \$164,000.

2.2.2.3 Pumping Station Dry Well

Structural

- The interior of the dry well is also concrete block and concrete flooring, which appear to be in good condition. No refinishing is recommended at this time.

Process Mechanical

- The dry well houses four wastewater pumps and motors as described below:
 - Pumps #1 and #4 are Fairbanks Morse 5710 (1150rpm, 355L/s, 18.3m) pumps that are equipped with VFDs. Pumps #1 and #4 were installed in 1972. The motors for pumps #1 and #4 are Electric Machinery (575V, 60 Hz, 125Hp, 1180 rpm) motors and were installed with the pumps in 1972.
 - Pump #2 is also a Fairbanks Morse 5710 (705rpm, 710L/s, 18.3m) pump that is equipped with a VFD. The motor is a Reliance motor (575V, 60Hz, 250Hp, 705rpm). Pump and motor assembly were installed in 1972.
 - Pump #3 is an Aurora 612A (585rpm, 695L/s, 18.5m) pump with a G.E. (575V, 60Hp, 250Hp, 600rpm) motor. This pump/motor assembly was installed in 1995.

All pumps appeared to be in moderate to poor condition. There is rusting at all the pump connections. It is recommended that pump and motors #1, #2, and #4 be replaced in 0-5 years, and pump and motor #3 be replaced in 5-10 years due to the age of these assets. The estimated total cost to replace the above pump and motor assemblies are \$480,000 (approximately \$120,000 each).

Electrical

- The James Street station is equipped with a substation transformer and outdoor switch gear that are in working condition. However, the transformer and switch gear were installed in the 1980's and has reached the end of their useful life. The estimated cost to replace the transformer and switch gear is \$55,000.
- The station has a Square D MCC that was originally installed in 2000. The MCC is in fair condition with an estimated remaining useful life of 10 years. The estimated cost to replace the MCC is \$80,000.

- There is also a Siemens 125 hp PowerFlex that appears to be in working condition. The PowerFlex was installed in 2000 and has a remaining useful life of 0-5 years. The cost estimate to replace the unit is \$20,000.
- The station has a Square D lighting panel that was installed in 2000, and is in fair condition. It is recommended that the panel is replaced in the next 5-10 years. The estimated cost to replace the panel is \$4,000.

2.2.3 Pumping Station Capacity

Drawings provided for this station do not have clear dimensions of the wet well. As a result, flow volumes for the draw down test could not be produced at this time. Moreover, the BM Ross Wastewater System Master Plan (2013) does not include a review of this station's flow capacity.

2.3 Sewage Pumping Station No. 2 – Bayview Parkway

2.3.1 Description

Sewage Pumping Station No. 2 (SPS2) is located at 406 Bayview Parkway. This pumping station was constructed in the late 1940's (approximately 1947). A 300mm diameter gravity sewer from the Forest Avenue South and Collins Drive Pumping Stations feed into common maintenance hole #1507. Wastewater from the maintenance hole enters the Bayview Parkway station through a 380mm diameter pipe. Wastewater is discharged from this station through a 200mm diameter forcemain into maintenance hole #88 at James Street and Forest Avenue. The area that this SPS services is low lying which results in higher-than-normal peak flows during spring runoff and storm events. A 1140 m³ equalization chamber was constructed in 1987 which has eliminated bypass events. In addition to the equalization tank, the station is equipped with two (2) pumps and motors with VFDs.



Figure 2 – Pumping Station No. 2

Image Source: Google Maps

2.3.2 Site Inspection Condition Assessment

2.3.2.1 Station Building

Building Mechanical

- A shop crane is used for lifting the pumps out of the dry well basement and it is in good condition. No upgrades are recommended at this time.

Process Mechanical

- The Bayview Parkway station has two (2) Fairbanks Morse B5414 (1170rpm, 70L/s, 30.0m TDH) pumps that are equipped with VFDs. Pumps #1 and #2 were installed in 2007, with pump #2 being rebuilt in 2019. The motors for both pumps are US Motors Type RVI (600V, 60Hz, 30Hp) and were also installed in 2007. Considering the age and condition of the station's assets, it is recommended that the pumps and motors be replaced in 20-25 years. The estimated cost to replace the pumps and motors at this station is \$120,000.
- What could be observed of the piping and valve system through the grated section of the floor in the dry well is in good condition. No upgrades are recommended at this time.

Electrical

- The Bayview Park Station is equipped with a Klockner-Moeller Series 200 MCC that was installed in 1989. The MCC's built-in ATS has failed with a temporary portable generator attached. It is recommended that the MCC is replaced immediately for an estimated cost of \$80,000.
- The station's PLC was installed in 1996 and is in fair condition. However, the PLC has approached the end of its useful life and production of this PLC has been discontinued. It is recommended to be replaced in the next 0-5 years for an estimated cost of \$50,000. The VFD's for Pump 1 and 2 are in good condition. There are no recommended upgrades for the VFDs at this time.
- The back-up diesel generator for the station was installed in 1989. The generator has reached the end of its useful life and is in poor condition. It is recommended that the generator is replaced within the next 0-5 years. The approximate cost to replace the generator is \$80,000.
- The magnetic flow meter for this station was installed in 2013. The flow meter is located in a confined space; it is assumed that the flow meter is in good condition.

2.3.2.2 Wet Well

Structural

- The city has advised that the wet well at this station is small and requires upgrades. However, determining the required size for the wet well is out of the scope of this Master Plan update. Therefore, a cost analysis for the expansion of the wet well was not included in the condition assessment costs.

2.3.3 Pumping Station Capacity

A wet-well draw down test was conducted at SPS 2. The average influent flow rate was measured to be 57 L/s over a 2-minute time interval. The average discharge flow rate was measured to be 144 L/s with one pump in operation. The discharge flow rate was measured while the pump was operating at partial speed (45 Hz/ 60 Hz). It should be noted that the measured discharge flow rate does not correspond to the pump capacity listed in the operations manual of 70 L/s at 30m TDH. Based on the findings of the draw-down test, the TDH seen by the pumps at this station is significantly lower than 30m, allowing the pumps to produce a greater discharge flow rate.

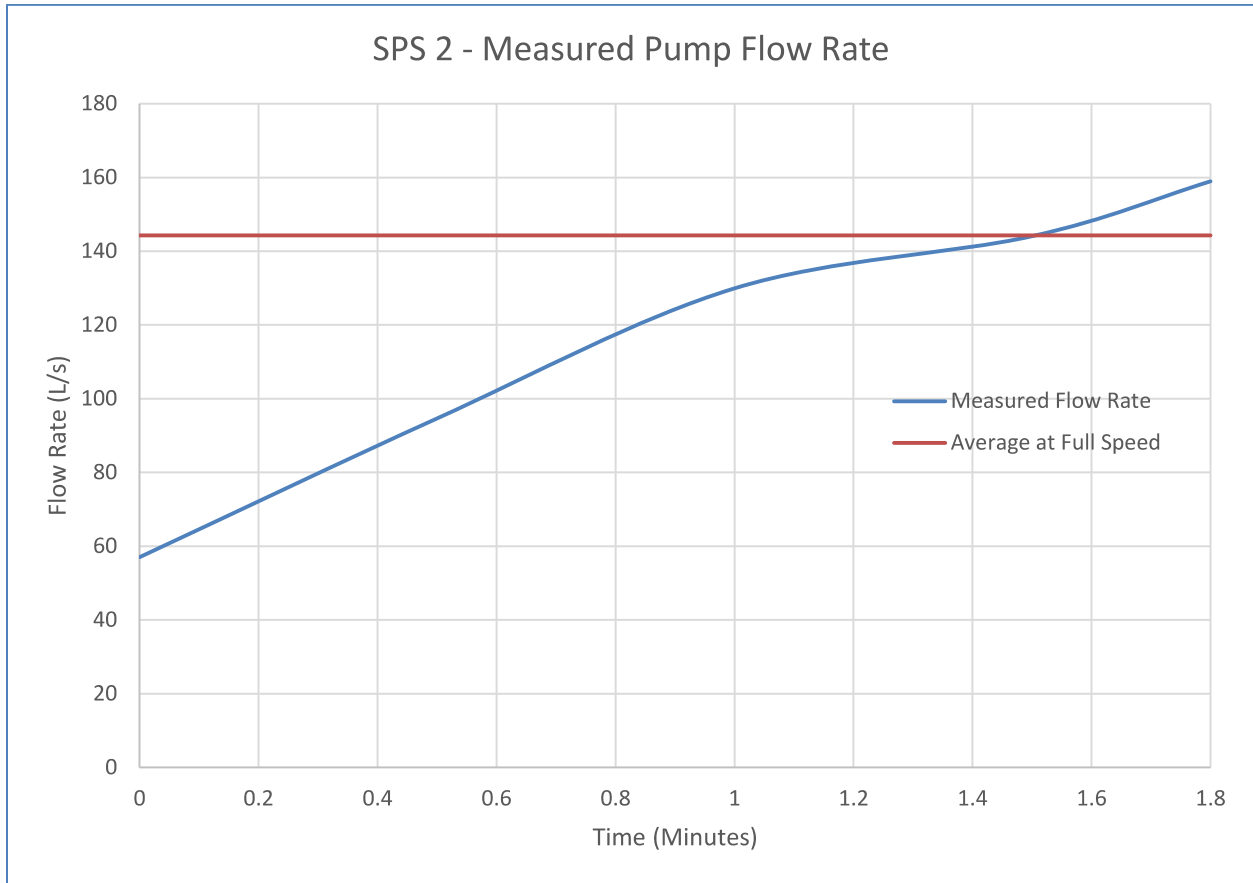


Figure 3 - SPS 2 Draw-Down Test Results

As identified in the BM Ross Wastewater System Master Plan Update (2013), it was determined SPS No. 2 operates at 26% and 48% of its rated capacity as per peak flow conditions and 2012 Hydra model respectively.

2.4 Sewage Pumping Station No. 3 – Couchiching Park

2.4.1 Description

Sewage Pumping Station No. 3 is located at 200 Jarvis Street. This station was built in 1930 and demolished in 1978, and the wet well was converted into a submersible station. Wastewater enters the station through a 200mm diameter gravity sewer. Wastewater is discharged from the station through a 200mm diameter forcemain to maintenance hole #47 on Jarvis Street. This station is equipped with two (2) submersible pumps and motors.



Figure 4 – Pumping Station No. 3 Wet Well

2.4.2 Site Inspection Condition Assessment

2.4.2.1 Wet Well

Structural

- There are two metal access hatches for the wet well in this station. The access hatch is in good condition with minimal rusting. The hatch, however, is not equipped with safety grating. It is recommended the hatch is upgraded to include safety grating in the next 0-5 years. The cost to upgrade the hatches is approximately \$10,000.

Process Mechanical

- The Couchiching Park Pump Station is equipped with two submersible pumps. Pumps and motors #1 and #2 were replaced in 2019 and 2008, respectively. Total Dynamic Head for the station pumps was approximated using the inlet-outlet elevations and assumed friction losses from the Hydra model.
 - Pump #1 and #2 are Flygt (1800rpm, 16L/s, 9.0m TDH) pumps. Considering the age of the pumps and motors, pump #1 and #2 are to be replaced in 20-25 years. The estimated cost to replace the pumps is included in the motor costs below.
 - Motor #1 and #2 are Flygt (5Hp, 1730rpm, 60 Hz, 208V) motors. In conjunction with the pumps, the motors should be replaced when the pumps are replaced. The cost to replace the pumps and motors is estimated to be \$60,000.
- What could be observed of the piping and valve system is in moderate condition with corrosion present at connections. Replace piping, valves, and equipment supports in 0-5 years. The cost to replace the valves and piping in the pumping station is estimated to be \$53,500.

2.4.3 Pumping Station Capacity

Due to the limited catchment area for this pump station, there was insufficient wastewater flow available to conduct a draw-down test. According to the BM Ross Wastewater System Master Plan Update (2013) SPS No. 3 is operating at 27% of its rated capacity (15.8 L/s), based on measured peak flows of (4.3 L/s), or at 18% of its rated capacity (15.8 L/s) based on the 2012 Hydra model results (2.9 L/s).

2.5 Sewage Pumping Station No. 4 – Elgin Street

2.5.1 Description

Sewage Pumping Station No. 4 is located at 100 King Street. This station was built before 1956 and was retrofitted to a submersible station in 1998. The inlet gravity sewer has a diameter of 200mm and discharges through a forcemain of 150mm diameter to maintenance hole #33 on Elgin Street. This station is being replaced as part of an upgrade projection on Centennial Street. The station is equipped with two (2) submersible pumps and motors. If the station is not replaced, the following upgrades are recommended for SPS No. 4.



Figure 5 – Pumping Station No. 4

2.5.2 Site Inspection Condition Assessment

2.5.2.1 Wet Well

Structural

- The metal access hatches to the wet well have significant corrosion and no safety grating. It is advised that the metal access hatches be replaced in 0-5 years. The approximate cost to replace the metal access hatches is \$10,000.

Process Mechanical

- This station has two submersible ABS (35 L/s, 7m) pumps equipped with motors (6Hp, 1780rpm, 60Hz, 575V) and installed during the 1998 station retrofit. Considering the age of the pumps and motors, these assets should be replaced in 10-15 years. The cost estimate to replace these pumps and motors is \$40,000.
- What could be observed of the piping and valve system is in moderate condition with corrosion present at connections. Replace piping, valves, and equipment supports in 10-15 years. The cost to replace the valves and piping in the pumping station is estimated to be \$53,000.

2.5.3 Pumping Station Capacity

The City of Orillia is currently in the process of replacing this pumping station with a new station on Cedar Island Road. As such, a draw-down test was not considered necessary at this station and was not conducted.

2.6 Sewage Pumping Station No. 5 – Couchiching Point

2.6.1 Description

Sewage Pumping Station No. 5 is located at 598 Couchiching Point. The original station was a Smith and Loveless station with a dry well and wet well, which was initially constructed in 1966. The Smith and Loveless station was replaced in 2009 with a submersible station. The submersible station is equipped with two (2) submersible pump and motor sets. Before entering the station, two 250mm gravity sewers converge in maintenance hole #318, which then feeds into the station wet well. Wastewater from this station is discharged through a 250mm forcemain to maintenance hole #88 at James Street and Forest Avenue.



Figure 6 – Pumping Station No. 5

2.6.2 Site Inspection Condition Assessment

2.6.2.1 Wet Well

Structural

- The fiberglass exterior of the submersible station is in excellent condition. The access hatches, however, are missing safety gratings. It is recommended that the access hatches be retrofitted with safety gratings within 0-5 years. The cost to upgrade the access hatches is estimated to be \$10,000.

Process Mechanical

- This station has two submersible Flygt (38.9L/s, 12.7m TDH) pumps equipped with motors (10Hp, 1740 rpm, 60Hz) that were installed in 2009. Considering the age of the pumps and motors, these

assets should be replaced in 20-25 years. The cost estimate to replace these pumps and motors is \$70,000.

- What could be observed of the piping and valve system is in good condition. No additional upgrades are recommended at this time.

Electrical

- The Couchiching Point pumping station dry well is equipped with a power control panel, manual transfer switch, Pump 1 and 2 starters, and an Allen-Bradley PLC Panel. All components are in good condition.
- The junction boxes were observed to be rusted with evidence of water penetration. It is recommended that the junction boxes be replaced with NEMA 4X type boxes with EYS seals for conduits as per ESA immediately. The cost to replace the boxes and seals is estimated to be \$2,000.

2.6.3 Pumping Station Capacity

A wet-well draw down test was conducted at SPS 5. The influent flow rate was measured to be 24.3L/s on average over a 2.5-minute time interval. The discharge flow rate was measured to be 34.4L/s with one pump in operation. The discharge flow rate was measured while the pump was operating at full speed on a constant speed drive. The pump did not reach the full capacity as identified in the operations manual, suggesting some fouling in the forcemain. However the discrepancy may be due to the imprecise nature of the measurement methodology.

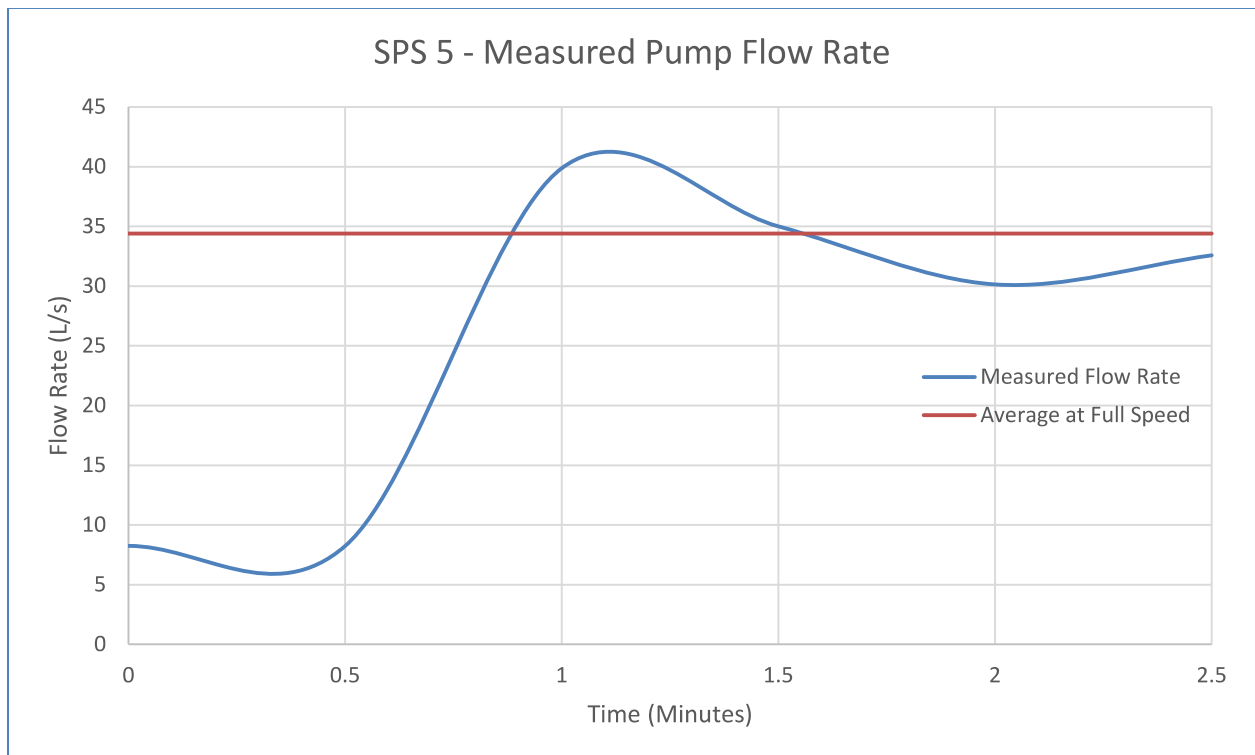


Figure 7 – SPS 5 Draw-Down Test Results

As identified in the BM Ross Wastewater System Master Plan Update (2013), SPS No. 5 is operating at 81%, 46%, and 32% of its rated capacity based on peak flow (31.4 L/s), Flo-tote (17.9 L/s) and Hydra model (12.4 L/s) results, respectively.

2.7 Sewage Pumping Station No. 6 – Hughes Road

As identified in the previous Wastewater System Master Plan Update, the Hughes Road sewage pumping station (SPS No. 6) is no longer in service. As a result, SPS No. 6 was not considered for this condition assessment.

2.8 Sewage Pumping Station No. 7 – Royal Oak

2.8.1 Description

The control building for Pumping Station No. 7 is located at 91 Laclie Street. This pumping station was built in 1962, with a new pump installed in 1985. Maintenance hole #1208 serves as this station's wet well and has an inlet gravity sewer of 200mm diameter and a discharge forcemain of 200mm. The discharge forcemain feeds a 300mm diameter gravity sewer at maintenance hole #1116 (Neywash St. and Laclie St. intersection), which then flows by gravity to maintenance hole #2008. This station is equipped with one (1) pump and motor.



Figure 8 – Pumping Station No. 7 Wet Well

2.8.2 Site Inspection Condition Assessment

2.8.2.1 Wet Well

Structural

- The metal access hatch and wrung ladder on Maintenance hole #1208 has significant corrosion. It is recommended that the hatch and the ladder be replaced in 0-5 years. The cost to replace the hatch and ladder is estimated to be \$13,000.

Process Mechanical

- The Royal Oak station has one Flygt C3085 MT (8.0L/s, 3.3m TDH) pump and motor (1.6Hp, 1700rpm, 230V) set. A new pump and motor were installed in 2013. It is recommended that the pump and motor be replaced in 25-30 years. The estimated replacement cost of the pump and motor estimated as \$15,000. Operations staff advise that a new pump is on order for this station.
- What could be observed of the piping and valve system appears to be in moderate condition with corrosion present on piping and valves. Replace piping, valves, and equipment supports in 0-5 years. The cost to replace the valves and piping in the pumping station is estimated to be \$34,000.

2.8.3 Pumping Station Capacity

Due to the limited catchment area for this pump station, there was insufficient wastewater flow available to conduct a draw-down test.

The BM Ross 2013 Master Plan Update indicated that this station operates at 0.5 L/s, which is 6% of its rated capacity of 8.1 L/s based on peak flow and hydra model results.

2.9 Sewage Pumping Station No. 8 – Tudhope Park

2.9.1 Description

The control building for Pumping Station No. 8 is located at 450 Atherley Road. This station is a submersible pump station, which was originally constructed in 1969, and was upgraded in 1991. This station has an inlet gravity sewer with 100mm diameter from maintenance hole #1822. Wastewater is discharged from this station through a 100mm diameter forcemain to maintenance hole #1512 on Atherley Road. This station consists of two (2) pump and motor sets.



Figure 9 – Pumping Station No. 8 Wet Well

2.9.2 Site Inspection Condition Assessment

2.9.2.1 Wet Well

Structural

- The metal access hatch at this station is missing safety grating. It is recommended that the station be retrofitted with safety grating in 0-5 years. The cost of an access hatch with safety grating is estimated to be \$10,000.

Process Mechanical

- The Tudhope Park station is equipped with two Flygt C-3102 (14.2L/s, 16m TDH) pump and motor (6Hp, 3450rpm, 60Hz, 600V) set. The pumps and motors were installed in 1991, and are recommended to be replaced in 0-5 years. The cost estimate to replace the pump and motor sets is \$60,000.
- What could be observed of the piping and valve system appears to be in good condition with minimal corrosion present on piping and valves. Replace piping, valves, and equipment supports in 5-10 years. The cost to replace the valves and piping in the pumping station is estimated to be \$57,000.

2.9.3 Pumping Station Capacity

Due to the limited catchment area for this pump station there was insufficient wastewater flow available to conduct a draw-down test.

The BM Ross Master Plan Update (2013) indicates that this station operates at 36% and 4% of its rated capacity (14.2 L/s) based on peak flow (5.1 L/s) and the 2012 Hydra model results (0.6 L/s), respectively.

2.10 Sewage Pumping Station No. 9 – Commerce Drive

2.10.1 Description

The control building for Pumping Station No. 9 is located at 25 Commerce Drive. This station is a prefabricated canister station and was first built in 1974. Due to a system failure which resulted in sewage entering the drywell in 2005, the MCC for the station was relocated above ground with Milltronics ultrasonic level control. A 200mm gravity sewer flows from maintenance hole #1349, and connects with the 200mm gravity sewer that services the Orillia SPCA at maintenance hole #1351. The sewer continues to the station's wet well, which is maintenance hole #1355. A second 200mm diameter gravity sewer enters the wet well from the Kubota foundry. This station discharges wastewater through a 150mm forcemain to maintenance hole #1348. This station has two (2) pump and motor sets.



Figure 10 – Pumping Station No. 9 Wet Well

2.10.2 Site Inspection Condition Assessment

2.10.2.1 Wet Well

Structural

- The concrete exterior for the wet well is in excellent condition. No refinishing is recommended at this time.
- There's one metal access hatch to the wet well that is not equipped with safety grating. The access hatch is in excellent condition; however, it is recommended that the hatch be retrofitted with safety grating in 0-5 years. The estimated cost to retrofit a hatch with safety grating is \$10,000.

Process Mechanical

- The Commerce Drive station is equipped with two (2) Flygt BP-3153HT (14.2L/s, 16m TDH) pump and motor (12Hp, 1765rpm, 60Hz, 208V) sets. The pumps and motors were installed in 2016 and are recommended to be replaced in 30-35 years. The cost estimate to replace the pump and motor sets is \$80,000.
- What could be observed of the piping and valve system appears to be in good condition. There is no valve or piping upgrades recommended.

Electrical

- An Allen-Bradley PLC, UPS, Pump 1 and 2 starters, generator switch and electrical enclosure with panel accessories are located in the dry well. All of the electrical components are in good condition. No upgrades are recommended at this time.
- The wet well for the Commerce Drive station houses an ultrasonic level transducer and two (2) float level indicators. A desktop review of the level indicating equipment was conducted due to being located in a confined space. It is assumed that the level indicating equipment is in good condition.

2.10.3 Pumping Station Capacity

A wet-well draw down test was conducted at SPS 9. The influent flow rate was measured to be 1.5 L/s on average over a 15-minute time interval. The discharge flow rate was measured to be 21.1L/s with one pump in operation. The discharge flow rate was measured while the pump was operating at full speed on a constant speed drive. The operations manual does not list a design flow rate for the pumps at this station as a measure of comparison. The results of the draw-down test are shown graphically in Figure 11.

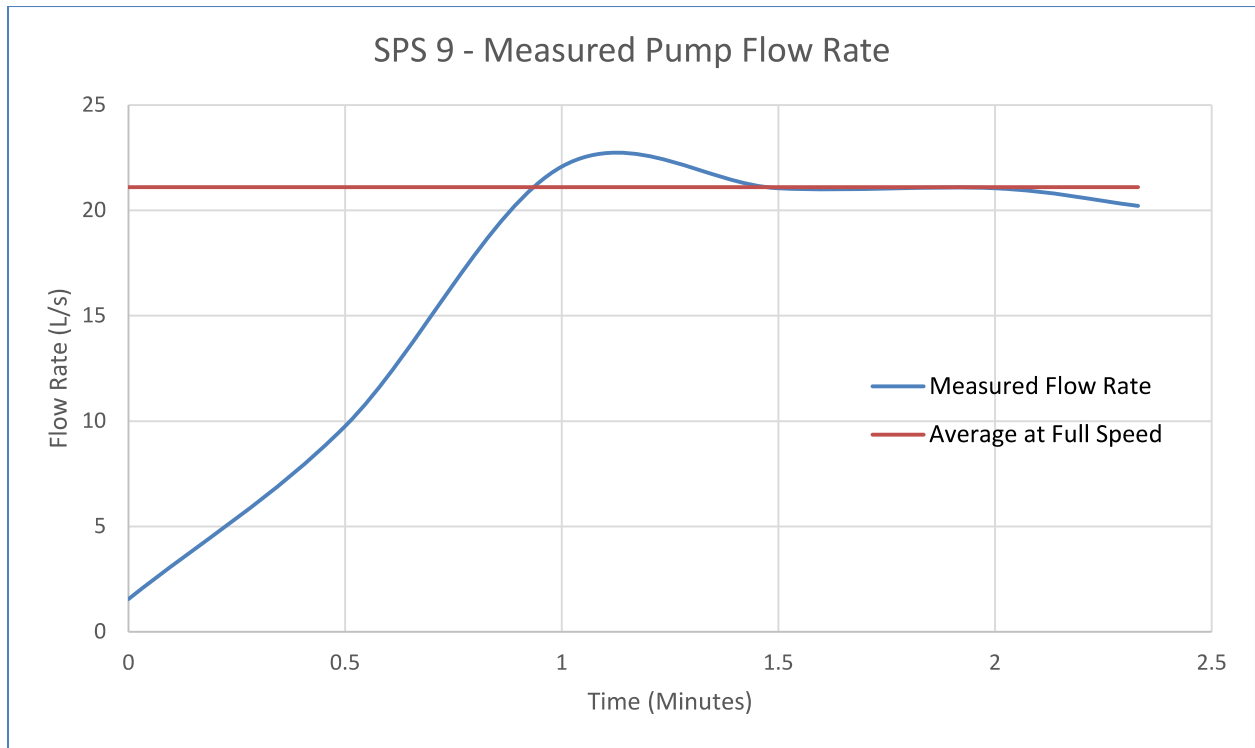


Figure 11 – SPS 9 Draw-Down Test Results

The BM Ross Master Plan Update (2013) indicates that this station operates at 29% and 12% of its rated capacity (36.1 L/s) based on peak flow (10.6 L/s), and the 2012 Hydra model results (4.3 L/s), respectively.

2.11 Sewage Pumping Station No. 10 – Victoria Crescent

2.11.1 Description

The control building for Pumping Station No. 10 is located at 160 Victoria Crescent. This station is a submersible station which was originally built in 1970; the station was upgraded and pumps were replaced in 1996. Wastewater from Lankin Boulevard and Shannon Street flows through individual 250mm gravity sewers to maintenance hole #151, which flows to maintenance hole #152 and the station's wet well. This station discharges its wastewater through a 150mm forcemain. This station is equipped with two (2) pump and motor sets.



Figure 12 – Pumping Station No. 10
Image Source: Google Maps

2.11.2 Site Inspection Condition Assessment

2.11.2.1 Wet Well

Structural

- The top of the wet well is a large, painted, metal covering with built-in access hatches. The exterior of the access hatches appears to be in good condition; however the inside of the hatches is severely corroded. The access hatches are also missing the safety grating. It is recommended that the access hatches be replaced in 0-5 years with hatches that have safety gratings. Access hatches with safety gratings are estimated to cost \$10,000.

Process Mechanical

- This station has two (2) ABS AF30-4 (11.36L/s, 10.76m TDH) pump and motor (4Hp, 1750rpm, 60Hz, 575V) sets. Pump/motor set #1 and #2 were installed in 1974 and 2019 respectively. It is advised that pump/motor set #1 be replaced in 0-5 years, and pump/motor set #2 be replaced in 30-35 years. The total cost to replace the pumps and motors is estimated to be \$50,000.
- What could be observed of the piping and valve system appears to be in poor condition with significant corrosion on valves and piping. It is recommended to replace piping, valves, and equipment supports in 0-5 years. The cost to replace the valves and piping in the pumping station is estimated to be \$47,500.

Electrical

- The Victoria Crescent station is equipped with a Klockner Moeller Pump Control Panel with was installed in 1994. Due to the age of the asset, it is recommended that the control panel is replaced within the next 0-5 years. The estimated cost to replace the control panel is \$5,000.
- The station also has a Square D disconnect switch and double-throw disconnect switch. Both switches are in good condition and do not require upgrades.

2.11.3 Pumping Station Capacity

A wet-well draw down test was conducted at SPS 10. The influent flow rate was measured to be 24.6 L/s on average over a 2.5-minute time interval. The discharge flow rate was measured to be 27L/s with one pump in operation. The discharge flow rate was measured while the pump was operating at full speed on

a constant speed drive. The operations manual lists a design flow rate for the pumps at this station as 11.6L/s at 10.76m TDH. Based on the findings of the flow test, the TDH seen by the pumps at this station is significantly lower than 10.76m, resulting in the pumps producing a much greater discharge flow rate. The results of the draw-down test are shown graphically in Figure 13.

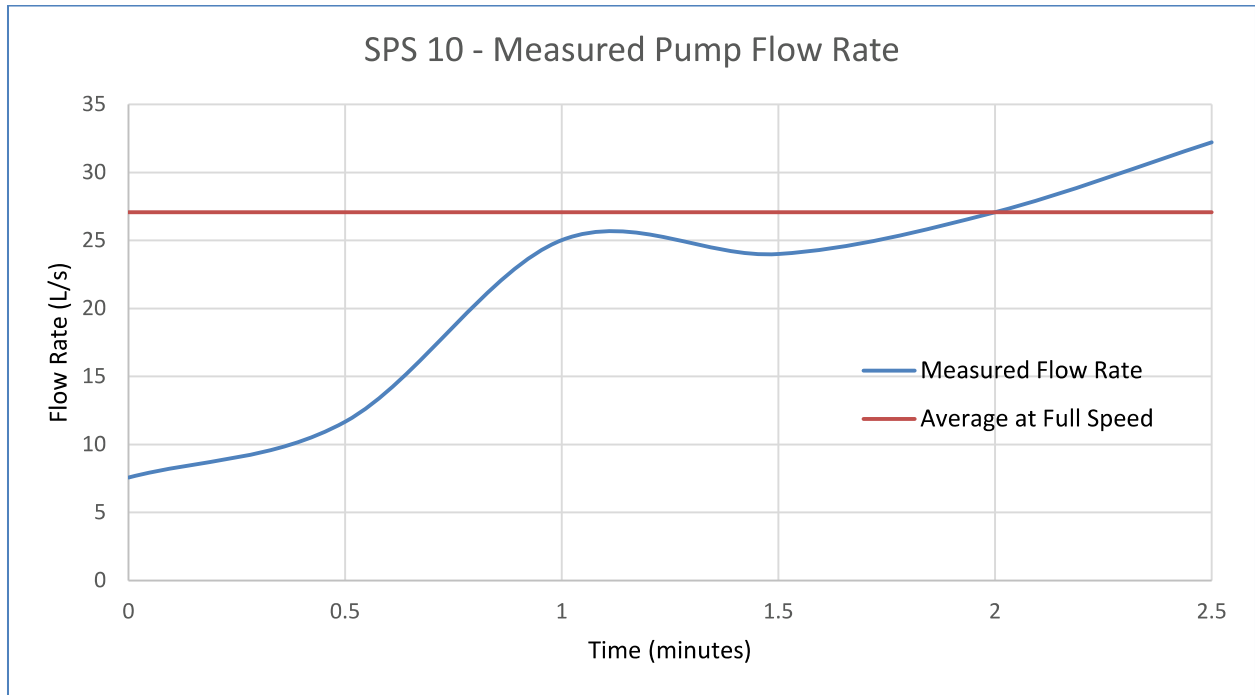


Figure 13 – SPS 10 Draw-Down Test Results

The BM Ross Master Plan Update (2013) indicates that this station operates at 61%, 83% and 45% of its rated capacity (11.4 L/s) based on peak flow (7.0 L/s), Flo-tote results (9.5 L/s) and the 2012 Hydra model results (5.1 L/s), respectively.

2.12 Sewage Pumping Station No. 11 – Shannon Street

2.12.1 Description

The control building for Pumping Station No. 11 is located at 25 Kitchener Street. The original station was built in 1966 and was a canister station (Smith and Loveless). In 2004, the station was upgraded to a submersible Flygt station. Wastewater enters the wet well of the station from maintenance hole #101 through a 250mm diameter gravity sewer. The station discharges wastewater through a 150mm diameter forcemain. This station is equipped with two (2) submersible pump and motor sets.



Figure 14 – Pumping Station No. 11 Wet Well

2.12.2 Site Inspection Condition Assessment

2.12.2.1 Wet Well

Structural

- The exterior concrete for the wet well is in good condition. No refinishing is recommended at this time.
- The metal access hatches are in good condition; however, they do not have safety grating. It is recommended that the access hatches be retrofitted to include safety grating. The cost to retrofit the access hatches is estimated to be \$10,000.

Process Mechanical

- The Shannon Street station has two (2) Flygt (28.5L/s, 4.70m TDH) pump and motor (3Hp, 1700rpm, 60Hz, 208V) sets. Both pump and motor sets were installed in 2004. It is recommended that the sets be replaced in 15-20 years. The total cost to replace the pumps and motors is estimated to be \$50,000.
- What could be observed of the piping and valve system appears to be in moderate condition; there are no immediate upgrades recommended.

Electrical

- The electrical panel enclosure for the Shannon Street station is in good condition. However, it was observed that water has entered the panel. It is recommended that the gasket seal for the panel is replaced immediately. The estimated cost to replace the gasket seal is \$1,500.
- The power to the station is controlled using a main power switch, double-throw switch and a portable generator switch. All of the switches were installed in 2004 and appear to be in good condition.
- The station is also equipped with two pump starters. The pump starters were installed in 2004 and appear to be in good condition.

- The Shannon Street station has an Allen-Bradley PLC and Summar PLC panel. The PLC and its panel are in good condition. It is recommended that the PLC and panel be replaced within the next 5-10 years. The estimated cost to replace the panel and the PLC is \$50,000.
- The level transducer and the four (4) float level indicators appear to be in good condition. No upgrades are recommended.
- The electrical conduits between the panel and the wet well are in good condition. However, the EYS seals should be installed immediately according to ESA standards. The cost to install the EYS seals is estimated to be \$1,500.

2.12.3 Pumping Station Capacity

A wet-well draw down test was conducted at SPS 11. The influent flow rate was measured to be 9.4 L/s on average over a 3-minute time interval. The discharge flow rate was measured to be 18.8L/s with one pump in operation. The discharge flow rate was measured while the pump was operating at full speed on a constant speed drive. The pump did not reach the full capacity as identified in the operations manual suggesting some fouling in the forcemain, however, the discrepancy may be due to the imprecise nature of the measurement methodology. The results of the draw-down test are shown graphically in Figure 15.

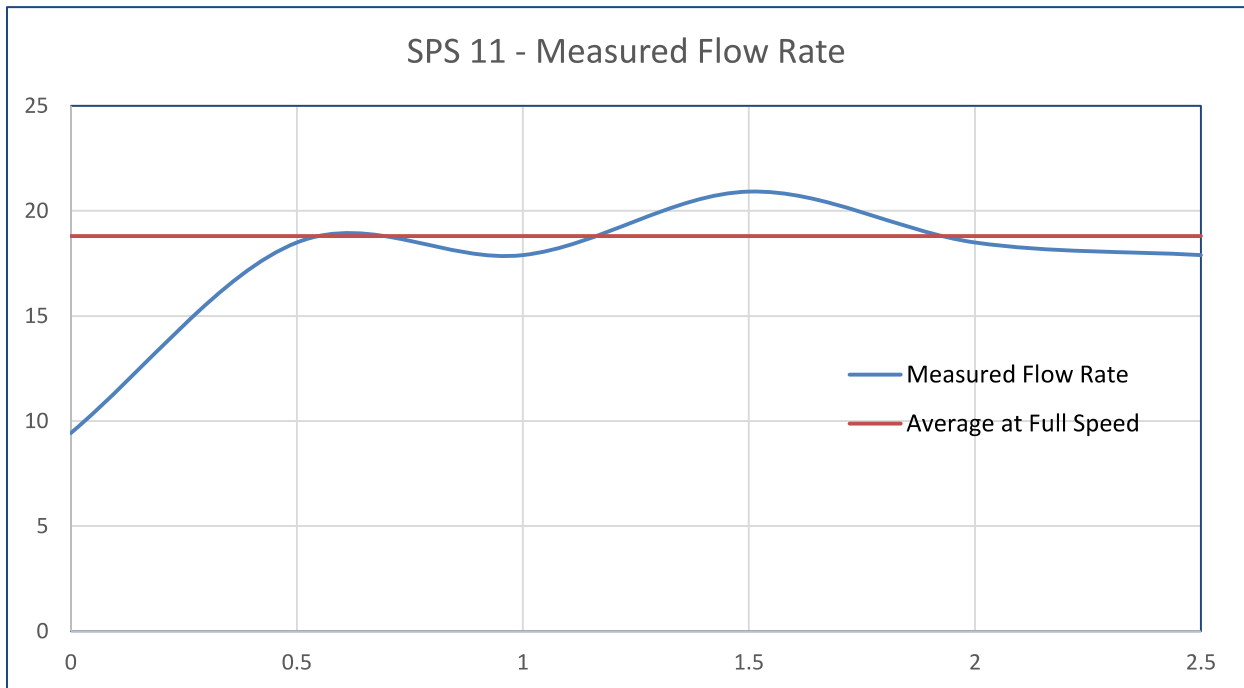


Figure 15 – SPS 11 Draw-Down Test Results

The BM Ross Master Plan Update (2013) indicates that this station operates at 64%, 65% and 22% of its rated capacity (22.9 L/s) based on peak flow (14.6 L/s), Flo-tote results (14.8 L/s) and the 2012 Hydra model results (5.1 L/s), respectively.

2.13 Sewage Pumping Station No. 12 – Fittons Road East

2.13.1 Description

The control building for Pumping Station No. 12, located at 267 Fittons Road East, is a prefabricated Smith and Loveless canister station that was built in 1969. Wastewater enters the canister station through a 250mm diameter gravity sewer from the west and a 200mm diameter gravity sewer from the north. Wastewater is discharged from the canister station via 150mm diameter forcemain, where it connects to the North Orillia Trunk sewer at maintenance hole #60. This station has two (2) pump and motor sets. The City has indicated that this station is being fully upgraded. No upgrades are recommended as part of this Master Plan update.



Figure 16 – Pumping Station No. 12 (Canister Station)

2.13.2 Pumping Station Capacity

The controls for this station were located within a confined space. As a result, a draw-down test was not conducted at this station.

The BM Ross Master Plan Update (2013) indicates that this station operates at 23% and 16% of its rated capacity (15.8 L/s) based on peak flow (3.6 L/s) and the 2012 Hydra model results (2.5 L/s), respectively.

2.14 Sewage Pumping Station No. 13 – Bridget & Maple

2.14.1 Description

Sewage Pumping Station No. 13 is located at 68 Bridget Drive. This station was built in 1969, with upgrades to convert the station to a submersible station beginning in 2009 and finishing in 2010. The station receives its wastewater from 250mm and 300mm diameter gravity sewers. The station discharges its wastewater through a 250mm diameter forcemain into maintenance hole #70.



Figure 17 – Pumping Station No. 13 Utility Locker

2.14.2 Site Inspection Condition Assessment

2.14.2.1 Wet Well

Structural

- The exterior and interior concrete of the wet well appears to be in good condition. No upgrades are recommended at this time.
- The metal access hatch to the wet well appears in good condition, however, the hatch is missing safety gratings. It is recommended that the access hatch is retrofitted to include safety grating. \$10,000 is the estimated cost to retrofit the access hatch.

Process Mechanical

- This station is equipped with two (2) Flygt (37.85L/s, 14.02m TDH) pumps and motors (12Hp, 1765rpm, 60Hz, 208V). The pumps and motors were installed in 2010. It is recommended the pumps and motors be replaced in 20-25 years. The estimated cost to replace the pumps and motors in the station is \$80,000.
- What could be observed of the piping and valve system appears to be good condition. No immediate upgrades are recommended.

Electrical

- The electrical panel enclosure for the Bridget and Maple station is in good condition. However, it was observed that water has been leaking into the panel. It is recommended that the gasket seal for the panel be replaced immediately. The estimated cost to replace the gasket seal is \$1,500.
- The power to the station is controlled by the main power switch, a double-throw switch and a portable generator switch. All of the switches were installed in 2010 and appear to be in good condition. No upgrades are recommended for the switches.

- The station's two (2) pump starters and PLC were also installed in 2010. The equipment is in good condition with no recommended upgrades at the time of inspection.
- The four (4) inch gooseneck ventilation pipes are too close to the electrical panel. According to OESC/ESA the vents should be three (3) or more feet away from the panel. It is recommended that the vents or panel is moved immediately to allow for the minimum spacing requirement of three (3) feet. Moving the vents is the more cost effective option with an estimated cost of \$10,000.

2.14.3 Pumping Station Capacity

A wet-well draw down test was conducted at SPS 13. The influent flow rate was measured to be 2.8 L/s on average over a 5-minute time interval. The discharge flow rate was measured to be 27.6L/s with one pump in operation. The discharge flow rate was measured while the pump was operating at full speed on a constant speed drive. The pump did not reach the full capacity as identified in the operations manual suggesting some fouling in the forcemain, however, the discrepancy may be due to the imprecise nature of the measurement methodology. The results of the draw-down test are shown graphically in Figure 18.

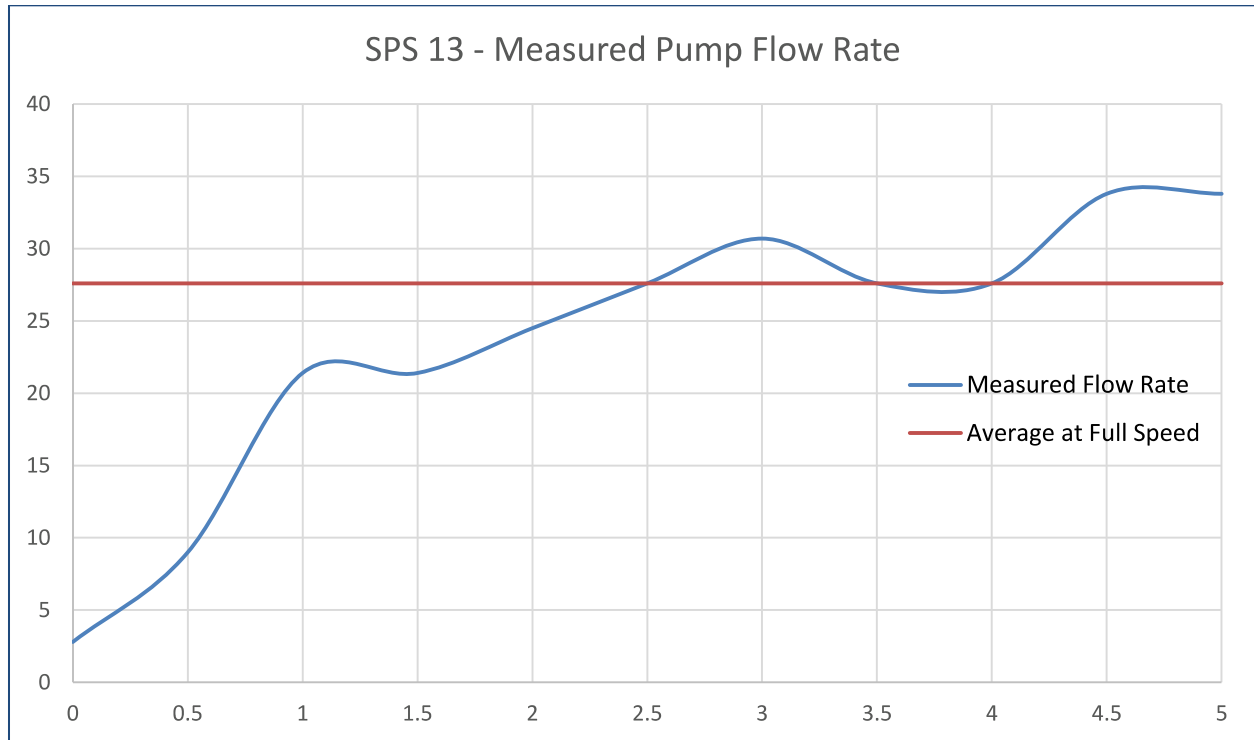


Figure 18 – SPS 13 Draw-Down Test Results

The BM Ross Master Plan Update (2013) indicates that this station operates at 23% and 14% of its rated capacity based on peak flow (8.0 L/s) and the 2012 Hydra model results (4.8 L/s), respectively.

2.15 Sewage Pumping Station No. 14 – Forest Avenue North

2.15.1 Description

Sewage Pumping Station No. 14 is located at 350 Forest Avenue North. This station was a Smith and Loveless canister station that was built in 1969, and was upgraded to submersible station in 2017. Wastewater enters the station through an inlet gravity sewer with a diameter of 200mm. The station

discharges its wastewater through a 150mm diameter forcemain that feeds a gravity sewer at maintenance hole #304. This station is equipped with two (2) pump and motor sets.



Figure 19 – Pumping Station No. 14 Wet Well

2.15.2 Site Inspection Condition Assessment

2.15.2.1 Wet Well

Structural

- The internal and external concrete of the wet well appear to be in excellent condition. No refinishing is recommended at this time.
- The metal access hatch to the wet well is in excellent condition, however, it is missing safety gratings. It is advised that the access hatch be retrofitted and safety gratings be installed immediately. The cost to retrofit the access hatch with safety grating is estimated to be \$10,000.

Process Mechanical

- This station is equipped with two (2) Flygt (28L/s, 6m TDH) pumps and motors (12hp, 1765rpm, 60Hz, 208V). The TDH for this station was estimated by using inlet-outlet elevations within the Hydra model. The pumps and motors were installed in 2017; it is recommended that the pumps and motors be replaced in 30-35 years. The estimated cost to replace the pumps and motors in the station is \$50,000.
- What could be observed of the piping and valve system appears to be in good condition. Due to the recent installment of this piping and valve system, there are no recommended upgrades.

Electrical

- The electrical equipment for the Forest Avenue North station was installed in 2017 and appeared to be in good condition. The station is equipped with the following:
 - Electrical Panel and accessories;
 - Siemens Main power switch;
 - Eaton double-throw switch;
 - Portable generator switch;
 - Two (2) pump starters;

- Allen-Bradley PLC and Summar PLC panel;
 - Siemens lighting panel;
 - Discharge flow meter;
 - Two (2) Flygt float level indicators; and
 - Ultrasonic level transducer.
- There are no recommended upgrades for the electrical equipment at the Forest Avenue North station during the time of inspection.

2.15.3 Pumping Station Capacity

A wet-well draw down test was conducted at SPS 14. The influent flow rate was negligible, with no appreciable change in volume witnessed over a 10-minute interval. The discharge flow meter measured a discharge flow rate of 17.55L/s. The discharge flow rate was measured to be 20 L/s with one pump in operation based on the drawdown test analysis. The discharge flow rate was measured while the pump was operating at full speed on a constant speed drive. The results of the draw-down test are shown graphically in Figure 20.

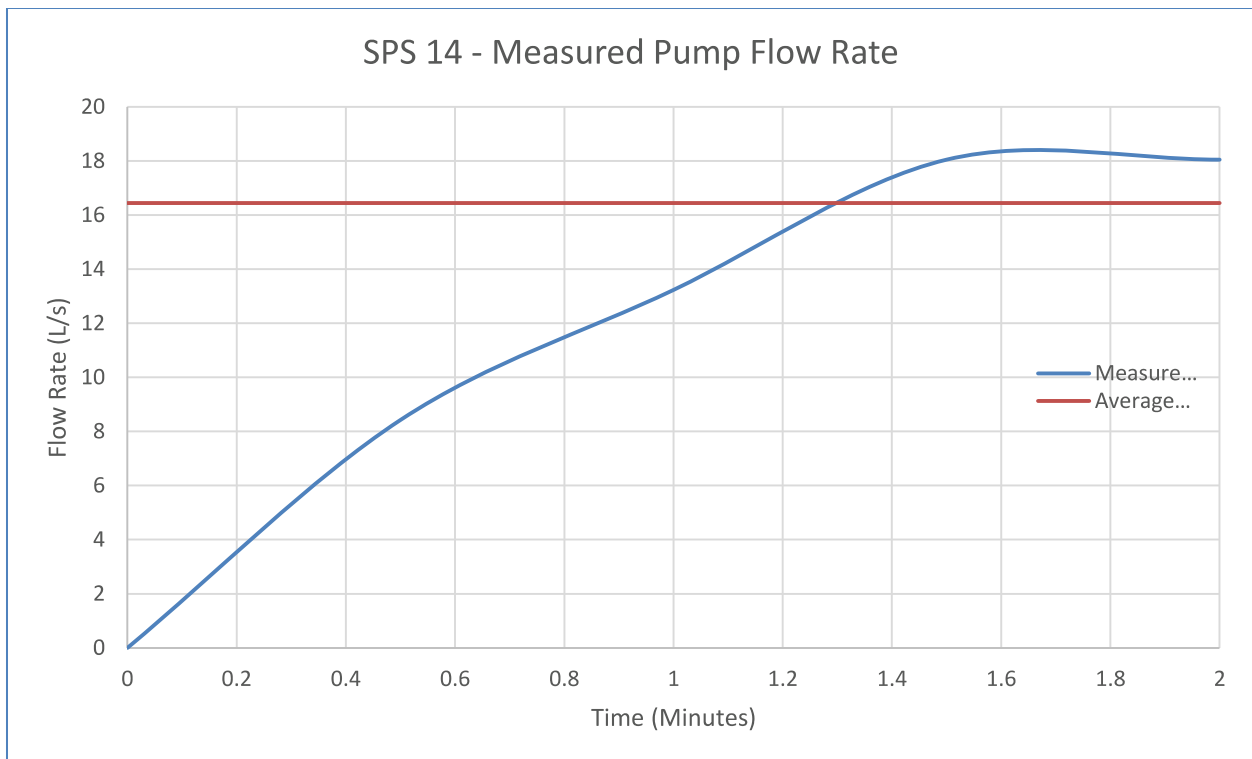


Figure 20 – SPS 14 Draw-Down Test Results

The BM Ross Master Plan Update (2013) indicates that this station operates at 8% and 4% of its rated capacity (14.2 L/s) based on peak flow (1.1 L/s) and the 2012 Hydra model results (0.6 L/s), respectively.

2.16 Sewage Pumping Station No. 15 – James Street East

As identified in the previous Wastewater System Master Plan Update, the James Street East stormwater pumping station is no longer in service. This station was not considered for the condition assessment.

2.17 Sewage Pumping Station No. 16 – Forest Avenue South

2.17.1 Description

Sewage Pumping Station No. 16 is located at 456 Forest Avenue South. This station was built in 1970, with an upgrade to a submersible station in 1987 using the original wet well. This station receives its wastewater through a 250mm diameter gravity sewer. Wastewater is discharged through a 150mm diameter forcemain into a gravity sewer at maintenance hole #272 (Forest Avenue and Collins Drive intersection). Moreover, this station is in a low-lying area in Orillia and has a history of high inflow and infiltration rates. This station is equipped with two (2) pump and motor sets.



Figure 21 – Pumping Station No. 16

2.17.2 Site Inspection Condition Assessment

2.17.2.1 Wet Well

Structural

- The structural concrete for the wet well appears to be in good condition. No refinishing or upgrades are recommended.
- The metal access hatches are in good condition; however, the access hatches are missing safety gratings. It is recommended that the access hatches be retrofitted with safety gratings within 0-5 years. \$10,000 is the approximate cost to retrofit the access hatches with safety gratings.
- The City has indicated that due to flooding in the area of the Forest Avenue South station the wet well will need to be redesigned to ensure there is enough capacity during high flow conditions. The estimated cost to resize the wet well was not considered part of the scope for this assessment since a complete review of the pumping station's design and historical flows, including I&I impacts would be required.

Process Mechanical

- This station has two (2) Flygt CP310MT (15.77L/s, 7.01m TDH) pumps and motors (4hp, 1750rpm, 60Hz, 230V). Pump/motor #2 was installed in 2019 with the submersible station upgrades and

pump/motor #1 was replaced in 2003. Considering the age of these assets, it's recommended that pump/motor sets #1 and #2 be replaced within 20-25 years, and 30-35 years respectively. It is estimated to cost \$50,000 to replace the pumps and motors at this station.

- The City has advised that a third pump is required for redundancy in high flows. The estimated cost for the third pump is \$35,000, with some modifications to the station anticipated.
- What could be observed of the piping and valve system appears to be moderate condition with minimal corrosion on valves and piping. It is recommended to replace piping, valves, and equipment supports in 0-5 years. The cost to replace the valves and piping in the pumping station is estimated to be \$47,500.

Electrical

- All of the electrical equipment at the station appears to be in good condition. It was observed however that the conduits between the pump control panel and the wet well require EYS seals to be installed immediately as per ESA standards. The estimated cost to install the EYS seals is \$1,200.
- The City has advised that this station requires a new control system and SCADA. The estimated cost to upgrade the system to provide either new Pribusin units on both ends via the exiting dedicated phone line or to provide cellular units on both ends via a wireless network is \$8,000. A more sophisticated upgrade that would require a new, wireless, radio transmitter and receiver via a new antenna would cost from \$25,000 to \$50,000, depending on the wireless signal paths, and has been excluded in the summary of costs shown in Table 2.

2.17.3 Pumping Station Capacity

The Forest Avenue pumping station is not equipped with a digital water level read-out. As a result, a reliable draw-down test could not be conducted at this station.

The BM Ross Master Plan Update (2013) indicates that this station operates at 56% and 45% of its rated capacity (18.9 L/s) based on peak flow (10.5 L/s) and the 2012 Hydra model results (8.5 L/s), respectively.

2.18 Sewage Pumping Station No. 17 – Collins Drive

2.18.1 Description

Sewage Pumping Station No. 17 is located at 372 Collins Drive. This station is a prefabricated submersible station that was constructed in 1975. This station is in a low-lying area in Orillia and has a history of high inflow and infiltration rates. This station is equipped with two (2) submersible pump and motor sets.



Figure 22 – Pumping Station No. 17 Wet Well

2.18.2 Site Inspection Condition Assessment

2.18.2.1 Wet Well

Structural

- The structural concrete exterior and interior of the wet well appear to be in good condition. No upgrades are recommended at this time.
- The two (2) metal access hatches to the wet well are in good condition; however, the hatches do not have safety gratings. It is recommended that the access hatches be retrofitted with safety gratings. The approximate cost of retrofitting the access hatches with safety gratings is \$10,000.
- The ladder that is currently in the wet well has significant corrosion. It is recommended the current ladder be replaced with an aluminum ladder within 0-5 years. The estimated cost to upgrade the current ladder with an aluminum ladder is \$3000.

Process Mechanical

- The Collins Drive Pumping Station is equipped with two (2) pump and motor sets. It is estimated to cost \$36,000 to replace the pump and motor sets.
 - Pump #1 is a Flygt CP3082MT (11.92L/s, 3.66m TDH) pump and motor (2.5hp, 1750rpm, 60Hz, 230V) that was installed with the original station in 1975. Considering the age of the assets, it is recommended this pump and motor combination be replaced with 0-5 years. The estimated cost to replace this pump set is \$18,000.
 - Pump #2 is a Flygt NP3085 (11.92L/s, 3.66m TDH) pump and motor (2.4hp, 1710rpm, 60Hz, 230V) that was installed in 2004. It is recommended to replace this pump and motor set in 15-20 years. The estimated cost to replace this pump set is \$18,000.
- What could be observed of the piping and valve system appears to be moderate condition with corrosion on valves and piping. Replace piping, valves, and equipment supports in 0-5 years. The cost to replace the valves and piping in the pumping station is estimated to be \$33,000.

Electrical

- The Collins Drive station is equipped with a Flygt pump control panel that was installed in 1974. The panel is in poor condition and has surpassed its useful service life. It is recommended that the panel is replaced within the next 0-5 years. The estimated cost to replace the panel is \$12,000.

2.18.3 Pumping Station Capacity

The Collin's Drive pumping station is not equipped with a digital water level read-out. As a result, a reliable draw-down test could not be conducted at this station.

The BM Ross Master Plan Update (2013) indicates that this station operates at 13% and 11% of its rated capacity (6.3 L/s) based on peak flow (0.8 L/s) and the 2012 Hydra model results (0.7 L/s), respectively.

2.19 Sewage Pumping Station No. 18 – Fittons Road West

2.19.1 Description

Sewage Pumping Station No. 18 (SPS18) is located at 160 Fittons Road West. This station was built in 1975 as a wet well/dry well vertical shaft station, which is housed in a building. The wet well receives its wastewater through a 400mm diameter gravity sewer from the east and a 200mm diameter gravity sewer from the west. Wastewater is discharged from this station through a 300mm diameter forcemain into a gravity sewer at maintenance hole #1058 (Fittons Road West and Leach Street intersection).



Figure 23 – Pumping Station No. 18

2.19.2 Site Inspection Condition Assessment

2.19.2.1 Wet Well

Process Mechanical

- The Fittons Road West Station is equipped with three (3) identical pump and motor sets with Allen Bradley VFDs. The pumps at this station are Fairbanks Morse 5413 (41L/s, 32.21m TDH) pumps and motors (40hp, 1800rpm, 60Hz, 600V) that were installed with the original building in 1975. Considering the age of these assets, it is recommended that the pump and motor sets be replaced in 0-5 years. The total cost to replace the pump and motor sets is estimated to be \$450,000 (approximately \$150,000 each).

- Due to the nature of this station, it was not possible to observe the piping or valves. From a desktop review of the piping and valve system, it is recommended the pipes and valves be replaced in 0-5 years due to the age of the assets. The cost to replace the pipes and valves is estimated at \$47,500.

Electrical

- The Fittons Road West station has a Square D MCC that was originally installed in 1975. The MCC has surpassed its useful life and it is recommended to be replaced immediately. The estimated cost to replace the MCC unit is \$80,000.
- The station’s back-up power is supplied by a Stamford Diesel Generator. The generator was also installed in 1975 and has surpassed its useful life. It is recommended that the generator is replaced immediately. The cost estimate to replace the generator is \$80,000.
- The fiberglass diesel storage tank for the generator fuel was also installed in 1975 and requires immediate replacement. The cost to replace the fiberglass tank is estimated to be \$8,000.
- The Allen-Bradley VFDs for Pumps 1, 2 and 3, as well as the Allen-Bradley PLC are in good condition. No upgrades were recommended at the time of inspection.

2.19.3 Pumping Station Capacity

A wet-well draw down test was conducted at SPS 18. The influent flow rate was measured to be 6.6 L/s on average over a 9-minute time interval. The discharge flow rate was measured to be 44.75L/s with one pump in operation. A drawdown test with the two smaller pumps running simultaneously was not performed. The discharge flow rate was measured while the pump was operating at full speed on a VFD. The operations manual lists a design flow rate for the pumps at this station as 41L/s at 32.21m TDH. The results of the draw-down test are shown graphically in Figure 24.

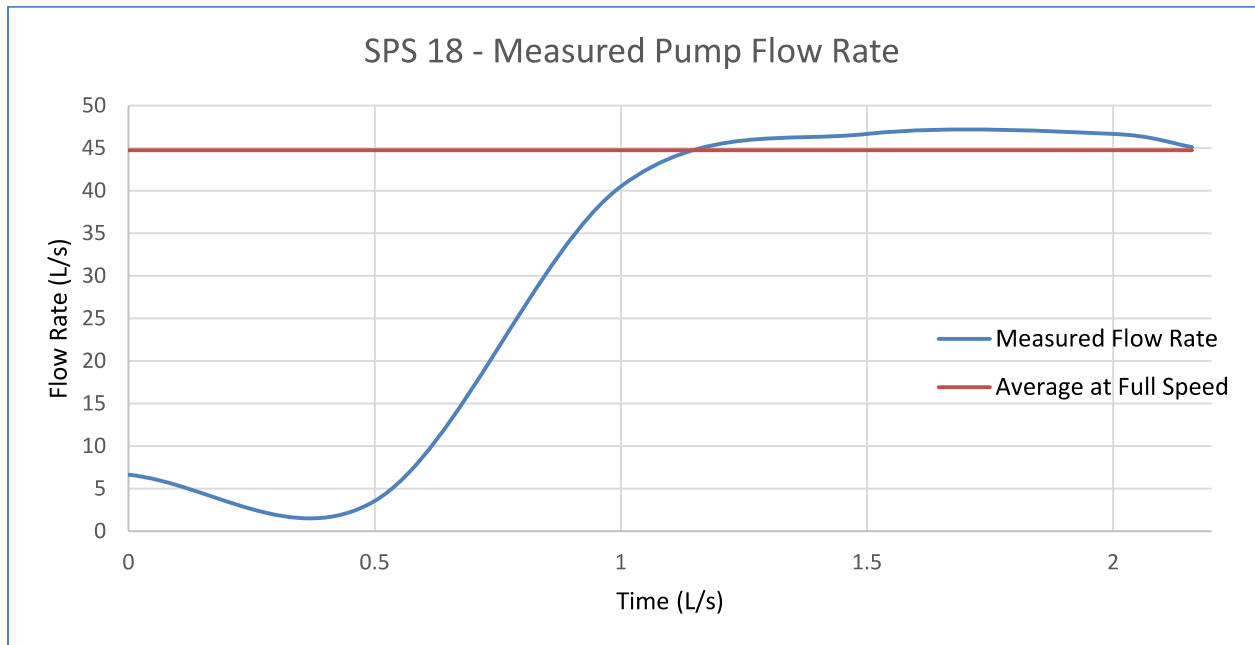


Figure 24 – SPS 18 Draw-Down Test Results

2.20 Sewage Pumping Station No. 19 – John Street

2.20.1 Description

Sewage Pumping Station No. 19 is located at 59 Westmount Drive North. This station was originally constructed as a Smith and Loveless canister station in 1974. The canister was removed in 2012 and replaced with two Flygt submersible pumps in the existing wet well. A utility locker was constructed to house the VFDs and control panel. Wastewater enters the wet well through three gravity sewers; a 250mm diameter sewer from the south, a 300mm diameter sewer from the north, and a 200mm diameter gravity sewer from maintenance hole #1802. Wastewater is discharged from this station to maintenance hole #783 on Westmount Drive through a 250mm diameter forcemain and gravity sewer.



Figure 25 – Pumping Station No. 19

2.20.2 Site Inspection Condition Assessment

2.20.2.1 Wet Well

Structural

- The two (2) metal access hatches to the wet well are in good condition; however the hatches do not have safety gratings. It is recommended that the access hatches be retrofitted with safety gratings. The approximate cost of retrofitting the access hatches with safety gratings is estimated to be \$10,000.

Process Mechanical

- This station is equipped with two (2) identical pump and motor sets. The pumps at this station are refurbished Flygt CP 3201HT (33L/s, 41.0m TDH) pumps and motors (47hp, 1750rpm, 60Hz, 600V) that were installed in 2012. Considering the age of these assets is unknown, it is recommended that the pump and motor sets be replaced in 5-10 years. The total cost to replace the pump and motor sets is estimated to be \$110,000.

Electrical

- The electrical panel enclosure for the John Street station was initially installed in 2013. Although the panel is in good condition, it was observed that water has been leaking into the panel through the gasket seals. It is recommended that the gasket seals be replaced immediately. The estimated cost to replace the seals is \$1,200.
- All of the electrical equipment in the John Street electrical panel was installed in 2013 and appeared to be in good condition. The electrical panel equipment is as follows:
 - Eaton main power switch;
 - Eaton double-throw switch;
 - Portable generator switch;
 - Allen-Bradley pump starter;
 - Allen-Bradley PLC with Summar PLC panel; and a
 - Cutler-Hammer/ Eaton lighting panel.
- Within the wet well of the station, there are two Flygt float level indicators and an ultrasonic level transducer. All of the level sensing equipment appeared to be in good condition with no upgrades recommended at the time of inspection.

2.20.3 Pumping Station Capacity

A wet-well draw down test was conducted at SPS 19. The influent flow rate was measured to be 5.5L/s on average over a 3-minute time interval. The discharge flow rate was measured to be 56.6L/s with one pump in operation. The discharge flow rate was measured while the pump was operating at full speed on a constant speed drive. The operations manual lists a design flow rate for the pumps at this station as 33L/s at 41m TDH. Based on the findings of the drawdown test, the TDH seen by the pumps at this station is lower than 41m, allowing the pumps to produce a much greater discharge flow rate. The results of the draw-down test are shown graphically in Figure 26.

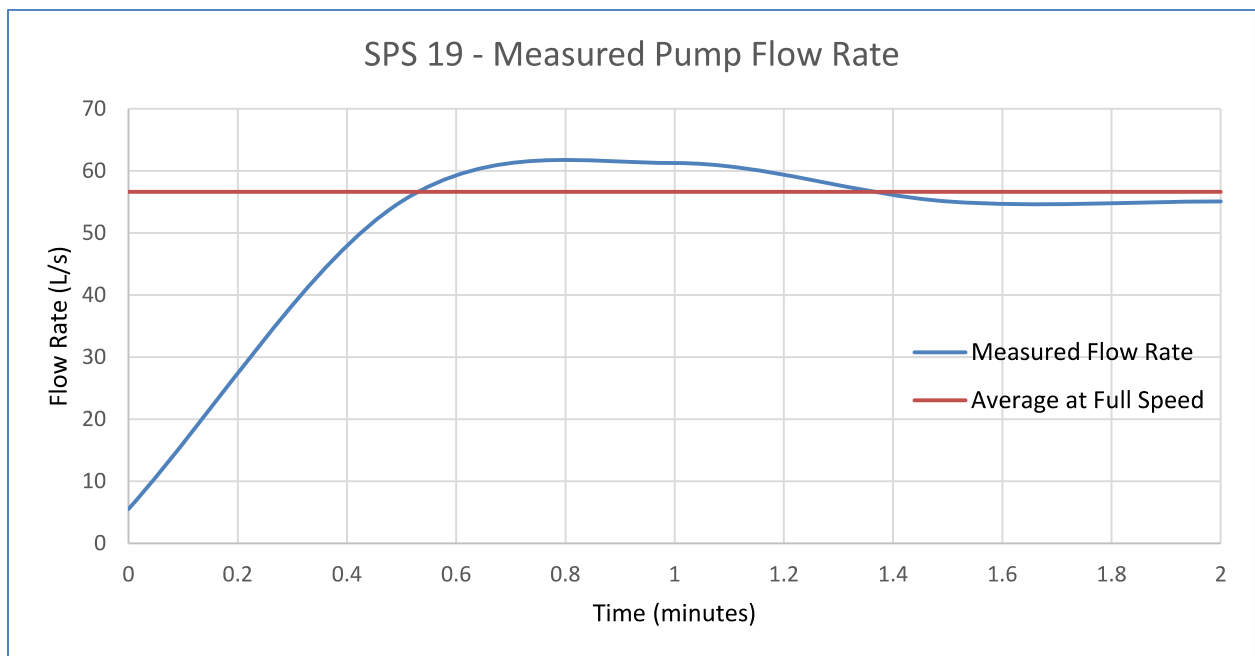


Figure 26 – SPS 19 Draw-Down Test Results

The BM Ross Master Plan Update (2013) indicates that this station operates at 49%, 18% and 40% of its rated capacity (59.3 L/s) based on peak flow (29.1 L/s), Flo-tote results (10.7 L/s) and the 2012 Hydra model results (23.6 L/s), respectively.

2.21 Sewage Pumping No. 20 – Broadview

2.21.1 Description

Sewage Pumping Station No. 20 is located at 752 Broadview Avenue. This station is a submersible station that was originally constructed in 1976. The station was upgraded with pumps, electrical works and SCADA in 2014. This station receives its waste through a 250mm diameter gravity sewer from the north, and discharges its wastewater through a 200mm diameter forcemain that feeds a 250mm diameter gravity sewer at maintenance hole #390. No confined space entries were conducted during this site inspection.



Figure 27 – Pumping Station No. 20

2.21.2 Site Inspection Condition Assessment

2.21.2.1 Wet Well

Structural

- The metal access hatches to the wet well are in good condition; however, the hatches do not have safety gratings. It is recommended that the access hatches be retrofitted with safety gratings. The approximate cost of retrofitting the access hatches with safety gratings is estimated to be \$10,000.

Process Mechanical

- The Broadview station is equipped with two (2) Flygt CG 3085MT (7.88L/s, 3.38m TDH) pumps and motors (2.4hp, 1710rpm, 60Hz, 230V) that were installed in 2014. Considering the age of these assets, it is recommended that the pump and motor sets be replaced in 25-30 years. The total cost to replace the pump and motor sets is estimated to be \$30,000.

Electrical

- The electrical equipment at the Broadview station was all installed in 2014 and appeared to be in good condition. The electrical equipment for this station includes:
 - Electrical panel and accessories;

- Eaton main power switch;
 - Eaton double-throw switch;
 - Portable generator power switch;
 - Two (2) pump starters;
 - Allen-Bradley PLC and Summar PLC panel;
 - Two (2) Flygt float level indicators; and
 - Ultrasonic level transducer.
- There are no recommended upgrades for the electrical equipment at the time of inspection. However, water was observed to have leaked into the electrical panel. It is recommended that the gasket seal on the electrical enclosure doors be replaced. The estimated cost to replace the gasket seals is \$1,200.

2.21.3 Pumping Station Capacity

A wet-well draw down test was conducted at SPS 20. The influent flow rate was measured to be 0.62L/s on average over a 16-minute time interval. The discharge flow rate was measured to be 12.6L/s with one pump in operation. The discharge flow rate was measured while the pump was operating at full speed on a constant speed drive. The operations manual lists a design flow rate for the pumps at this station as 7.88L/s at 3.38m TDH. Based on the findings of the flow test, the TDH seen by the pumps at this station is slightly lower than 3.38m, allowing the pumps to produce a greater discharge flow rate. The results of the draw-down test are shown graphically in Figure 28.

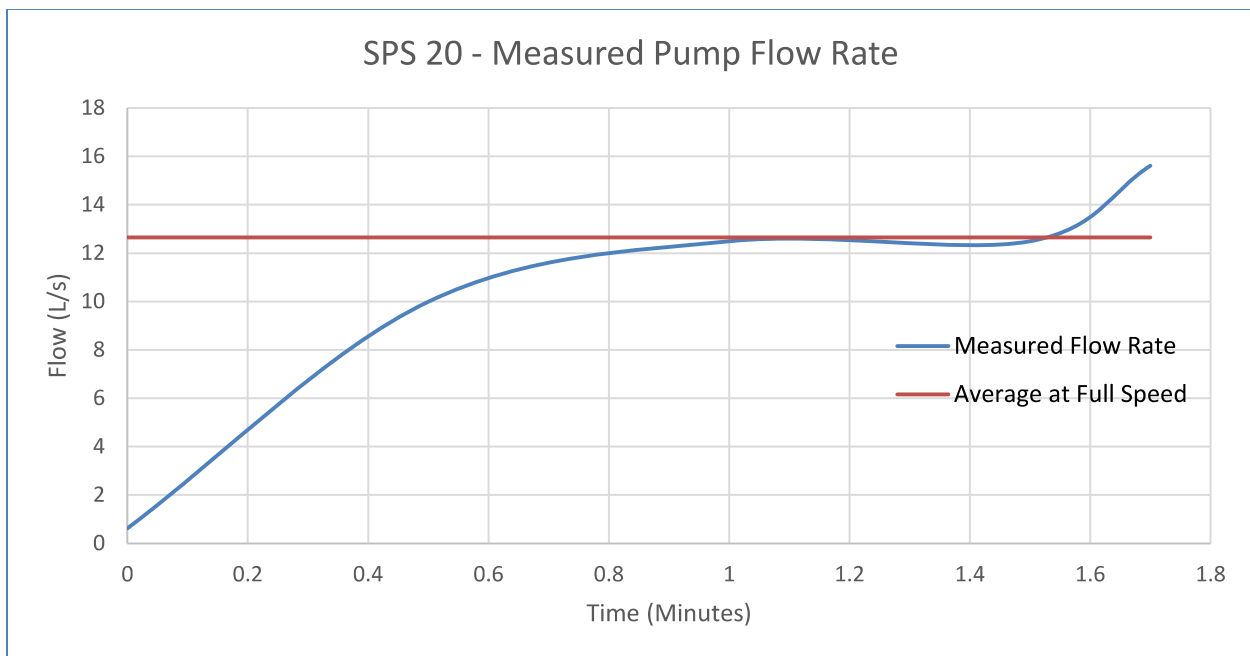


Figure 28 – SPS 20 Draw-Down Test Results

The BM Ross Master Plan Update (2013) indicates that this station operates at 14% and 9% of its rated capacity (7.9 L/s) based on peak flow (1.1 L/s) and the 2012 Hydra model results (0.7 L/s), respectively.

2.22 Sewage Pumping Station No. 21 – Cedarmere Road

As identified in the previous Wastewater System Master Plan Update, the Cedarmere Road sewage pumping station is no longer in service. This station was not considered for the condition assessment.

2.23 Sewage Pumping Station No. 22 – West Mount Drive South

2.23.1 Description

Sewage Pumping Station No. 22 (also called Ridge Road Station) is located at 245 Westmount Drive South. This station is a submersible station that was originally constructed in 1995. This station has a 200mm diameter inlet gravity sewer, and a 75mm diameter discharge forcemain. The forcemain feeds a 200mm diameter gravity sewer at maintenance hole #642.



Figure 29 – Pumping Station No. 22

2.23.2 Site Inspection Condition Assessment

2.23.2.1 Wet Well

Structural

- The structural concrete exterior and interior of the wet well appear to be in good condition. No upgrades are recommended at this time.
- The two (2) metal access hatches to the wet well are in good condition; however, the hatches do not have safety gratings. It is recommended that the access hatches be retrofitted with safety gratings. The approximate cost of retrofitting the access hatches with safety gratings is estimated to be \$10,000.

Process Mechanical

- The ridge Road station is equipped with two (2) Flygt C-3985MT (2.71L/s, 7.32m TDH) pumps and motors (2.4hp, 1700rpm, 60Hz, 230V), installed in 1995. Considering the age of these assets, it is recommended that the pumps and motors are replaced in 5-10 years. The estimated cost is \$30,000 to replace the pump and motor sets.

- What could be observed of the piping and valve system appears to be in good condition, with minimal corrosion on valves and piping. It is recommended to replace piping, valves, and equipment supports in 10-15 years. The cost to replace the valves and piping in the pumping station is estimated to be \$43,000.

2.23.3 Pumping Station Capacity

Due to the limited catchment area for this pump station there was not enough wastewater flow available to conduct a draw-down test.

The BM Ross Master Plan Update (2013) indicates that this station operates at 10% and 3% of its rated capacity (3.0 L/s) based on peak flow (0.3 L/s) and 2012 Hydra model results (0.1 L/s) respectively.

2.24 Sewage Pumping Station No. 23 – Champlain

2.24.1 Description

Sewage Pumping Station No. 23 is located at 24 Mulcahy Crescent. The original station was constructed in 1994, however due to significant growth in the West Ridge area, the pump station was retrofitted in 2011. This station is now a wet well/ dry well station inside of a building. The inlet sewer for this station is a 900mm diameter gravity sewer. Wastewater is discharged through either a 300mm or 600mm diameter forcemain to maintenance hole #1600 (north of Laurentian Drive and Arthur Street intersection). This station is equipped with three (3) submersible pumps, a channel grinder unit on the primary channel and a manual bar screen on the by-pass channel.



Figure 30 – Pumping Station No. 23

2.24.2 Site Inspection Condition Assessment

2.24.2.1 Dry Well

Process Mechanical

- This station is equipped with three (3) identical ABS ME 860/6-5360 (120.0L/s, 37.98m TDH) pumps and motors (600V, 60Hz, 123Hp, 1175rpm) with VFD's. All three pumps were installed in 2011. It is recommended that the existing pumps and motors be replaced in 25-30 years. The cost to replace the pump and motor sets is estimated to be \$240,000.

Electrical

- The electrical equipment at the Champlain station was installed in 2009 and appears to be in good condition. The electrical equipment at the station includes:
 - Pioneer power transformer;
 - Two (2) Moeller MCCs;
 - MTU diesel generator;
 - Allen-Bradley PLC;
 - MSA gas detection system;
 - Muffin Monster grinder pump controls;
 - Six (6) float level indicators; and
 - Two (2) ultrasonic level transducers.

There were no recommended upgrades for the electrical equipment at the time of inspection.

2.24.2.2 Wet Well

Process Mechanical

- The Champlain Station has two wet wells (wet well 'A' and 'B'), each with its own inlet sluice gate. A third sluice gate is located in the wet well between wells 'A' and 'B' to allow for either side to be isolated. The sluice gates appeared to be in good condition. No additional recommendations for upgrades.

2.24.3 Pumping Station Capacity

A wet-well draw down test was conducted at SPS 23. The influent flow rate was measured to be 11.9L/s on average over a 15-minute time interval. The discharge flow rate was measured to be 77L/s with one pump in operation. The discharge flow rate was measured while the pump was operating at full speed on a VFD. The pump did not reach the full capacity as identified in the operations manual suggesting some fouling in the forcemain, however, the discrepancy may be due to the imprecise nature of the measurement methodology. The results of the draw-down test are shown graphically in Figure 31.

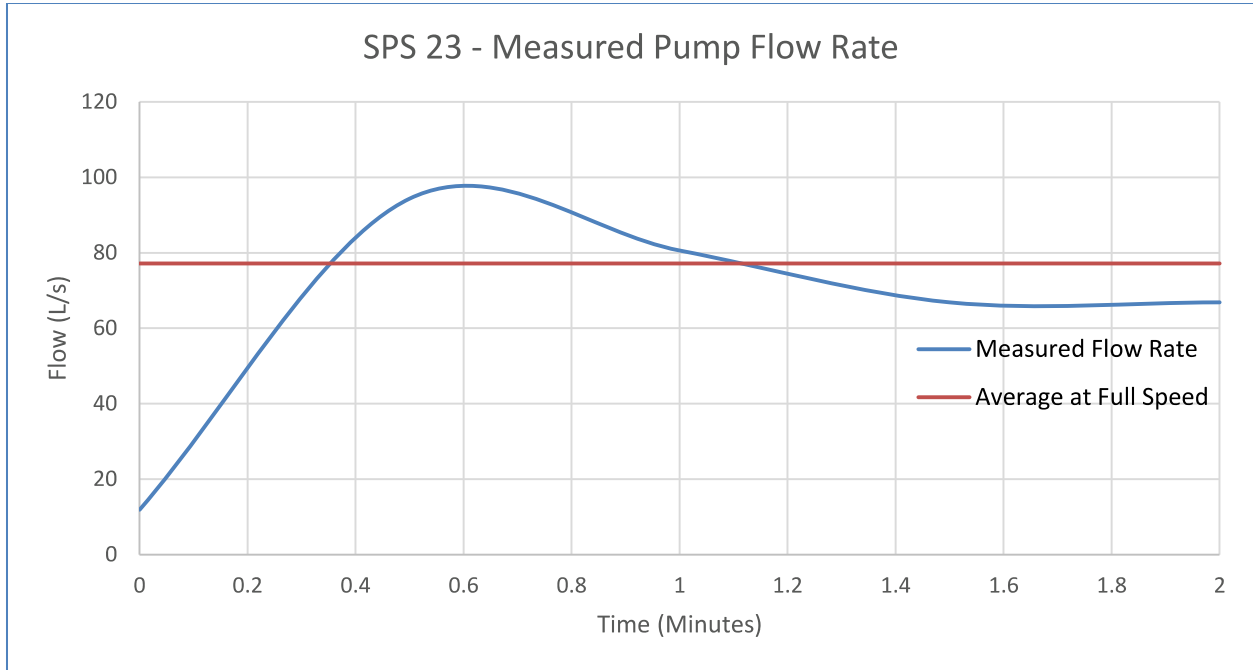


Figure 31 – SPS 23 Draw-Down Test Results

The BM Ross Master Plan Update (2013) indicates that this station operates at 36% and 16% of its rated capacity (210.0 L/s) based on peak flow (75.4 L/s) and the 2012 Hydra model results (33.4 L/s), respectively.

2.25 Sewage Pumping No. 24 – Leacock

2.25.1 Description

Sewage Pumping Station No. 24 (SPS24) is located at 40 Museum Drive. This station is a privately-owned station for the Villages of Leacock Point Condominiums. The station was originally constructed in the early 1990's, with the City of Orillia entering a contract to operate and maintain the station in 2004. The station has its electrical works housed in a building on site with a submersible wet well station to the east of the building that has two (2) submersible pumps.



Figure 32 – Pumping Station No. 24

2.25.2 Site Inspection Condition Assessment

2.25.2.1 Wet Well

Structural

- The structural concrete exterior and interior of the wet well appear to be in good condition. No upgrades are recommended at this time.
- The three (3) metal access hatches to the wet well are in good condition; however, the hatches do not have safety gratings. It is recommended that the access hatches be retrofitted with safety gratings. The approximate cost of retrofitting the access hatches with safety gratings is estimated to be \$15,000.

Process Mechanical

- The Leacock station is equipped with two (2) Flygt NP-3102.160-1188 pumps and motors (5hp, 1745rpm, 60Hz, 600V) that were installed in 2017. It is recommended to replace the pumps and motors within 15-20 years. The cost for replacement is estimated to be \$50,000.
- What could be observed of the piping and valve system appears to be in good condition, with minimal corrosion on valves and piping. It is recommended to replace piping, valves, and equipment supports in 5-10 years. The cost to replace the valves and piping in the pumping station is estimated to be \$43,000.

Electrical

- The Leacock Station's main power disconnection switch and power distribution panel were originally installed in 1993. The switch and panel are in fair condition; however they are approaching the end of their useful life. It is recommended that the switch and the panel are replaced within the next 0-5 years for an estimated cost of \$9,000.
- The lighting transformer and panel at the station were also installed in 1993 and appear to be in good condition. However, due to the age of the assets, it is recommended that the transformer and panel are replaced within the next 0-5 years. The total estimated cost to replace the lighting transformer and panel is \$6,000.
- The back-up power for Leacock pumping station is provided by a Leroy Somer/ Wajax diesel generator that is equipped with a Thomson generator transfer switch. The generator and transfer

switch were installed in 1993 and are approaching the end of their useful life. It is recommended that the generator and the transfer switch are replaced within the next 0-5 years at an estimated cost of \$40,000.

- The station's duplex pump control panel, four (4) float level indicators, and ultrasonic level transducer are in good condition. There were no recommended upgrades for this equipment at the time of inspection.

2.25.3 Pumping Station Capacity

Drawings for this station were not available at the time of the draw-down test. As a result, flow volumes in the wet well for the draw down test could not be produced at this time.

The BM Ross Wastewater System Master Plan Update (2013) does not include this station in its review.

3.0 Schedule of Recommended Upgrades

As outlined in Table 2 below, the final estimate for the pumping station upgrades within the next fifteen (15) years is estimated at \$2,067,500:

Table 2 – Cost Estimate Summary

Schedule of Upgrades	WWTC Unit Process	Capital Cost	WWTC Asset Refurbishment
0 to 5 Years	SPS 1 - James Street	\$668,000	Hoist Replacement, Manual Bar Screen Removal, Valving/Piping, Pump Replacement and Electrical Upgrades
	SPS 2 - Bayview Parkway	\$210,000	Electrical Upgrades
	SPS 3 - Couchiching Park	\$63,500	Accessibility Upgrades, and Piping/Valving Replacement
	SPS 4 - Elgin Street	\$10,000	Accessibility Upgrades
	SPS 5 - Couchiching Point	\$12,000	Accessibility and Electrical Upgrades
	SPS 7 - Royal Oak	\$47,000	Accessibility Upgrades and Piping/Valving Replacement
	SPS 8 - Tudhope Park	\$70,000	Accessibility Upgrades and Pump Replacement
	SPS 9 - Commerce Drive	\$10,000	Accessibility Upgrades
	SPS 10 - Victoria Crescent	\$82,500	Accessibility Upgrades, Electrical Upgrades, Piping/Valving and Pump Replacement
	SPS 11 - Shannon Street	\$13,000	Accessibility and Electrical Upgrades

Schedule of Upgrades	WWTC Unit Process	Capital Cost	WWTC Asset Refurbishment
0 to 5 Years cont'd.	SPS 13 - Bridget & Maple	\$21,500	Accessibility, Electrical Upgrades and Gooseneck Vents Relocation
	SPS 14 - Forest Avenue North	\$10,000	Accessibility Upgrades
	SPS 16 - Forest Avenue South	\$554,200	Accessibility Upgrades, Electrical Upgrades, Addition of Third Pump for Redundancy, Piping/Valving and Pump Upgrades
	SPS 17 - Collins Drive	\$76,000	Accessibility Upgrades, Electrical Upgrades, Piping/Valving and Pump Upgrades
	SPS 18 - Fittons Road West	\$665,500	Electrical Upgrades, Piping/Valving and Pump Replacement
	SPS 19 - John Street	\$11,200	Accessibility and Electrical Upgrades
	SPS 20 - Broadview	\$11,200	Accessibility and Electrical Upgrades
	SPS 22 - Westmount Drive South	\$10,000	Accessibility Upgrades
	SPS 23 - Champlain	\$400,000	Bar Screen Removal and Pump Upgrades
	SPS 24 - Leacock	\$70,000	Accessibility and Electrical Upgrades
Total Cost of 0 to 5 Year Upgrades		\$3,015,600	
5 to 10 Years	SPS 1 - James Street	\$354,000	Channel Grinders and Pump Replacement, and Electrical Upgrades
	SPS 8 - Tudhope Park	\$57,000	Piping/Valving Replacement
	SPS 11 - Shannon Street	\$50,000	Electrical Upgrades
	SPS 19 - John Street	\$110,000	Pump Replacement
	SPS 22 - Westmount Drive South	\$30,000	Pump Replacement
	SPS 24 - Leacock	\$43,000	Piping/Valving and Pump Replacement
Total Cost of 5 to 10 Year Upgrades		\$644,000	
10 to 15 Years	SPS 4 - Elgin Street	\$93,000	Piping/Valving and Pump Replacement
	SPS 22 - Westmount Drive South	\$43,000	Piping/ Valving Replacement

Schedule of Upgrades	WWTC Unit Process	Capital Cost	WWTC Asset Refurbishment
Total Cost of 10 to 15 Year Upgrades		\$136,000	
15 to 20 Years	SPS 11 - Shannon Street	\$50,000	Pump Replacement
	SPS 16 - Forest Avenue South	\$25,000	Pump Replacement
	SPS 17 - Collins Drive	\$18,000	Pump Replacement
	SPS 24 - Leacock	\$540,000	Pump Replacement
Total Cost of 15 to 20 Year Upgrades		\$633,000	
20 to 25 Years	SPS 2 - Bayview Parkway	\$120,000	Pump Replacement
	SPS 3 - Couchiching Park	\$60,000	Pump Replacement
	SPS 5 - Couchiching Point	\$70,000	Pump Replacement
	SPS 13 - Bridget & Maple	\$80,000	Pump Replacement
Total Cost of 15 to 20 Year Upgrades		\$330,000	
25 to 30 Years	SPS 7 - Royal Oak	\$15,000	Pump Replacement
	SPS 20 - Broadview	\$30,000	Pump Replacement
	SPS 23 - Champlain	\$240,000	Pump Replacement (Contingent on not upgrading to grinder pumps)
Total Cost of 15 to 20 Year Upgrades		\$285,000	
30 to 35 Years	SPS 3 - Couchiching Park	\$30,000	Pump Replacement
	SPS 9 - Commerce Drive	\$80,000	Pump Replacement
	SPS 10 - Victoria Crescent	\$30,000	Pump Replacement
	SPS 14 - Forest Avenue North	\$50,000	Pump Replacement
Total Cost of 15 to 20 Year Upgrades		\$190,000	
Total Cost of Upgrades		\$5,233,600	

In essence, a majority of the immediate upgrades (0-5 years) are a result of the stations being non-compliant with safety codes. Many of the stations do not have safety gratings under their hatches for fall prevention, which should be addressed immediately. Moreover, several stations are using assets that are beyond their service life and should be upgraded. The total upgrade cost across all 21 operating pumping stations for the next 0 to 35 years is estimated to be \$5,233,600.

City Of Orillia Sewage Pumping Station
Condition Assessment TM

Appendix A

Site Photographs

















ASL

REBUILT

Dec 3/14











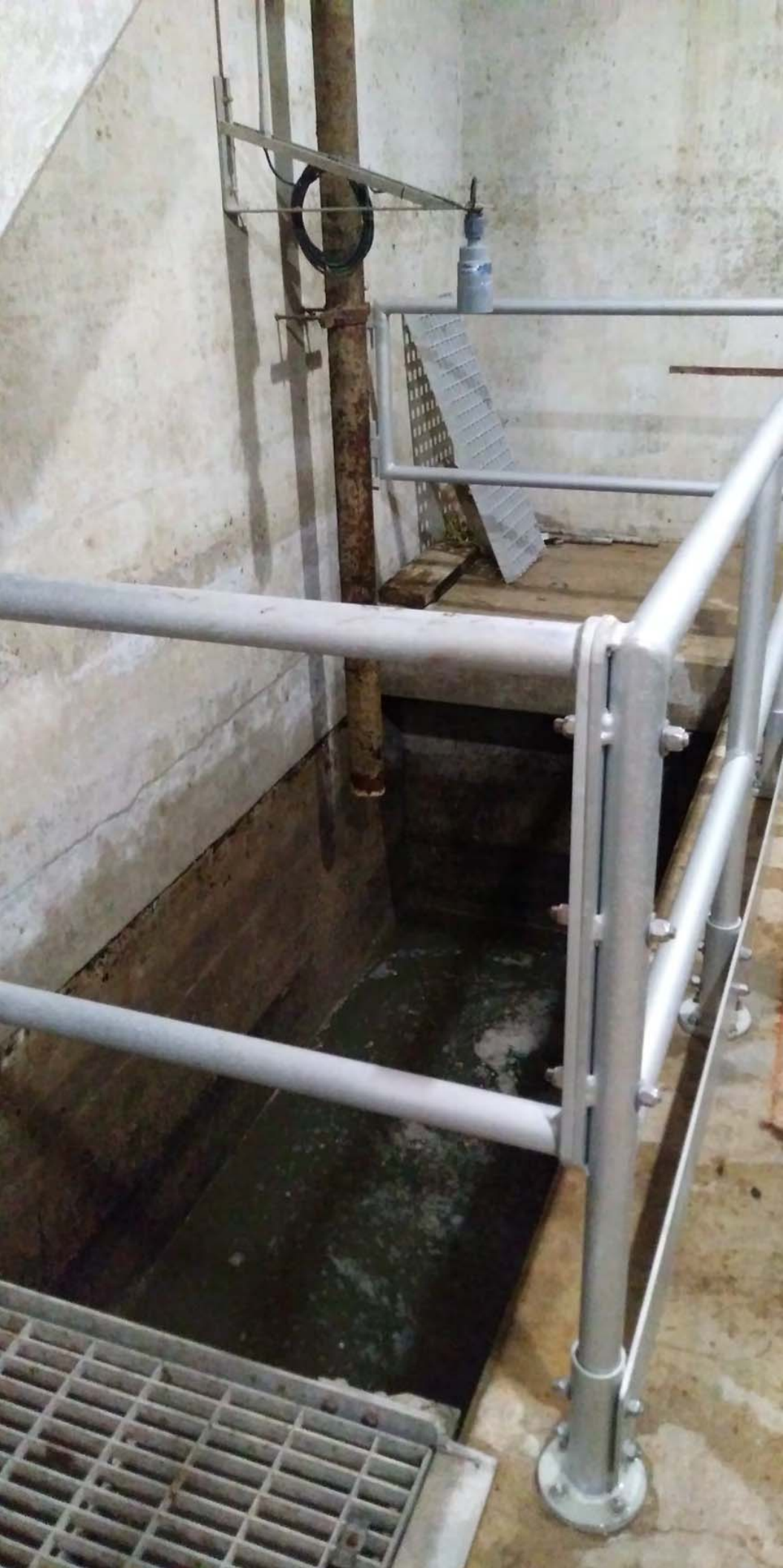


City of Orillia

HAUST











Made in the U.S.A.

"Apollo"

Potable Expansion Tank

1418 S. Pearl St., Pageland, SC 29728 (704)847-9191



NOTICE
THIS TANK HAS BEEN FACTORY PRE-CHARGED.
CONSULT MANUAL FOR PROPER SETTINGS.

D.O.T TEST
PRESSURE 100 P.S.I.G.

319175-000







LISTED
11KL

STATIONARY ENGINE-GENERATOR ASSEMBLY

File: AU3044 0098-7737-01, C

Model No. DQFAB - 1379038
Modele

Serial No. K090067142 Spec. A
Serie

IMPORTANT!
Model & Serial No. Required When Ordering Parts.
Modele & No. Serie Requis Pour Commander Des Pieces. 99-2433

CUMMINS POWER GENERATION
1400 73RD AVE. N.E.
MINNEAPOLIS, MN 55432 U.S.A.
MADE IN U.S.A

FREQUENCY		60 HZ			
SERVICE RATING	PHASE	STANDBY		PRIME	
		1PH	3PH	1PH	3PH
RATED KW		0.0	800.0	0.0	0.0
POWER FACTOR		0.0	0.8	0.0	0.0
RATED KVA		0.0	1000.0	0.0	0.0
I2 CAPABILITY CONNECTION		WYE			
BATTERY	VOLTS	AMPS		AMPS	
24 VDC	347/ 600	962.3			
ROTATING SPEED	1800RPM				
NOMINAL RATED					
FUEL:	Diesel				
WIRING DIAGRAM					

Model No. DQFAB - 1379038
Modele

Serial No. K090067142 Spec.
Serie

IMPORTANT!
Model & Serial No. Required When Ordering Parts.
Modele & No. Serie Requis Pour Commander Des Pieces 99-2433

12/03/2009 MMDDYYYY Build Date
0326-6923 Calibration P/N
1704 CPL #
Feature P/N Feature P/N Feature P/N
3415087 3415089 3415092
3415095 3415115 3415155
3415158 4054430
0xd6f3 Checksum



For Electrical Equipment Only
Pour Material Electrique Seulement

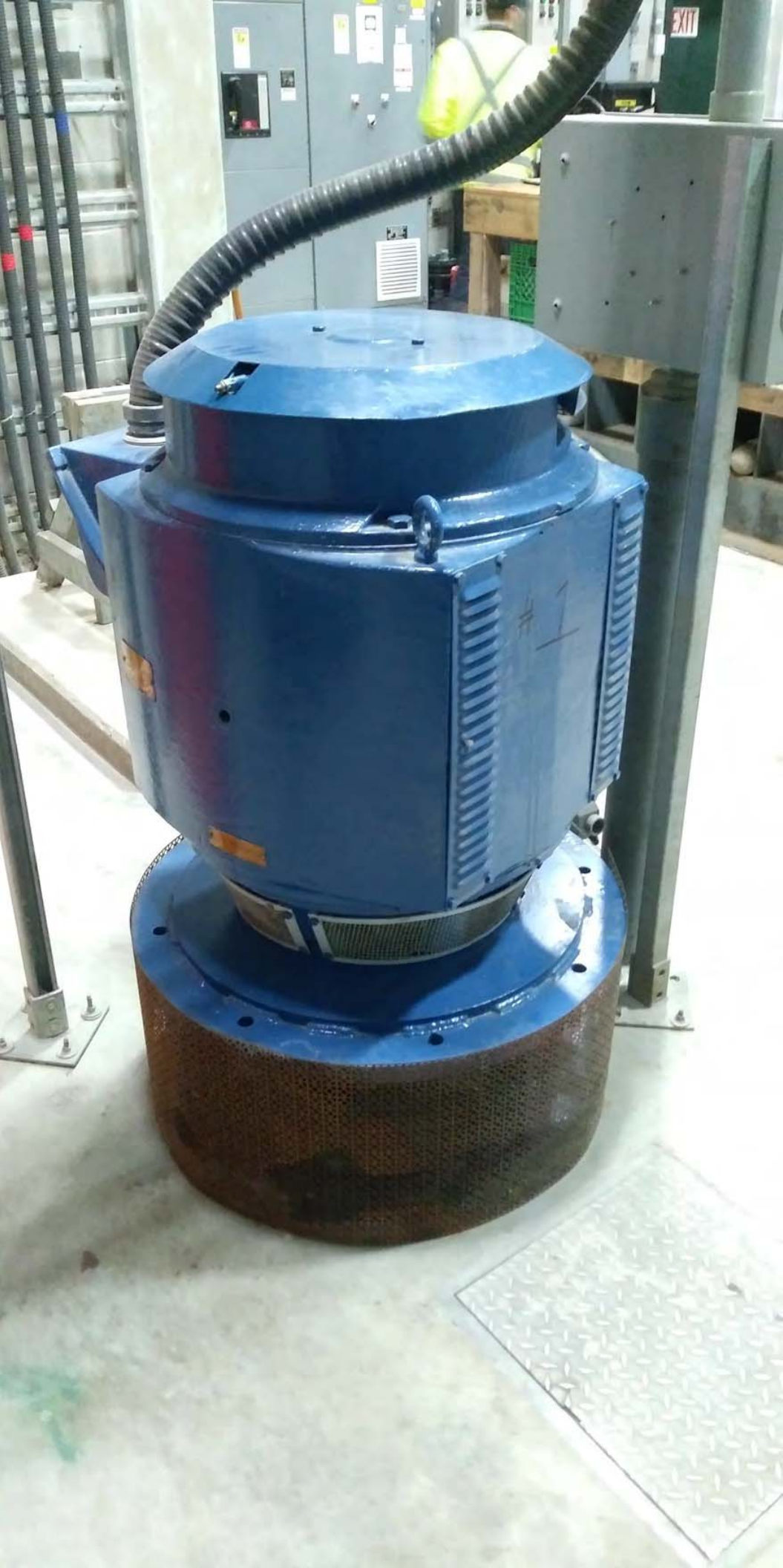


For Electrical Equipment Only
Pour Material Electrique Seulement

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EXIT



● RUN
● STOP
● FWD
● REV
● ALARM
● TEST
● CLEAR
● LOCK
● UNLOCK

VFD-P0924

SX
 SENSORLESS
 VECTOR DRIVE

BENSHAW

WARNING
 High Voltage
 Danger of electric shock
 when working on this equipment

⚠ DANGER

⚡

See Flash and Shock Hazard

Peak Primary Current	6.0 A
Rated Primary Current	5.0 A
Rated Output	0.75 kW
Rated Output Voltage	240 V
Rated Output Current	3.1 A
Rated Output Power	180 W
Rated Output Torque	0.27 Nm
Rated Output Speed	1500 rpm
Rated Output Frequency	50 Hz
Rated Output Phase	3-Phase
Rated Output Line	3-Phase

Parameter: 0000

STOP

START

STOP

START

STOP

START

WARNING
 High Voltage
 Danger of electric shock
 when working on this equipment





VFD #1
PUMP #1

DANGER
HIGH VOLTAGE
ELECTRIC SHOCK
DEATH

SIEMENS
6ES7 311-1CG03-0AB0
6ES7 311-1CG03-0AB0
6ES7 311-1CG03-0AB0

0.00

Parker FLUIDP **ACCEPTED**
SYSTEM DATE INITIALS
MODEL NUMBER
HEUT1896
S/N 620U70 TANK 40 GAL
PUMP FLOW 12 GPM
PRESSURE MAX 2600 PSI
HYDRAULIC PUMP/MOTOR DIVISION
OTSEGO MICH 49078 USA



IMPORTANT
SAFETY WORK PRACTICES
HYDRAULIC BUSINESS
BY LHM

←

SAFETY WORK PRACTICES
HYDRAULIC BUSINESS
BY LHM











RAW SEWAGE

232 S
TURNS
ON
VALVE









OVERFLOW VALVES

MUTLIN
M.P.L. 10

WARNING
DO NOT OPERATE
THIS EQUIPMENT
UNLESS YOU ARE
A TRAINED OPERATOR

120240V PANEL























SERVICE DISCONNECT

LOW WATER LEVEL

PUMP #1

PUMP #2

0.00

Pump #1

PUMP #1

PUMP #2

0.00

Pump #2



















Wgt: 1.13
Lvl: 159
Vmt: 1.4

DANGER
AUTHORIZED
PERSONNEL ONLY

WARNING
ELECTRIC SHOCK
DEATH

STOP

STOP

STOP

1000























ICP-101
PLC CONTROL PANEL



DANGER
AUTHORIZED
PERSONNEL ONLY

DANGER
ARC FLASH & SHOCK HAZARD
Appropriate personal protection
equipment required









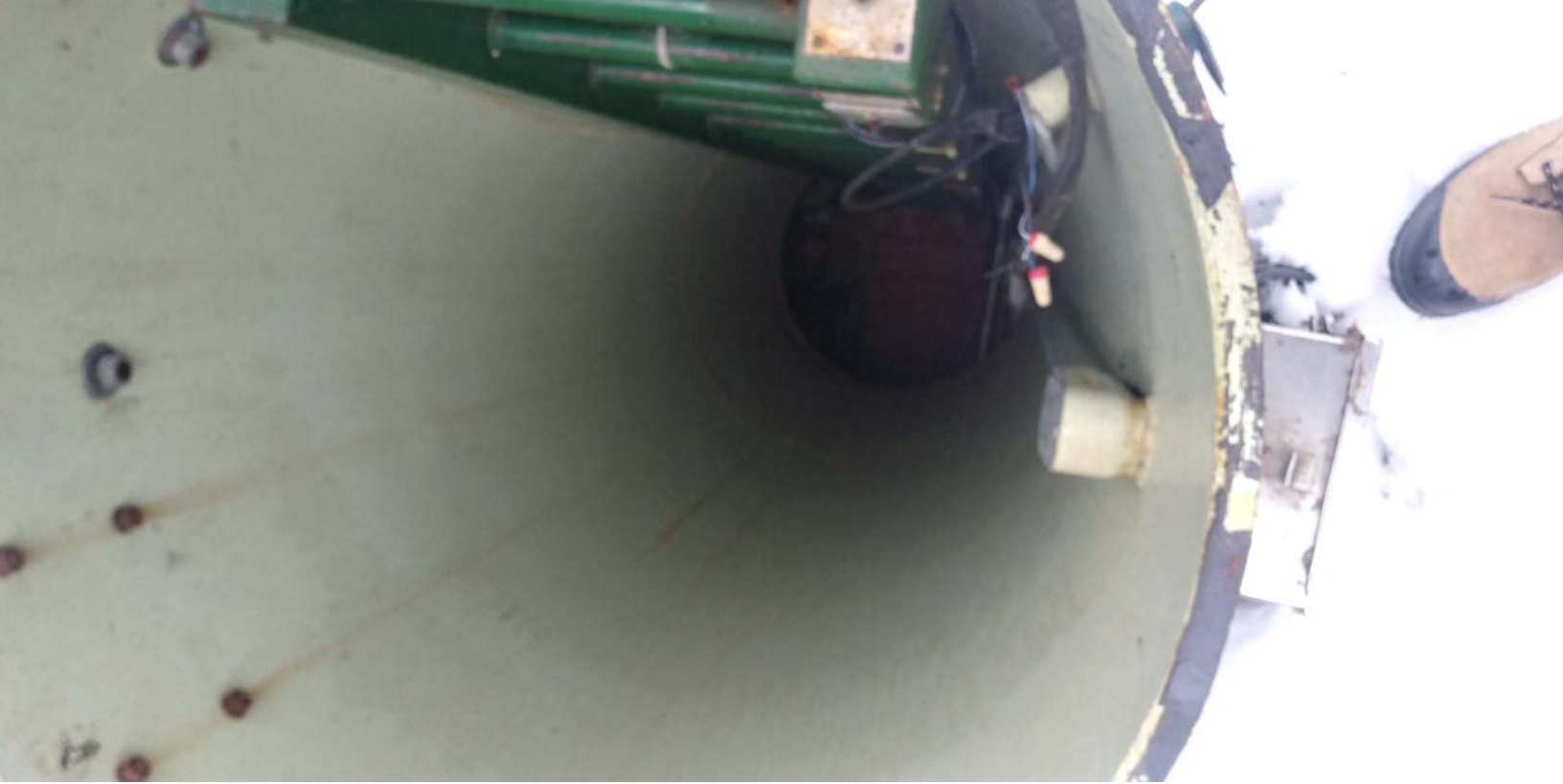
















Allen-Bradley

PUMP No 1
STARTER

32 #

PUMP No 2
STARTER

32 #

HYDRO POWER

ON

OFF

GEN. POWER

ON

WARNING
This panel contains high voltage electrical components. Only qualified personnel should be allowed to work on this panel. Always lock out and tag out before working on this panel. For more information, see the safety manual.































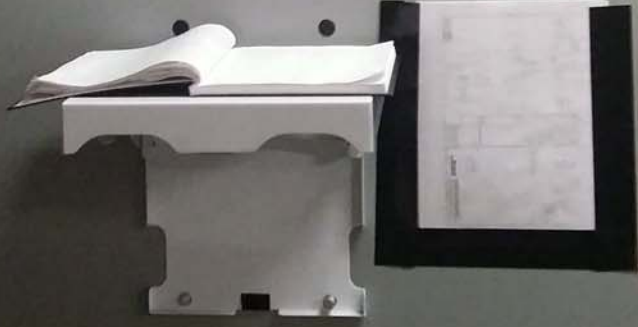








ICP-101
PLC CONTROL PANEL





ICP-101
PLC CONTROL PANEL



WET WELL LEVEL



WARNING
DANGER
SAFETY
INSTRUCTIONS
READ CAREFULLY
BEFORE
OPERATION
TO AVOID
ACCIDENTS
AND
INJURIES
CONTACT
YOUR
SUPERVISOR
FOR
FURTHER
INFORMATION







WESTMOUNT DR. N

STOP



VFD1
CONTROL PANEL



WARNING
DO NOT TOUCH
THIS PANEL



VFD2
CONTROL PANEL

















DUPLEX PUMP CONTROL
230V 1 Ph 60Hz
2.4kW



CAUTION/ATTENTION
AVERTISSEMENT: ARRÊTÉ AVANT D'OUVRIR LE COFFRET METTRE L'INTERRUPTEUR EN POSITION NEutre CIRCUIT
MAIN SURCHU

FLYGT

▲ DANGER
ARC FLASH & SHOCK HAZARD
Appropriate personal protection equipment required

PUMP # 1



PUMP # 2



11.12.2014 10:00:00
11.12.2014 10:00:00
11.12.2014 10:00:00



LEVITON
BX100-V
TYPE 4X, 12

240V 1PH 60HZ 100A
USE ONLY
NEUTRAL TO GROUND
BONDED
SUPPLY GENERATOR

LEVITON
BX100-V
TYPE 4X, 12







WARNING
ELECTRIC SHOCK
DEATH
DO NOT TOUCH
ELECTRICAL EQUIPMENT
UNLESS YOU ARE
A QUALIFIED
ELECTRICIAN
AUTHORIZED
PERSONNEL ONLY

AUTHORIZED
PERSONNEL ONLY





















MSA MODEL 9010/9020 CONTROLLER

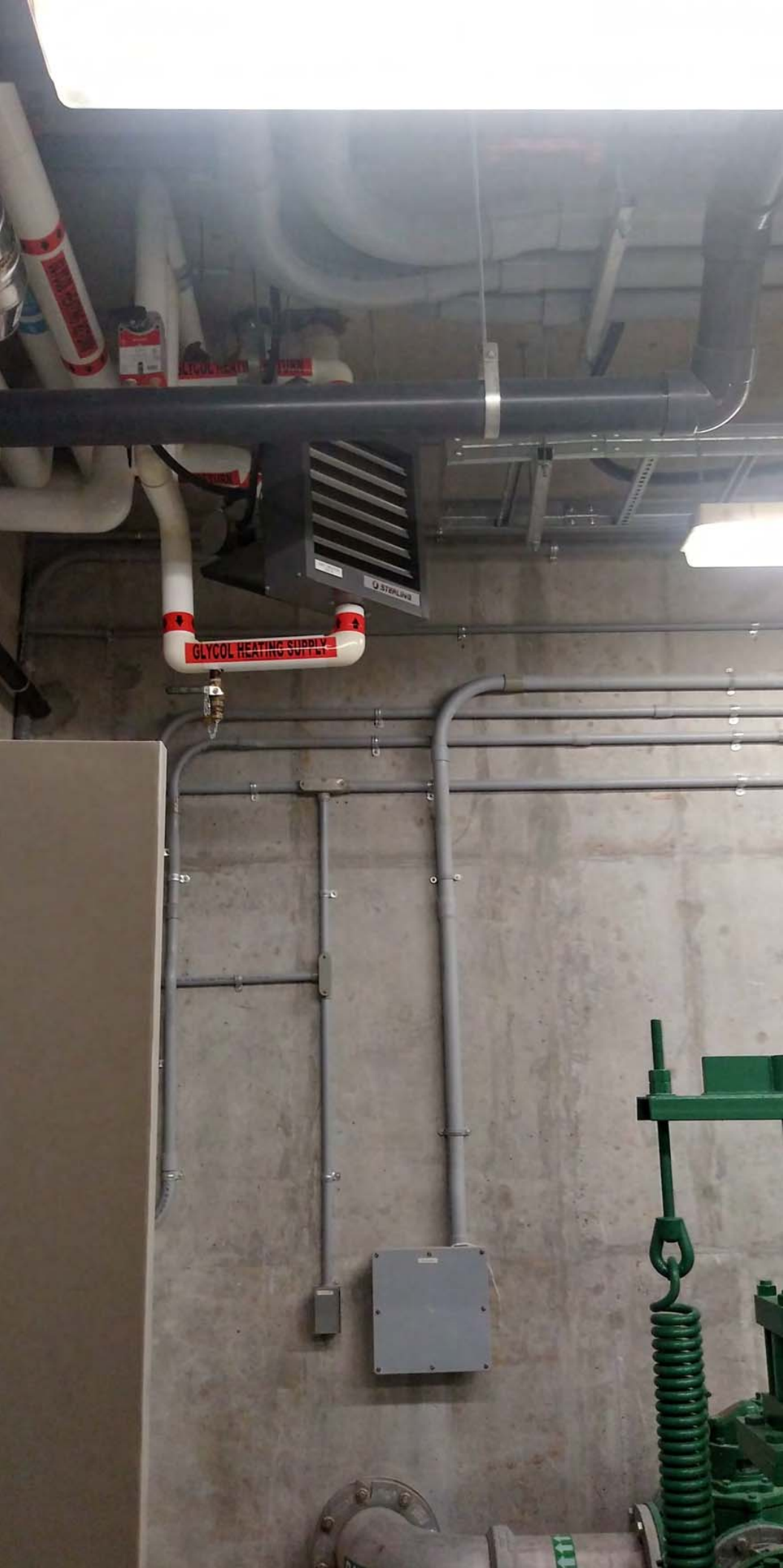
GAS DETECTION CONTROL PANEL
GDCP - 1



















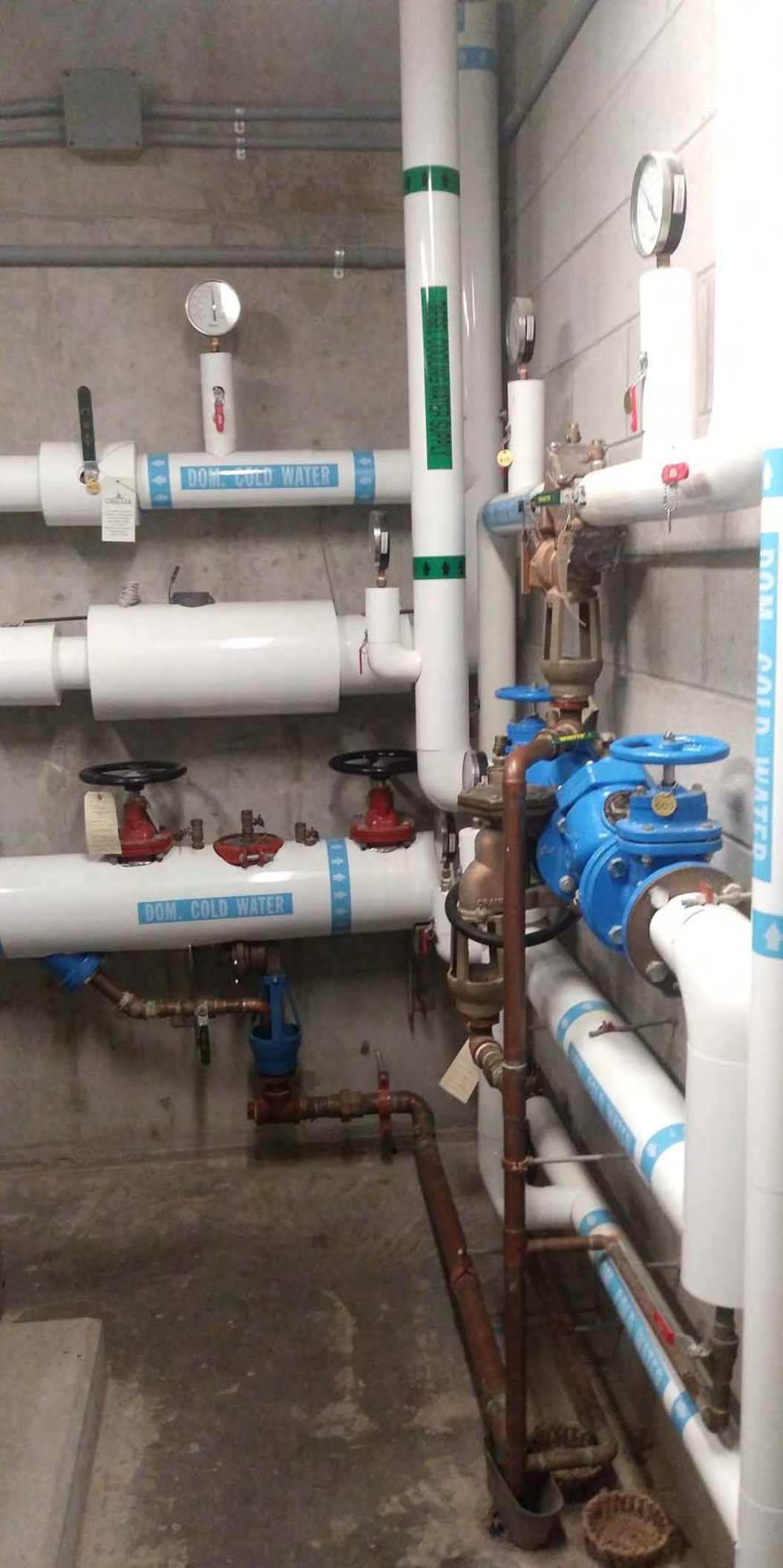
































SUPPLY R



















PRIVATE PARKING
FOR RESIDENTS & GUESTS OF
LEACOCK VILLAGE
CONDOMINIUM
UNAUTHORIZED
VEHICLES WILL
BE TOWED AT
OWNER'S RISK





PUMP NO 1

PUMP NO 2

MULTI DISPLAY BOARD 500

TEMPERATURE SENSOR

PUMP NO 1 OVERLOAD FAULT

PUMP NO 2 OVERLOAD FAULT

POWER ON

PUMP NO 1 HEAT SENSING FAULT

PUMP NO 2 HEAT SENSING FAULT

WELL LEVEL FAULT

PUMP NO 1 HIGH LEVEL FAULT

PUMP NO 2 HIGH LEVEL FAULT

LINE PUMP STOP FLUID ACTIVATED

PUMP NO 1 RUNNING

PUMP NO 2 RUNNING

LED PUMP STOP FLUID ACTIVATED

RESET PUMP 1

R

RESET PUMP 2

R

PUMP NO 1 STOP - AUTO

PUMP NO 2 STOP - AUTO

PUMP STOP FLUID ACTIVATED

PUMP NO 1 CLOSEST TO HOUSE LEFT 300

PUMP NO 2 CLOSEST TO GENERATOR BUILDING

PUMP SELECTION BY 2003 - 04

WELL LEVEL BY 04

STOP

STOP

STOP

RESET PUMP 1 AND 2 BY 2003 - 04



WARNING
ELECTRIC SHOCK
DEATH
DANGER

⚠ DANGER
ARC FLASH & BUCK HAZARD
Appropriate personal protective
equipment required



MODES BY PUMP

MODES BY PUMP











City of Orillia Wastewater Servicing Master Plan Report Appendix – B

Wastewater Treatment Centre Condition Assessment Technical Memorandum

City of Orillia

Wastewater System Master Plan

Technical Memorandum

Wastewater Treatment Center Condition

Assessment

FINAL

March 2021




Wastewater System Master Plan

Technical Memorandum Site Inspection and Review of the Scope of Upgrades

Project No. 118088

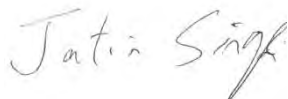
Prepared for:
The City of Orillia

Prepared By:



Rebecca Weatherall, E.I.T.

Reviewed by:



Jatin Singh, P.Eng., PMP

Ainley & Associates Limited.
195 County Court Blvd., Suite 300
Brampton, ON L6W 4P7
Phone: (905) 452-5172
Fax: (705) 445-0968
www.ainleygroup.com

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1.0 Introduction

The City of Orillia (City) retained the Ainley Group (Ainley) to provide engineering services for the completion of a Wastewater System Master Plan. As part of this project it was necessary to establish the condition of the existing facilities and this technical memorandum documents the findings of the condition assessment.

On April 15th, 2019, Ainley documents the findings of the condition assessment completed a site investigation of the City's wastewater treatment center. The purpose of this investigation was to determine the condition of the plant structures, process equipment and electrical works to document the current conditions. The inspection was limited to accessible areas and does not include works that are under construction. Process tanks were in operation during the inspection. Submerged areas were not inspected. In conducting this site investigation, no entry was made into confined spaces.

The purpose of this Technical Memorandum is to identify the condition of existing plant to ascertain its ability to meet existing performance requirements, and provide input into whether existing assets are suitable to meet the long term capacity and treatment requirements over the next 30 years. The results of the condition assessment will assist with the development of alternative solutions to meet the City's long term capacity and treatment requirements from the Orillia collection system.

This Technical Memorandum documents the findings of the site investigation and outlines the scope of upgrades required to maintain the plant in full compliance with its current Certificate of Approval.

2.0 Condition Assessment Findings and Recommended Upgrades

2.1 Orillia Wastewater Treatment Center

2.1.1 Description

The Orillia Wastewater Treatment Centre (WWTC) is located at 40 Kitchener Street, Orillia, Ontario. The plant is a tertiary treatment facility that utilizes a conventional activated sludge process and discharges into Lake Simcoe.

The addition of the tertiary treatment system was a recommendation in the 2013 WWSMP update, resulting from anticipated changes to the WWTC's phosphorus effluent limit due to changing regulations, which came into effect.

Per the plant's Environmental Compliance Approval (ECA), the plant has a rated capacity of 27,300m³/d.

The WWTC receives all of its flows from the James Street SPS, where all flow from the collection system is directed. The facility consists of the following major treatment units or systems:

- Headworks
- Primary Clarifiers
- Biological Treatment (Aeration)
- Secondary Clarifiers

- Tertiary Treatment
- UV Disinfection
- Chemical Dosing for Phosphorous Removal
- Sludge (WAS) Thickening
- Anaerobic Digester Complex
- Sludge Storage Lagoons
- Emergency Standby Power

Figure 1 presents the WWTC's current process flow diagram.

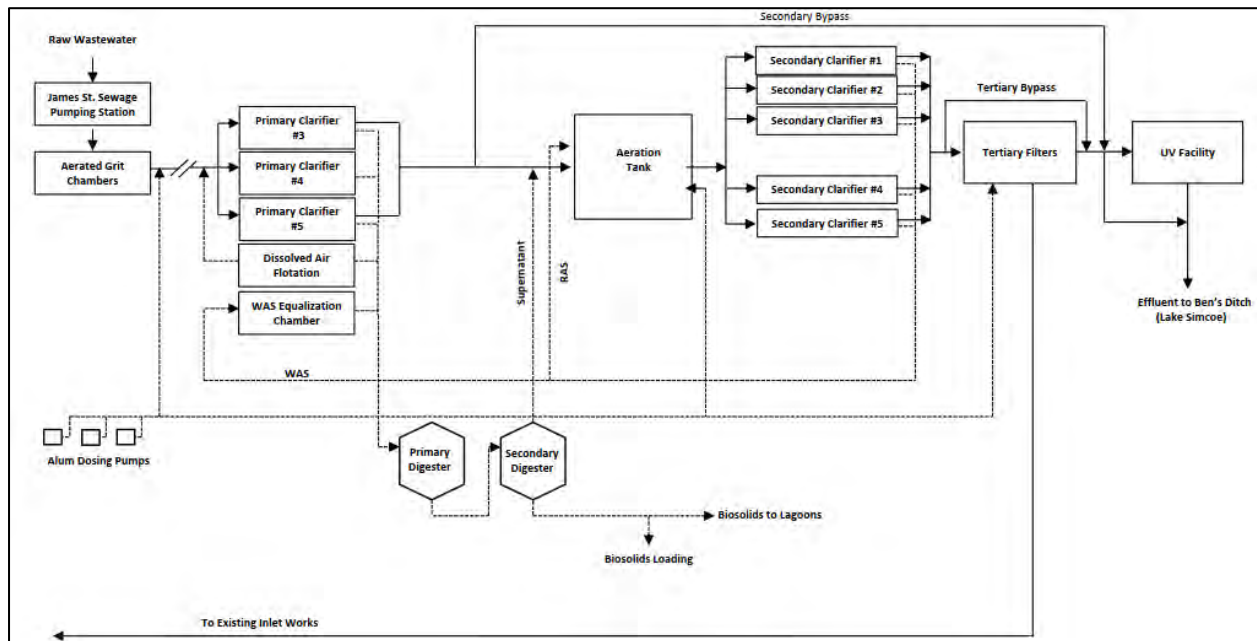


Figure 1 – Orillia WWTC Process Flow Diagram

2.1.2 Site Inspection Condition Assessment

2.1.2.1 WWTC Site and Administration Building

The WWTC has an asphalt driveway that leads to the administration building and a parking lot. The building has a grey brick exterior and membrane roof. The lot is enclosed with an eight-foot chain link fence. The interior of the building is painted concrete brick with tile flooring. The following upgrades are recommended for the WWTC site and administration building:

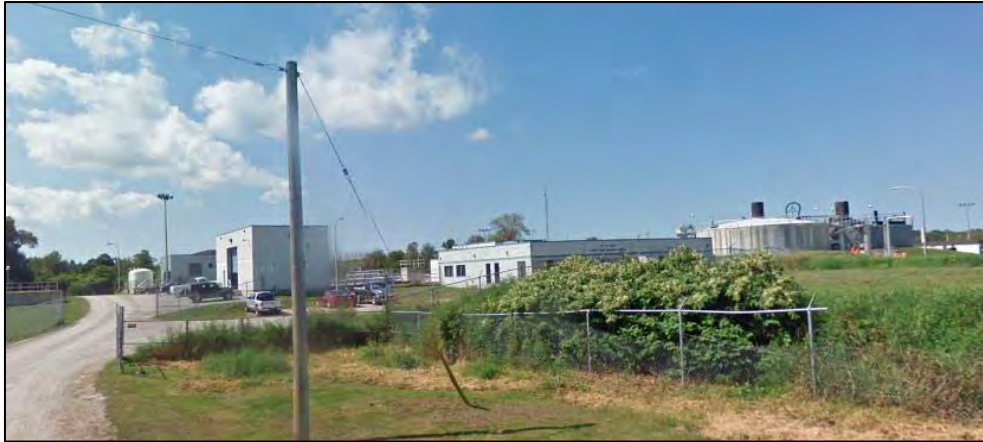


Figure 2 – Plant Exterior
(Source: Google Maps)

Site Works

- Property Line Fencing: Appears in good condition, some vegetation growth and rust is present. There are no recommended upgrades at this time.
- The gravel driveway and asphalt parking lot of the plant appeared to be in good condition. No apparent deficiencies in the driveway or parking lot were observed. No upgrades are recommended at this time.

Structural

- Generally, the structures of the WWTC are in good condition. No major repair for any of the structures is required for the next 5-10 years.
- The administration building interior such as the meeting room, control room and office area are finished with false ceiling and dry wall, and therefore, these areas are not covered in this condition assessment.

Process Mechanical

- Buried piping was not evaluated as part of this condition assessment. However, buried piping will be assessed through a desktop review of the collection system and plant capacity assessments.

Power and I&C

- A Federal Pioneer power distribution switch board (1200A, 600V, 800AT) is installed in the administration building in the electrical room. The asset has a remaining useful service life of 7 years and should be replaced by the end of its useful life. The cost to replace the switch board is estimated to be \$35,000.
- A Cutler-Hammer Motor Control Center (MCC) (400A, 600V) is located in the workshop of the administration building. The MCC has a remaining lifespan of 3 years and should be replaced within this time. The cost to replace this MCC is estimated to be \$150,000.
- The WWTC is equipped with a Kohler outdoor stand-by diesel power generator with a water proof enclosure. The generator is in good condition and no upgrades are recommended at this time.

- The WWTC is also equipped with an outdoor Westinghouse Switchgear (600/347V, 2000A) substation that is housed in a walk-in enclosure. New breakers were recently installed at the station. However, due to the overall condition, it is recommended that the station be replaced within the next five (5) years. The cost to replace this station is estimated at \$200,000.

2.1.2.2 Inlet and Headworks

The inlet works uses two aerated grit tanks for grit removal and two manually cleaned bar screens for the removal of larger objects and floatables. The grit tanks are 10.7m x 4.9m x 4.3m SWD. Aeration is provided to the two tanks by two rotary lobe blowers. Grit that has accumulated in the chambers is removed by vacuum truck. The following upgrades are recommended for the headworks:



Figure 3 – Intake Grit Chamber

Structural

- The metal monorail above the plant inlet channels is in poor condition with visible heavy corrosion on its surface. However, the crane device is out of service. It can be removed. The metal guardrail is in good condition, but does not conform to the current building code. The railing and post are undersized and there is no kick plate on the guard rail. It is recommended the overhead crane be removed within 1-5 years. The estimated cost for removal is \$5,000.
- The screen building is in good condition. The roof, metal hatches and interior walls are in good condition with only minor hair cracks on the floor. The metal door is in good condition, except the weather-stripping has deteriorated. The exterior concrete platform is also in good condition even though the surface is rough under exposed condition. Some areas of the exterior wall cladding have dents likely caused by accidental impact from a heavy object. It is recommended that the weather stripping on the door be replaced within 1 year. Replacing the weather-stripping refinishing is estimated to cost \$2,000.

Process Mechanical

- There are two manual bar screens, each 0.9m long, with 3mm bars at 30mm spacing. The screens appear to require considerable manual efforts to keep clean. It is recommended that the manual bar screens be replaced with automated screens to reduce manual efforts. The manual bar screens are recommended to be replaced with automatic screens in 5 years. The

approximate cost to replace the two bar screens is \$300,000, excluding required building modifications.

- Two (2) Roots blowers and Brook Electric motors (10hp, 1150rpm, 575V, 60Hz) aerate the grit chamber. The blowers appear to be in moderate condition with mild corrosion present on the blower silencers. New blowers and blower motors were installed in 2017 and 2019 and are expected to function well for the next 20 years, after which they should be replaced. The cost to replace the blower system is estimated to be \$100,000.
- Blower pipes and valves within the blower room are in poor condition with significant corrosion present. It is recommended that the blower piping and valves be replaced in five years. It may be cost-effective to replace the blower system at the same time that the piping is replaced. The estimated cost for pipe and valve replacement is included in the costs to replace the blower systems above.

Power and I&C

- A Cutler-Hammer Motor Control Center (MCC) (150A, 600V) is located in the headworks/screen building. This MCC has a remaining lifespan of three years and should be replaced within this time. The cost to replace this MCC is estimated to be \$150,000.
- There are two lighting panels:
 - Lighting Panel A (LPA) is a Square D 1P3W (100A, 120/240V) panel with a remaining useful life of three years and should be replaced. The cost to replace this panel is estimated to be \$4,000.
 - Lighting Panel B (LPA) is a Square D 1P3W (60A, 120/240V) panel and is in good condition and is expected to last another 13 years. The cost to replace this panel is estimated at \$2,000.
- Most of the headworks area is classified as either a Class 1, Division 1 or Class 1, Division 2 hazardous area per the NFPA 820 standard. The headworks building is currently grandfathered, however, when upgrades are implemented in the building, such as replacing the bar screen, it may no longer be grandfathered and modifications to meet the NFPA 820 standard may be required. These would need to be assessed at the time of upgrades.

2.1.2.3 Primary Clarifiers

Primary treatment at the Orillia WWTC consists of three circular clarifiers. Wastewater flows are proportionately distributed to each clarifier through a flow division chamber. One clarifier has a diameter of 18.2m and 3.3m SWD, the other two clarifiers are both 22m in diameter and have 4.6m SWD.

Four raw sludge pumps are used to remove sludge from the clarifiers. The sludge pumps are located in a primary sludge pumping building and discharge to the sludge digesters. The 150mm diameter primary sludge line is equipped with an inline grinder pump and a by-pass line. The following upgrades are recommended for the primary clarifiers:



Figure 4 – Primary Clarification Ditch

Structural

- There are vertical concrete cracks on the exterior south wall of the structure in between clarifiers #1 and #2. As well, there are vertical concrete cracks at regular intervals on the exterior surface of the concrete tank, likely due to shrinkage cracks from the original construction.
- The metal bridges of the clarifiers have corrosion in many places. It is recommended that the bridges be sandblasted and repainted in the next 1 to 5 years. The cost of repainting is estimated to be \$25,000.
- The metal roof of the primary sludge pumping station is in fair condition. There is a hole at the eave location of the roof on the west side of the building. The interior block wall is in good condition. On the wall beside the stairs to the basement, there are vertical concrete cracks. The floor tile, the metal grating and the round concrete columns and the peripheral concrete wall in the basement are in good condition. It is advised that the leaking concrete and metal roof be repaired in a year. The cost for repairs is estimated at \$3,000.
- The primary sludge pumping station basement tunnel running towards east is in good condition with only minor hair cracks on the floor. There is no sign of leakage.
- The primary sludge pumping station basement tunnel running northward is in good condition. The piping penetrations through the east wall of this tunnel section show evidence of leakage at all the pipe penetration locations. A section of this tunnel turns west at the north end. The section going west is in good condition. It is advised to replace the link-seals at all pipe penetration locations within the next five years. The cost to replace the link-seals is estimated to be \$4,000.

Process Mechanical

- The three (3) clarifiers are each equipped with a sludge collection system. Each system is equipped with an electrically driven motor (60Hz, 332V, 132A, 50Hp, 1720rpm). The motors appear to be in good condition; no upgrades are recommended at this time.
- There are a total of four RAS diaphragm sludge pumps (11.5L/s, 24m). The pumps are in good condition, no additional upgrades are recommended.
- There is also a single in-line Muffin Monster grinder pump and motor. The grinder pump is in good condition. No further upgrades are recommended at this time.
- What could be observed of the piping and valve system is in good condition; no additional upgrades are recommended at this time.

- Four raw sludge pumps are used to remove the raw sludge from the three clarifiers. Buried piping and submerged equipment were not considered as part of this assessment. No required upgrades are noted at this time.
- The in-line grinder pump connected to the primary sludge line appears to be in moderate condition with minimal corrosion present on the pump discharge. It is recommended that this pump be replaced within the next 5-10 years. The cost to replace the in-line grinder pump is estimated to be \$55,000.
- The pipes and valves that could be observed are generally in good condition. However, a section of piping in the north end of the basement is in poor condition. It is recommended this section of piping be replaced within the next 0-5 years at an estimated price of \$40,000.

Power and I&C

- A Klockner Moeller 42KIA MCC (600V, 600A, 150AT) is located within the primary pumping building. The MCC has a remaining useful life of five (5) years. The estimated cost to replace this MCC is \$100,000.
- The primary pumping building also houses an Allen-Bradley PLC and panel. The PLC and panel set have a remaining useful life of 16 years and upgrades are not required until that time. No upgrades were recommended at the time of inspection.

2.1.2.4 Secondary Treatment

The secondary treatment system consists of one, six-pass aeration tank. This tank was to be upgraded along with the tertiary upgrades, however due to the existing structural conditions of the tank the upgrades were not feasible. The tanks provide a total combined capacity of 4,414 m³. Each tank is equipped with a fine-bubble aeration diffuser. Three high speed blowers (2 duty, 1 standby) supply air at a rated capacity of 6,100 m³/hr at 51kPa. The following upgrades are recommended for the secondary treatment system:



Figure 5 – Six-Pass Aeration Channels

Process Mechanical

- The City advised that the three (3) sluice gates at the aeration splitter box for the secondary treatment aerated channels are seized and require replacement. The estimated cost to replace the three (3) sluice gates is estimated to be \$40,000.
- The secondary treatment aerated channels are equipped with two blowers (125Hp, 575V, 115A, 3560rpm, 60Hz). The blowers appear to be in good condition; however, they have been upgraded as part of the tertiary upgrades and are not recommended for upgrades as part of this assessment.

2.1.2.5 Secondary Clarifiers

- The Orillia WWTC has a total of five secondary clarifiers. Wastewater flows to the clarifiers is divided proportionately through a distribution chamber. Two of the five clarifiers are square and measure 13.7m x 13.7m x 3m SWD. The third clarifier is square and has dimensions of 18.3m x 18.3m x 3m SWD. The fourth and fifth clarifiers are circular, center-feed clarifiers with diameters of 30.5m with a 4.6m SWD. A secondary pumping building is housed three RAS and two scum pumps. The following upgrades are recommended for the secondary clarifiers:



Figure 6 – Secondary Clarifier

Structural

The superstructure of the Clarifier Building located in between the two Clarifiers is in good shape. The concrete platform at the building entrance, which is the roof of the basement structure, has suffered from weathering.

The basement structure of the Clarifier Building is in good conditions except the following:

- Leaking vertical cracks on the exposed clarifier walls;
- The mid-level concrete platform has ponding water likely from the leaking digester wall; and
- There is a vertical crack on the wall beside the stair, but the crack has previously repaired by injection.

The basement (bottom floor) appears to be in good shape with only minor cracks noted. It is recommended to repair the clarifier walls in the immediate future. The estimated cost to repair the walls is estimated to be \$8,000.

Process Mechanical

- Each of the five secondary clarifiers is equipped with a motor (330V, 60Hz, 150A, 0.5Hp) and sludge sweeper set. The motor sets appear to be visually and operably in good condition. No upgrades are recommended.
- The sludge pumping room is equipped with three RAS Fairbanks pumps and GEC Canada Ltd. motors (40Hp, 575V). Two of three of the RAS pumps were fully refurbished in 2019. It is recommended that the third pump and motor set be replaced within the next five years. The estimated cost to replace the three pump and motor sets is \$83,300.
- The City identified that clarifier drive supports for clarifiers 3 and 5 require additional inspection, re-anchoring, and repair within the next 0-5 years. The estimated cost to complete this work for both clarifiers is estimated to be \$100,000.
- What could be observed of the RAS piping and valve system show that they are in moderate condition but with significant corrosion present at connections. Replacement of piping, valves, and equipment supports in five years is recommended. It would be cost-effective to replace the piping system when the pumps are being replaced and the cost to replace the valves and piping is included in the cost for the pumps and motors above.
- In addition to the RAS pumps, there are two scum pumps (15hp, 1756rpm, 60Hz, 575V, 14.8A) in the secondary pumping building. There is no date on the name plate but visual inspection determined that the pumps are in moderate condition. The pump and motor sets are in good condition, with minimal corrosion present. It is recommended to replace the scum pump and motor within five years. The estimated cost to replace this system is \$80,000.
- What could be observed of the scum piping and valve system showed that they are in moderate condition with some corrosion present at connections. Replacement of piping, valves, and equipment supports is recommended within five (5) years. The estimated cost to replace the valves and piping is included in the scum pump and motor costs above.

Power and I&C

- The secondary clarification treatment system is controlled by an Allen-Bradley 42KIA MCC (600V, 400Amp). It is advised to replace this MCC within eight years. The estimated replacement cost for this MCC is \$120,000.
- The secondary clarification PLC is an Allen-Bradley MicroLogix PLC Controller. The PLC has a remaining useful life of 16 years and no upgrades are required until that time.

2.1.2.6 Sludge Thickening

The Orillia WWTC uses dissolved air floatation (DAF) for WAS thickening. This process includes an aerated WAS equalization tank. Process air is supplied by a 550 m³/hr positive displacement blower connected to a fine bubble aeration assembly. The system has two feeds pumps that are equipped with VFDs. The thickened WAS from the DAF tank is pumped to the anaerobic digester by positive displacement pumps. All of the structural, process mechanical, and power and instrumentation/control assets appear to be in good condition. No upgrades are recommended at this time.



Figure 7 – DAF Rotor Motor

Process Mechanical

- Before entering the DAF tank, wastewater enters an aerated WAS Equalization tank. The tank's blower (60Hz, 15Hp, 1760rp, 575V) appears to be in good condition.
- There are two DAF feed pumps and motors (575V, 2.3A, 60Hz, 1715rpm). The feed pumps and motors appear to be in good condition.
- There are two DAF recirculation pumps and motors (575V, 14.4A, 1780rpm). The pumps and motor sets appear to be in good condition.
- There is one DAF sludge mixing rotor and motor set (1Hp, 330/57V, 60Hz, 286/1430rpm). The motor and rotor appear to be in good condition.
- The DAF system is equipped with two thickened waste activated sludge (TWAS) pumps and motors (7.5Hp, 332/575V, 60Hz, 1708rpm). The pumps and motors appear to be in good condition.
- What could be observed of the DAF piping and valve system is in good condition. There are no recommended upgrades for the DAF tank and associated assets at this time.
- The polymer flash mixer system for the DAF tank appears to be in good condition. There are no additional upgrades recommended.

Power and I&C

- The DAF MCC is a Cutler-Hammer 3P4W/42KIA MCC (600V, 600A, 100AT). The MCC is in good condition; no upgrades are recommended at this time.
- The DAF PLC is a Summar panel with an Allen-Bradley Micrologix PLC Controller. The PLC and panel are in good condition; no upgrades are required at this time.

2.1.2.7 Digester Complex

The digester complex consists of a primary and secondary anaerobic digestion system that feeds two sludge storage lagoons. The primary digester has a diameter and depth of 15.2m and 6.68m SWD, respectively. The primary digester has a fixed insulated cover with two external draft tube mixers. The secondary digester has a diameter and depth of 15.1m and 6.41m SWD respectively, and is equipped with a floating cover. From the secondary digester, two submersible pumps direct supernatant to the transfer box. From here, the supernatant can be directed to the head of the aeration tank or to the sludge storage lagoons.

Sludge from the primary digester is heated by a gas fired boiler that exhausts through a heat stack. The complex includes a digester waste gas flare with a maximum flow rate of 50 m³/hr. Biosolids from the secondary digester are discharged to the two on-site storage lagoons. The following upgrades are recommended for the digester complex:



Figure 8 – Digester Complex

Structural

- There are vertical leaking cracks on the exterior surface of the digester and the concrete foundation wall of the digester building, particularly at the joints where the digester building is abutting the two digesters. It is recommended that the concrete cracks be sealed on the exposed digester wall within a year. It is estimated to cost \$10,000 to seal the cracks in the wall.
- The metal platform at the top of the digesters is in good condition. The flat roof of the Digester Building has ponding water, indicating that the roof drain has plugged and the roof does not have positive drainage to the roof drain. It is advised to replace and clean the roof drain within a year. Moreover, it is recommended to refinish the flat roofing on the digester building to create positive drainage within a year. The cost to refinish the plugged drain valve and roof refinishing is estimated to be \$13,500.
- The floating roof on the secondary digester has an insulation cover and, therefore an inspection of the roof was not possible for this roof section.
- The basement structure of the Digester Building is in good condition with only minor vertical cracks and minor leaks. There are spalling concrete on one of the concrete columns, underside

of a beam and roof slab. It is recommended that the concrete spalling in the basement be repaired within one to five (5) years. It is estimated to cost \$4,500 to repair the spalling.

- The exterior concrete stairs are in fair condition. Concrete spalling present on the stairs is recommended to be refinished within a year. The estimated cost to refinish the stairs is \$3,000.
- Inside the building on ground floor, there is a crack on the exposed wall of the digester, which was repaired previously. The metal grating and monorail beam are in good condition.
- The above-grade structure has minor cracks on the block wall.

Process Mechanical

- The digester complex is equipped with one sludge loading pump and motor (575V, 1750rpm, 60Hz, 15Hp), which is used to transfer sludge from the primary clarifiers and DAF system to the primary digester. The motor appears to be in good condition with minimal corrosion present. There are no upgrades recommended at this time.
- The primary digester is equipped with a circulating SFX pump (5Hp, 575V) which is used to circulate sludge from the bottom of the primary digester back to the top of the digester. The pump appeared to be in good condition with minimal corrosion present; no upgrades are recommended.
- This pump discharges sludge through a hot water sleeve to promote sludge thickening. Two hot water pumps (3/4Hp, 575V) are used to discharge hot water through the sleeve. The hot water sleeve and pumps appear to be in good condition with little to no corrosion present. There are no upgrades recommended at this time.
- The primary digester is equipped with two Eimco sludge mixers and Westinghouse motors (60Hz, 10Hp, 575V, 1748rpm). The motors appear to be in good condition, with minimal corrosion present. The sludge mixers were submerged at the time of inspection. There are no additional upgrades recommended for the sludge mixing system.
- The sludge storage lagoons appear to be in good condition. No additional upgrades are recommended at this time.
- The digester gas control system is comprised of a pressure switch and ignition system, auxiliary gas control with electric solenoids, and a flare stack. The gas control system appears to be in good condition and does not require further upgrades.

Power and I&C

- The Digester Complex has two MCCs:
 - There is one Square D 42KIA MCC (600V, 100A), that should be replaced within the next five (5) years. The cost estimate to replace this MCC is \$35,000.
 - There is one Allen-Bradley 42KIA MCC (600V, 100A), that should be replaced within the next eight (8) years. The approximate cost to replace this MCC is \$80,000.

2.1.2.8 Sludge Storage Lagoons

The capacity of the lagoons was increased in 2015, as a result of recommendations in the 2013 WWSMP update. The two lagoons currently have a combined storage capacity of approximately 24,705 m³. Lagoon #1 has dimensions of approximately 134m x 48m x 1.7m, and lagoon #2 has dimensions of 151m x 48m x 1.9m. The visible elements of the sludge storage lagoons generally appear to be in good condition. However, the City advised that the liner in the lagoon #1 is torn and needs to be repaired immediately. This would involve cleaning the lagoon to allow City staff to make the necessary repairs. The estimated cost to clean the lagoon #1 and repair the liner is \$149,000.

2.1.2.9 Chemical Dosing

The Orillia WWTC uses a skid-mounted, three-pump system. The first pump delivers alum to the aeration system, the second pump is dedicated to delivering alum to the primary clarification system, and the third pump will act as a stand-by pump, which will be used for dosing the tertiary filtration system. The new pumps have a total design flow rate of 101 L/hr. Alum is stored in two fibreglass tanks. The following upgrades are recommended for the chemical dosing system:



Figure 9 – Alum Tanks

Structural

- The Alum tank concrete containment structure is in fair shape. There is concrete spalling at the locations where the Alum discharges. There is no concrete protection coating for the containment surface. It is recommended that a protective coating be applied the concrete containment area within a year. The estimated cost for the protective coating is \$25,000.

Process Mechanical

- The 22,500L Alum storage tank appears in good condition. No upgrades are recommended at this time.
- The insulating jacket on the discharge piping of the alum tank has been crushed. It is recommended that the jacket be replaced within five years. It is estimated to cost \$3,000 to replace the insulating jacket, assuming there is no damage to the discharge pipe.
- There are three electrically-driven chemical metering pumps. The entire chemical dosing system was replaced as part of the tertiary upgrades. No recommended upgrades at this time.

2.1.2.10 Boiler Building

The boiler building is approximately 9.5m by 7.5m and houses a dual-gas boiler unit. The boiler is used to heat the sludge within the Primary Digester to achieve adequate temperatures that promote microbial activity for the treatment of the sludge. The boiler also heats several of the buildings on the WWTC plant site. Methane gas produced by the sludge digestion process, in conjunction with natural gas, is used to fuel the boiler. The boiler has an input and output capacity of 1,431,840 BTU/hr and 1,145,700 BTU/hr respectively when using fuel from the digester tanks, and an input and output capacity of 2,512,000 BTU/hr and 2,010,000 BUT/hr respectively when using natural gas as fuel.

Moreover, the flare stack for the digester is also located within the building. The gas produced by the anaerobic digesters is burned through the flare stack.



Figure 10 – WWTC Boiler

Structural

- The exterior architectural and masonry walls are in good condition. There are vertical cracks on the concrete wall of the basement, but there is no observable leakage. There is minor defect noted on the concrete pump pad surface. The exterior concrete appears to be in good condition, but the metal stair from the platform to the ground surface has rust and the general configuration does not conform to the Building Code.

Process Mechanical

- The boiler building contains a dual-gas boiler that is fueled by both natural gas and gas from the digester tanks. The boiler, boiler burners, gas pressure boosters, and waste gas burner system appear to be in good condition. No additional upgrades are recommended for the boiler system.

Power and I&C

- The boiler is equipped with a Klockner Moeller 42KIA MCC (600V, 100A). The remaining useful life of the boiler is eight (8) years. The estimated cost to replace the boiler building MCC is \$80,000.

2.1.2.11 Tertiary Treatment

The tertiary filter lift station was constructed in 2019 and incorporates two tertiary cloth disk filters (one duty, on standby) that has a rated capacity of 89,000m³/d. The system is also equipped with the following:

- Four 37.5kW vertical turbine pumps (3 duty and 1 standby), each pump equipped with VFD and dual-set point to provide 27,300m³/d at 6.3m TDH or 89,000m³/d at 8.2m TDH.
- Two duty backwash pumps rated at 65.6 L/s at 50 m TDH. The backwash pumps include VFDs.
- Alum dosing is provided to trim dose of alum when the soluble phosphorus levels are too high.
- A new plant bypass chamber that directs flows to the tertiary lift station, with excess flows diverted to the UV system.
- A new manhole (MH#9), downstream of MH#4, receives the bypass/excess flows from the tertiary treatment system bypass chamber and secondary treatment bypass and directs it to the UV facility.

This system is a recent addition to the WPCP, therefore no upgrades are recommended.

2.1.2.12 UV Disinfection

The UV disinfection channel was installed in 2007/2008 and is equipped with two UV banks connected in series. Each UV bank has ten modules that contain eight bulbs per module. The WWTC UV system is rated for a peak capacity of 72,700m³/d.



Figure 11 – UV Treatment Bank

Structural

- The UV Treatment building is in good condition. There are minor defects on the coating of the floor. A slight discolouration at the floor and wall joint is noted, which is not significant. No additional upgrades are recommended at this time.
- The jib crane which has been checked annually appears to be in good condition. No additional recommended upgrades are required.

Process Mechanical

- The UV system consists of two banks, each ten modules that hold eight lightbulbs. The unit is electrically powered and is rated to treat a peak flow of 72,700m³/d. The UV banks appear to be in good condition with bulbs being replaced recently. It is recommended to maintain the current bulb replacement schedule; no additional upgrades are required.

Power and I&C

- The UV building houses an Allen-Bradley 42KIA MCC (600V, 600A, 125AT). The MCC is in good condition, there are no recommended upgrades at this time.

2.1.2.13 Outfall Works

The treated effluent discharges from the plant to a stormwater channel via a 2.5m tall and 1.85m wide overflow weir. This stormwater channel outlets to Lake Simcoe, which is approximately 550m from the WWTC.



Figure 12 – Orillia WWTC Outfall

Process Mechanical

- The outlet of the outfall pipe appears to be in good condition; no upgrades are currently recommended for the outfall works.

3.0 Recommended Upgrades Summary

3.1 Schedule of Upgrades

Table 1 below summarizes expected timeline and the costs associated with replacing and refinishing major assets within the WWTC:

Table 1 – Schedule of WWTC Upgrades

Schedule of Upgrades	WWTC Unit Process	Capital Cost	WWTC Asset Refurbishment
0 to 5 Years	WWTC Site & Admin Building	\$ 385,000	Electrical Upgrades
	Inlet/ Head Works	\$ 461,000	Monorail Removal, Weather Upgrades, Bar Screen Upgrades, Electrical Upgrades
	Primary Treatment	\$ 172,000	Bridge Refurbishments, Sludge Pumping Building Refinishing, Electrical Upgrades and Piping/Valving
	Secondary Treatment	\$ 40,000	Sluice Gate Replacement
	Secondary Clarifiers	\$ 271,300	Structural Repairs, RAS and Scum Pump Upgrades
	Sludge Digestion	\$ 31,000	Digester Tank Refurbishment, Digester Building Refinishing, Electrical Upgrades
	Chemical Dosing	\$ 28,000	Alum Tank Containment Structure Refinishing, Alum Tank Piping and Pump/Motor Upgrades
	Sludge Storage Lagoons	\$ 149,000	Clean Out and Repair Lagoon#1
Total Cost of 0 to 5 Year Upgrades		\$ 1,537,300	
5 to 10 Years	WWTC Site	\$ 35,000	Electrical Upgrades

Schedule of Upgrades	WWTC Unit Process	Capital Cost	WWTC Asset Refurbishment
	Inlet/ Head Works	\$ 100,000	Blower Upgrades
	Primary Treatment	\$ 55,000	Pump Upgrades
	Secondary Clarifiers	\$ 120,000	Electrical Upgrades
	Sludge Digestion	\$ 80,000.00	Electrical Upgrades
	Boiler Works	\$ 80,000.00	Electrical Upgrades
Total Cost of 5 to 10 Year Upgrades		\$ 470,000	
10 to 15 Years	Inlet/ Head Works	\$ 2,000	Electrical Upgrades
	Primary Treatment	\$ 100,000	Electrical Upgrades
Total Cost of 10 to 15 Year Upgrades		\$ 102,000	
Total Cost of Upgrades		\$ 2,109,300	

In essence, it is recommended that the assets be upgraded as per the Schedule of Upgrades above. It is essential that the assets be replaced during the suggested timelines to maintain the functionality of the WWTC. The total cost of all WWTC recommended upgrades over the next 15-years is \$2,109,300.

City of Orillia Wastewater Treatment Center
Condition Assessment TM

Appendix A

Orillia WWTC – Site Photographs













UNWATERING
PUMP

START

AB

STOP

AB







SOLD and / or SERVICED by:
SPL
INDUSTRIAL PUMPS
& EQUIPMENT INC.
705-720-0300 www.splpumps.com

A.C. MOTOR		10519
BROOK ELECTRIC MOTORS OF CANADA LTD. OHIAHO		
A HARVEY SINGLET COMPANY		
TYPE	3	10519
HP	1/2	10519
LA SPEED	1725	10519
LA VOLTS	230	10519
LA AMP	3.1	10519
PHASE	3	10519
INSULATION	CLASS B	10519
TELEPHONE	416-291-1111	10519
TELETYPE	416-291-1111	10519
TELEFAX	416-291-1111	10519
WEBSITE	www.be.com	10519
EMAIL	sales@be.com	10519
ADDRESS	1000 SHEPPARD AVE. E. UNIT 10	10519
CITY	SCARBOROUGH	10519
PROVINCE	ON	10519
COUNTRY	CANADA	10519

REPAIR IN SERVICE MAR. 29 / 17



1 IN

SERVICE

July 28 / 2015

USED

Blue label with illegible text

















WARNING
THIS MACHINE IS DESIGNED
FOR ONE DIRECTION OF
ROTATION ONLY. START MOTOR
AND CONFIRM PROPER
ROTATION BEFORE PUTTING
INTO OPERATION.







WARNING
THIS MACHINE IS DESIGNED
FOR ONE DIRECTION OF
ROTATION ONLY. START MOTOR
AND CONFIRM PROPER
ROTATION BEFORE PUTTING
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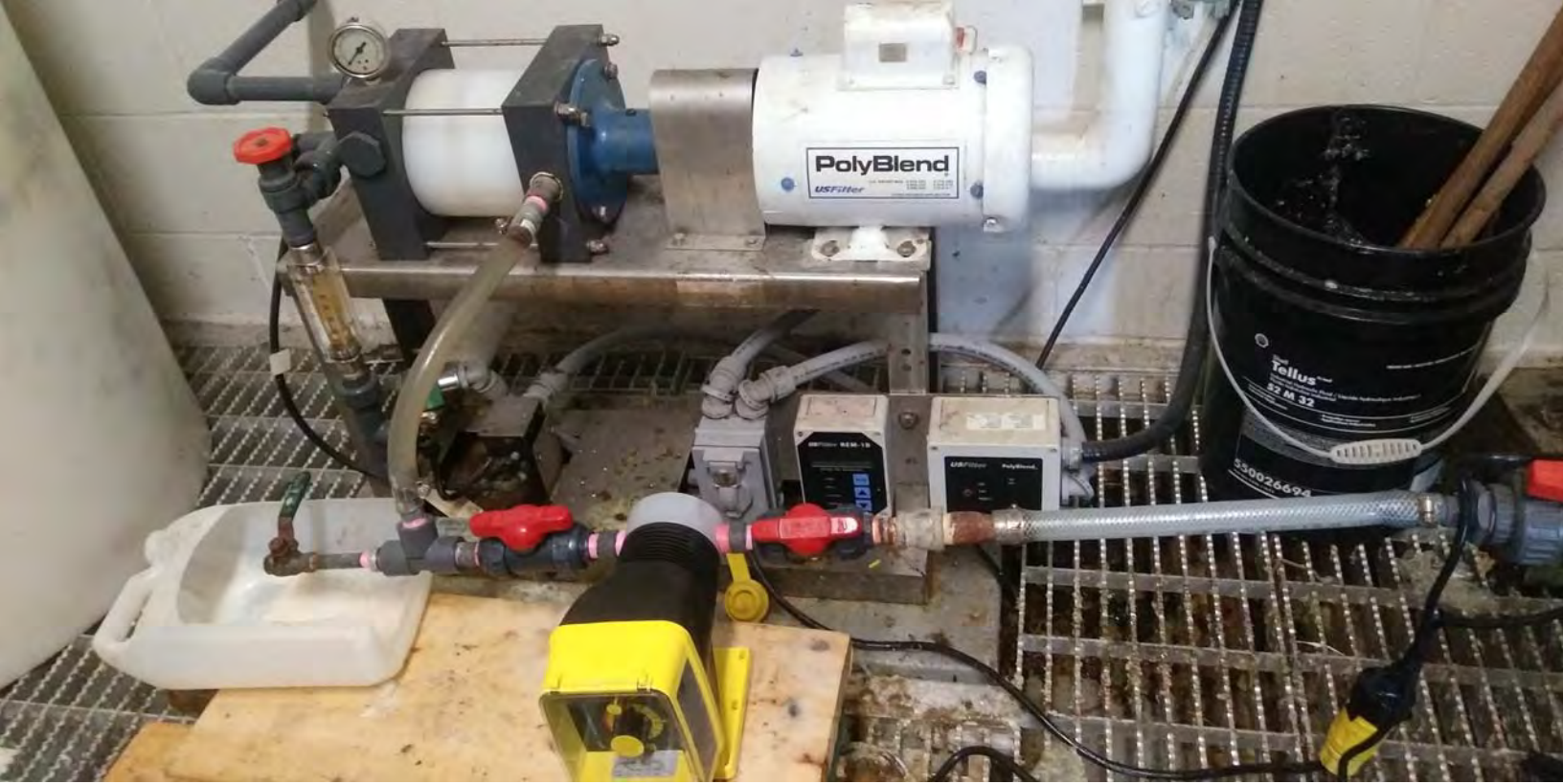
LUBRICATION LEGEND

NO.	ITEM	AMOUNT	UNIT
1	WATER	20 GAL	PER HOUR
2	COOLANT	10 GAL	PER HOUR
3	WATER	2 GAL	PER HOUR
4	COOLANT	1 GAL	PER HOUR

ALWAYS USE THE CORRECT OIL
ALWAYS USE THE CORRECT OIL FOR THE MACHINE
NEVER USE OIL THAT IS APPROXIMATELY 1 YEAR FROM EXPIRATION DATE
NEVER USE OIL THAT IS APPROXIMATELY 1 YEAR FROM EXPIRATION DATE
NEVER USE OIL THAT IS APPROXIMATELY 1 YEAR FROM EXPIRATION DATE



















































































SCUM













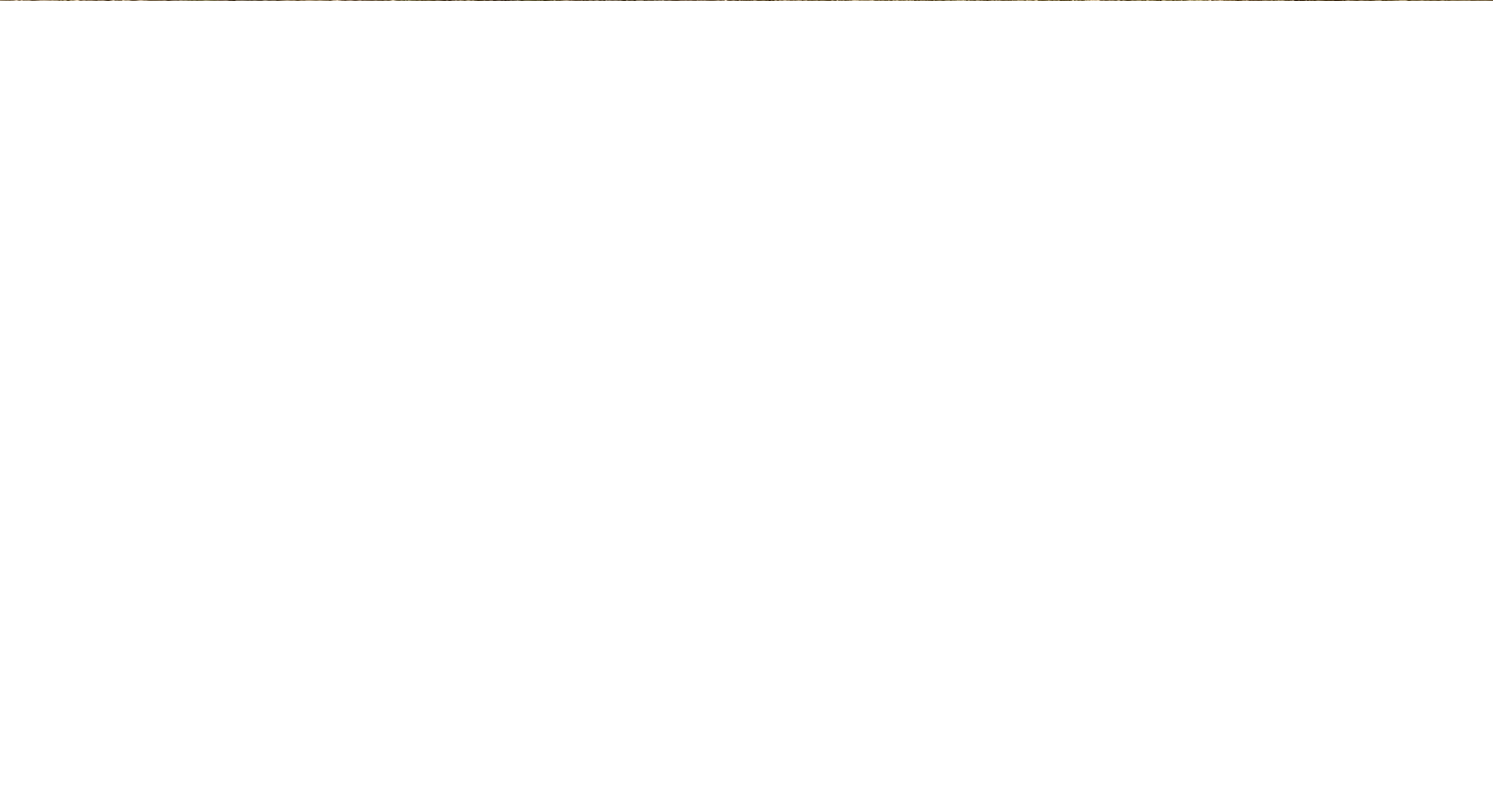








































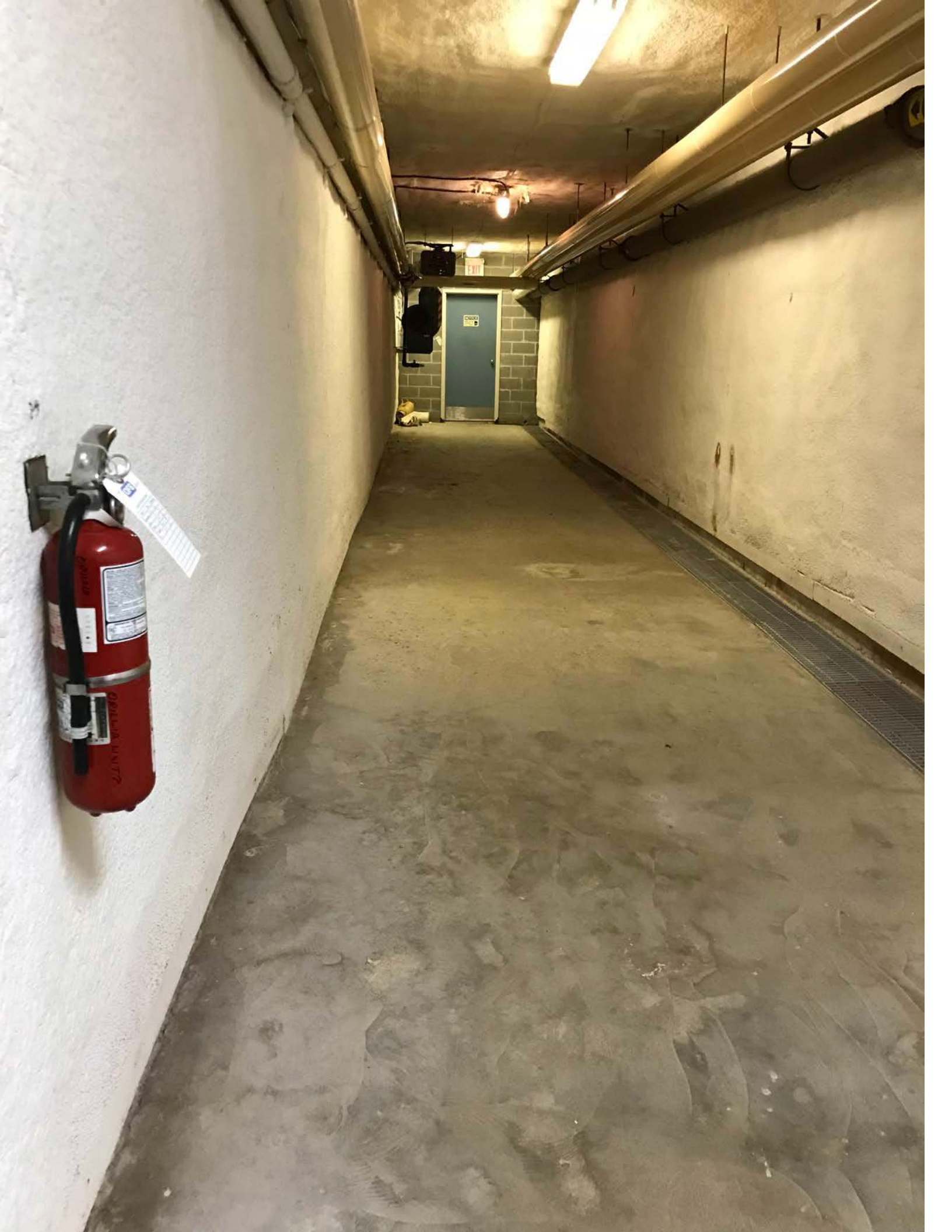




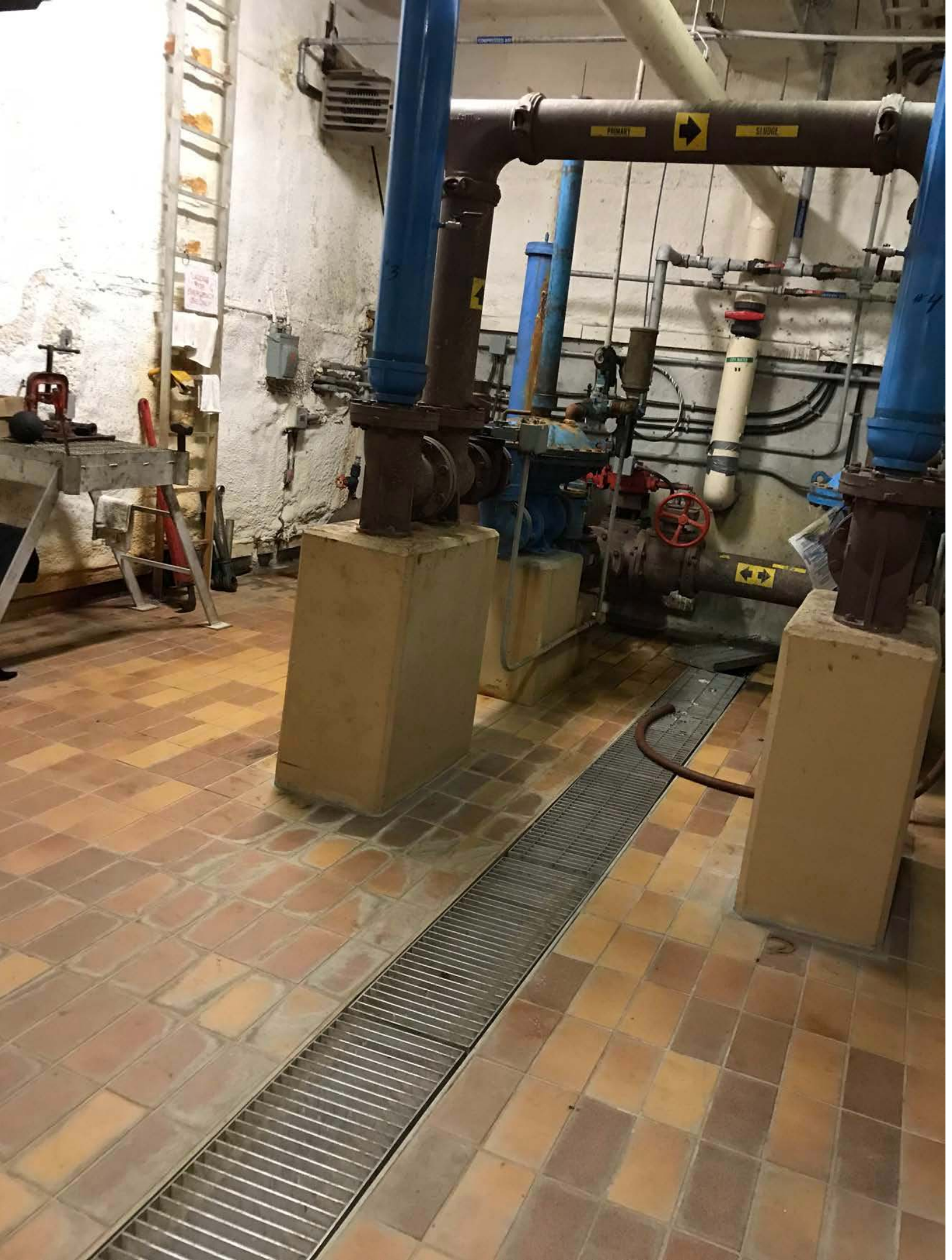






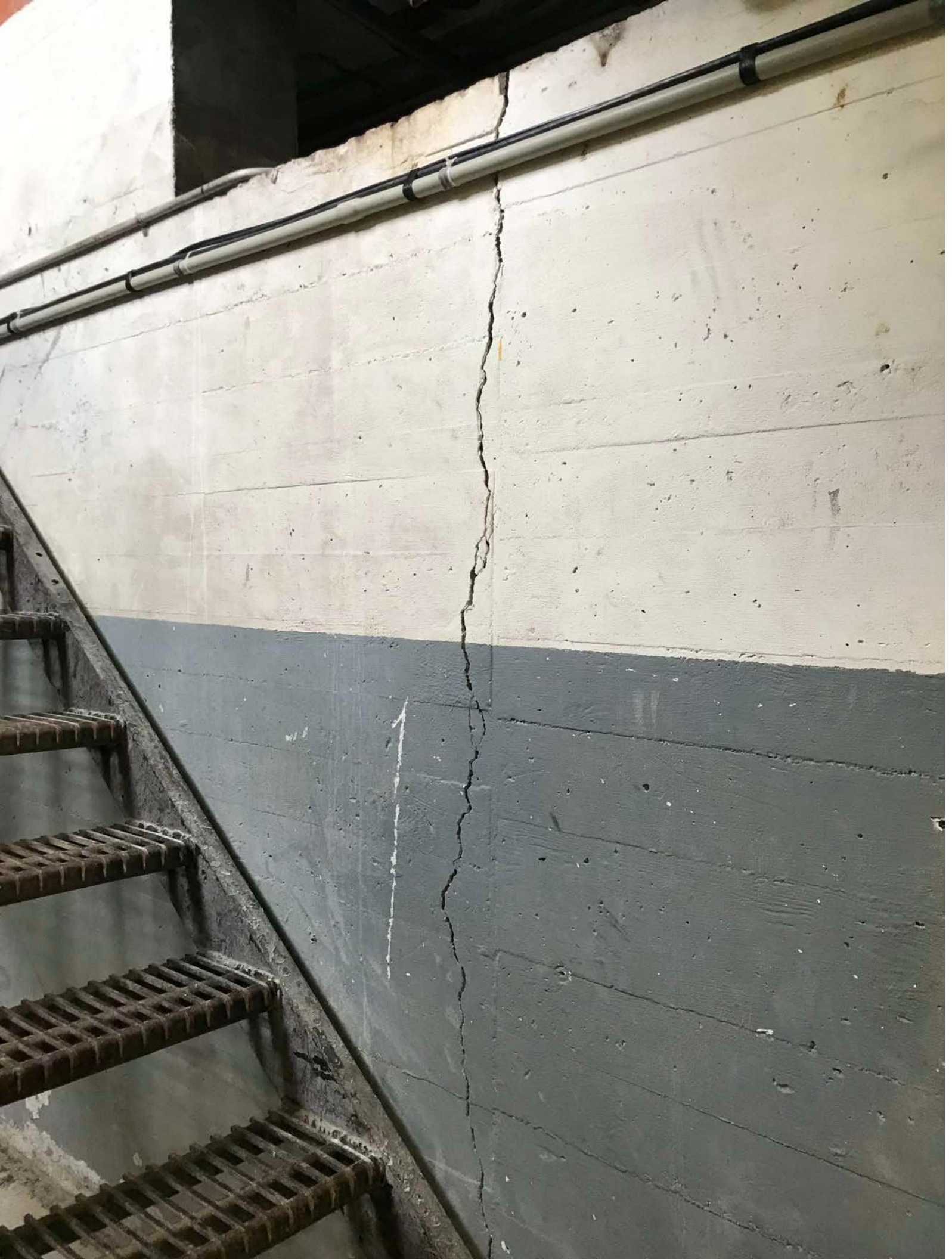


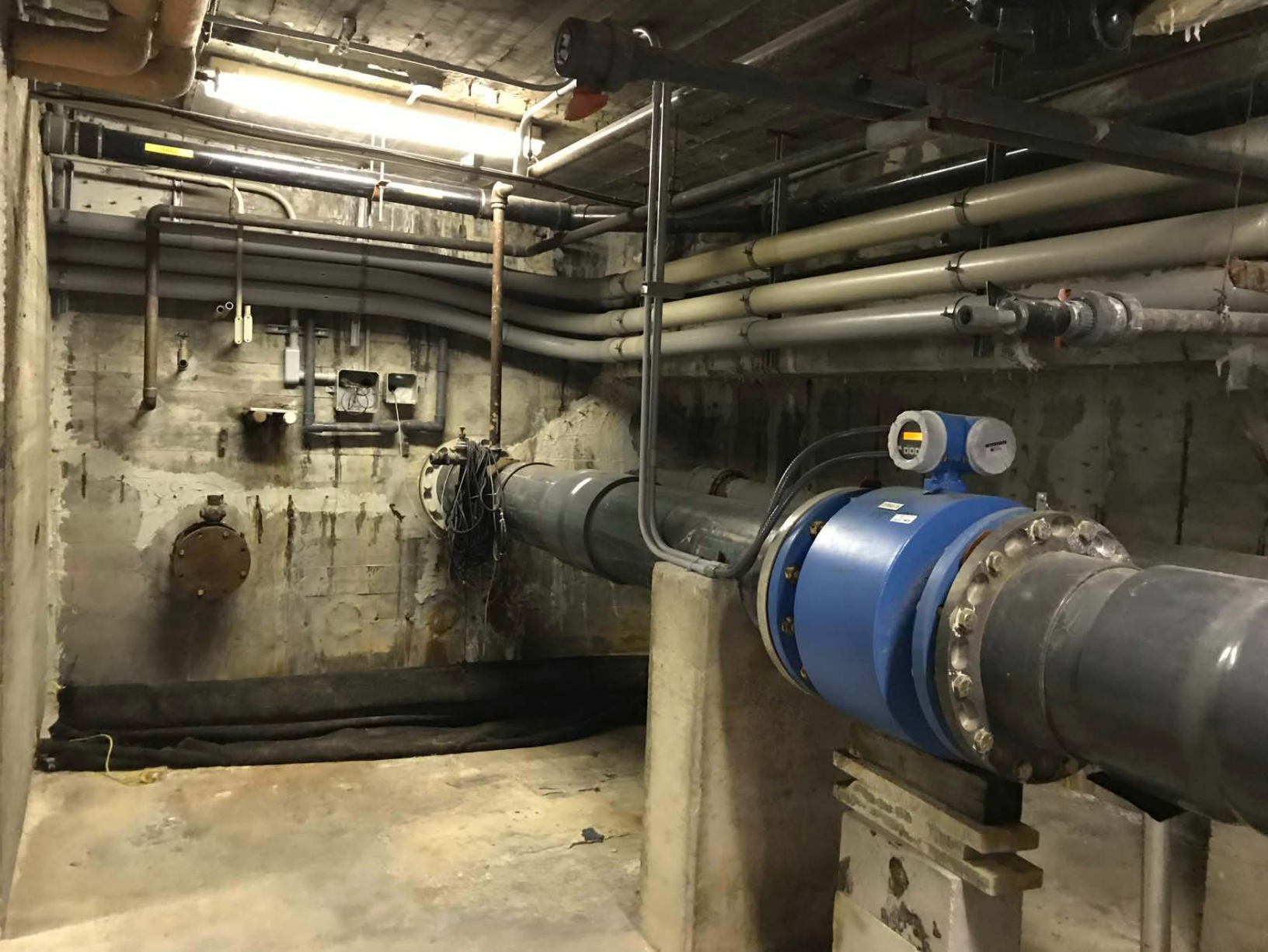
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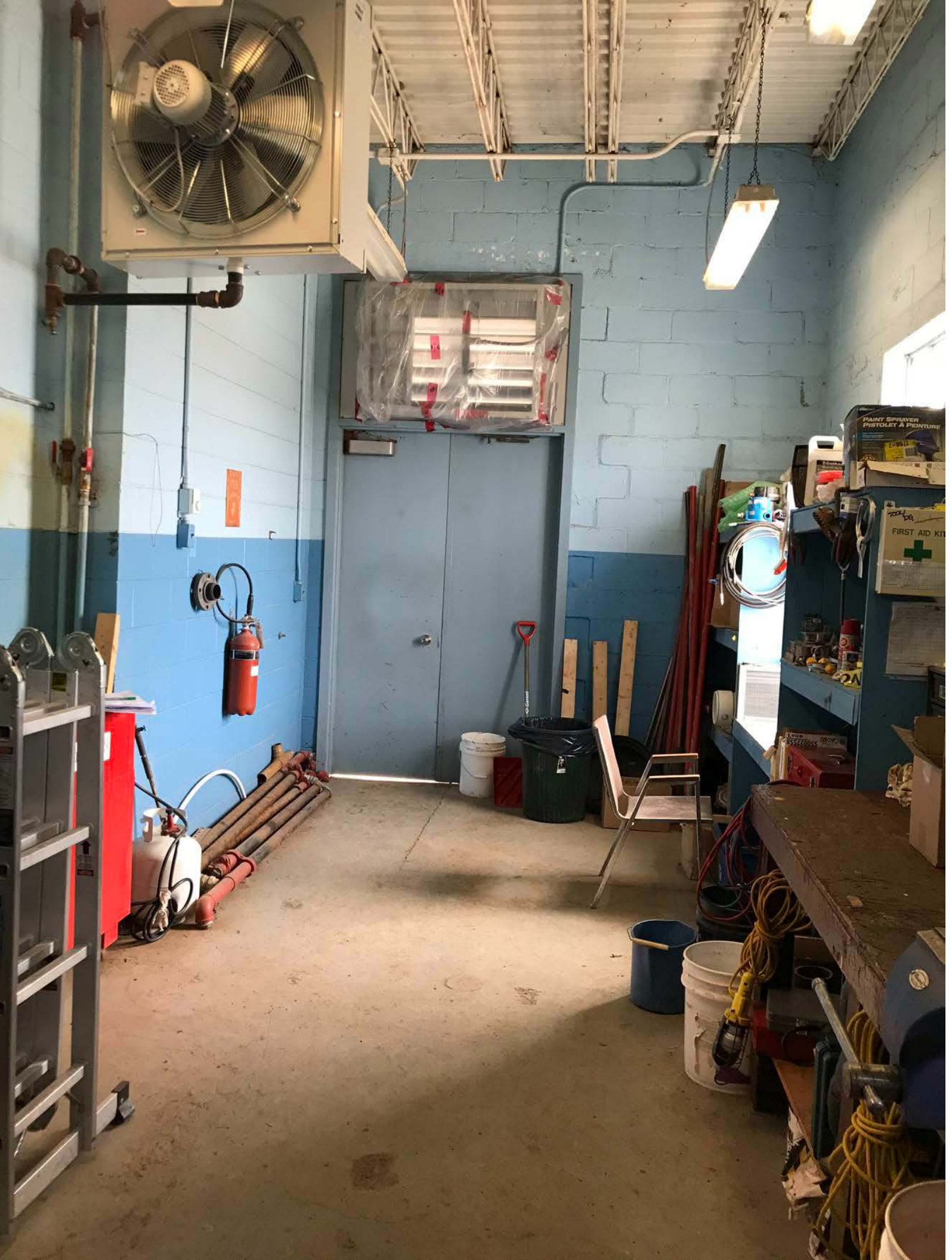






















City of Orillia Wastewater Servicing Master Plan Report Appendix – C

Existing and Future Sewage Flows Technical Memorandum

City of Orillia

Wastewater System Master Plan

Technical Memorandum
Existing and Future Sewage Flows

FINAL

March 2021



Wastewater System Master Plan

Technical Memorandum Existing and Future Sewage Flows

Project No. 118088

Prepared for:
The City of Orillia

Prepared By:



Simon Glass, P.Eng.

Reviewed by:



Preya Balgobin, P.Eng.

Ainley Group
195 County Court Boulevard
Brampton, ON L6W 3X7
Phone: (905) 452- 5172
Fax: (905) 595-6701
www.ainleygroup.com

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1.0 Introduction

The City of Orillia (City) retained the Ainley Group to provide engineering services for their Wastewater System Master Plan (WWSMP) update. The intention of the study is to prepare a comprehensive plan for the maintenance, expansion, and rehabilitation of the City's wastewater infrastructure. The WWSMP will endeavor to define the capital projects needed to meet the demands of growth and rehabilitation/replacement projects needed to maintain the functionality of the existing wastewater infrastructure.

This report provides an overview of the historical wastewater flows in the existing sanitary system. Also discussed are the projected housing and economic development rates and the downstream impact on the wastewater infrastructure.

2.0 Objectives

The objectives of this Technical Memorandum are as follows:

- Review historical findings from previous planning documentation
- Identify sanitary sewer flows from existing development in Orillia.
- Establish growth potential for the City based on the Official Plan (OP) settlement area boundary and current housing density targets.
- Project future sanitary sewer flows from new development within the settlement area boundary.
- Assess the impact of future wastewater flows on the existing collection infrastructure.
- Assess the impact of future wastewater flows on the Capacity of the WPCP.

2.1 Population

The residential population assumptions and projections provided herein are taken primarily from the 2017 Development Charges Background Study (D.C. Study) completed by Hemson Consulting Limited. The D.C. Study projects the City will grow by 2,650 additional residential units over the 2017-2026 planning period and a total growth of 4,290 additional residential units by 2031. The study assumes a density of 2.41 persons per residential unit. In terms of employment the D.C. Study projects an additional 1,140 jobs over the 2017-2026 planning period and 1,872 additional jobs over the 2017-2031 planning period.

For the purposes of this study, which seeks to plan for a 30-year time horizon, the D.C. Study projections have been prorated out to 2049. This assumes that the City grows at the same rate of growth from 2016 to 2031, extrapolated to 2049. The resulting projections are shown graphically in Figure 1.

Town of Orillia, Population and Jobs over Time based on DC Background Study (Hemson)

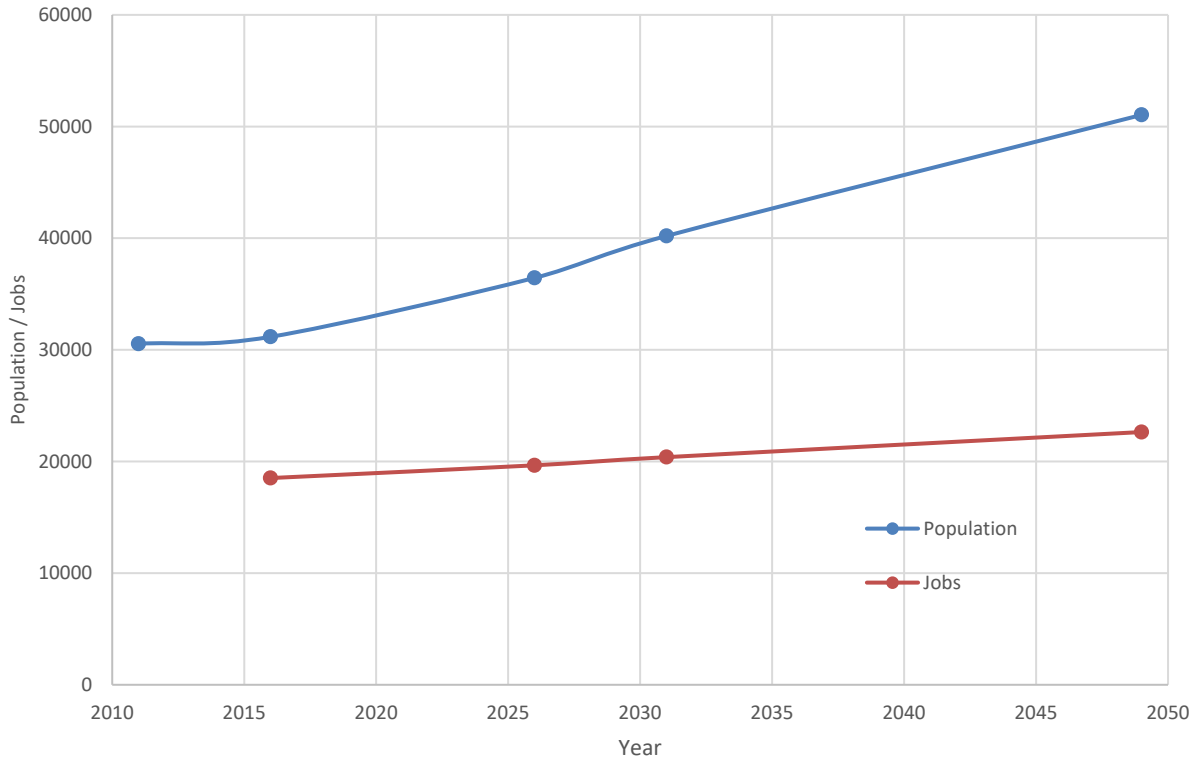


Figure 1 – Orillia Population Projections

3.0 Wastewater Flow Design Basis

3.1 Flows from Existing Orillia Service Area

The flow trends for the City of Orillia were reviewed over the 2013-2018 time period. The flow data used in this analysis was the “WWTC Daily Flows” data as presented in the WWTC Annual Compliance Reports.

Over the 2013 – 2018 time period the Town has experienced an average day flow (ADF) of 14,736 m³/d with a corresponding average per capita flow rate of 473 L/cap/day including extraneous flows (Inflow and infiltration). The observed average day flow rate is on the high-end of expected average day flow rates for new development. The average day flow rate varied significantly over the time period, a summary of the flow data for this period is presented in Table 3.

Table 1 – Orillia Wastewater Flow Data Summary, Flow Units: m³/d

Year	Population	ADF	ADF/ Cap	Peak Day Flow	Peak/ Cap
2013	30,709	14,650	0.477	45,011	1.466
2014	30,797	15,414	0.500	47,889	1.555
2015	30,837	13,324	0.432	27,759	0.900
2016	31,166	14,012	0.450	47,430	1.522
2017	31,595	15,784	0.500	48,215	1.526
2018	32,020	15,236	0.476	44,495	1.390
Avg.		14,736	0.473	48,215	1.393

In order to clearly show the general flow trends within the City a plot of the aggregated monthly averages over the time period is presented in Figure 2. Figure 2 also shows the maximum and minimum daily flows by month over the time interval. From Figure 2 it can be seen that peak flows occur predominantly during the spring freshet period with peak day factors in the range of 3 - 3.25. The overall peak day factor for the City is greater than the design peak day factor of the WWTC (2.66) and is therefore not sustainable since the WWTC would be unable to manage peak flow events before the ADF capacity of the facility is expended. The high peak factor may indicate that the existing collection infrastructure has a problem with inflow and infiltration. However, peak factors typically decrease as the service population increases so the trend should be monitored to establish whether or not excessive peak flows will be an issue in the future.

Comparison of Average, Minimum and Maximum Monthly Flows, 2013 - 2018

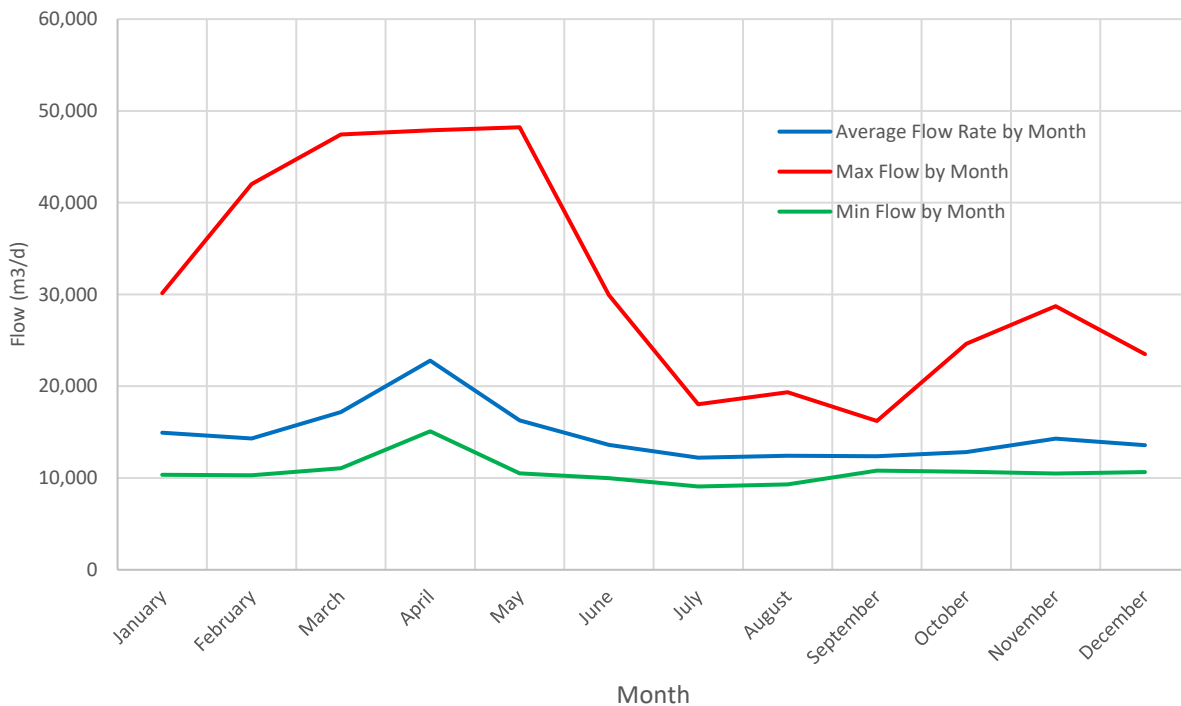


Figure 2 – Aggregated Monthly Flow Trends, 2013-2018

The daily flow data to the Orillia Wastewater Treatment Centre over the 2013-2018 time period is presented in Figure 3. Over the past 6 years the average daily flow has remained very stable with differences in year-to-year averages driven primarily by the frequency and severity of peak flow events during the spring months. Overall, the average flow rate has shown a slight decrease over time however this effect is insignificant. During the time interval examined, average day flows have been approximately 54% of the WWTC ADF capacity and peak flows have reached 66% of the peak flow capacity. Generally, an expansion of wastewater treatment capacity is triggered when ADF flows reach 85% of the plant ADF capacity.

From Figure 3 it can be seen that there is significant divergence between distributed water and wastewater flows which is most pronounced during the spring periods. The divergence seen is attributed to extraneous flows into the wastewater collection system. Without extraneous flow, wastewater flows would always be below the distributed water total flow. The discrepancy in flows is most pronounced during the spring season, suggesting that melting snow is entering the collection system. The winters of 2014/2016 are more typical of past winters with a shorter duration of spring runoff in April. The winter of 2017 exhibited higher wastewater flows over a longer period from January to May reflecting changes to weather patterns causing multiple thaw events as well as rain storms. The intense peak flow experienced over a short period indicates that there are likely many inflow sources to the collection system, including roof leaders, connected sump pumps, and catch basins.

Figure 3 shows the average daily water use plotted alongside the wastewater flow data. The difference between base rate water use and the daily wastewater flow is identified as a high-level estimation of the inflow and infiltration to the collection system. Based only on the average difference in distributed water and wastewater flow, it is estimated that on an average day basis, 3,496 m³/d of the current wastewater flow is due to inflow and infiltration to the system. However, this phenomenon is primarily occurring during the spring freshet. The estimated I/I rate represents 24% of the overall wastewater flows during a year.

The approach used to approximate I&I, using water distributed water volumes rather than metered water volumes, does not account for water losses from the distribution system. Performing the same evaluation with metered water rates yields a higher estimate for the portion of flow attributable to I&I, since metered water volume will always be lower than distributed water volume. Using metered water data, the same calculation approximates that 40% of total wastewater flow is resulting from I&I. The true percentage is likely between the two estimates, as metered water will not account for unbilled authorised consumption and apparent/commercial losses (customer meter under-registration and theft). A true understanding of the I&I rates would best be determined through flow monitoring data, rather than analysis of high-level daily flow averages. The estimated rate of 24% will be carried through the report but all recommendations will be made under the understanding that the I&I rate may be as high as 40%.

Table 2 – Derivation of Total Flow Rate Assumptions, ICI included

Year	Pop. Avg.	Base Water Use (m ³ /d)	ADF (m ³ /d)	Est. I&I (m ³ /d)	Est. Per Cap WW (m ³ /cap/d)	Est. Per Cap I&I (m ³ /cap/d)
2013-18	31,189	11,240	14,736	3,496	0.360	0.112

The per capita flow rates in Table 2 do not separately take into account the total flow volume generated by industrial, commercial and institutional (ICI) activity within Orillia, as such, the flow values are inflated for approximating flow from new residential development. Based on the 2013 Master Plan Update, the current wastewater flow generated from ICI sources is approximately 43% of total flows in the City. Assuming the

proportion of flow from ICI has remained relatively stable, the portion of ADF that comes from ICI sources has been extracted from the residential portion, and the resulting flow rate assumptions are presented in Table 3.

Table 3 – Derivation of Residential Flow Rate Assumptions (approximate ICI flow removed)

Year	Pop. Avg.	Res ADF (m ³ /d)	ICI ADF (m ³ /d)	Est. Res I&I (m ³ /d)	Est. Per Cap WW (m ³ /cap/d)	Est. Per Cap I&I (m ³ /cap/d)
2013-18	31,189	6,407	4,833	3,496	0.205	0.112

Daily Wastewater Flow, 2013-2018

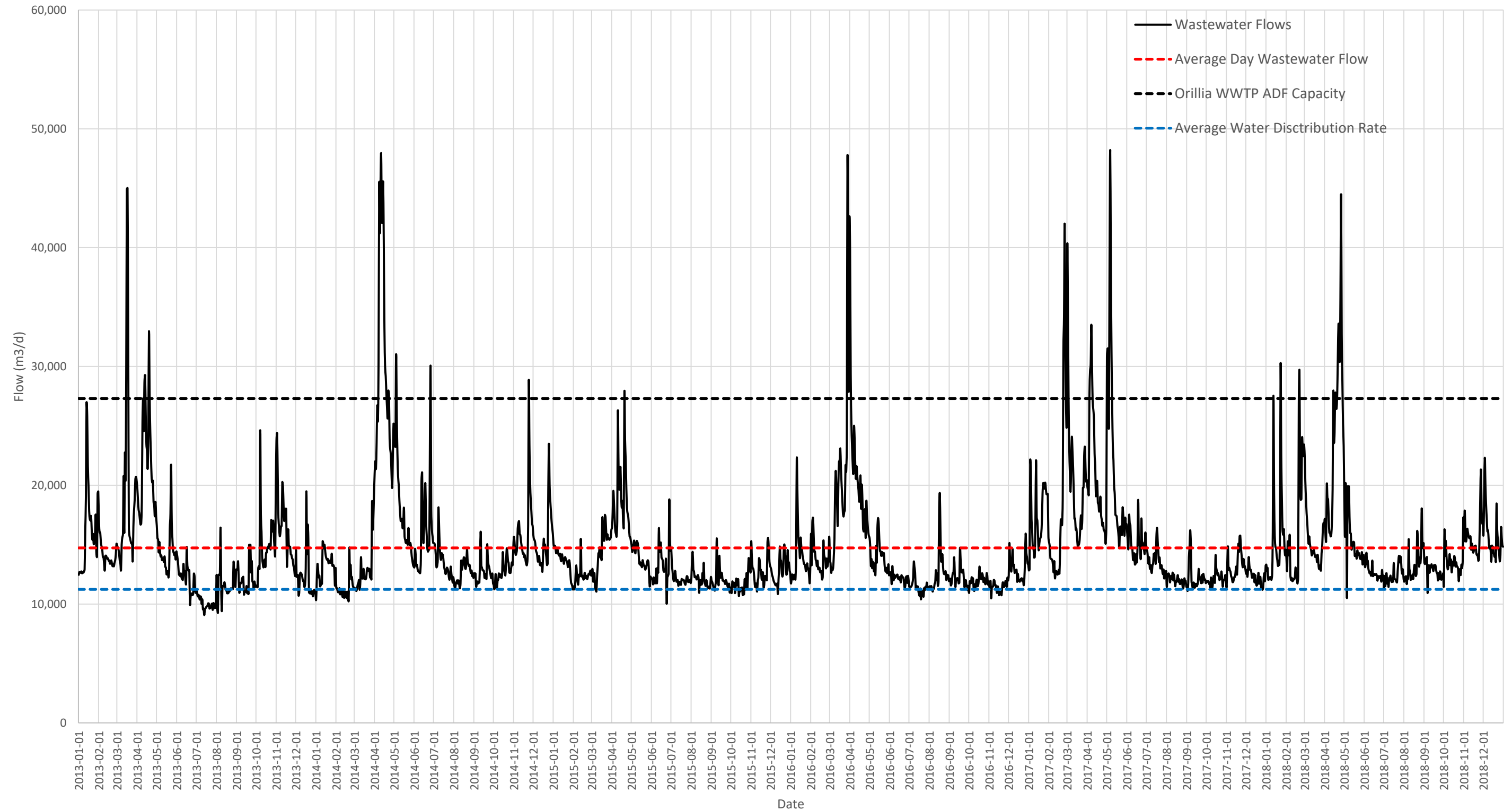


Figure 3 – Southampton Wastewater Flow Trend (2013 - 2018)

It is standard design procedure to allow for a degree of inflow and infiltration to a sanitary collection system. Typically, inflow and infiltration rate assumptions come in two forms, an allowance for infiltration on the basis of “area” or “per capita” allowances. Assumptions commonly used in Ontario to estimate average I&I would be 0.01-0.02 L/s/ha of development or 90-150 L/cap/day. From the analysis provided, a rate of 110 L/cap/day appears to be appropriate for Orillia, slightly rounded down from the calculated 112 L/cap/day.

Also based on the flow rate analysis above, it is suggested that a residential wastewater flow rate of 205 L/cap/d may be appropriate for Orillia. The actual calculated residential wastewater generation rate (including average I&I) is 317 L/c/d. The design residential per capita ADF currently in place for the City of Orillia is 300 L/c/d, as established in Report to Council Committee No. PD-02-038 on April 14, 2003 (copy included in Appendix A). The design rate includes a factor equal to 5% of total existing 5-year average flow for re-urbanization of existing development. Based on current flows, this factor adds 25 L/c/d to the calculated wastewater generation rate, increasing the rate from 210 L/cap/d to 230 L/c/d for design purposes. This rate is within the range of design standards used by various locations within southern Ontario. Several example locations and their respective rates are outlined in Table 4.

Table 4 – Sewage Generation Assumptions, Southern Ontario

Design Standard	Residential Flow Rate
City of Barrie	225 L/c/d
Proposed Assumption	230 L/c/d
Region of Halton	275 L/c/d
Region of Peel	303 L/c/d
Region of Waterloo	350 L/c/d
MOECC (design guidelines)	225 - 450 L/c/d

Table 5 outlines the assumptions which will be used to generate the estimated average daily flow for new residential, institutional, commercial and industrial development, including inflow and infiltration from development in Orillia. The residential flow assumptions are as derived in this section of the report. The ICI flow assumptions are standard assumptions, commonly used throughout Ontario. It should be noted that the proposed industrial flow rate represents a deviation from the historical design standards for the City of Orillia, which carry 36 m³/ha/d for industrial flow sources, however the reduced assumption is more in line with other municipalities in Ontario.

Table 5 – Flow assumptions for preliminary design

Residential Flow	230 L/c/d
Inflow and Infiltration	110 L/c/d
Industrial Flow	28 m ³ /ha/d
Commercial Flow	28 m ³ /ha/d
Institutional	28 m ³ /ha/d

The volume of wastewater generation from new development areas and infill areas of Orillia, presented in the following sections, are calculated on an area by area basis using the per capita flows established herein. Average daily flows and peak flows were calculated by area. Peak flows were calculated using the Harmon Peaking Factor calculation.

3.2 Build-out of Available Land

The build-out of the City is defined as complete development of all available parcels within the settlement area boundary. Growth areas are designated in the City’s Official Plan (OP). These areas are illustrated in Figure 4.

The City’s Official Plan (OP) states that 40% of new residential development should be intensification occurring within the City’s “Built Boundary”. The OP defines the density of development as shown in Table 6. The density targets specified in the OP were used to estimate the total population of the City under the full build-out scenario.

Table 6 – Official Plan Density Targets

Development Type	Target
Designated Greenfield Areas (Lands Outside of the Built Boundary)	42 persons and/or jobs/ha
Neighborhood Greenfield	50 persons/ha
Business Park/ Industrial	50 jobs/ha
Major Institutional	50 jobs/ha
Community Commercial	50 jobs/ha

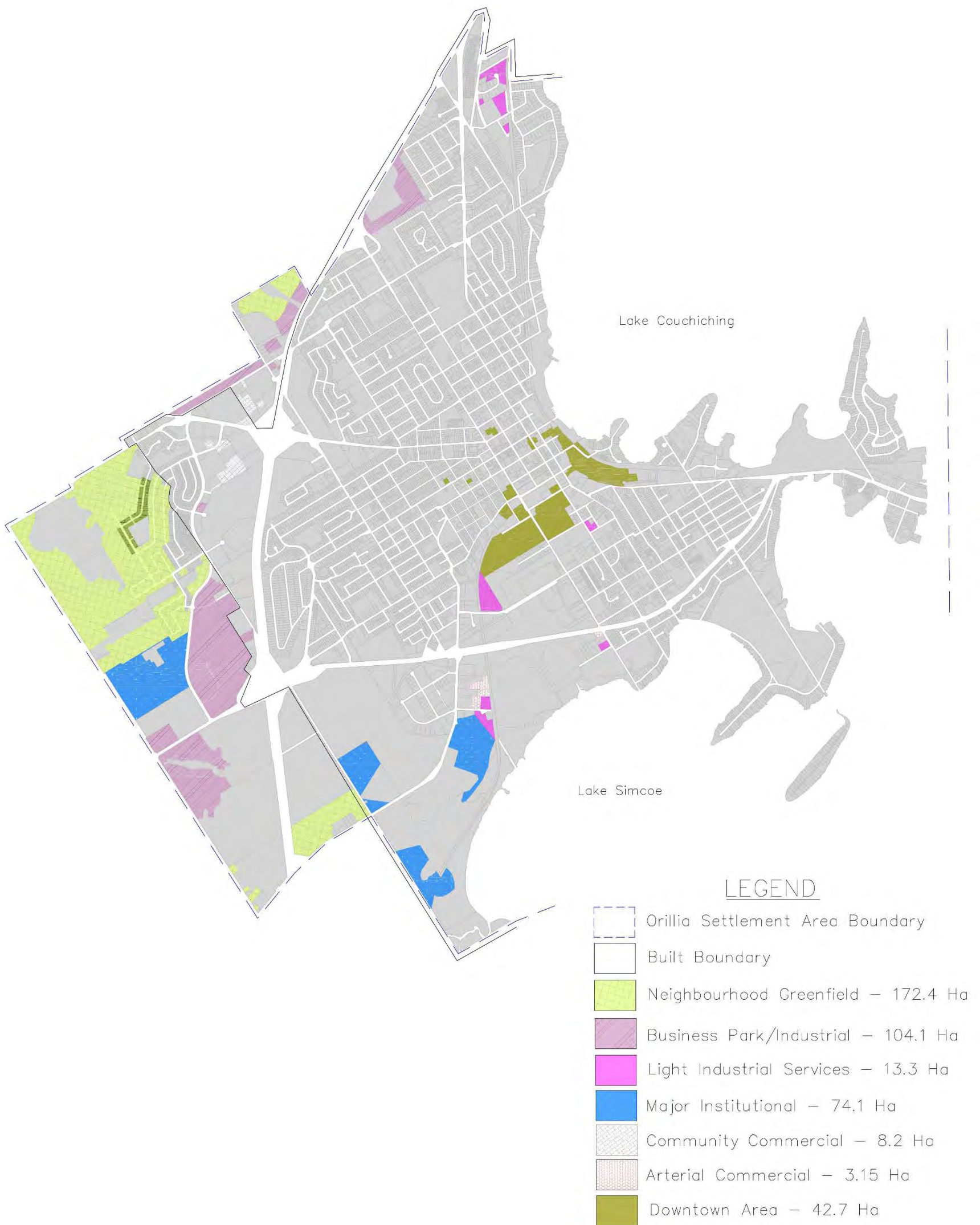


Figure 4 – Potential Development Land in Orillia

The number of people occupying each residential unit is assumed to be 2.4, based on the findings of the D.C. Study.

Flow contributions from institutional/commercial/industrial growth areas are shown with an equivalent residential population. Equivalent population is determined by calculating the flows based on the flow assumptions outlined in Table 5 and then dividing by the per capita flow contribution of 345 L/c/d (residential ADF and I&I). The growth areas considered within the analysis are listed in Table 7 and are reflected in Figure 4.

Flow estimates are calculated on the following basis:

$$ADF = Area * Housing Density * Occupants Per Unit * Per Capita Flow$$

Table 7 – Wastewater Flows from New Growth Areas

Identification	Area (Ha)	Eq. Population	ADF Estimate (m ³ /d)
Neighbourhood Greenfield	172.4	8,620	2,973.9
Neighbourhood Greenfield - Intensification	69.0	3,450	1,190.3
Light Industrial Services	13.3	1,079	372.4
Major Institutional	74.1	5,936	2,074.8
Community Commercial	8.2	665	229.6
Arterial Commercial	3.15	256	88.2
Downtown Area	42.7	3,465	1,195.6
Total:	382.85	23,471	8,124.8

3.3 30-Year Wastewater Flow

An estimation of wastewater flow over time is provided in Figure 5. The total wastewater flow is based on the population projections outlined in the D.C. Study up to the year 2031. Growth between 2031 and 2049 is assumed to follow the same growth rate projected to 2031 of 265 additional housing units year over year.

A range of projected average day flows is presented in Figure 5, which is based on the variance in average day flows experienced between 2013 and 2018. The high-end projection uses the high flow experienced in 2017 as a baseline for projecting flows in the future. The low-end projection assumes the 2015 flows as a baseline.

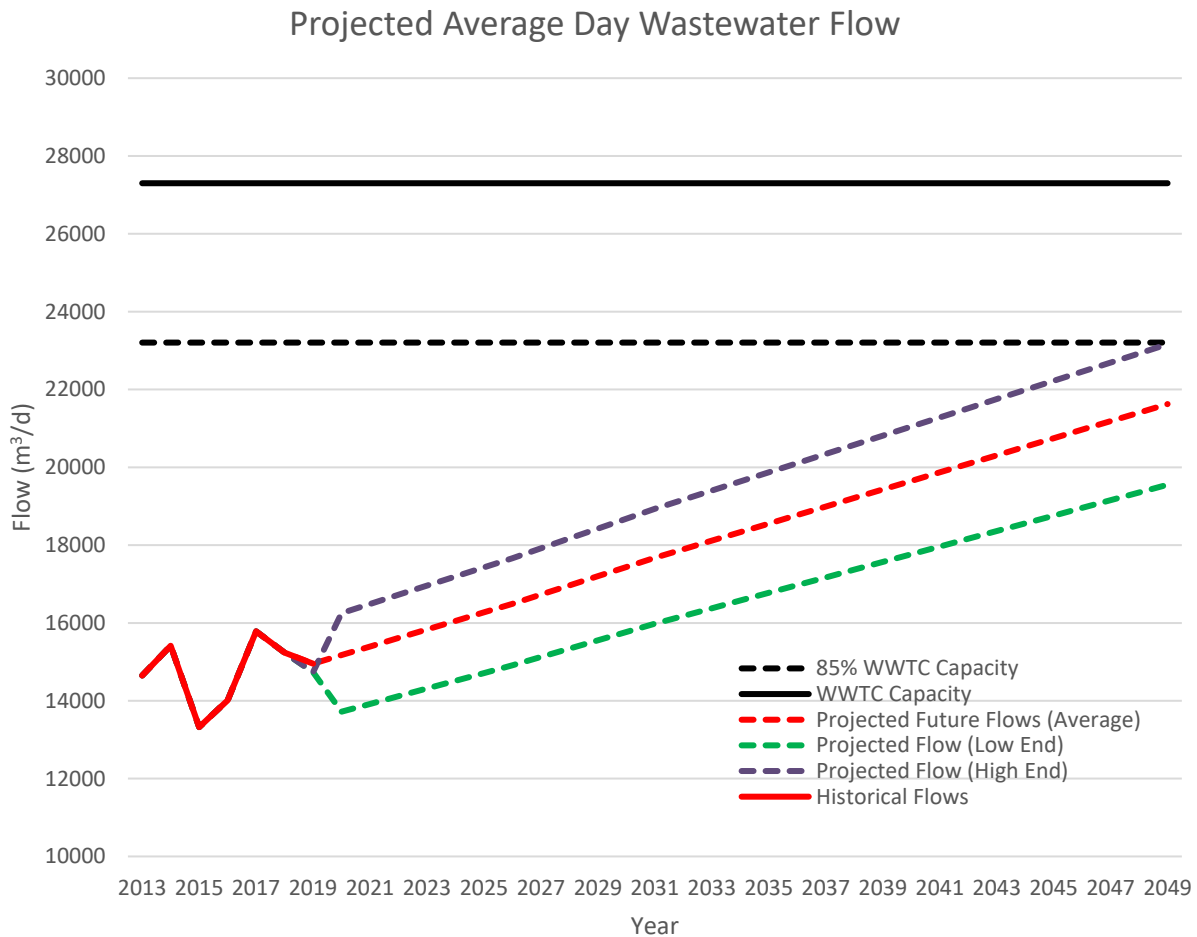


Figure 5 – Wastewater Flow over Time

Based on current projections the Orillia WWTC would receive a total of 21,625 m³/d ADF (79% of its rated capacity) by 2049 with a corresponding population of approximately 51,041 people. The peak day factors currently being experienced by the City are up to 3.25, resulting in a projected peak flow of 70,280 m³/d, which is nearing the peak day capacity of the WWTC (72,620 m³/d). However, as previously noted, peak factors typically decrease as the service population increases, therefore, the trend should continue to be monitored.

The projections suggest that ADF flows will reach 85% of the WWTC capacity by 2050 at the earliest and 2068 at the latest. It is generally suggested that planning for expansion of a wastewater treatment facility should begin once ADF flows reach 85% of the plant's rated capacity.

3.4 Full Build-out Summary

The total flow volume from the full build-out of the existing settlement area boundary is summarized in Table 8. Based on the estimated growth trend from the D.C Study, as shown in Figure 5, the full build-out of the existing settlement area boundary would be reached by 2084, assuming development continues at a consistent pace.

Table 8 – Wastewater Flow Summary for Build-out Development

	Population	ADF (m ³ /d)	Peak Day Flow (m ³ /d)
Existing System (2018)	32,020	15,236	44,495
New Growth	23,471	8,125	20,963
Total:	55,491	23,361	65,456

4.0 Conclusions

This Technical Memorandum, prepared in support of the City of Orillia Wastewater System Master Plan, provides:

- A review of historical findings from previous planning documentation.
- An overview of historical sanitary sewer flows from existing development in Orillia.
- A comprehensive review of growth potential for the City within the settlement area boundary.
- An assessment of the impact of future wastewater flows on the capacity of the WPCP.

This Technical Memorandum details the following information, in part summarized from previous reporting, and in part concluded from independent analysis from Ainley:

- Existing population of the Town of Orillia is approximately 31,166 based on the 2016 census.
- The Hemson Development Charges Study (D.C. Study) provides the basis for the assessment of population and economic growth within the City of Orillia.
- The density of development anticipated into the future is expected to be approximately 50 units/ha based on the targets of the City’s Official Plan.
- Per the D.C. Study, the occupancy per housing unit is approximated to be to be 2.4 persons/unit.
- The existing wastewater flows indicate that approximately 3,496 m³/d of the overall flow is a result of inflow and infiltration to the collection system accounting for 24% of overall flow to the WWTC.
- Peak daily flows to the plant reach as high as 3.25 times the average day flow; this is much higher than the plant’s rated peaking factor of 2.66, but would be expected to decrease as the plant approaches capacity so the trend should continue to be closely monitored.
- Inflow and infiltration rates in the system are significant and occur predominantly within the spring freshet period.
- The following design parameters are proposed based on the analysis of the existing wastewater flows:

Table 9 – Flow assumptions for preliminary design

Residential Flow	235 L/c/d
Inflow and Infiltration	110 L/c/d
Industrial Flow	28 m ³ /ha/d
Commercial Flow	28 m ³ /ha/d
Institutional	28 m ³ /ha/d

- A total of 313.85 ha of new development area is identified within the existing settlement area.
- A total of 69 ha of infill area is identified within the existing settlement area, based on the Official Plan goal of maintaining 40% of all new residential development as infill and intensification.

- Based on the assessment of wastewater servicing within the existing settlement area, the following wastewater flows have been identified:
 - 2018 average wastewater flow 15,236 m³/d
 - To service New Growth Areas Defined in Town Official Plan 6,934 m³/d
 - To fully service infill growth within the existing community 1,190m³/d
 - Resulting in a total estimated wastewater flow 23,361 m³/d
- Servicing the existing communities and new growth areas would result in the following residential populations connected to the communal system:
 - Existing Communities 32,020 persons
 - Infill growth 3,450 persons
 - New Growth Areas 20,020 persons
 - Resulting in a total residential population 55,490 persons
- The existing WWTC will not reach full capacity within the 30-year planning period.
- Based on the current estimated rates of growth, the WWTC will reach 85% capacity by 2050 at the earliest.

City of Orillia Wastewater Servicing Master Plan Report Appendix – D

Evaluation of Wastewater Treatment Centre Performance and Capacity Technical Memorandum

City of Orillia
Wastewater System Master Plan

Technical Memorandum
Evaluation of Wastewater Treatment Centre
Performance and Capacity

FINAL

March 2021



Wastewater System Master Plan

Technical Memorandum Evaluation of Wastewater Treatment Centre

Project No. 118088

Prepared for:
The City of Orillia

Prepared By:



Jatin Singh, P.Eng., PMP

Reviewed by:



Preya Balgobin, P.Eng.

Ainley Group
195 County Court Boulevard
Brampton, ON L6W 3X7
Phone: (905) 452- 5172
Fax: (905) 595-6701
www.ainleygroup.com

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1.0 Introduction

All sewage collected in the City of Orillia's sewage collection system arrives at the James Street Sanitary Pumping Station (SPS). The wastewater from this SPS is pumped to the Orillia Wastewater Treatment Centre (WWTC), which is currently a secondary treatment facility utilizing a conventional activated sludge process. The WWTC is currently undergoing a construction upgrade to add tertiary filtration for phosphorus removal. The plant has a rated capacity of 27,300 m³/d (peak flow rate of 72,700 m³/d) and currently operates at approximately 54% capacity (14,736 m³/d).

1.1 Objectives

The primary objective of this Technical Memorandum is to review the capacity of the existing WWTC and septage receiving station for existing and future (30-year) wastewater flows and effluent quality. Other objectives are as follows:

- Review historical plant data for the WWTC and the Septage Facility
- Assess the impact of future (30 year) wastewater flows and septage on the capacity of the WWTC.
- Review and confirm recommendations presented in the “*Septage and Hauled Receiving Station Proposed Equalization Tank Assessment Study (2016)*”

2.0 Flows and Effluent Limits

2.1 Raw Sewage Flow

Historical WWTC data (2013-2018) indicates that the WWTC is operating within its rated capacity. Average daily flow (ADF) and peak daily flow (PDF) over this period was 14,736 m³/d and 48,215 m³/d, respectively. Based on the flow projections discussed previously, the 30-year flow projection indicates that the Orillia WWTC would receive a total ADF of 21,625 m³/d and PDF of 70,280 m³/d by the year 2049, which is within the WWTC's current capacity mentioned in the ECA.

2.2 Effluent Requirements

It is required that the Orillia WWTC meet the effluent limits set by the MECP in the ECA at all times throughout the year. The current requirements of the Orillia WWTC as outlined in the plant ECA are as follows:

Table 1 - Current Effluent Limits

Parameter	Average Concentration (mg/L)	Average Loading (kg/yr)
CBOD ₅	15.0 (monthly)	-
Total Suspended Solids	15.0 (monthly)	-
Total Phosphorus	0.18 (annual) ²	996 ¹
pH	Maintained within 6.0 – 9.5 inclusive, at all times	
<i>E. Coli</i>	< 200 organisms/ 100 mL (<i>Geometric Mean Density</i>)	

¹ Lake Simcoe Phosphorus Reduction Strategy Effluent Limit

² Lake Simcoe Phosphorus Reduction Strategy Effluent Limit for Total Phosphorus is 0.10 mg/L.

Based on the review of the historical data, the WWTC has been consistently achieving all effluent limits and objectives mentioned in the ECA. Table 2 below shows average effluent concentrations achieved by WWTC between 2014-2018.

Table 2 – Historical Effluent Characteristics (2014-2018)

Parameter	Average Concentration (mg/L)
CBOD ₅	3.5 (monthly)
Total Suspended Solids	4.0 (monthly)
Total Phosphorus	0.08 (annual)
pH	Maintained within 6.0 – 9.5 inclusive, at all times
<i>E. Coli</i>	< 9.2 organisms/ 100 mL (<i>Geometric Mean Density</i>)

3.0 Orillia WWTC

3.1 Headworks

The inlet works consists of two aerated grit tanks for grit removal, and two manually raked bar screens. The grit removal tanks are each 10.7 m x 4.9 m x 4.3 m SWD and aeration is provided by two rotary lobe blowers. Accumulated grit in the system is removed by vacuum truck. Two (2) aerated grit tanks provide a total volume of 451 m³ which corresponds to a detention time of 9 minutes at a peak flow rate of 72,700 m³/d. Per MECP design guidelines for sewage works, the detention time in the aerated grit tanks should be between 2-5 minutes at peak hourly flows. The longer detention time provides additional benefit in the form of pre-aeration. The grit tanks are sized adequately to handle future raw sewage flows. The blower capacity is unknown at the time of writing this report. Per MECP design guidelines for sewage works, air supply for each grit tank should be between 4.7 to 12.4 L/(m.s).

3.2 Primary Clarifiers

Primary treatment at the site consists of three circular clarifiers: one clarifier measuring 18.2 m in diameter with 3.3 m SWD, and two clarifiers each measuring 22 m in diameter with 4.6 m SWD. MECP design guidelines recommend surface loading rates between 30-50 m³/(m².d) for average flows and 80-120 m³/(m².d) for peak flows. The primary clarifiers at the WWTC have sufficient capacity to treat a plant ADF of approximately 35,715 m³/d ADF (at a 35 m³/m²/d surface overflow rate) and 81,633 m³/d peak flow (at 80 m³/m²/d surface overflow rate). The primary clarifiers are sized adequately to handle current and future flows.

3.3 Secondary Treatment

Current tertiary treatment upgrades at the WWTC, designed by CIMA+, will upgrade the existing aeration system by adding a second tank (each tank will include three passes). Based on CIMA+'s design report (March, 2016), the upgraded aeration tanks will be hydraulically designed to handle a peak hourly flow of 89,000 m³/d. New blowers (3 blowers, total: 2 duty, 1 standby) to be installed under the current upgrades will have a total capacity of 14,000 m³/hr (each blower 7,000 m³/hour @ 53.8 kPa). Secondary treatment equipment is adequately sized to handle current and future raw sewage flows at the WWTC.

3.4 Secondary Clarifiers

The plant has a total of five secondary clarifiers which provide a combined total surface area of 2,172 m². The clarifiers provide treatment for a peak flow rate of 80,364 m³/d based on the MECP guideline of 37 m³/m²/d maximum for surface overflow rate. The clarifiers are adequately sized to handle current and future raw sewage flows at the WWTC.

3.5 Tertiary Treatment

The tertiary treatment (currently under construction) at the plant will consist of a Tertiary Filter Lift Station and two tertiary cloth filters; the pump station and the filtration units will each be rated for an average day flow rate of 27,300 m³/d and a peak flow rate of 89,000 m³/d. Each filtration unit is equipped with a filter backwash pump for cleaning the cloth disks. Filter backwash and reject will be pumped to the primary effluent flow splitting chamber. Tertiary filtration is sufficiently sized for current and future raw sewage flows.

3.6 UV Disinfection

The disinfection system consists of a UV disinfection channel equipped with two UV banks installed in series. The UV system is rated for a peak capacity of 72,700 m³/d. The UV disinfection system is sufficiently sized for current and future raw sewage flows.

3.7 Chemical Dosing

The plant utilizes a dual-point alum addition process for phosphorus removal. Alum is added to the wastewater at the bar screens and at two points in the aeration tanks. The alum is stored in two fiberglass tanks each with a capacity of 22,500 L. As of writing this report an upgrade to the chemical dosing system is currently in the design phase. Planned upgrades to this system include replacing the existing chemical dosing pumps to a skid-mounted three pump system. One pump will be dedicated for the aeration system, one pump dedicated to the primary clarification system and one stand-by pump that will be used for dosing the planned tertiary filtration system. The new pumps will have a design flow rate of 101 L/hr. Chemical dosing is sufficiently sized for current and future raw sewage flows.

3.8 Sludge Pumping

An activated sludge pumping station for return activated sludge (RAS) and waste activated sludge (WAS) pumps the settled sludge from the secondary clarifiers to the dissolved air flotation thickener (DAF). RAS pumping is achieved by means of three non-clog pumps each driven by 30 kW motors with VFD controls. The capacity of the RAS pumps is unknown at the time of writing this report. Since the plant is undergoing an upgrade, it is understood that the RAS pumps are sufficiently sized for the new/retrofitted aeration tanks, which have been sized to accommodate future raw sewage flows at the WWTC.

WAS from secondary clarifier is thickened in the dissolved air flotation thickener (DAF) and discharged to the primary digester. A WAS equalization tank is used to feed the DAF unit. Future flows at the facility is not expected to impact the WAS pumping operation at WWTC.

3.9 Digester Complex

Per MECP design guidelines for sewage works, the nominal minimum hydraulic retention time (HRT) in the primary digester should be at least 15 days. The existing digester complex at the WWTC consists of a two-stage anaerobic digestion system. Based on historical plant data from 2014-2018, on average 33,284 m³/year or 91 m³/d of sludge (raw sludge + thickened sludge) is discharged to the primary digester.

Maximum month sludge production from 2014 - 2018 is 150m³/d. Per MECP design guidelines for sewage works, digester should be based on maximum month sludge production. Based on maximum month sludge production of 150 m³/d, the volume of primary digester required to achieve a retention time of 15 days, should be at least 2,250 m³. The existing primary digester has a volume of 1,322 m³ which means it is able to accommodate only 88 m³/d of sludge production to meet 15 day HRT. Based on historical sludge production rates, it can be prorated that maximum sludge production will be 88 m³/d at raw sewage flow of 8,600 m³/d which means existing primary digester is undersized.

By prorating the flows, approximately 220 m³/d (maximum month) of sludge will be generated at the projected future plant average daily flow of 21,625 m³/d. At plant rated capacity (27,300 m³/d), it is estimated that the maximum month sludge production will be 277 m³/d. The prorated sludge generation rate is consistent with the 2008 MECP design guidelines. Per these guidelines, typical sludge generation rate from an activated sludge plant with anaerobic digester (with phosphorus removal) is 220 g of dry solids per cubic meter of treated sewage. Assuming 2.2% solids concentration in the digested sludge (varies from 2-6% per MECP design guidelines); this is equivalent to approximately 273 m³/d of sludge at the plant rated capacity. At plant rated capacity, the existing primary digester will provide a hydraulic retention time of less than 5 days which does not comply with the MECP guidelines. Additional digestion capacity will be required for future wastewater flow to meet 15 days HRT at future plant average daily flow and at plant rated capacity.

Note that the DAF system has been “limited” over the past few years and if its performance can be improved, the recommendations in this WWSMP update should be revisited in light of the achieved improvement in performance.

3.10 Sludge Storage Lagoons

Based on the historical data (2014- 2018), on average 33,507 m³ of biosolids are produced annually, which corresponds to 92 m³/d of biosolids production. Available storage volume in the lagoons (24,705 m³ within the existing lagoons) provide a retention time of approximately 268 days prior to clean out.

At the plant rated capacity of 27,300 m³/d, approximately 170 m³/d of biosolids will be generated (prorating the flows). The prorated Biosolid generation rate is consistent with the 2008 MECP design guidelines. Per these guidelines, typical Biosolids generation rate from an activated sludge plant with anaerobic digester (with phosphorus removal) is 150 g of dry solids per cubic meter of treated sewage. Assuming 2.4% solids concentration in the digested sludge (varies from 2-6% per MECP design guidelines); this is equivalent to approximately 170 m³/d of Biosolids at the rated capacity of the plant. Expected average biosolids generation at various flows is shown in the Table 3. At the 30-year ADF, the lagoons will have capacity to store biosolids for almost six months.

Table 3 - Expected Biosolids Flow from Raw Sewage and Retention Time in Lagoons.

Raw Sewage Flow Rate (m ³ /d)	Biosolids (m ³ /d)	Retention Time in Lagoons (days)
Current Average Daily Flow (14,736 m ³ /d)	92	268
30-year Average Daily Flow (21,625 m ³ /d)	135	183
Plant Rated Capacity (27,300 m ³ /d)	170	145

4.0 Septage Receiving Station (SRS)

A septage receiving station (SRS), located at the James Street SPS site, discharges septage to the James Street SPS. The SRS at the James Street pumping station was constructed in 2007. The primary components of the station include: (a) Rock Trap, (b) Grinder, (c) Actuated Inlet Valve and (d) Auger Screen. Grit removal is not provided at the SRS.

In general, the design capacity of an SRS should be sufficient to allow the discharge of approximately 10 m³ (typical size of a haulage truck) in 10 minutes or 1443 m³/d (16.7 L/s). Therefore, the design flow through the receiving station flow train (including motorized shutoff valve, flow meter and ancillary devices such as grinders) should be a minimum of 16.7 L/s.

The James Street SRS has received hauled waste trucks of capacity of up to 32 m³ during the local festivals/events. Based on the data provided by the City, it takes approximately 30 minutes to unload a 32 m³ haulage truck, which corresponds to a flow rate of 1529 m³/d (17.7 L/s). The James Street SRS is capable of handling a peak flow of 2160 m³/d or 25.0 L/s (KMK Design Brief, 2006). The existing SRS is sized adequately and has spare capacity to accept additional septage load.

During previous correspondence with the City, it was noted that cleaning of the rock trap is a maintenance issue and operations staff believe the rock trap may be undersized. Typical installations require removal of cover bolts etc. for access inside the traps for cleaning. To facilitate rock removal, it is recommended that the design of the rock trap at the SRS be modified to allow for efficient cleaning using vacuum trucks. A bigger rock trap can also be installed to reduce the frequency of the cleaning.

4.1 Septage Flow

Historical data (2014-2018) indicates that the average flow of septage received at the SRS is approximately 49.5 m³/d as shown below in Table 4.

Table 4 – Flow Data Summary, 2014-2018

Year	Total Flow (m ³)	Average Daily Flow (m ³ /d)
2014	18,112	50.0
2015	18,599	51.0
2016	16,688	46.0
2017	19,980	55.0
2018	16,304	45.0
Average	17,936	49.4

4.2 Impact of Septage on WWTC Processes

In 2016, the City conducted a “*Septage and Hauled Receiving Station Proposed Equalization Tank Assessment Study*”, which discussed the impact of septage discharge on the WWTC processes. Recent data (2016-2018) obtained from the City of Orillia, indicate that the current septage flows and characteristics are similar to flows and characteristics used in the 2016 study. Therefore, the recommendations and conclusions of the previous study are applicable. The study concluded the following:

- Based on average (2008-2016) septage characteristics, 315 m³/d (3.6 L/s) of septage can be discharged into the WWTC without limiting the liquids train’s capacity, at its current WWTC average daily flow of 14,736 m³/d. This translates to approximately 13 m³/h of septage if the

WWTC's flow at the time of discharge is equal to or greater than its current observed ADF. If WWTC flows are less than its current ADF, the amount of septage that the plant would be able to treat will be proportionately lower. **2019 Update:** Previous study assumed the new blower's capacity of 12,200 m³/d which was based on the preliminary design from CIMA+. Based on the current ECA and updated detailed design brief provided by the City, the new blowers have a total capacity of 14,000 m³/d. Based on this, WWTC should be able to handle 400 m³/d and 150 m³/d of septage flow at current average daily flow and future wastewater flows (30-year projected flows), respectively without negatively affecting the liquids train's treatment capacity. There is a reduction in the amount of septage that can be treated at the future flow compared with current flows because the increased pollutant loadings to the WWTC from a larger population reduces the amount of loading that can be added to the WWTC from septage.

- Major bottlenecks for septage treatment at the WWTC include the blower capacity, primary digester capacity (<15 days), colored effluent (reduced UV intensity), and sludge storage volumes (reduced retention time in Lagoons). To avoid discharging colored effluent to Lake Simcoe, it is recommended that a dye-free, non-formaldehyde deodorizer be used in portable toilets at the music festivals.
- Additional sludge produced from septage will increase the biosolids production and reduce the retention time in the existing lagoons.
2019 Update: Additional biosolid storage capacity to provide 240 days of storage as recommended by the MECP in the lagoons will be required if septage is introduced at the 30-year project future flows.
- An equalization tank with flow control was recommended to transfer septage to the WWTC at a controlled rate that is proportional to the sewage flows to avoid shock loading to the plant. A Schedule B Class Environmental Assessment (EA) would be required to construct a new equalization tank. **2019 Update:** The 2016 recommendation of constructing an equalization tank is still applicable under the WWSMP update since the WWTC will no longer be able to accept the same amount of septage it currently does once wastewater flows to the WWTC reach the 30-year projected ADF. The system will have a higher sensitivity to septage loadings and a method of controlling the rate of septage addition to the WWTC should be implemented such that septage flows are paced with wastewater flows.

City of Orillia Wastewater Servicing Master Plan Report Appendix – E

Calculation of Estimated for Cost of Treating Septage at the Orillia WWTC

CITY OF ORILLIA WASTEWATER SERVICING MASTER PLAN
APPENDIX E
ESTIMATE OF CITY'S COST TO TREAT SEPTAGE

$Ax + By = C$

$x = ay$

$B = (\text{Total Annual Flow to WWTC}) - A$

A: yearly volume of septage received at the WWTC

B: yearly volume of sewage received at the WWTC in the same year as A

x: cost per cubic meter to treat septage

y: cost per cubic meter to treat sewage

C: total annual cost of operating the plant. I've requested this number from the City

a: the ratio of how much stronger the septage is than the raw sewage

Total Annual Flow in 2018	5,553,729 m3
Total Annual Cost of Operation (C)	\$1,653,577
Total Annual Septage in 2018 (A)	16,304 m3
Yearly Volume of Sewage (B)=	5,537,425 m3
Strength of Septage Relative to Sewage (a):	47 (see calcs below)
Cost per cubic meter to treat sewage (y)=	\$ 0.26
Cost per cubic meter to treat septage (x)=	\$ 12.33

Sewage and Septage Characteristics:

The values for **Septage** characteristics are average of 2018 data points recorded in the following spreadsheet:
Chemical Analysis of Hauled_Sewage-Septage Quality - 2008-2019

The values for **Sewage** characteristics are taken from the City of Orillia's 2018 Annual Wastewater Treatment Centre Performance Report:

	BOD (mg/L)	TSS (mg/L)	TP (mg/L)
Sewage	146.7	207.67	3.20
Septage	3136.2727	12073.08	194.2583
Septage/Sewage	21.37881868	58.13589	60.7057188
Average Multiplier:	46.74014203	a=	47

If septage is **47** times stronger than sewage, then 16,304 m³ of septage is equal to (16,304 x 47) **766,288** m³ of sewage.

City of Orillia Wastewater Servicing Master Plan Report Appendix – F

EA Consultation Materials and Correspondences

City of Orillia Wastewater Servicing Master Plan Table of Contents for Appendix F

Table of Contents

1. Communication Plan
2. Notice of Commencement
3. Notice of PIC#1
4. PIC#1 Display Boards
5. Notice of Completion
6. Agency, Indigenous Groups and Stakeholders Comments



CONSULTATION PLAN

**City of Orillia
Wastewater System Master Plan**

Prepared By: Ainley Group

File No. 118088

November 2018

FINAL



1.0 PROJECT SCOPE

The City of Orillia has retained the services of the Ainley Group to develop a Wastewater Servicing Plan for the area within the city limits of Orillia. The objective of the study is to develop a comprehensive, long-term wastewater servicing strategy for existing and future land use.

This study is being completed in accordance with the Master Plan process (Approach #2) as identified in the Municipal Class Environmental Assessment (Class EA) document (amended 2015) with the intent to satisfy the Class EA requirements for the Schedule A, A+, and select Schedule B projects identified within the Master Plan as well as to provide the basis for future Schedule C projects. This Consultation Plan has been prepared to detail the method of notification proposed for this project and to demonstrate that the notification requirements of the Municipal Class EA process are being fulfilled.

2.0 CONSULTATION PLAN DURING MASTER PLANNING PROCESS

2.1 Points of Contact

As per Section A.3.5.3 of the Municipal Class EA, a minimum of two points of contact are required for an Approach #2 Master Plan. For this undertaking, three points of contact will be completed as follows:

- a) Contact Point No. 1 - Notice of Commencement: The initial point of contact will introduce the project, provide a brief overview of the works proposed and advise of the commencement of the Master Planning process. Public input will be encouraged and direction provided for the submission of comments. This will be issued during Phase 1 of the Master Planning process.
- b) Contact Point No. 2 - Notice of Public Open House: This notice will provide details pertaining to the Public Open House (POH) scheduled for the project and extend an invitation to review the alternative solutions under consideration to address the deficiencies in the Wastewater System over the next 30 years. This notice will be issued during Phase 2 of the Class EA process.
- c) Contact Point No. 3 - Notice of Completion: This is the final notification required to complete the Master Planning process and will be issued in Phase 2. This notice will advise of the preparation of a Master Plan Report that will be available for a 30 day public review period. The public venues available to review the document will be identified in the notice. Details pertaining to the protocol for making a Part II Order request will also be included.
- d) Stakeholder Meetings: To be scheduled as required.

2.2 Consultation Package

Information will be circulated to a full list of contacts that will include relevant agencies, emergency services, area stakeholders and utilities as well as Aboriginal communities and agencies. Material issued at each point of contact (excluding stakeholder meetings) will consist of the following:

- Notice: A notice will be placed on the City's website and in two editions of the local paper. The Class EA document directs that two published notices are required during each mandatory point

of contact. As per Section A.3.5.3, ‘two published notices’ are defined as two notices appearing in separate issues of the same newspaper. As the municipality will be using only one newspaper, the Orillia Today, the notice will be published in two editions of this same newspaper. Project information will also be available on Orillia’s major projects webpage.

- Agency Consultation: The contact list will include relevant external agencies, neighboring municipalities, community associations, and area stakeholders. Key contacts will include the Ministry of the Environment, Conservation and Parks (MECP), the Ministry of Natural Resources and Forestry (MNRF), the Lake Simcoe Region Conservation Authority (LSRCA), the local Member of Parliament, neighboring municipalities, as well as emergency services, school boards, student transportation agencies, and utility companies. Correspondence will include a letter advising of the project as well as a copy of the notice.
- Indigenous Consultation: The Aboriginal and Treaty Rights Information System (ATRIS) provided by Indigenous and Northern Affairs Canada (INAC) (formerly Aboriginal Affairs and Northern Development Canada (AANDC)) will be utilized to identify Indigenous communities or agencies that may have an interest in the project. Recent discussions with the MECP indicate that the Ministry of Indigenous Relations and Reconciliation (formerly Ministry of Aboriginal Affairs) will no longer be providing direction in this regard and the MECP will now be completing this task. This protocol is temporary and may change in future. As such, in addition to completing a search through ATRIS, an email will be sent to the MECP EA Coordinator at the project start to also request direction in this regard. The list provided by ATRIS is usually very comprehensive and it is expected that any community or agency identified by MECP will be already included on the list established by ATRIS.

Correspondence to Indigenous communities will include a letter and a copy of the notice. The letters will be issued on Ainley Group letterhead and addressed to the Chief of each community. These will be sent by registered mail so that confirmation of receipt can be included in the project file.

- Public Consultation: A notice to be published in local paper, and project information and updates will also be available for public review on the Orillia major projects webpage. A copy of the notice will be provided to the Orillia Chamber of Commerce for circulation to its associated members.
- Stakeholders: A list of key stakeholders will be developed based on previous Orillia Class EA projects and will be provided to the City to review. Stakeholder meetings will be scheduled, as required.
- Utility Consultation: Utility companies that include Union Gas Limited, Bell Canada, Orillia Power Distribution Corporation, and Rogers Communications will be forwarded a letter and copy of the notice.

3.0 SCHEDULE

Table 1.0 provides additional details pertaining to the consultation schedule proposed for this project during the Master Planning process.

Table 1.0 Consultation Schedule

NOTICE OF COMMENCEMENT	
Complete mail-out to agencies and indigenous communities	November 1, 2018
Newspaper Publish Date #1	November 1, 2018
Newspaper Publish Date #2	November 8, 2018
PRE-CONSULTATION WITH AGENCIES	
MECP	TBD
Conservation Authority (LSRCA)	TBD
MNRF	TBD
NOTICE OF PUBLIC OPEN HOUSE	
Submit draft consultation material to City for review	March 22, 2019
Deadline for City comments on consultation pkg.	March 28, 2019
<i>Submit draft POH Exhibits to City (2 week review period)</i>	April 1, 2019
Consultation package finalized	March 29, 2019
Deadline for submission of final notice to newspaper(s)	April 1, 2019
<i>Deadline for City comments on POH Exhibits</i>	April 15, 2019
Complete mail-out to agencies and public (3 weeks prior to POH)	April 4, 2019
Newspaper Publish Date #1 (3 weeks prior to POH)	April 4, 2019
Newspaper Publish Date #2 (2 weeks prior to POH)	April 11, 2019
<i>Finalize POH Exhibits</i>	April 19, 2019
Date of POH	April 26, 2019
Deadline for submission of public comments following POH (2 weeks following POH)	May 10, 2019
NOTICE OF COMPLETION	
Submit draft consultation material to City for review	June 10, 2019
<i>Submission of Draft Master Plan to City for Review</i>	June 10, 2019
Deadline for City comments on consultation material	June 20, 2018
Consultation package finalized	June 21, 2019
Deadline for submission of final notice to newspaper(s)	June 24, 2019
Complete mail-out to agencies and public	June 27, 2019
<i>Deadline for Project Team comments on Master Plan (2 week review period)</i>	June 24, 2019
Newspaper Publish Date #1	June 27, 2019
<i>Finalize Master Plan</i>	July 1, 201
<i>Deliver Master Plan to public viewing locations</i>	July 4, 2019
Newspaper Publish Date #2	July 4, 2019
Start of 30 day public review period	July 4, 2019
End of 30 day public review period	August 2, 2019

November 1, 2018

File No. 118088

Re: **City of Orillia
Wastewater System Master Plan
Notice of Study Commencement**

Dear Sir and/or Madam:

The City of Orillia has retained the services of the Ainley Group to develop a Wastewater Servicing Plan for the area within the city limits of Orillia. The objective of the study is to develop a comprehensive, long-term wastewater servicing strategy for existing and future land use.

This study is being completed in accordance with the Master Plan process (Approach #2) as identified in the Municipal Class Environmental Assessment (Class EA) document (amended 2015) with the intent to satisfy the Class EA requirements for the Schedule A, A+, and select Schedule B projects identified within the Master Plan as well as to provide the basis for future Schedule C projects.

This notice is to advise you of the commencement of the Master Plan process and to provide you with the opportunity to comment on the project. Please refer to the attached copy of the Notice of Study Commencement for further details regarding the project. Further correspondence regarding this project will follow in the coming months and you will be notified in advance of a Public Information Centre scheduled for this project.

Should you have any further questions or concerns, please contact the undersigned or Stephen Gendron, Manager of Environmental Engineering, City of Orillia at 705-325-2212 or via email at sgendron@orillia.ca.

Yours truly,

AINLEY & ASSOCIATES LIMITED



Chris Ewen, P. Eng., PMP
Project Manager
Phone: 905-452-5172 x203
ewen@ainleygroup.com

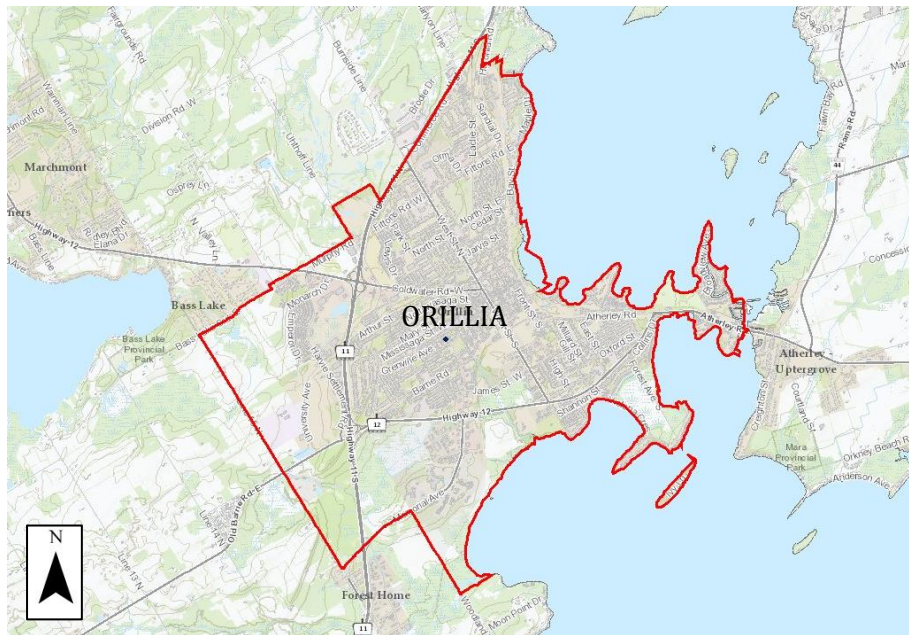


CITY OF ORILLIA Wastewater System Master Plan Notice of Study Commencement



The Project

The City of Orillia has retained the services of the Ainley Group to undertake a Wastewater System Master Plan with the objectives of developing a comprehensive, long-term sanitary servicing strategy for existing and future land use within the city limits of Orillia. The process will involve an assessment of the existing servicing infrastructure to identify necessary upgrades and future servicing priorities.



The Process

This study is being completed in accordance with the Master Plan process as identified in the Municipal Class Environmental Assessment (Class EA) document (amended 2015). It will follow Approach #2 with the intent to fulfill the Class EA requirements for the Schedule A, A+ and select Schedule B projects identified within the Master Plan as well as to provide the basis for future Schedule C projects.

How to Get Involved

Public input is encouraged throughout this process and will be given consideration during the planning and design of this project. Information will be collected in accordance with the *Municipal Freedom of Information and Protection of Privacy Act*. Project updates and notices will be posted on the City's website orillia.ca/wastewatermasterplan inform the public of the Class EA process. With the exception of personal information, all comments will become part of the public record. To obtain additional information or to provide input, please contact either of the following members of the study team:

Stephen Gendron, P.Eng.
Manager of Environmental Engineering
City of Orillia
50 Andrew Street South, Suite 300
Orillia, ON L3V 7T5
Phone: 705-325-2212
Email: sgendron@orillia.ca

Chris Ewen, P.Eng., PMP
Project Manager
Ainley Group
195 County Court, Suite 300
Brampton, ON L6W 4P7
Tel: 905-452-5172
Email: ewen@ainleygroup.com

This notice first issued November 1, 2018.

Notice 

Wastewater System Master Plan Notice of Public Information Centre (PIC)

Background:

The City of Orillia is completing a Wastewater System Master Plan with the objectives of developing a comprehensive, long-term sanitary servicing strategy for existing and future land use within the city limits of Orillia. The Master Plan involves an assessment of the existing servicing infrastructure to identify necessary upgrades and future servicing priorities.

Process:

This study is being conducted in accordance with the Master Plan process as identified in the Municipal Class Environmental Assessment (Class EA) document (amended 2015). It will follow Approach #2 with the intent to fulfill the Class EA requirements for the Schedule A, A+ and select Schedule B projects identified within the Master Plan as well as to provide the basis for future Schedule C projects.

Public Information Centre:

In light of COVID-19 requirements for physical distancing and respecting concerns relating to the spread of COVID-19, the PIC will be conducted digitally. Display boards will be made available to the public on the City's website, orillia.ca/wastewatermasterplan, starting on Oct. 26, 2020. The PIC will outline the scope of work and overall study process; provide the results of condition and capacity assessments, and illustrate the findings of forecasted flow rates and potential servicing populations. Also included are the alternative solutions and preliminary evaluations and preliminary preferred alternative solutions to address the current and future needs of the wastewater system. The PIC is a mechanism for local residents, interested members of the public, and other stakeholders to review and comment on the alternatives, the evaluation process, the preliminary preferred alternative solutions, and next steps in the study process.



Comments:

Public engagement and input are key components of this study and will assist in ensuring that anyone with an interest in the study has the opportunity to provide input as the study proceeds. Comments can be submitted using the online comment form, available on City's website, or by email, by Nov. 25, 2020. To obtain information or to provide input, please contact either of the following members of the study team:

Stephen Gendron, P.Eng.
Manager of Environmental Engineering, Assets, and Capital Projects
City of Orillia
50 Andrew St. S., Suite 300
Orillia, ON L3V 7T5
Phone: 705-325-2212
Email: sgendron@orillia.ca

Preya Balgobin, P.Eng.
Project Manager
Ainley Group
195 County Crt., Suite 300
Brampton, ON L6W 4P7
Tel: 905-452-5172
Email: balgobin@ainleygroup.com

Comments and information regarding this project are being collected in accordance with the *Municipal Freedom of Information and Protection of Privacy Act* for the purpose of meeting environmental assessment requirements. With the exception of personal information, all comments received will become part of the public record.



The Orillia Farmers' Market Moves Inside the Orillia Public Library Oct. 17

The Orillia Farmers' Market will move inside the Orillia Public Library starting Oct. 17 for the fall and winter season. Visit the Market Saturdays from 8 a.m. to 12:30 p.m. There are new vendors joining us weekly leading up to Christmas. Please send any vendor inquiries to marketmanager@orillia.ca.

Important Dates 

Upcoming Meetings

Monday, Oct. 19: Council Committee

Monday, Oct. 26: Public Meeting re Planning Matters

Monday, Oct. 26: Regular Council

Monday, Nov. 2: Council Committee

Monday, Nov. 9: Regular Council

Please Note:

As of Sept. 1, 2020, Council Committee and Council meetings will begin at 4 p.m. The Closed Session portion of these meetings will commence prior to 4 p.m. Meetings will be held electronically. Residents are encouraged to watch the meetings on Rogers TV or online. Full agenda packages and the streaming link are available at orillia.ca. For further information contact: Office of the City Clerk, 3rd Floor, Orillia City Centre, 50 Andrew St. S. 705-325-1311 or clerks@orillia.ca.

Job Opportunities

Park/Facility Operator

Environment and Infrastructure Services Department
Closing: Oct. 14, 2020

For a full list of positions available at the City of Orillia, including duties and qualifications, visit orillia.ca/employment.

2020 Annual General Membership Meeting of the Downtown Orillia B.I.A.

The 2020 Annual General Membership meeting will take place electronically on Thursday, Oct. 22.

To RSVP and receive log-in information please contact us by Oct. 21, 2020 at office@downtownorillia.ca.

Agenda

- 2021 Events
- COVID-19 Promotions
- 2021 Budget

Visit downtownorillia.ca for more information.



Public Information Centre

WELCOME

City of Orillia Wastewater System Master Plan



October 26, 2020

Purpose of This Public Information Centre

- To provide residents, stakeholders, and other interested parties with information related to the findings of the City of Orillia's Wastewater Servicing Master Plan Update
- Master Plans follows the Municipal Class EA Process and comprises Phase 1 and Phase 2 of the Process

Background of the Class Environmental Assessment Process

Infrastructure Projects undertaken by a Municipality or by a Developer vary in their environmental impacts and are therefore classified in one of the four (4) different Schedules as follows:

Schedule “A”

- Generally includes normal or emergency operational and maintenance activities;
- The environmental effects of these activities are usually minimal and, therefore, these projects are pre-approved;

Schedule “A+”

- These projects are pre-approved, however the public is to be advised prior to project implementation. The manner in which the public is advised is to be determined by the proponent;

Schedule “B”

- Generally includes improvements and minor expansions to existing facilities and there is the potential for minor adverse environmental impacts and therefore the proponent is required to proceed through a screening process including consultation with those who may be affected;

Schedule “C”

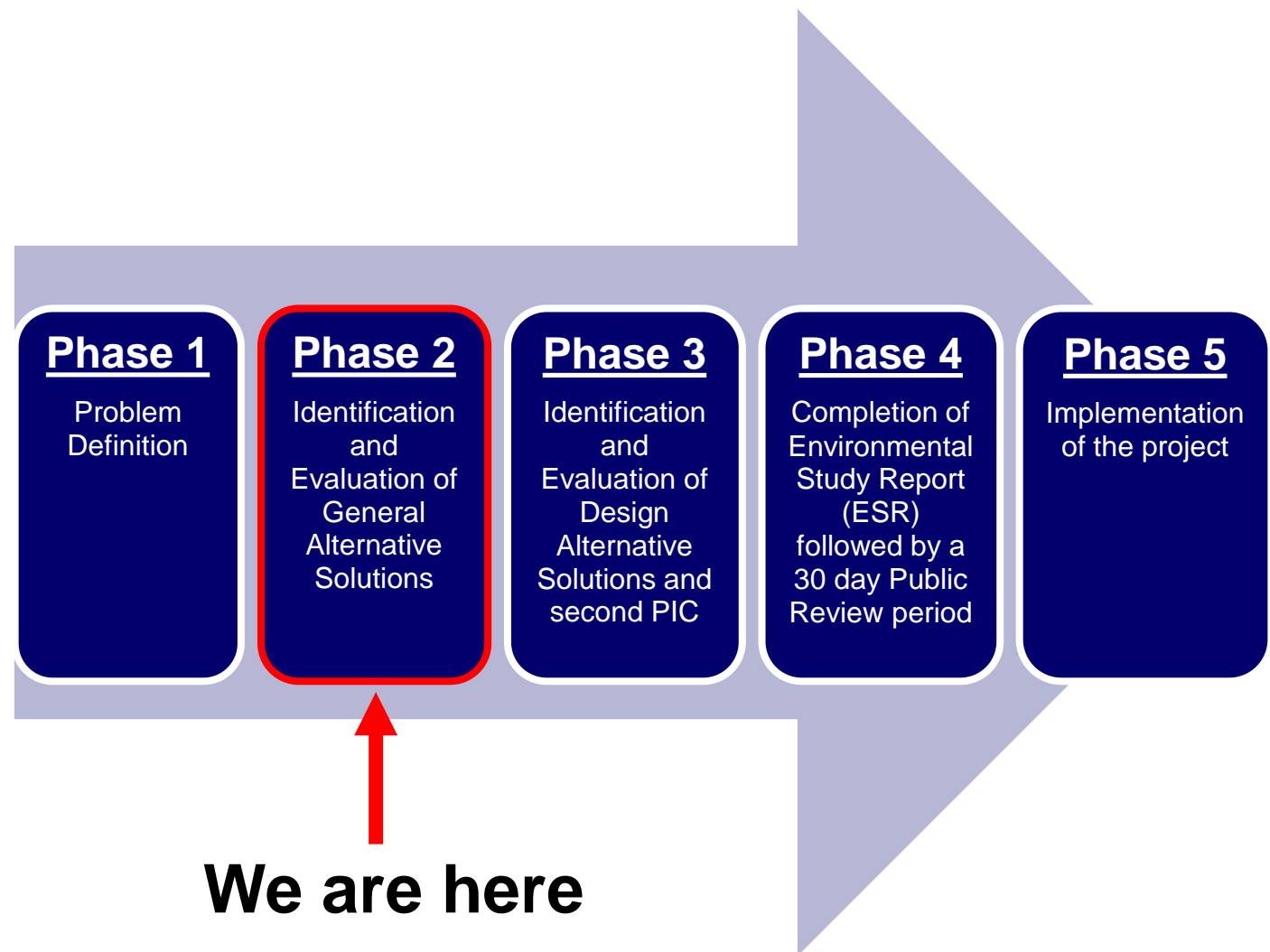
- Generally includes the construction of new facilities and major expansions to existing facilities and these projects proceed through the environmental assessment planning process outlined in the Class EA.

Class Environmental Assessment (EA) Process

Key Principles of Class EA

- Consultation with affected parties early in and throughout the process.
- Consideration of a reasonable range of alternatives.
- Consideration of effects on all aspects of the environment.
- Systematic evaluation of alternatives.
- Documentation & traceability.

The Class EA process consists of 5 Phases as follows:

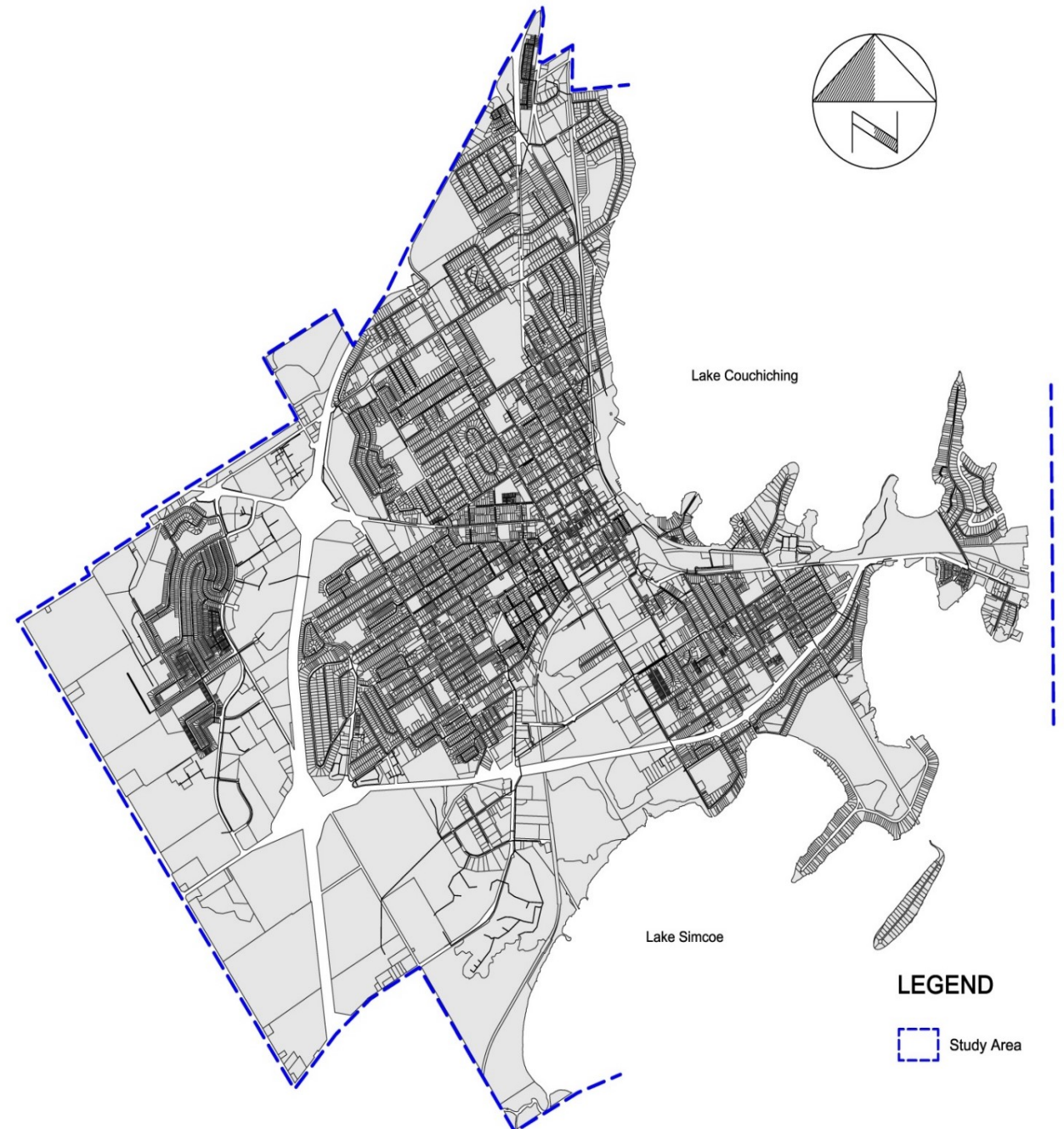


Approach to Master Plan

- Assess current condition of assets and estimate costs and timing of required upgrades to carry the assets through the 30-year Master Plan study period.
- Estimate projected wastewater flows into system from new development and projected population growth.
- Assess the current capacity of the collection system, pumping stations, Orillia Wastewater Treatment Centre (WWTC), and septage receiving station.
- Develop a problem statement based on the findings of the background assessments.
- Generate a list of potentially viable alternative solutions to each problem identified in the problem statement.
- Evaluate each alternative solution and recommend a preferred general alternative solution for each problem in the problem statement.

Study Area

- The Service Area is defined as the Settlement Area boundary for the City of Orillia, including the proposed development lands, within the City's Official Plan.
- The Study Area is defined as the area in which the various alternatives evaluated would be located.
- The Study Area is as shown on the figure on the right



Existing Collection System Condition Assessment

2013 Master Plan Recommendations for Sewer Replacements

- Review of the collection system was a review of historical documents. Assessment of buried infrastructure was not performed.
- The 2013 WWSMP developed a recommendation for sewer replacements over the upcoming 20-year period.

Sewer Diameter (mm)	Replacement in Metres		
	Within 3 Years (by 2016)	Within 10 Years (by 2023)	Within 20 Years (by 2033)
200	2,138	4,363	4,355
225		895	736
250	575	1,484	2,671
300	158	589	438
350			75
375		111	347
525		436	173
600	82	365	714
675		32	133
750		229	231
900			99
TOTAL	2,950	8,504	9,972

Existing Collection System Condition Assessment

- The City has been implementing the recommended sewer upgrades.
- The sewer replacements completed since the last WWSMP update are shown in this table.
- Sewer upgrades have progressed at approximately 451 m/yr.
- Sewer upgrade rate is lower than recommended in 2013 WWSMP due in part to the City decision to prioritize the Front Street and Centennial Drive projects.
- The City will need to increase the sewer upgrades to 1,781 m/yr to meet the recommended year 2023 target.

Sewer Replacements Completed Since the 2013 WWSMP		
Sewer Diameter (mm)	Recommended Replacements by 2023 (m)	Replacements Completed Since 2013 (m)
200	4,363	1,303
225	895	
250	1,484	1,356
300	589	197
350		
375	111	
450		185
525	436	
600	365	121
675	32	
750	229	
900		
TOTAL	8,504	3,162

Existing Pumping Stations Condition Assessment

SPS #1 – James Street

- Replace the two 1,500kg hoists
- Replace the sluice gates in the wet well
- Remove the two manual bar screens
- Replace the channel grinder unit
- Upgrade the piping and valve system in the wet well
- Replace all the pumps #1, #2, and #4 within 5 years and #3 within 10 years
- Electrical upgrades – replace the substation transformer and outdoor switch gear, MCC, PowerFlex unit and lighting panel

SPS #2 – Bayview Parkway

- City advised that the wet well needs to be expanded
- Electrical Upgrades – replace MCC, PLC, and diesel generator

SPS #3 – Couchiching Park

- Retrofit the wet well access hatch with safety grating
- Replace the piping and valve system

SPS #4 – Elgin Street

This station is being replaced as part of an upgrade projection on Centennial Street

SPS #5 – Couchiching Point

- Retrofit the access hatch with safety grating
- Electrical Upgrades – replace junction boxes

SPS #6 – Hughes Road

- Not in service

SPS #7 – Royal Oak

- Replace the access hatch and wrung ladder
- Replace the piping and valve system

SPS #8 – Tudhope Park

- Retrofit the access hatch with safety grating
- Replace the pumps and motors
- Replace the piping and valve system

SPS #9 – Commerce Drive

- Retrofit the wet well access hatch with safety grating

SPS #10 – Victoria Crescent

- Replace the wet well access hatches
- Replace the pump/motor set #1
- Upgrade the piping and valve system
- Electrical Upgrades – replace control panel

SPS #11 – Shannon Street

- Retrofit the access hatches with safety grating
- Electrical Upgrades – replace the gasket seal for the electrical panel enclosure, replace PLC and PLC panel, install EYS seals on the electrical conduits

SPS #12 – Fittons Road East

- Being fully upgraded.

Existing Pumping Stations Condition Assessment

SPS #13 – Bridget & Maple

- Retrofit the wet well access hatch with safety grating
- Electrical Upgrades – replace the gasket seal for the electrical panel enclosure, move the gooseneck vents three or more feet away from the electrical panel

SPS #14 – Forest Avenue North

- Retrofit the wet well access hatch with safety grating

SPS #15 – James Street East

- Not in service

SPS #16 – Forest Avenue South

- Retrofit the access hatches with safety grating
- Review the size of the wet well as noted by the City
- Add a third pump for redundancy in high flows
- Replace the piping and valve system
- Electrical Upgrades - install EYS seals on the electrical conduits, install new control system and SCADA

SPS #17 – Collins Drive

- Retrofit the wet well access hatches with safety grating
- Replace the current ladder with an aluminum ladder
- Replace pump and motor #1
- Replace the piping and valve system
- Electrical Upgrades – replace the pump control panel

SPS #18 – Fittons Road West

- Replace the pumps and motor sets
- Replace the piping and valve system
- Electrical Upgrades – replace MCC, diesel generator, diesel storage tank

SPS #19 – John Street

- Retrofit the wet well access hatches with safety grating
- Replace pump and motor sets
- Electrical Upgrades – replace the gasket seal for the electrical panel enclosure

SPS #20 – Broadview

- Retrofit the wet well access hatches with safety grating
- Electrical Upgrades – replace the gasket seal for the electrical panel enclosure

SPS #21 – Cedarmere Road

- Not in service

SPS #22 – Westmount Drive South

- Retrofit the wet well access hatches with safety grating
- Replace the pumps and motors
- Replace the piping and valve system

SPS #23 – Champlain

- Upgrade or replace the bar screen
- Replace the pumps and motors

SPS #24 – Leacock

- Retrofit the access hatches with safety grating
- Replace the piping and valve system
- Electrical Upgrades – replace the power disconnection switch and power distribution panel, lighting transformer and panel, diesel generator and transfer switch

Existing Pumping Stations Condition Assessment

Summary of Schedule and Estimated Cost for SPS Upgrades

Schedule for Upgrades	SPS	Estimated Capital Cost
0 to 5 Years	SPS1-SPS11, SPS13, SPS14, SPS16-SPS20, SPS22-SPS24	\$3,015,600
5 to 10 Years	SPS1, SPS8, SPS11, SPS19, SPS22, SPS24	\$644,000
10 to 15 Years	SPS 4, SPS22	\$136,000
15 to 20 Years	SPS11, SPS16, SPS17, SPS24	\$633,000
20 to 25 Years	SPS2, SPS3, SPS5, SPS13	\$330,000
25 to 30 Years	SPS7, SPS20, SPS23	\$285,000
30 to 35 Years	SPS3, SPS9, SPS10, SPS14	\$190,000
Total Cost of Upgrades		\$5,233,600

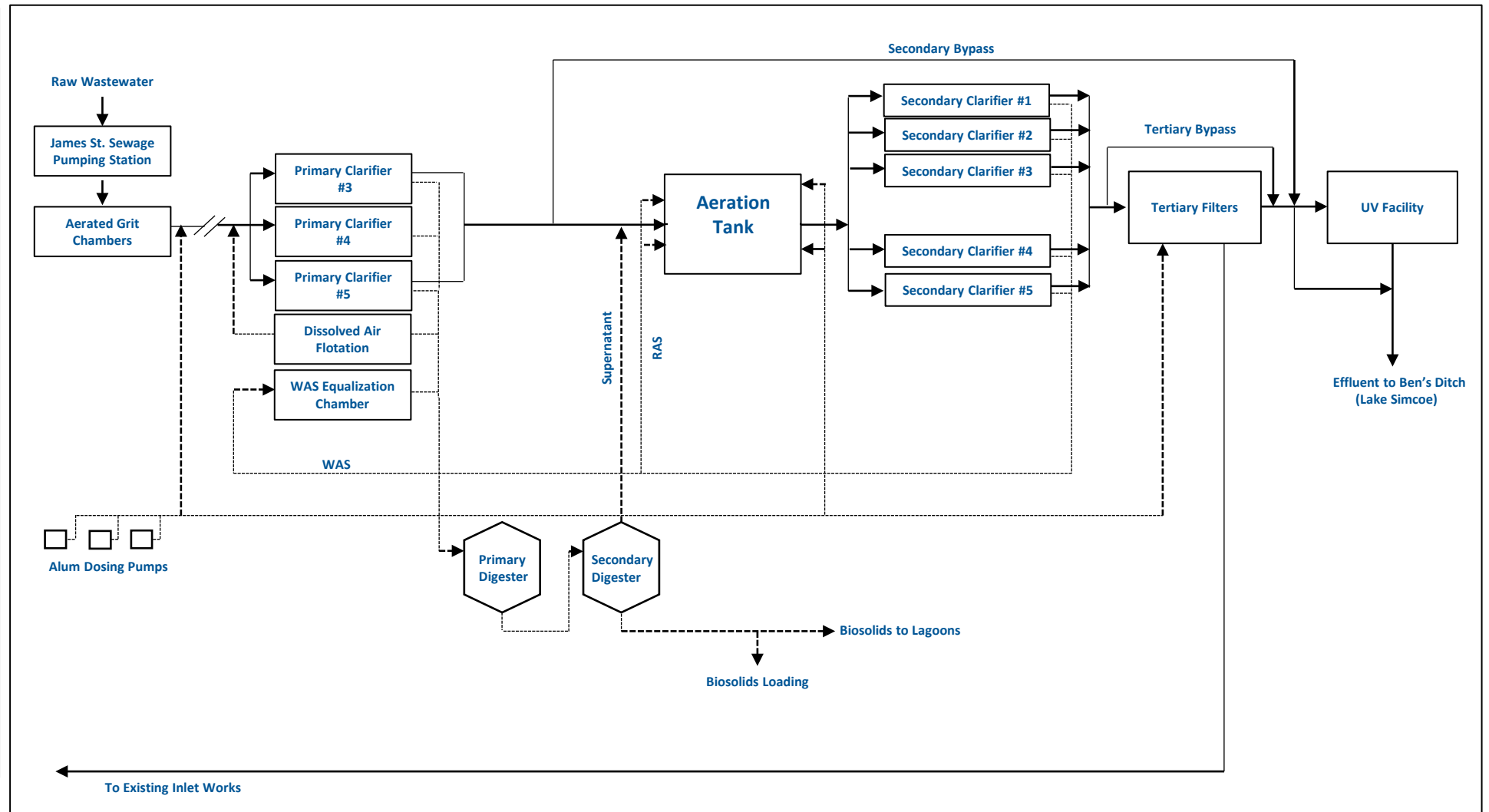
Existing Water Pollution Control Plant (WWTC) Condition Assessment

Treatment Process Description

- The WWTC is a tertiary treatment facility that utilizes a conventional activated sludge process.
- The WWTC receives all of its flows from the James Street SPS, where all flow from the collection system is directed.
- Treated effluent is discharged into Lake Simcoe

Major Treatment Units:

- Headworks
- Primary Clarifiers
- Biological Treatment (Aeration)
- Secondary Clarifiers
- Tertiary Treatment
- UV Disinfection
- Chemical Dosing for Phosphorous Removal
- Sludge (WAS) Thickening
- Anaerobic Digester Complex
- Biosolids (stabilized sludge) Storage Lagoons
- Emergency Standby Power



Existing Wastewater Treatment Centre Condition Assessment

WWTC Site and Admin Building

- Electrical Upgrades – Replace the power distribution switch board, MCC and the outdoor switchgear substation

Headworks

- Remove the metal monorail above the plant inlet channels
- Replace the weather-stripping on the screen building door
- Replace the manual bar screens with automated ones
- Replace blower pipes and valves
- Electrical Upgrades – Replace MCC and lighting panel A, and code upgrades

Secondary Treatment

- Replace the three sluice gates at the aeration splitter box

Chemical Dosing

- Apply a protective coating to the alum tank concrete containment area
- Replace the insulating jacket on the discharge piping of the alum tank

Sludge Storage Lagoons

- Clean-out and repair liner in lagoon #1

Primary Clarifiers

- Sandblast and repaint the metal bridges of the clarifiers
- Repair the leaking concrete and metal roof of the primary sludge pumping building
- Replace the link-seal at all pipe penetration locations through the east wall of the primary sludge pumping basement tunnel
- Replace the in-line grinder pump connected to the primary sludge line
- Replace the section of piping in the north end of the basement
- Electrical Upgrades - Replace the MCC

Secondary Clarifiers

- Repair the clarifier walls
- Retrofit or replace one of the three RAS pumps and the motor set
- Repair the clarifier drive supports for clarifier 3 and 5
- Replace RAS piping and valve system
- Replace the scum pump and motor
- Replace scum piping and valve system
- Electrical Upgrades - Replace the MCC

Digester Complex

- Seal the concrete cracks on the exposed digester wall
- Replace and clean the roof drain
- Refinish the flat roofing on the digester building to create positive drainage
- Repair the concrete spalling in the digester building basement
- Refinish the exterior concrete stairs
- Replace the two MCC of the digester complex

Existing Wastewater Treatment Centre Condition Assessment

- Estimated cost of upgrades within the next 5 years = \$1.5M
- Estimated cost of upgrades within the next 5 – 10 years = \$0.5M
- Estimated cost of upgrades within the next 10 - 15 years = \$0.1M

Schedule of Upgrades	WWTC Unit Process	Capital Cost	WWTC Asset Refurbishment
0 to 5 Years	WWTC Site & Admin Building	\$ 385,000	Electrical Upgrades
	Inlet/ Head Works	\$ 461,000	Monorail Removal, Weather Upgrades, Bar Screen Upgrades, Electrical Upgrades
	Primary Treatment	\$ 172,000	Bridge Refurbishments, Sludge Pumping Building Refinishing, Electrical Upgrades and Piping/Valving
	Secondary Treatment	\$ 40,000	Sluice Gate Replacement
	Secondary Clarifiers	\$ 271,300	Structural Repairs, RAS and Scum Pump Upgrades
	Sludge Digestion	\$ 31,000	Digester Tank Refurbishment, Digester Building Refinishing, Electrical Upgrades
	Chemical Dosing	\$ 28,000	Alum Tank Containment Structure Refinishing, Alum Tank Piping and Pump/Motor Upgrades
	Sludge Storage Lagoons	\$ 149,000	Clean Out and Repair Lagoon #1
Total Cost of 0 to 5 Year Upgrades		\$ 1,537,300	
5 to 10 Years	WWTC Site	\$ 35,000	Electrical Upgrades
	Inlet/ Head Works	\$ 100,000	Blower Upgrades
	Primary Treatment	\$ 55,000	Pump Upgrades
	Secondary Clarifiers	\$ 120,000	Electrical Upgrades
	Sludge Digestion	\$ 80,000.00	Electrical Upgrades
	Boiler Works	\$ 80,000.00	Electrical Upgrades
Total Cost of 5 to 10 Year Upgrades		\$ 470,000	
10 to 15 Years	Inlet/ Head Works	\$ 2,000	Electrical Upgrades
	Primary Treatment	\$ 100,000	Electrical Upgrades
Total Cost of 10 to 15 Year Upgrades		\$ 102,000	
Total Cost of Upgrades		\$ 2,109,300	

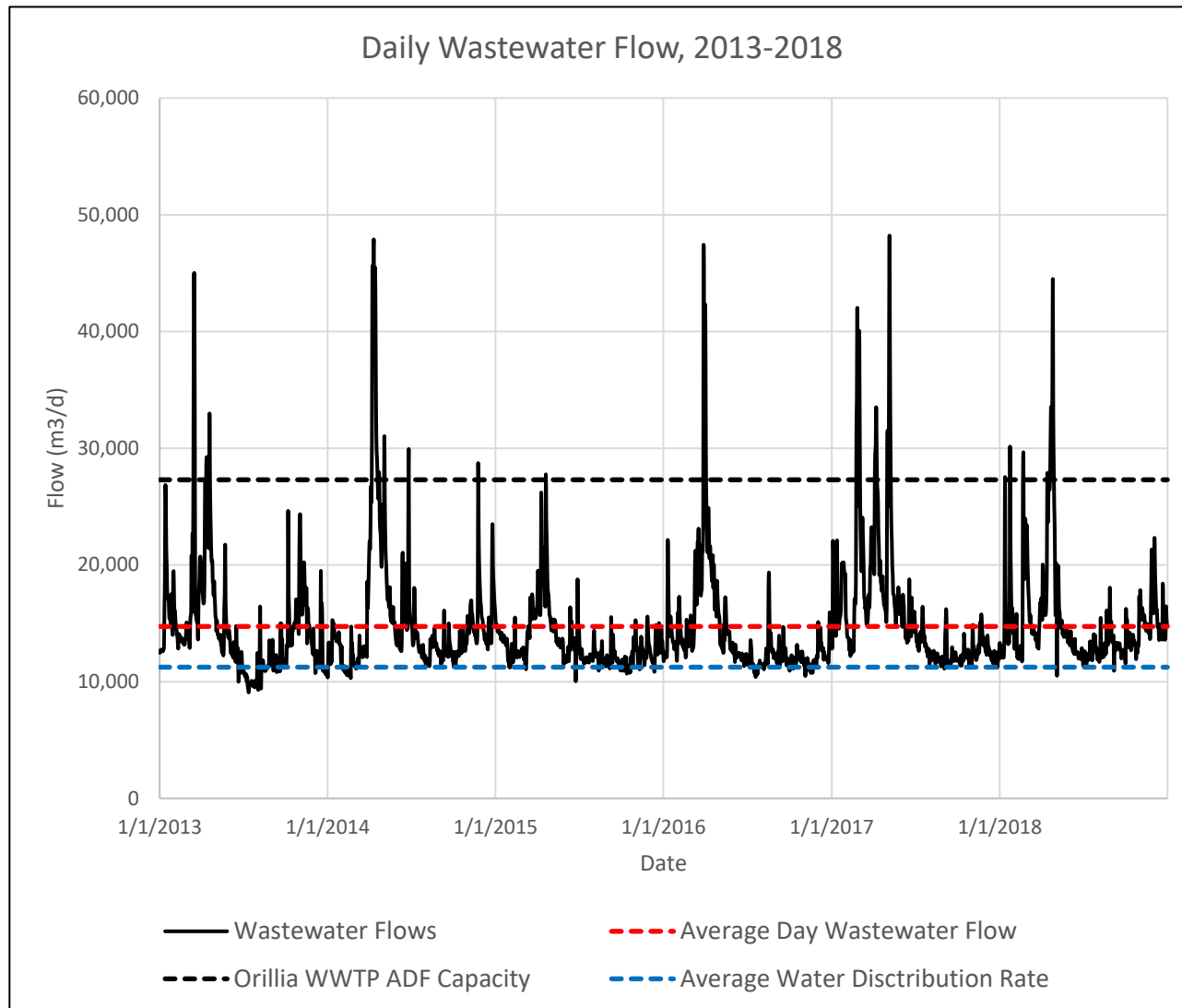
Existing Septage Receiving Station Condition Assessment

- Located adjacent to the James Street SPS
- Discharges septage to the James Street SPS, which pumps to the WWTC
- Major components of the SRS:
 - Rock Trap
 - Grinder
 - Actuated Inlet Valve
 - Auger Screen
- System is in good condition and no upgrades recommended at this time.
- Operations staff report operational difficulties

Operational Issues

- Rock trap seems undersized and its cleaning is operationally intensive.
- When the City is accepting septage from large festivals, there are numerous additional trucks, resulting in long line-ups and long unloading times at the SRS.

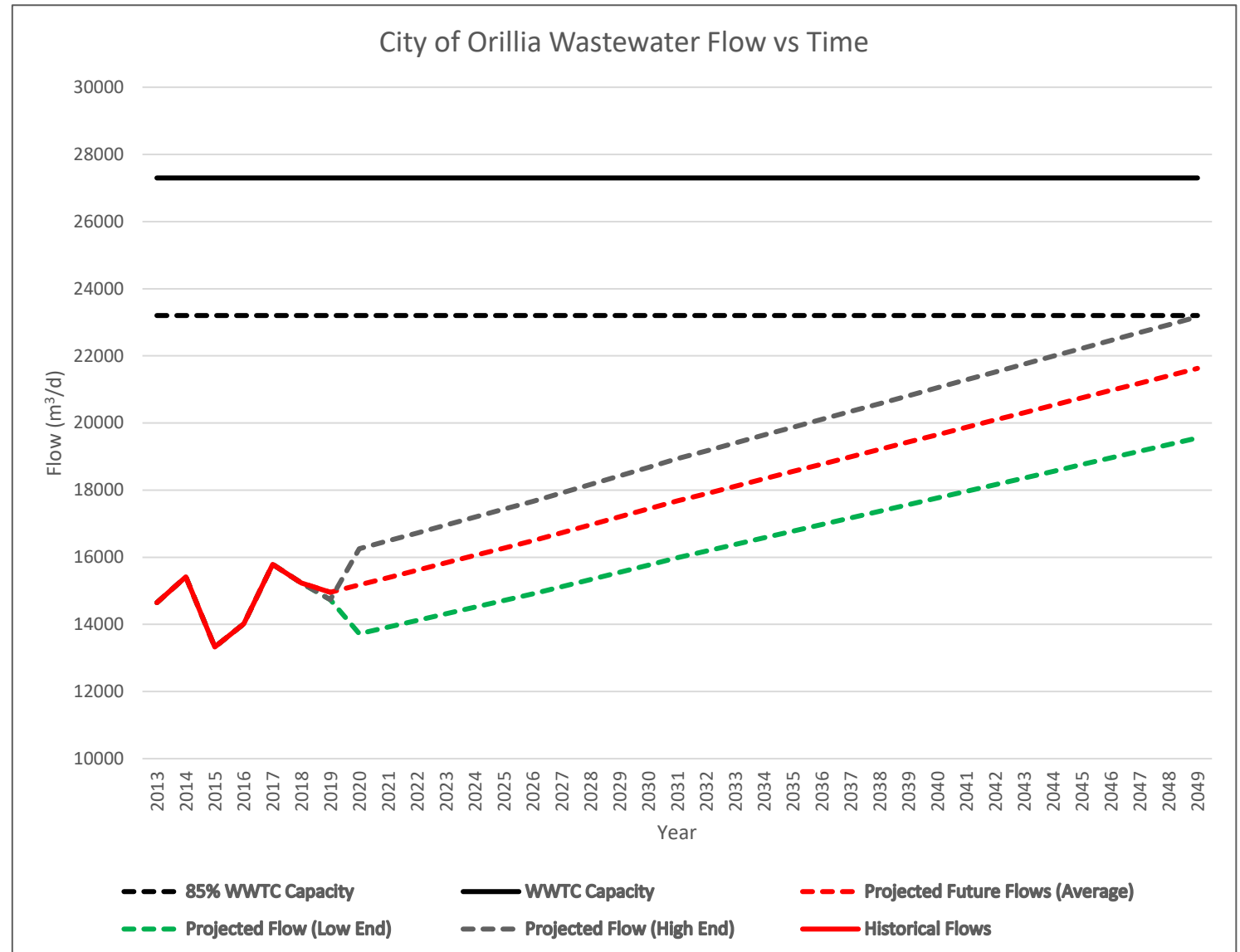
Existing Orillia Service Area Flows



- The City's current average day flow (ADF) is 14,736 m³/d to the Orillia WWTC.
- The ADF has remained very stable with differences in year-to-year averages driven primarily by the frequency and severity of peak flow events during the spring months.
- The current ADF is a decrease from the ADF reported in the 2013 WWSMP (17,880 m³/d), despite the increase in population. This is likely due to the City's efforts to reduce I&I in the period following the 2013 update.
- Average day flows have been approximately 54% of the WWTC ADF capacity and peak flows have reached 66% of the peak flow capacity.
- Based only on the average difference in distributed water and wastewater flow, it is estimated that on an average day basis 3,496 m³/d of the current wastewater flow is due to I&I to the system (primarily occurring during the spring freshet).
- The estimated I/I rate represents 24%-41% of the overall wastewater flows during a year and is approximately 31% greater than the base water use.

Population and Flow Projections

- Development is projected to proceed at a pace of approximately 265 homes/year until 2049.
- In terms of employment, an additional 4,120 jobs are projected from 2016 to 2049.
- The Orillia WWTC would receive a total of 21,625 m³/d ADF by 2049, which corresponds to a population of approximately 51,041 people.
- The peak-day factors currently being experienced by the City are up to 3.25, resulting in a projected peak flow of 70,280 m³/d, which is nearing the peak day capacity of the WWTC, reported as 72,620 m³/d.
- Based on an average increase in flows during the study period, the projected 2049 ADF equates to 79% of the WWTC's rated capacity and would not trigger the need for a plant expansion.



Capacity Assessment – Collection System & SPSs

- The calibrated and updated Hydra model was used to simulate conditions under the current flow conditions and the projected future flow conditions for the 30-year study period.
- Based on the results of the Hydra model, projected 2049 flows can be accommodated by the existing sewers without any upgrades required.
- Using the Hydra model and flow projections for the 30-year study period, the required capacity of each SPS was determined for year 2049 flows. The adjacent table presents the current firm capacity of each SPS, according to their ECA, and required capacity in year 2049, per results of the model for each pumping station.

Future Flow Pumping Station Capacity			
SPS	SPS Current Firm Capacity (L/s)	2049 Peak Day Flow (L/s)	2049 Peak Instantaneous Flow (L/s)
SPS 1	1263	736	1000
SPS 2	34.3	15.9	23.5
SPS 3	4.3	0.9	1.7
SPS 4	41	2.5	4.7
SPS 5	42.3	11.9	16.7
SPS 7	8.0	0.13	0.2
SPS 8	14.2	0.3	0.5
SPS 9	20	3.2	5.7
SPS 10	7.0	1.8	3.7
SPS 11	28.5	6.3	8.3
SPS 12	3.6	0.9	1.8
SPS 13	41.1	7.7	18
SPS 14	20.9	0.3	0.5
SPS 16	10.5	2.8	5.4
SPS 17	6.3	0.62	0.95
SPS 18	37.9	15	29
SPS 19	45	6.6	12.6
SPS 20	7.88	0.25	0.50
SPS 22	2.71	0.02	0.03
SPS 23	360	130	260
SPS 24	23.0	3.8	5.1

Capacity Assessment – WWTC

- The results of the assessment of the capacity of WWTC processes to treat projected year 2049 flows of 21,625 m³/d ADF are summarised below:

Processes with Sufficient Capacity to Treat Projected Year 2049 Flows

Aerated Grit Tanks in Headworks Building

Primary Clarifiers

Secondary Treatment (Aeration System)

Secondary Clarifiers

Tertiary Treatment

UV Disinfection

Chemical Dosing

Sludge Pumping

Processes with Insufficient Capacity to Treat Projected Year 2049 Flows

Sludge Stabilization/Digestion

Biosolids Storage Lagoons

Capacity Assessment – Septage Receiving Station

- The existing SRS is adequately sized for current flows, but has minimal spare capacity to accept additional future flows.
- There is currently no way of controlling the time and rate of septage addition to the WWTC.

Impact of Septage on WWTC Processes

- This Master Plan reviewed findings of 2016 report “*Septage and Hauled Receiving Station Proposed Equalization Tank Assessment Study*”
- Major bottlenecks cited in report for septage treatment are:
 - Blower capacity
 - Primary digester capacity (<15 days)
 - Coloured effluent to Lake Simcoe (reduced UV intensity)
 - Sludge storage volumes (reduced retention time in Lagoons)
- With the new blowers installed in the 2019 tertiary treatment upgrades, the WWTC should be able to handle:
 - 400 m³/d (4.6 L/s) septage flow at current WWTC average daily flow of 14, 736 m³/d of raw sewage
 - 150 m³/d (1.7 L/s) of septage flow at WWTC’s 30-year projected wastewater flows
 - The increased pollutant loadings to the WWTC from higher future flow will reduce the amount of septage that can be added to the WWTC without overloading the WWTC’s processes.
- A dye-free, non-formaldehyde deodorizer is recommended to be used in portable toilets at the music festivals.
- The 2016 report recommended construction of an equalization tank with metering pumps to pace the rate of septage transfer to WWTC to the wastewater flow entering the WWTC at the time of septage transfer to avoid overloading the WWTC
- A septage equalization tank would require a Schedule B Class EA.

Problem/Opportunity Statement

The problem statement consists of the following major areas of concern:

- 1. Inflow and infiltration**
- 2. Condition and age of existing sewers**
- 3. Future capacity of the septage receiving station and control of flows to the WWTC**
- 4. Limited capacity of sludge stabilization at the WWTC**
- 5. Limited capacity of the biosolids storage lagoons**

General Alternative Solutions

1. Inflow and Infiltration

- Do Nothing
- Identify zones of high I&I and implement upgrades to reduce I&I levels.

2. Condition and Age of Existing Sewers

- Do nothing
- Continue current sewer rehabilitation program as outlined in previous WWSMP and Develop Sewer Management Program to Monitor Progress

3. Limited Capacity of Septage Receiving Station

- Do nothing
- Divert festival flows to another facility
- Have festival organisers agree to stagger deliveries to SRS to avoid the long line-ups and delays during truck unloading at SRS
- Install equalization tank to meter flow of septage to plant

General Alternative Solutions

4. Limited Capacity of Sludge Stabilization / Digester

- Do nothing
- Expand anaerobic digester capacity
- Hire biosolids contractor to haul biosolids to independent facility for treatment and participate in revenue sharing from sales of fertilizer end-product.

5. Limited Capacity of Biosolids Storage Lagoons

- Do nothing
- Expand lagoons
- Construct biosolids storage tanks
- Hire biosolids contractor to haul sludge/biosolids to independent facility for treatment and participate in revenue sharing from marketing of stabilized end-product.
- Perform a Biosolids Options Study to review all available solids management alternatives that might produce a marketable product

Evaluation of General Alternative Solutions: Inflow and Infiltration

Alternative 1: Do Nothing

- Does not address the I&I issue, which will increase with time and potentially drive flows to the WWTC beyond the rated capacity, resulting in poor treatment or the need to bypass.
- Not viable in the long term and eliminated as an alternative

Alternative 2: Identify and Correct I&I Issues

- This alternative can significantly decrease I&I in the collection system.
- An I&I study would be needed to determine what areas in the system are experiencing I&I issues.
- Zone with heaviest I&I can be targeted for upgrades first.
- Approximate costs of performing an I&I study range from \$80,000 for a basic investigation where areas with I&I are known in advance to \$1,500,000 or more for a highly detailed investigation that includes surveying every manhole in the system.
- The estimated cost for an I&I study of the appropriate scope for the of City of Orillia is \$250,000.
- Alternative is the proposed preferred alternative solution

Evaluation of General Alternative Solutions: Condition and Age of Existing Sewers

Alternative 1: Do Nothing

- Not a viable alternative in the long term as it does not address the needs of the City and could lead to negative environmental impacts due to leaks in the system.
- Not viable in the long term and eliminated as an alternative

Alternative 2: Develop and Implement a Sewer Management Program

- Develop a sewer management program that monitors age and condition of sewers and uses risk management tools, such as risk/consequence analysis, to forecast when a sewer will need to be upgraded
- Alternative 2 is the proposed preferred alternative solution

Evaluation of General Alternative Solutions: Septage Receiving Capacity

Alternative 1: Do Nothing

- SRS system is adequate for the short term.
- When sewage flows to the WWTC increases, the WWTC will become more sensitive to the rate at which septage is added and the frequency of system upsets will increase.
- Not a viable alternative in the long term as it does not address the needs of the City and could lead to overloading of the WWTC in the future.

Alternative 2: Stagger Septage Deliveries from Festivals

- The City previously requested staggering deliveries, but it could not be accommodated by the festival.
- This alternative could not be implemented.

Evaluation of General Alternative Solutions: Septage Receiving Capacity

Alternative 3: Divert Flows from Festivals to Another Facility

- The City has implemented this option and has not accepted flows from festivals since 2016, which has alleviated operational issues.
- As sewage flows to the WWTC increases, the WWTC will become more sensitive to the addition of septage and the frequency of system upsets could increase. A method of controlling the timing and amount of septage transferred to the WWTC will be needed as wastewater flows increase.
- Diverting festival flows alone will not solve the problem and is not a complete solution in the long term and was eliminated from the evaluation.

Alternative 4: Construct Equalization Tank and Meter Septage Flow to WWTC

- This option involves constructing an equalization tank at the SRS, as recommended in the 2016 *Septage and Hauled Receiving Station Proposed Equalization Tank Assessment Study*
- Septage flows would be stored in the equalization tank and metered to the WWTC at a flow that's proportional to WWTC flows at the time of transfer to prevent overloading the WWTC's processes.
- Estimated cost to construct an equalization tank is between \$2,130,000 and \$3,980,000, depending on whether capacity is included to accommodate septage from large festivals.
- Alternative 4 is the proposed preferred alternative solution.

Evaluation of General Alternative Solutions: WWTC Sludge Stabilization Capacity

Alternative 1: Do Nothing

- Does not address the problem since the digesters are undersized for the plant's current flows and additional sludge produced from an expanded future population will need to be treated and/or managed.
- This is not a viable solution in the long term and was eliminated from the evaluation.

Alternative 2: Expand Anaerobic Digestion Capacity

- Construct a new anaerobic digester at the site that is sized to meet the projected year 2049 flow.
- Expansion would require a new digester, digester control building, sludge heat exchanger and waste gas burner
- There will likely be upgrades required for the gas handling system to meet current codes and standards, such as the NFPA 820 Standard.
- A new boiler would not be needed since the existing boilers have sufficient capacity to service a second primary digester.

Evaluation of General Alternative Solutions: WWTC Sludge Stabilization Capacity

Alternative 2: Expand Digestion Capacity

- One new primary digester would be needed. Another secondary digester is not needed.
- The new primary digester could be located to the southeast of the secondary digester
- The exiting site road would need to be rerouted around the new digester
- A new digester control building would be needed to house the new pumps and heat exchanger
- The digester could be made narrower and taller to fit to the north east of the secondary digester. There are many underground piping interferences in this area, which would make construction more complex.
- Exact location would be determined during the detailed design phase



ESTIMATED CAPITAL COST: \$13,108,000

Evaluation of General Alternative Solutions: Biosolids Storage Capacity

Alternative 1: Do Nothing

- The lagoons are adequately sized to accommodate biosolids production until approximately year 2027, after which they will need to be expanded to meet year 2049 projected flows.
- This alternative is not viable in the long term and has been eliminated from the evaluation

Evaluation of General Alternative Solutions: Biosolids Storage Capacity

Alternative 2: Expand Lagoons

- Expand the capacity of the existing lagoons to accommodate projected future biosolids production
- WWTC has sufficient available land to construct the required 8000 m³ lagoon.



ESTIMATED CAPITAL COST: \$936,000

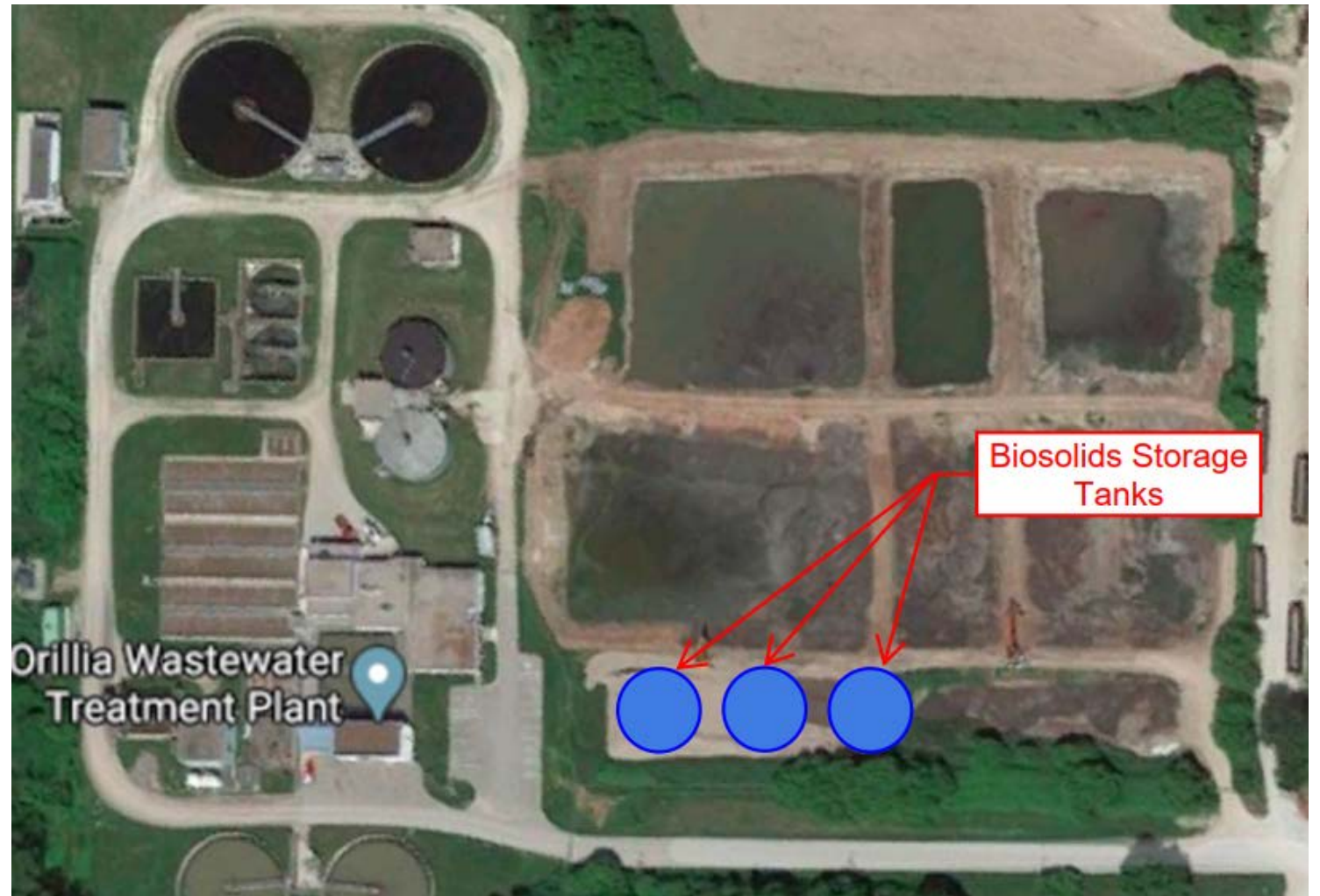
Advantages	Disadvantages
<ul style="list-style-type: none"> Expands existing system, which is well understood by operations staff. Low capital and operating costs 	<ul style="list-style-type: none"> Does not minimize footprint Uses all of available land at site and no space remaining for future expansion if needed

Evaluation of General Alternative Solutions: Biosolids Storage Capacity

Alternative 2: Biosolids Storage Tanks

- Construct biosolids storage tanks to store the additional biosolids.
- Storage tanks minimize land usage and leave space for future expansion beyond year 2049.

Advantages	Disadvantages
<ul style="list-style-type: none"> Minimizes footprint and leaves land available for future expansion. Less likelihood of odours because biosolids are in covered tanks 	<ul style="list-style-type: none"> Higher capital and life-cycle costs



ESTIMATED CAPITAL COST: \$3,373,000

Evaluation of Biosolids Storage Capacity Alternatives

PRIMARY CRITERIA	SECONDARY CRITERIA	ALTERNATIVE SOLUTIONS	
		Alternative 1 Expand Lagoons	Alternative 2 Biosolids Storage Tanks
CRITERIA	CRITERIA	SCORE*	SCORE*
Social/Culture	Aesthetic Impacts (plant appearance)	3	2
	Effect on Residential Properties	3	3
	Effect on Businesses/Commercial Properties	3	3
	Effect on Industrial Properties	3	4
	Impact on Archaeological and/or Cultural Heritage	3	3
<i>Average Score</i>		3.0	3.0
Technical	Solves or Improves Technical/Capacity Problem in the Long Term	3	5
	Constructability	3	4
	Ease of Operation & Maintenance Complexity	5	4
<i>Average Score</i>		3.7	4.3
Environmental	Effect on Habitat/Wildlife	3	3
	Effect on Vegetation/Wetlands	3	3
	Effect on Groundwater	3	4
	Effect on Surface Water	3	3
	Public Health and Safety	3	4
<i>Average Score</i>		3.0	3.4
Economic	Capital Cost	5	3
	Operation and Maintenance Costs	5	4
	Net Present Value	5	3
<i>Average Score</i>		5.0	3.3
TOTAL SCORE**		14.7	14.1

*Score is a number from 1 to 5, with 5 being the most favourable affect.
 **Sum of average scores for each set of criteria

Results of the evaluation indicate that the preferred alternative is to expand the lagoons.

Independent Biosolids Management Contractor

- This alternative could address the sludge stabilization capacity and biosolids storage capacity problems simultaneously.
- Rather than the City constructing a new digester and expanding the lagoons, this alternative involves hiring an independent Biosolids Management Contractor, such as Lystek International or Walker Industries, to haul raw sludge from the WWTC and treat it at their facility.
- Final product is a marketable Class A biosolids (fertilizer or compost/soil amendment) that Contractor markets through their marketing network.
- A portion of revenues generated from end-product sales would be shared with the City.
- Amount of revenue generation depends on market conditions at the time of production, sludge characteristics, and sludge quantity processed.
- To make this alternative economically viable, the City would have to construct a dewatering facility to dewater the sludge to approximately 25% solids content to reduce haulage costs.

Independent Biosolids Management Contractor

Parameters Used in This Alternative:

- Approximately 34,000 m³/yr. of raw sludge at 3% would be transferred to Contractor's facility.
- Raw sludge would be dewatered to 25% total solids before hauling to Contractor's facility.
- Contractor's haulage and tipping fees at \$95/tonne.
- Revenue sharing is quoted at \$1.25/tonne based on fertilizer being sold at \$7.50/tonne.

Key Variables of This Alternative:

- Amount of revenue generation depends on market value of end-product at time of sales and negotiated terms with Contractor
- Exact terms of contract, such as revenue split between City, would need to be negotiated with Contractor.
- Dewatering technology used in this Master Plan evaluation is centrifuges, which are the most energy intensive. Other alternatives are available and would need more detailed evaluation
- Amount of polymer needed in the dewatering operations would need to be determined through a sludge settleability test with selected polymers



ESTIMATED CAPITAL COST: \$3,310,000

Evaluation of Biosolids Management Contractor Alternative

LIFE CYCLE COST ANALYSIS		
	EXPANDED DIGESTER AND LAGOONS	INDEPENDENT CONTRACTOR
Capital Cost	\$13,690,000	\$3,310,000
Annual Operation and Maintenance Cost	\$750,000	\$10,370,000
Net Present Value	\$14,440,000	\$13,680,000

Advantages	Disadvantages
<ul style="list-style-type: none"> City would not have to finance the construction and operation of a second digester and expanded lagoon. City could garner profit from sludge production City would not need to manage marketing of biosolids end-product. Revenue from end-product sales would off-set a portion of the operating costs of the dewatering facility. 	<ul style="list-style-type: none"> City would not receive 100% of the revenue generated. City would be relying on a third-party, which carries risks if third party goes out of business or ceases operation for any reason. City would forego opportunity of implementing an on-site technology (solar drying, composting, CHP.) that produces a marketable biosolids product and retain 100% of the revenues

Evaluation of Biosolids Contractor Alternative

PRIMARY CRITERIA	SECONDARY CRITERIA	ALTERNATIVE SOLUTIONS	
		Alternative 1 Expanded Anaerobic Digestion & Lagoon	Alternative 2 Independent Contractor
CRITERIA	CRITERIA	SCORE*	SCORE*
Social/Culture	Aesthetic Impacts (plant appearance)	3	4
	Effect on Residential Properties	3	4
	Effect on Businesses/Commercial Properties	5	5
	Effect on Industrial Properties	4	3
	Impact on Archaeological and/or Cultural Heritage	3	3
<i>Average Score</i>		3.6	3.8
Technical	Solves or Improves Technical/Capacity Problem in the Long Term		3
	Constructability	4	5
	Ease of Operation & Maintenance Complexity	4	5
<i>Average Score</i>		4.0	4.3
Environmental	Effect on Habitat/Wildlife	4	3
	Effect on Vegetation/Wetlands	4	3
	Effect on Groundwater	3	4
	Effect on Surface Water	4	3
	Public Health and Safety	3	3
<i>Average Score</i>		3.6	3.2
Economic	Capital Cost	2	4
	Operation and Maintenance Costs	4	2
	Net Present Value	3	3.5
<i>Average Score</i>		3.0	3.2
TOTAL SCORE**		14.2	14.5

- The current evaluation shows that Alternative 2 (Independent Contractor) is the proposed preferred general alternative solution.
- Before implementing this alternative, it is recommended that a biosolids option study be performed.
- The biosolids options study would evaluate all potentially viable alternatives that could produce a marketable Class A biosolids and/or heat/power for the facility.
- Implementing a resource recovery system would move the WWTC towards being a net zero facility.

*Score is a number from 1 to 5, with 5 being the most favourable affect.

**Sum of average scores for each set of criteria

Other Options to Manage Sludge/Biosolids with Potential for Revenue Generation

- Biosolids can be processed to a level where they are suitable for commercial marketing and generate revenue. Typically, additional treatment systems are required after the sludge stabilization stage to produce a biosolids end-product of quality that meets the regulations as a commercially marketable product.
- There are two options available for generating a marketable biosolids product.
 - The first option consists of constructing an on-site treatment system then marketing the biosolids product.
 - The second option is to retain the services of an independent Biosolids Management Contractor.
- The first alternative would require the capital expenditure of constructing a biosolids processing system, but would have the benefit that 100% of the revenue would go to the City.
- The second alternative would not require the Town to finance the construction and operation of the expanded sludge stabilization and biosolids storage systems. However, only a portion of the revenues would come back to the Town.

Other Options to Manage Sludge/Biosolids with Potential for Revenue Generation

- Amount of revenue generation that is possible from commercial marketing biosolids from the wastewater treatment facility is dependent on the following parameters:
 - Quantity of the biosolids.
 - Characteristics of the biosolids (nutrient profile).
 - Market value of the biosolids end-product at the time of marketing
 - The life-cycle costs associated with the technology used to produce the biosolids product.
- Commercially marketable biosolids are either fertilizers or soil amendments.
- Several viable technologies exist that produce a biosolids product that can be marketed in Ontario.

Other Options to Manage Sludge/Biosolids with Potential for Revenue Generation

Solar Drying

- Solar drying involves stabilization of the biosolids using the sun’s energy as the heat source.
- Stabilized sludge is spread across the floor of drying greenhouses, where the heat of the sun stabilizes and dries the biosolids. Greenhouses could replace lagoons.
- The end-product is a pelletized fertilizer which is approved for unrestricted use in Ontario on lawns, gardens, agriculture amendments, etc.
- A thickening system will be needed to reduce the water content in the biosolids. A pellet cooling system may not be required with this technology since the heat applied for drying is significantly less than with traditional thermal drying technologies.
- Since the heat applied is low compared to traditional thermal drying technologies, the process takes longer and, thus, requires a large footprint to expose all of the biosolids to the sun.
- This technology incorporates supplemental heating to provide heat during the winter months where there is reduced levels of sunlight and the ambient temperature is low.

Advantages	Disadvantages
<ul style="list-style-type: none"> ▪ Reduced energy costs compared to traditional thermal drying methods ▪ Fertilizer product is high in nutrients, such as nitrogen and phosphorous – increased value as fertilizer ▪ Product easily packed for marketing. ▪ Does not require the addition of chemicals or other bulking agents – reduce traffic to and haulage costs from facility. 	<ul style="list-style-type: none"> ▪ Large footprint. ▪ Requires supplemental heating for periods of low-sunshine ▪ Potential for fugitive odours

Other Options to Manage Sludge/Biosolids with Potential for Revenue Generation

On-Site Composting

- The composting process naturally heats the material by microbial decomposition to temperatures of 50 to 65°C and pasteurizes the biosolids.
- Typically, bulking agents(wood chips, straw, or sawdust) are added to the biosolids to improve the structural integrity of the mixture. Other organic composting materials are possible, such as food scraps, yard trimmings, and paper products. The choice of bulking agent is dictated by the type of composting used.
- Windrow involve making piles or windrows of the material to be composted and aerating it to support the micro-organisms that decompose the material
- In-vessel composting is performed within an enclosed container (tank, silo, concrete lined trench, etc.) and can accept almost any type of organic waste (meat, animal manure, biosolids, food scraps). Other advantages include less potential for nuisance odours, smaller footprint than other composting methods, and faster processing times.
- The mixing in windrow composting tends to release odours. To control fugitive odours, windrows can be covered with a semi-permeable geotextile material, which allows the passage of oxygen molecules but prevents passage of larger molecules, including odorous compounds.
- In vessel has less potential for nuisance odours, smaller footprint than other composting methods, and faster processing times.

Advantages	Disadvantages
<ul style="list-style-type: none"> ▪ Reduced energy costs compared to other stabilization methods. ▪ High level of flexibility, robustness, and lower labour costs possible with in-vessel composting method. ▪ Compost product marketable, especially to local residents. 	<ul style="list-style-type: none"> ▪ Large footprint. ▪ Precipitation can slow down the degradation process of organics due to excessive moisture and evaporative cooling (except for in-vessel) ▪ High potential for fugitive odours (except for in-vessel). ▪ Windrow and static pile are labour intensive.

Other Options to Manage Sludge/Biosolids with Potential for Revenue Generation

Thermal Drying

- Thermal drying involves heating the biosolids to reduce its pathogen levels, reduce its water content to almost zero, and achieve the quality required for commercial marketing.
- The end-product is a pelletized fertilizer, which is approved for unrestricted use. The fertilizer pellets can be sold for residential use, such as direct application to lawns or gardens. They can also be directly applied in public areas, used as agricultural amendments, or mixed with other ingredients prior to application.
- Technologies used for thermal drying include rotary dryers, fluidized beds, hollow-flight dryers, and steam dryers. This option would require incorporating a thickening system upstream of the thermal dryer to reduce the water content from approximately 96% to 75%, thus reducing the amount of energy required to dry the biosolids.
- In addition, a cooling system will be needed to prevent ignition of the dried pellets when they are being stored.

Advantages	Disadvantages
<ul style="list-style-type: none"> ▪ Fertilizer product is high in nutrients, such as nitrogen and phosphorous – increased value as fertilizer ▪ Product easily packed for marketing. ▪ Small footprint compared with other technologies. ▪ Achieves the highest volume reduction (pellets are at least 90% solids) – reduced trucking traffic. ▪ Does not require the addition of chemicals or other agents – reduced traffic to and from facility. 	<ul style="list-style-type: none"> ▪ Higher energy consumption than other technologies ▪ High capital cost. ▪ Dust generated in drying process creates an explosion hazard. ▪ Systems are complex and require skilled operations staff. ▪ Potential for odours.

Other Options to Manage Sludge/Biosolids with Potential for Revenue Generation

Combined Heat and Power (CHP)

- A CHP system would convert the biogas produced in the anaerobic digester(s) to heat and electricity.
- Expanding the WWTC’s digestion capacity could make a CHP system cost effective.
- CHP systems typically use reciprocating engines, micro-turbines, or fuel cells
- Heat generated through CHP can be used as to heat buildings at the WWTC
- Excess electricity can be sold back to the grid
- 2011 Study by the US EPA (Opportunities for Combined Heat and Power at Wastewater Treatment Facilities) indicates that CHP systems become profitable for plants operating above approximately 19,000 m³/d (5 million MGD). Orillia’s projected year 2049 flow is 21,625 m³/d
- The EPA study cites that the cost to generate electricity using a CHP system at a wastewater treatment facility is between \$0.01 USD to \$0.083 USD per kWh.

Advantages	Disadvantages
<ul style="list-style-type: none"> ▪ Cost to produce power is less than cost of retail electricity – costs savings for facility ▪ CHP are high efficiency systems ▪ Would move the facility towards being a net-zero facility ▪ Energy produced by CHP systems have lower greenhouse gas emissions compared with electricity grids. 	<ul style="list-style-type: none"> ▪ Very high capital cost. ▪ Heat not used in the summer may go to waste.

Biosolids Option Study

- Would review and compare all potentially viable sludge stabilization technologies
- Procedure is similar to a Schedule C Class EA process, but specifically focused on strategies for sludge stabilization and management
- In-depth review of all aspects of each strategy (capital costs, land requirements, revenue generation, energy consumption, impacts to social, environmental, and cultural assets)
- Will more clearly define the potential for the City to generate revenue from each technology
 - Revenue could be in the form of marketable biosolids product and/or
 - Recovered heat and energy from anaerobic digestion system.
- It is recommended that the City conduct a Biosolids Options Study prior to implementing the proposed recommended alternative solutions for sludge stabilization or biosolids storage
- The Biosolids Option Study should be conducted within the next two years, in time to start implementing the preferred alternative before the WWTC's digestion capacity is exceeded.

Proposed Recommended General Alternative Solutions

Problem Statement	Proposed Recommended General Alternative Solution
Inflow and infiltration	Perform I&I Study and Continue I&I Reduction Efforts with Focus on Zones with Identified High I&I
Condition and Age of Existing Sewers	Develop and Implement Sewer Management Program
Future Capacity and Flow Control at Septage Receiving Station	Construct a Septage Equalization Tank and Control Septage Flows to the WWTC
Limited Capacity of Sludge Stabilization / Digestion at the WWTC	Construct a Second Primary Digester (preceded by a Biosolids Options Study)
Limited Capacity of Biosolids Storage (Lagoons)	Expand Lagoons (preceded by a Biosolids Options Study)

YOUR COMMENTS ARE IMPORTANT TO US

- We invite you to provide comments or questions by completing and submitting the on-line Comment Sheet.
- All comments are to be submitted by **November 25, 2020**.
- Questions can be directed to either of the following members of the Project Team:

Stephen Gendron, P.Eng.
**Manager of Environmental Engineering,
Assets, and Capital Projects**
City of Orillia
50 Andrew St. S., Suite 300
Orillia, ON L3V 7T5
Phone: 705-325-2212
Email: sgendron@orillia.ca

Preya Balgobin, P. Eng.
Project Manager
Ainley Group
195 County Crt., Suite 300
Brampton, ON L6W 4P7
Tel: 905-452-5172
Email: balgobin@ainleygroup.com

Thank you for visiting the Public Information Centre
We appreciate your participation!

Comments and information regarding this project are being collected in accordance with the Municipal Freedom of Information and Protection of Privacy Act for the purpose of meeting environmental assessment requirements. With the exception of personal information, all comments received will become part of the public record

Wastewater System Master Plan Notice of Completion

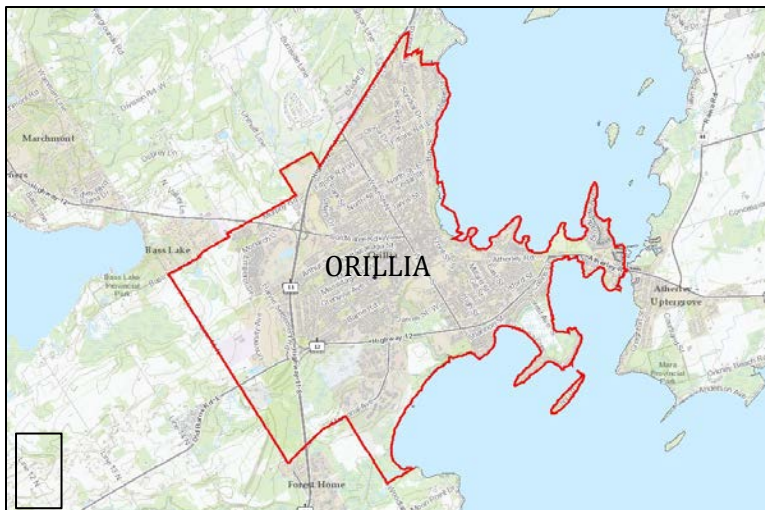
The City of Orillia is completing a Wastewater System Master Plan (Master Plan) with the objectives of developing a comprehensive, long-term sanitary servicing strategy for existing and future land use within the city limits of Orillia. The Master Plan involves an assessment of the existing servicing infrastructure to identify necessary upgrades and future servicing priorities.

This study has been completed in accordance with the Municipal Class Environmental Assessment (Class EA) document (amended 2015). It followed Approach #2 with the intent to fulfill the Class EA requirements for the Schedule A, A+ and select Schedule B projects identified within the Master Plan as well as to provide the basis for future Schedule C projects.

A digital Public Information Centre (PIC) was conducted from Oct. 26, 2020 to Nov. 25, 2020, with display boards made available to the public on the City's website. The digital PIC provided an opportunity for all interested parties to review and comment on the alternatives, the evaluation process, the preliminary general alternative solutions, and next steps in the study process.

The study identified several areas of concerns including inflow and infiltration (I&I), condition and age of existing sewers, future capacity and flow control at septage receiving station, limited capacity of sludge stabilization/digestion at the Wastewater Treatment Centre (WWTC) and limited capacity of biosolids storage (lagoons). Concluding the PIC period and review of comments received, the Proposed Recommended General Alternative Solutions to address the areas of concerns identified by the study are to perform an I&I study and continue I&I reduction efforts with focus on zones with identified high I&I, develop and implement a sewer management program, construct a septage equalization tank and control septage flows to the WWTC, construct a second primary digester and expand the lagoons, both preceded by a Biosolids Option Study.

By this Notice, the Master Plan Study Report will be available on the City's website for 30 calendar days in accordance with the Municipal Class EA document. The public review period will begin on June 16, 2021 and end on July 16, 2021. If you have any outstanding concerns about this project, please submit them using the online comment form, available on City's website at orillia.ca/wastewatermasterplan or by email. To obtain information or to provide input, please contact either of the following members of the study team:



Stephen Gendron, P.Eng.
Manager of Environmental Engineering, Assets, and Capital Projects
City of Orillia
50 Andrew St. S., Suite 300
Orillia, ON L3V 7T5
Phone: 705-325-2212
Email: sgendron@orillia.ca

Preya Balgobin, P.Eng.
Project Manager
Ainley Group
195 County Crt., Suite 300
Brampton, ON L6W 4P7
Tel: 905-452-5172
Email: balgobin@ainleygroup.com

If concerns regarding this project cannot be resolved in discussion with the City of Orillia, a person or party may request that the Minister of Environment, Conservation and Parks make an order for the project to comply with Part II of the *Environmental Assessment Act*. This request (commonly referred to as a Part II Order) must be received within the above review period by the Minister of the Environment, Conservation and Parks and the Environmental Assessment and Permissions Branch, at the addresses listed below and copied to Stephen Gendron at the City of Orillia. Provided that no request is received on or before July 16, 2021, the City may proceed with implementation of the servicing strategies as outlined in the Master Plan Report.

Minister
Ministry of the Environment, Conservation and Parks
777 Bay St., 5th Floor
Toronto, ON M7A 2J3
Minister.mecp@ontario.ca

Director, Environmental Assessment Branch
Ministry of the Environment, Conservation and Parks
135 St. Clair Ave. W., 1st Floor
Toronto, ON M4V 1P5
enviropemissions@ontario.ca

Any input received during this process will be maintained on file for use during the project and may be included in project documentation. Information collected will be used in accordance with the Freedom of Information and Protection of Privacy Act. With the exception of personal information, all comments will become part of the public record.

This notice was issued on June 16, 2021.

**CITY OF ORILLIA WASTEWATER SYSTEM MASTER PLAN UPDATE
AGENCY COMMENTS SUMMARY**

NO.	RESPONDENT INFORMATION	COMMENTS RECEIVED	RESPONSE / ACTION
NOTICE OF COMMENCEMENT			
1	Carol Neumann Rural Planner, Land Use Policy and Stewardship Ontario Ministry of Agriculture, Food and Rural Affairs 6484 Wellington Road 7 Elora, ON N0B 1S0 519-846-3393 Carol.neumann@ontario.ca	<p><u>Email Submitted November 1, 2018</u></p> <p>“Thank you for your email. I will forward it to Jocelyn Beatty, the OMAFRA Rural Planner responsible for this geographic area. For future reference, a map of OMAFRA’s Rural Planners and their geographic coverage areas can be found here.”</p>	<ul style="list-style-type: none"> • An email response was sent by Ainley Group on November 5, 2018 identifying that the contact list has been updated accordingly.
2	Henry Glavic Charter Construction hglavic@charterconstruction.ca	<p><u>Email Submitted November 1, 2018</u></p> <p>“Thank you for the notice. We are definitely interested in this study and ask that you include us in all future notices.”</p>	<ul style="list-style-type: none"> • An email response was sent by Ainley Group on November 5, 2018 confirming that all project notices will be provided.
3	Jim Dymont MHBC Planning, Urban Design & Landscape Architecture 705-733-5310 jdymont@mhbcplan.com	<p><u>Email Submitted November 1, 2018</u></p> <p>“Please take me off your mailing list. Thanks.”</p>	<ul style="list-style-type: none"> • An email response was sent by Ainley Group on November 5, 2018 confirming that MHBC Planning has been removed from the mailing list.
4	Chunmei Liu Environmental Resource Planner/Environmental Assessment Coordinator Central Region, Ministry of the Environment and Climate Change 5775 Yonge Street, 8th Flr Toronto, Ontario M2M 4J1 416-326-4886 Chunmei.Liu@ontario.ca	<p><u>Email Submitted June 27, 2017</u></p> <p>“Attached please find mecp delegating letter for this project. If you have any questions regarding this letter, please contact me directly.</p> <p>I would also like you to know that there is a new mecp process for notices of commencement and completion. Please refer MEA website for details: http://www.municipalclassea.ca/.</p> <p>Please ensure that the notices of study commencement and completion for all new projects including this one and notices of completion for ongoing projects will follow the new process.”</p> <p>The delegating letter provides the following guidance regarding the ministry’s interests with respect to the Class EA process:</p> <ul style="list-style-type: none"> • The MECP is delegating the duty to consult Aboriginal communities to the City of Orillia. The MECP identified a list of communities that should be consulted and consultation step that should be followed by the proponent throughout the project. • The Notice of Completion and final Master Plan should be provided to the MECP when completed for review. • Areas of Interest: <ul style="list-style-type: none"> ○ Source Water Protection <ul style="list-style-type: none"> - include a section in the Project File/EASR on source water protection - consult with the local source protection authority to discuss potential impacts on drinking 	<ul style="list-style-type: none"> • An email response was sent by Ainley Group on November 5, 2018 confirming receipt of the delegating letter and information on the new MECP process. The response identified that the new MECP was reviewed and provided to the regional office and will continue to be followed throughout the Master Plan.

**CITY OF ORILLIA WASTEWATER SYSTEM MASTER PLAN UPDATE
AGENCY COMMENTS SUMMARY**

NO.	RESPONDENT INFORMATION	COMMENTS RECEIVED	RESPONSE / ACTION
NOTICE OF PIC NO. 1			
1	Grant Hipgrave Orillia Power ghipgrave@orilliapower.ca	<p><u>Email Submitted October 14, 2020</u></p> <p>“The appropriate contacts for Orillia Power Distribution Corporation are:</p> <p>Glenn McCurdy Director of Distribution Operations</p> <p>and</p> <p>Eric Lucier Manager of Engineering</p> <p>Both have been cc’d on this note so that you can pick up their email coordinates.”</p>	<ul style="list-style-type: none"> • No response required.

**CITY OF ORILLIA WASTEWATER SYSTEM MASTER PLAN UPDATE
AGENCY COMMENTS SUMMARY**

NO.	RESPONDENT INFORMATION	COMMENTS RECEIVED	RESPONSE / ACTION
2	Matthew Stoner A/S/Sergeant #10343 Orillia Detachment Ontario Provincial Police T. 705-326-3536 C. 705-328-5679 matthew.stoner@opp.ca	<u>Email Submitted October 16, 2020</u> “We have no concerns.”	<ul style="list-style-type: none"> No response required.
NOTICE OF COMPLETION			

Preya Balgobin

From: Grant Hipgrave <ghipgrave@orilliapower.ca>
Sent: Wednesday, October 14, 2020 1:14 PM
To: Masoumeh Sharafi
Cc: Preya Balgobin; Glenn McCurdy; Eric Lucier
Subject: RE: 118088-City of Orillia Wastewater System Master Plan: Notice of Public Information Centre (PIC)-Orillia Power Distribution Corporation

Hello Mr. Sharafi:

The appropriate contacts for Orillia Power Distribution Corporation are:

Glenn McCurdy
Director of Distribution Operations

and

Eric Lucier
Manager of Engineering

Both have been cc'd on this note so that you can pick up their email coordinates.

Regards
Grant

From: Masoumeh Sharafi <sharafi@ainleygroup.com>
Sent: Wednesday, October 14, 2020 11:55 AM
To: Grant Hipgrave <ghipgrave@orilliapower.ca>
Cc: Preya Balgobin <balgobin@ainleygroup.com>
Subject: 118088-City of Orillia Wastewater System Master Plan: Notice of Public Information Centre (PIC)-Orillia Power Distribution Corporation

Dear Mr. Hipgrave,

We have your name as the contact person for the Orillia Power Distribution Corporation on the City of Orillia Wastewater System Master Plan stakeholder contact list. Can you please confirm if you would be the person to receive all the communication regarding the Orillia Master Plan? If not, can you please provide the contact information of the right person so that we can send them the emails and notices?

Regards,

Masoumeh Sharafi, PhD, EIT
Engineering Intern



www.ainleygroup.com

Tel: (905) 452-5172 Ext: 216

Cell: (647) 899-0642

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Masoumeh Sharafi

From: Stoner, Matthew (OPP) <Matthew.Stoner@opp.ca>
Sent: Friday, October 16, 2020 2:47 PM
To: Masoumeh Sharafi
Cc: MacDonald, Andrew (OPP)
Subject: FW: 118088-City of Orillia Wastewater System Master Plan: Notice of Public Information Centre (PIC)-Ontario Provincial Police
Attachments: 118088-Orillia Master Plan-Notice of PIC.PDF

Sharafi,

We have no concerns.

Matt

*Matt Stoner
A/S/Sergeant #10343
Orillia Detachment
Ontario Provincial Police
T. 705-326-3536
C. 705-328-5679*

"If you have any accommodation needs or require communication supports or alternate formats, please let me know"

From: OPP Orillia (OPP)
Sent: Wednesday, October 14, 2020 2:42 PM
To: MacDonald, Andrew (OPP) <Andrew.N.MacDonald@opp.ca>; Stoner, Matthew (OPP) <Matthew.Stoner@opp.ca>
Subject: FW: 118088-City of Orillia Wastewater System Master Plan: Notice of Public Information Centre (PIC)-Ontario Provincial Police

From: Masoumeh Sharafi [<mailto:sharafi@ainleygroup.com>]
Sent: 14-Oct-20 12:37 PM
To: OPP Orillia (OPP) <OPP.Orillia@opp.ca>
Cc: Preya Balgobin <balgobin@ainleygroup.com>
Subject: 118088-City of Orillia Wastewater System Master Plan: Notice of Public Information Centre (PIC)-Ontario Provincial Police

CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments in unexpected emails.

To whom it may concern,

We're sending you this email to let you know of the upcoming Public Information Centre (PIC) for the City of Orillia Wastewater System Master Plan, scheduled for October 26, 2020.

Due to the COVID-19 pandemic and requirements for physical distancing and respecting concerns relating to the spread of COVID-19, this PIC will be held digitally on the City's website, www.orillia.ca/wastewatermasterplan.

Public consultation is an important component of the Master Plan process. Please review the information presented on October 26th and feel free to contact the project team with any comment, questions, or concerns you might have.

Please refer to the Notice of PIC attached to this email for additional details.

Regards,

Masoumeh Sharafi, PhD, EIT
Engineering Intern



www.ainleygroup.com

Tel: (905) 452-5172 Ext: 216

Cell: (647) 899-0642

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**CITY OF ORILLIA WASTEWATER SYSTEM MASTER PLAN UPDATE
INDIGENOUS COMMENTS SUMMARY**

NO.	RESPONDENT INFORMATION	COMMENTS RECEIVED	RESPONSE / ACTION
NOTICE OF COMMENCEMENT			
1	Sharday James Community Consultation Worker, Communications Chippewas of Rama First Nation 705-325-3611 ext. 1633 shardayj@ramafirstnation.ca	<p><u>Email Submitted November 5, 2018</u></p> <p>“I am sending this email in regards to a notice we received from you dated November 1st, 2018 which discusses the development of a Wastewater Servicing Plan for the City of Orillia. We would be interested in seeing this study upon completion which I assume includes environmental assessments. Please keep us update on this project as it proceeds.”</p>	<ul style="list-style-type: none"> An email response was sent on November 6, 2018 confirming all future correspondence will be provided to the Chippewas of Rama First Nation community.
NOTICE OF PIC NO. 1			
1	Lance Copegog Executive Assistant to Chief and Council Beausoleil First Nation Telephone: 705-247-2215 11 O’Gema Miikan, Christian Island, ON L9M 0A9 lcopegog@chimnissing.ca	<p><u>Email Submitted October 14, 2020</u></p> <p>“I acknowledge receipt of your email.</p> <p>I am forwarding your email to Mike Smith and Dana Monague, who work within the Lands Department at Beausoleil First Nation.”</p>	<ul style="list-style-type: none"> Mike Smith and Dana Monague added to contact list.
2	Kathleen Ryan Acting Manager Saugeen Ojibway Nation Environment Office 25 Maadookii Subdivision, Neyaashiinigmiing, ON, N0H 2T0 Office: 519-534-5507 Cell: 226-567-0219 Fax: 519-534-5525 Kathleen.ryan@saugeenojibwaynation.ca	<p><u>Email Submitted October 19, 2020</u></p> <p>“Yes - please send these to Juanita.meekins@saugeenojibwaynation.ca and cc' myself.”</p>	<ul style="list-style-type: none"> Juanita Meekins added to contact database and PIC notice sent to her on 19Oct2020.
NOTICE OF COMPLETION			

Preya Balgobin

From: Lance Copegog <lcopegog@chimnissing.ca>
Sent: Wednesday, October 14, 2020 9:51 AM
To: Masoumeh Sharafi
Cc: bfnchief@chimnissing.ca; Preya Balgobin; 'Dana Monague'; 'Mike Smith'
Subject: RE: 118088-City of Orillia Wastewater System Master Plan: Notice of Public Information Centre (PIC)-Beausoleil First Nation

Good morning:

I acknowledge receipt of your email.

I am forwarding your email to Mike Smith and Dana Monague, who work within the Lands Department at Beausoleil First Nation.

Thank you,

Lance Copegog
Executive Assistant to Chief and Council
Beausoleil First Nation
Telephone: 705-247-2215
11 O'Gema Miikan, Christian Island, ON L9M 0A9

From: Masoumeh Sharafi <sharafi@ainleygroup.com>
Sent: October-13-20 3:09 PM
To: lcopegog@chimnissing.ca
Cc: bfnchief@chimnissing.ca; Preya Balgobin <balgobin@ainleygroup.com>
Subject: FW: 118088-City of Orillia Wastewater System Master Plan: Notice of Public Information Centre (PIC)-Beausoleil First Nation

Dear Mr. Copegog,

We're sending you this email to let you know of the upcoming Public Information Centre (PIC) for the City of Orillia Wastewater System Master Plan, scheduled for October 26, 2020.

Due to the COVID-19 pandemic and requirements for physical distancing and respecting concerns relating to the spread of COVID-19, this PIC will be held digitally on the City's website, www.orillia.ca/wastewatermasterplan.

Public consultation is an important component of the Master Plan process. Please review the information presented on October 26th and feel free to contact the project team with any comment, questions, or concerns you might have.

Please refer to the Notice of PIC attached to this email for additional details.

Regards,

Masoumeh Sharafi, PhD, EIT
Engineering Intern



www.ainleygroup.com

Tel: (905) 452-5172 Ext: 216

Cell: (647) 899-0642

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From: Masoumeh Sharafi
Sent: Tuesday, October 13, 2020 1:34 PM
To: bfchief@chimnissing.ca; tanyaroot@chimnissing.ca
Cc: Preya Balgobin
Subject: 118088-City of Orillia Wastewater System Master Plan: Notice of Public Information Centre (PIC)-Beausoleil First Nation

Dear Chief Monague,

We're sending you this email to let you know of the upcoming Public Information Centre (PIC) for the City of Orillia Wastewater System Master Plan, scheduled for October 26, 2020.

Due to the COVID-19 pandemic and requirements for physical distancing and respecting concerns relating to the spread of COVID-19, this PIC will be held digitally on the City's website, www.orillia.ca/wastewatermasterplan.

Public consultation is an important component of the Master Plan process. Please review the information presented on October 26th and feel free to contact the project team with any comment, questions, or concerns you might have.

Please refer to the Notice of PIC attached to this email for additional details.

Regards,

Masoumeh Sharafi, PhD, EIT
Engineering Intern



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Preya Balgobin

From: Kathleen Ryan <kathleen.ryan@saugeenojibwaynation.ca>
Sent: Monday, October 19, 2020 2:27 PM
To: Masoumeh Sharafi
Cc: Preya Balgobin
Subject: Re: 118088-City of Orillia Wastewater System Master Plan: Notice of Public Information Centre (PIC)-Saugeen Ojibway Nation Environment Office

Aanii,

Yes - please send these to Juanita.meekins@saugeenojibwaynation.ca and cc' myself.

Miigwetch,
Kat

On Tue, Oct 13, 2020 at 2:41 PM Masoumeh Sharafi <sharafi@ainleygroup.com> wrote:

Dear Ms. Ryan,

We have contact information of Ms. Joselyn Keeshig on the City of Orillia Wastewater System Master Plan stakeholder contact list for the Saugeen Ojibway Nation Environment Office. I have been advised that you are the new contact person for the Saugeen Ojibway Nation Environment Office. Can you please confirm if you would be the person to receive all the notices regarding the Orillia Master Plan? If not, can you please provide the contact information of the right person so that we can send them the emails and notices?

Regards,

Masoumeh Sharafi, PhD, EIT

Engineering Intern



www.ainleygroup.com

Tel: (905) 452-5172 Ext: 216

Cell: (647) 899-0642

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--

Kathleen Ryan | Acting Manager
Saugeen Ojibway Nation Environment Office
25 Maadookii Subdivision, Neyaashiinigmiing, ON, N0H 2T0
Office: 519-534-5507 | Cell: 226-567-0219 | Fax: 519-534-5525

Preya Balgobin

From: Preya Balgobin
Sent: Friday, July 10, 2020 9:47 AM
To: [REDACTED]
Cc: 'Stephen Gendron'
Subject: RE: FW: Orillia Wastewater System master Plan

Hi [REDACTED]

I wouldn't be able to answer that question because Ainley has been retained to perform the Master Plan update only. Negotiations such as the one you're asking about would be between the developer and the City, outside of the Master Plan scope of work.

If you don't already have a copy of the 2012 Class EA, that might be a good place to start. A Class EA typically goes into more detail than a Master Plan, since it deals with only one component of a system, whereas, a Master Plan covers several, if not all, components in a system. The Class EA might discuss possible arrangements between the City and the developer for that SPS.

Regards,
Preya Balgobin

From: [REDACTED]
Sent: July 10, 2020 6:56 AM
To: Preya Balgobin <balgobin@ainleygroup.com>
Cc: 'Stephen Gendron' <SGendron@orillia.ca>
Subject: RE: FW: Orillia Wastewater System master Plan

Hi Preya,

Thanks for clarifying. Would we receive development charge credits equal to the cost of constructing the SPS?

Please feel free to call me if it is easier to discuss.

Thanks,

[REDACTED]

From: Preya Balgobin <balgobin@ainleygroup.com>
Sent: July 9, 2020 10:19 PM
To: [REDACTED]
Cc: 'Stephen Gendron' <SGendron@orillia.ca>
Subject: RE: FW: Orillia Wastewater System master Plan

Hi [REDACTED],

Based on our information, a sewage pumping station will be required to allow the development of the Inch Farm lands and a sewage pumping station for that purpose is currently covered under an existing Class Environmental Assessment from 2012.

This Master Plan update will refer to the 2012 Class EA, but will not specifically cover this SPS.

I hope that answers your inquiry, but please let me know if you have additional questions.

Regards,
Preya Balgobin

From: [REDACTED]
Sent: July 9, 2020 3:41 PM
To: Preya Balgobin <balgobin@ainleygroup.com>
Cc: 'Stephen Gendron' <SGendron@orillia.ca>
Subject: RE: FW: Orillia Wastewater System master Plan

Hi Preya,

I wanted to follow-up on my question below.

Thanks,

From: [REDACTED]
Sent: July 6, 2020 2:58 PM
To: 'Preya Balgobin' <balgobin@ainleygroup.com>
Cc: 'Stephen Gendron' <SGendron@orillia.ca>
Subject: RE: FW: Orillia Wastewater System master Plan

Hi Preya and Stephen:

I hope you're keeping well. We're looking at another parcel in Orillia and thought I'd reach out with a few questions.

The lands we're looking at are known as 4501 Uhtoff Line and are draft plan approved for 123 singles and 46 semis (previously the Inch Farm). Our understanding is the lands still require municipal services. Can you clarify whether a pumping station will be required to service these lands from a sanitary servicing perspective or whether we would be able to utilize the infrastructure work already completed by the Smart Centres development.

Thank you in advance for your help.

From: Preya Balgobin <balgobin@ainleygroup.com>
Sent: April 28, 2020 5:03 PM
To: [REDACTED]
Cc: Stephen Gendron <SGendron@orillia.ca>
Subject: RE: FW: Orillia Wastewater System master Plan

Hi [REDACTED]

All the lands within the master plan study area are slated to be serviced by 2041. The piece of land in question is owned by a developer and the water/wastewater infrastructure will be constructed by the developer when they develop the land. That being the case, the timing for provision of service is in the hands of the developer and not driven by the City, so we are not able to say when servicing will be in place for that piece of land.

Not a definitive answer, I know, but that's all we are certain of at this point.

Please let me know if you have additional questions.

Regards,
Preya Balgobin

From: [REDACTED]
Sent: April 23, 2020 1:22 PM
To: Preya Balgobin <balgobin@ainleygroup.com>
Subject: Re: FW: Orillia Wastewater System master Plan

Hi Preya,

Thank you for offering. I am trying to get more clarity on servicing timing, particularly as it relates to servicing the lands shown below. It is my understanding services are not yet available for these lands and was wondering when this is anticipated. Any assistance is appreciated.



Thank you,

[REDACTED]

On Tue, Apr 21, 2020 at 3:50 PM Preya Balgobin <balgobin@ainleygroup.com> wrote:

Of course. Are you interested in something in particular? I'm the project manager so I can answer any question you might have.

Regards,

Preya Balgobin

From: [REDACTED]
Sent: April 21, 2020 3:36 PM
To: Preya Balgobin <balgobin@ainleygroup.com>
Subject: Re: FW: Orillia Wastewater System master Plan

Thank you very much. If you could please put me on the contact list that would be appreciated.

Regards,

[REDACTED]

On Tue, Apr 21, 2020 at 3:31 PM Preya Balgobin <balgobin@ainleygroup.com> wrote:

Hello [REDACTED],

Thanks for your inquiry about Orillia's Master Plan Update. The update is still in progress and we expect to have the final report completed in September of this year. A public information session is planned for July, however, that will be depend on the situation with Covid.

In the meantime, if there is something specific you'd like to know about the study, I'd be happy to help.

Also, if you'd like, can put you on the study's public contact list so you'll receive notice related to the study, including the notice of the public session once a date has been finalized.

Regards,

Preya Balgobin, P.Eng

Senior Project Manager



www.ainleygroup.com

Tel: (905) 452-5172 Ext. 209

Cell: (289) 541-8766

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From: [REDACTED]
Sent: April 21, 2020 1:04 PM
To: Chris Ewen <ewen@ainleygroup.com>
Subject: Orillia Wastewater System master Plan

Hi Chris,

I wanted to inquire on the status of the Sanitary System Master Plan study that for Orillia. It is my understanding this was expected to be complete by September 2019. I was hoping to receive a copy of the report, as I couldn't find it online.

Thanks,



From: [Jason Covey](#)
To: [Preya Balgobin](#)
Cc: [Stephen Gendron](#); [Tim Collingwood](#); [Simon Glass](#); [Suzanne Troxler](#)
Subject: RE: Fittons Rd West SPS #18
Date: Thursday, September 9, 2021 9:23:12 AM
Attachments: [image002.png](#)
[image013.png](#)
[image015.png](#)
[image016.png](#)
[image017.png](#)
[image018.png](#)

Hi Preya,

The approach you have described below sounds fine.

Regards.
Jason

Jason R. Covey, B.Sc.(Eng.), P.Eng.
Senior Engineer

Tatham Engineering Limited
115 Sandford Fleming Drive, Suite 200 | Collingwood | Ontario | L9Y 5A6
T 705-444-2565 x2018 | C 705-888-0186 | jcovey@tathameng.com | tathameng.com



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From: Preya Balgobin <balgobin@ainleygroup.com>
Sent: Wednesday, September 08, 2021 1:36 PM
To: Jason Covey <jcovey@tathameng.com>
Cc: Stephen Gendron <SGendron@orillia.ca>; Tim Collingwood <tcollingwood@tathameng.com>;
Simon Glass <glass@ainleygroup.com>; Suzanne Troxler <stroxler@tathameng.com>
Subject: RE: Fittons Rd West SPS #18

Hi Jason,

I understand that there are few development scenarios for SPS #18 have recently become active that were unknown or inactive at the time that the Master Plan was being conducted. As a result,

the projected future flow for SPS #18 will be affected.

The City has embarked on a detailed review of the future flows that will result from the current development scenarios in order to identify the revised required capacity for SPS #18.

In light of this new information, we propose to finalize the Master Plan Report as-is and include a statement indicating the following:

- that the development areas related to SPS #18 were revised as the Master Plan was being finalized and the Master Plan does not include flows from the revised development areas
- that the City has embarked on a separate assignment to establish future flows for SPS #18, which will identify the required capacity for the SPS to meet the needs of the updated developments.

We would like to know if this approach would be acceptable to Tatham as a response to your question about SPS #18's required capacity as I would like to finalize the Master Plan at this time.

Please let me know.

Regards,
Preya Balgobin, P.Eng.
Senior Project Manager



www.ainleygroup.com

Tel: (905) 452-5172 Ext. 209

Cell: (289) 541-8766

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From: Preya Balgobin

Sent: Wednesday, August 25, 2021 11:42 AM

To: Jason Covey <jcovey@tathameng.com>

Cc: Stephen Gendron <SGendron@orillia.ca>; Tim Collingwood <tcollingwood@tathameng.com>;
Simon Glass <glass@ainleygroup.com>; Suzanne Troxler <stroxler@tathameng.com>

Subject: RE: Fittons Rd West SPS #18

Hi Jason,

Do you need any additional information from the study team or do you now have everything you need?

Please let me know.

Regards,
Preya Balgobin, P.Eng.
Senior Project Manager



www.ainleygroup.com

Tel: (905) 452-5172 Ext. 209

Cell: (289) 541-8766

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From: Preya Balgobin

Sent: Thursday, August 12, 2021 1:50 PM

To: Jason Covey <jcovey@tathameng.com>

Cc: Stephen Gendron <SGendron@orillia.ca>; Tim Collingwood <tcollingwood@tathameng.com>;
Simon Glass <glass@ainleygroup.com>; Suzanne Troxler <stroxler@tathameng.com>

Subject: RE: Fittons Rd West SPS #18

Hi Jason,

Please see below for details of the the input assumptions and calculations for the development areas of SPS 18, which includes an assumed equivalent population of 1961.

Model assumptions:

- EQ pop 1961
- 350 L/c/d
- PF = 3

Development Assumptions:

- Residential area 11.6 Ha (50 units/Ha, 2.41 PPU)
- Commercial Area 13.05 Ha (28 m³/ha/d, PF = 1.6)

This includes a residential area of 11.6 Ha.

Assumed 50 units / Ha

Assumed 2.41 ppu = 1398 persons

Assumed 350 L/c/d = 489.3 m³/d

Assumed PF = 3

Peak Flow = 1467.9 m³/d = 16.99 L/s

Includes several commercial areas totalling 13.05 Ha

Assumed 28 m³/ha/d = 365.4 m³/d

PF = 1.6 from industrial areas
Peak Flow = 584.5 m³/d = 6.76 L/s

Converting commercial to EQ pop for model input
584.5 m³/d peak flow/ 3.0 PF (residential)
= 194.8 m³/d ADF = 194800 L/d ADF
194800 L/d / 350 L/c/d = 557 EQ pop

1398 + 557 = 1,955 EQ pop. This is slightly different from what was imported to the model from Excel but very close.

Please let us know if there are concerns or questions with these assumptions and estimates.

Regards,
Preya Balgobin, P.Eng.
Senior Project Manager



www.ainleygroup.com

Tel: (905) 452-5172 Ext. 209

Cell: (289) 541-8766

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From: Simon Glass <glass@ainleygroup.com>

Sent: Thursday, August 5, 2021 9:36 AM

To: Jason Covey <jcovey@tathameng.com>; Preya Balgobin <balgobin@ainleygroup.com>

Cc: Stephen Gendron <SGendron@orillia.ca>; Tim Collingwood <tcollingwood@tathameng.com>;
Suzanne Troxler <stroxler@tathameng.com>

Subject: RE: Fittons Rd West SPS #18

Hi Jason,

I am sorry I haven't got back to you yet. The laptop which had our version of Hydra installed died. I've been contacting the software provider to get the install files so we can get this software on a new computer so we can review however we have not received a response. I will reach out again today.

Regards,

Simon Glass
Project Engineer



Tel: (905) 452-5172 Ext. 220
Cell: (289) 654-2865

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From: Jason Covey <jcovey@tathameng.com>
Sent: August 5, 2021 9:31 AM
To: Preya Balgobin <balgobin@ainleygroup.com>
Cc: Stephen Gendron <SGendron@orillia.ca>; Tim Collingwood <tcollingwood@tathameng.com>; Suzanne Troxler <stroxler@tathameng.com>; Simon Glass <glass@ainleygroup.com>
Subject: RE: Fittons Rd West SPS #18

Good morning Preya,

Can you provide an update on this please?

Regards,
Jason

From: Preya Balgobin <balgobin@ainleygroup.com>
Sent: Friday, July 23, 2021 3:20 PM
To: Jason Covey <jcovey@tathameng.com>
Cc: Stephen Gendron <SGendron@orillia.ca>; Tim Collingwood <tcollingwood@tathameng.com>; Suzanne Troxler <stroxler@tathameng.com>; Simon Glass <glass@ainleygroup.com>
Subject: RE: Fittons Rd West SPS #18

Hi Jason,

The projected flow for SPS #18 is an output of the updated Hydra model. I will have our system modelling (Simon) check the parameters used in developing the future flow for that station and get back to you.

Regards,
Preya Balgobin, P.Eng.
Senior Project Manager



www.ainleygroup.com

Tel: (905) 452-5172 Ext. 209

Cell: (289) 541-8766

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From: Jason Covey <jcovey@tathameng.com>

Sent: Friday, July 23, 2021 3:08 PM

To: Preya Balgobin <balgobin@ainleygroup.com>

Cc: Stephen Gendron <SGendron@orillia.ca>; Tim Collingwood <tcollingwood@tathameng.com>; Suzanne Troxler <stroxler@tathameng.com>

Subject: RE: Fittons Rd West SPS #18

Good afternoon Preya,

Thank you for the updated information on the firm capacity of SPS #18.

The 2012 Class EA projected an ultimate peak flow of 65 L/s from west of Highway 11, discharging to SPS #18.

The draft master plan (Table 18) projects a 2049 peak flow of 28.6 L/s to SPS #18. How was the 2049 peak flow calculated and what assumptions were used? What existing flow to SPS #18 was assumed?

Regards.

Jason

Jason R. Covey, B.Sc.(Eng.), P.Eng.

Senior Engineer

Tatham Engineering Limited

115 Sandford Fleming Drive, Suite 200 | Collingwood | Ontario | L9Y 5A6

T 705-444-2565 x2018 | C 705-888-0186 | jcovey@tathameng.com | tathameng.com



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From: Preya Balgobin <balgobin@ainleygroup.com>

Sent: Tuesday, July 13, 2021 4:40 PM

To: Tim Collingwood <tcollingwood@tathameng.com>

Cc: Suzanne Troxler <stroxler@tathameng.com>; Jason Covey <jcovey@tathameng.com>; Stephen Gendron <SGendron@orillia.ca>

Subject: RE: Fittons Rd West SPS #18

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Hi Tim,

We repeated the drawdown test at Fittons Road West SPS (SPS 18) with two of the three pumps running and the resulting flow was 64.8 L/s. The final Master Plan report will list 64.8 L/s as the firm capacity of this pumping station.

Please let us know if you have any further questions.

Regards,
Preya Balgobin, P.Eng.
Senior Project Manager



www.ainleygroup.com

Tel: (905) 452-5172 Ext. 209

Cell: (289) 541-8766

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From: Preya Balgobin

Sent: Tuesday, June 29, 2021 3:22 PM

To: Tim Collingwood <tcollingwood@tathameng.com>

Cc: Suzanne Troxler <stroxler@tathameng.com>; Jason Covey <jcovey@tathameng.com>; Stephen Gendron <SGendron@orillia.ca>

Subject: RE: Fittons Rd West SPS #18

Hi Tim,

Thank you for the information. We'll look into this and get back to you.

Regards,
Preya Balgobin, P.Eng.
Senior Project Manager



www.ainleygroup.com

Tel: (905) 452-5172 Ext. 209

Cell: (289) 541-8766

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From: Tim Collingwood <tcollingwood@tathameng.com>

Sent: Monday, June 28, 2021 9:30 AM

To: Preya Balgobin <balgobin@ainleygroup.com>; Stephen Gendron <SGendron@orillia.ca>

Cc: Suzanne Troxler <stroxler@tathameng.com>; Jason Covey <jcovey@tathameng.com>

Subject: RE: Fittons Rd West SPS #18

Good morning,

With respect to the history of the 109 L/s capacity of SPS 18, it appears to have come from the attached 2004 report by the City, which was then used as a basis for the 2012 Class EA.

Regards,

Tim Collingwood, B.A.Sc., P.Eng.

Director, Manager – Orillia Office

Tatham Engineering Limited

10 Diana Drive, Building 8, Unit 7 | Orillia | Ontario | L3V 8K8

T 705-325-1753 x2014 | C 705-323-6004 | tcollingwood@tathameng.com | tathameng.com



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From: Jason Covey <jcovey@tathameng.com>

Sent: June 25, 2021 11:54 AM

To: Preya Balgobin <balgobin@ainleygroup.com>

Cc: Tim Collingwood <tcollingwood@tathameng.com>; Stephen Gendron <SGendron@orillia.ca>;

Suzanne Troxler <stroxler@tathameng.com>

Subject: RE: Fittons Rd West SPS #18

Good Morning Preya,

Thank you for your reply. A couple of follow up questions:

1. Is it fair to say that the firm pumping capacity of SPS 18 is approximately 80 L/s (i.e. with two pumps in operation)?
2. What pumping rate/configuration was used for SPS 18 for the computer model analysis of the collection system? One pump running at 41 L/s? Two pumps running?

Regards.

Jason

From: Preya Balgobin <balgobin@ainleygroup.com>

Sent: Thursday, June 24, 2021 4:13 PM

To: Jason Covey <jcovey@tathameng.com>

Cc: Tim Collingwood <tcollingwood@tathameng.com>; Stephen Gendron <SGendron@orillia.ca>

Subject: RE: Fittons Rd West SPS #18

Hello Jason,

Thank you for your question and bringing this issue to our attention. The 41 L/s capacity listed in Table 18 of the Master Plan report is the capacity of one pump, as cited in the station's ECA. It is not the firm capacity of SPS 18. The ECA does not state the firm capacity of this 3-pump SPS.

The firm capacity of a three-pump SPS, per the Ministry of the Environment's guidelines, is the flow developed when two of the smallest pumps are operating at the same time. With SPS 18, the three pumps are the same size. However, the Master Plan drawdown test was performed with only one pump in operation, so it does not represent the SPS's firm capacity. We expect the firm capacity to be higher than 41 L/s.

We will add a note in Table 18 to clarify that the firm capacity is higher than listed in the table, but was not established during the Master Plan study.

We cannot comment on the accuracy of the 109 L/s that's reported in the 2012 Class EA as we were not involved in that Class EA. It does seem high. Perhaps they're reporting the flow developed with three pumps in operation. Again, we cannot verify this since we were not involved in that Class EA and suggest that you consult the Inch Farm Class EA documents to find out how exactly the 109 L/s was established.

Please reach out to us if you have additional questions.

Regards,

Preya Balgobin, P.Eng.

Senior Project Manager



www.ainleygroup.com

Tel: (905) 452-5172 Ext. 209

Cell: (289) 541-8766

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From: Jason Covey <jcovey@tathameng.com>
Sent: Tuesday, June 22, 2021 13:36
To: Stephen Gendron <SGendron@orillia.ca>
Cc: Tim Collingwood <tcollingwood@tathameng.com>
Subject: Fittons Rd West SPS #18

Good Afternoon Stephen,

Further to my voicemail today, I am trying to determine the available capacity at the Fittons Rd West sewage pumping station (SPS #18) to accommodate additional development west of Highway 11 being contemplated by our client.

I have reviewed the draft Wastewater System Master Plan report currently posted on the City's [website](#). The report states that SPS #18 has three variable speed pumps each with a capacity of 41 L/s, and this was confirmed with drawdown testing. However, the report appears to limit the total firm capacity of the SPS to 41 L/s (table 18 on p.77).

The 2012 Inch SPS Class EA indicated that SPS #18 was capable of pumping up to 109 L/s under parallel pump operation.

I'm wondering if you would be able to provide any further insight into the actual firm capacity of SPS #18. I expect that it's not as low as 41 L/s but perhaps 109 L/s is too high. Any info you can provide on the capabilities and/or limitations of SPS #18 would be helpful.

If you could please give me a call or send a reply at your earliest convenience, it would be appreciated.

Regards.

Jason

Jason R. Covey, B.Sc.(Eng.), P.Eng.

Senior Engineer

Tatham Engineering Limited

115 Sandford Fleming Drive, Suite 200 | Collingwood | Ontario | L9Y 5A6

T 705-444-2565 x2018 | C 705-888-0186 | jcovey@tathameng.com | tathameng.com



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