

**APPENDIX A**

**REFERENCE MATERIAL**





*Class Environmental Assessment for the*  
**Craigleith Sewage Treatment Plant**  
The Blue Mountains, Stage III Expansion

environmental study report



[www.genivar.com](http://www.genivar.com)

November 2009



4891

November 10, 2009

The Blue Mountains  
Water and Wastewater Services  
26 Bridge Street  
Thornbury, ON N0H 2P0

Attention: Mr. John Caswell  
Water and Wastewater Services Manager

**Re: Class Environmental Assessment for the Craigleith Sewage Treatment Plant  
Expansion  
Environmental Study Report**

Dear Sir:

We are pleased to present to The Blue Mountains the Environmental Study Report for the Provision of Craigleith Sewage Treatment Plant Stage 3 Expansion for the Craigleith Service Area and its surrounding developments including Castle Glen, Osler and areas in Collingwood.

We trust that our report submission meets your requirements and we look forward to the Town's review and comments.

Respectfully submitted,

**GENIVAR Ontario Inc.**

Michelle Albert, P.Eng.  
Project Manager

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Transmittal Letter  
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## Executive Summary

This Environmental Study Report (ESR) was completed as a continuation of the 2006 Combined Environmental Assessment Master Plan Phase 2 Final Report for the Craigleith, Castle Glen, and Osler Service Areas (Combined EA Phase 2 Final Report) which completed Phases 1 and 2 of the Municipal Class Environmental Assessment process for water and wastewater infrastructure in the Craigleith Service Area. Currently, wastewater generated in the Craigleith Service Area, is treated at the Craigleith Sewage Treatment Plant (STP). However, the existing Craigleith STP does not have sufficient capacity to service the projected increases in wastewater flow in the Service Area. Also, areas adjacent to Craigleith are developing and will require wastewater servicing and treatment, including Osler, Castle Glen, and areas in Collingwood. The Combined EA Phase 2 Final Report concluded that all of the wastewater generated in the Craigleith Service Area would be treated at an expanded Craigleith STP since expanding the existing STP had the lowest overall impact on the social and natural environment, at the least cost.

As part of this ESR a comprehensive review of current growth projections and sewage generation rates for the Town was undertaken. Current Town planning documents estimates that the total number of connections in 2028 for the Service Area will be 8,248. This is lower than the growth projections used in the Combined EA Phase 2 Final Report. For comparison purposes, the number of connections stated in the Combined EA Final Report for the Craigleith Service Area was 12,485, this equates to a decrease of 4,237 connections.

Three approaches were utilized to determine the sewage generation rate in the Service Area 1) MOE design criteria, 2) historical 5-year annual average flows, and 3) historical 5-year annual average winter (peak) season flows. Based on the analysis, it is recommended that the historical 5-year annual average winter (peak) season flow, which is  $0.89 \text{ m}^3/\text{unit}/\text{d}$ , be used to determine the timing of sewage treatment plant capacity increases. Therefore, based on the population projections and the sewage generation unit rate, the existing Craigleith STP will meet the Town's requirements until 2032. A planned Stage 3 expansion of the Craigleith STP, to increase the average day flow capacity at the plant by  $3,340 \text{ m}^3/\text{d}$  for a total treatment capacity of  $11,437 \text{ m}^3/\text{d}$ , should be planned for 2032. It is also recommended that the expanded plant be designed to meet the existing plant's effluent objectives and compliance limits.

A review and comprehensive analysis of sewage treatment plant process options was completed and to achieve the specified design criteria, the following unit processes are recommended for the Craigleith STP Stage 3 expansion:

- Grit Removal
- Extended Aeration
- Secondary Clarification
- Phosphorus Removal
- UV Disinfection
- Tertiary Filtration
- Aerobic Digestion

It is recognized that sewage treatment facilities should not be placed adjacent to sensitive land uses; therefore a minimum separation distance must be maintained. The conceptual design of the Craigleith STP Stage 3 expansion detailed in this ESR is based on the assumption that, given the

minimal noise and odour concerns historically identified at the plant, a minimum separation distance of 100 m will be adequate. However, upon the construction of the Stage 3 aeration/clarifier unit, the buffer zone will extend into approximately 18 m of the north limit of the existing site. It is therefore recommended that the land directly to the North of the site be purchased to maintain an adequate buffer from any potential noise/odour emissions from the Stage 3 expansion and to utilize the buffer zone to install noise and/or odour mitigating infrastructure if they are identified as a concern.

The total estimated cost for the Stage 3 expansion is presented in the Table below. These cost estimates have been developed at a planning level of accuracy and will be reviewed and updated during the preliminary and detailed design stages of the Stage 3 Expansion.

**Cost Estimation for Stage 3 Expansion**

Stage 3 Upgrades	Cost Estimation in 2008 dollars
One Grit Channel	\$150,000
One Aeration/Clarifier	\$2,900,000
One Aerobic Digester	\$1,700,000
Tertiary Filtration	\$1,700,000
UV System	\$500,000
Effluent Pumping Station Upgrade	\$100,000
Land Acquisition	\$250,000
Site Work/Landscaping	\$100,000
Site Pipework	\$150,000
Electrical	\$300,000
<b>Construction</b>	<b>\$7,850,000</b>
Project Contingency (15%)	\$1,177,500
<b>Total Construction Cost</b>	<b>\$9,027,500</b>
Engineering (15%)	\$1,354,125
<b>Total Project Cost</b>	<b>\$10,381,625</b>

## 1. Project Background

In 2006, The Blue Mountains completed a Combined Environmental Assessment Master Plan Phase 2 Final Report for the Craigleith, Castle Glen, and Osler Service Areas (Combined EA Phase 2 Final Report). The Combined EA evaluated alternatives and identified the water and wastewater servicing requirements to meet the growth expectations in the Craigleith, Castle Glen and Osler Service Areas as well as areas within Clearview Township and parts of the Town of Collingwood, which border The Blue Mountains. The Combined EA also identified preferred solutions for providing municipal water and wastewater servicing to areas in the Town which are currently not serviced.

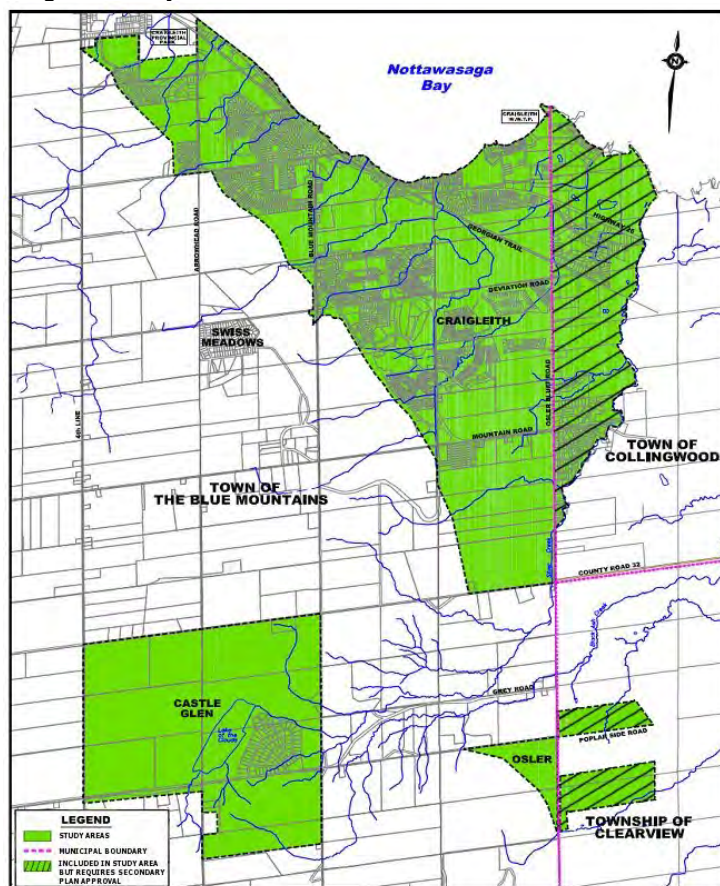
Presently, wastewater generated in the Craigleith Service Area, illustrated in Figure 1, is treated at the Craigleith Sewage Treatment Plant (STP) as shown in Plan 1. However, the existing Craigleith STP does not have sufficient capacity to service the projected increases in wastewater flow in the Service Area. Also, areas adjacent to Craigleith are developing and will require sewage servicing and treatment, including Osler, Castle Glen, and areas in Collingwood. It was concluded in the Combined EA Phase 2 Final Report that all of the wastewater generated in the aforementioned areas would be treated at an expanded Craigleith STP. Expanding the existing STP had the lowest overall impact on the social and natural environment, at the least cost.

Both the Combined EA and this project are being completed following the Municipal Class Environmental Assessment (Class EA) planning process which requires the integration of sound engineering judgment, prudent long-term planning and protection of all aspects of the environment (natural, social, economic, and cultural). Consultation with the public and affected agencies, to obtain comments and input, and ultimately achieve acceptance of the preferred alternative is a key component of the process.

This Study is being conducted in accordance with the requirements for a Schedule C project as set by the Municipal Class EA process.

The requirements for undertaking a Class EA are described in the document *Municipal Class Environmental Assessment*, October 2000 (as amended in 2007), Municipal Engineers Association (MEA).

Figure 1 – Project Service Area



# Plan 1- Study Area



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Nottawasaga Bay

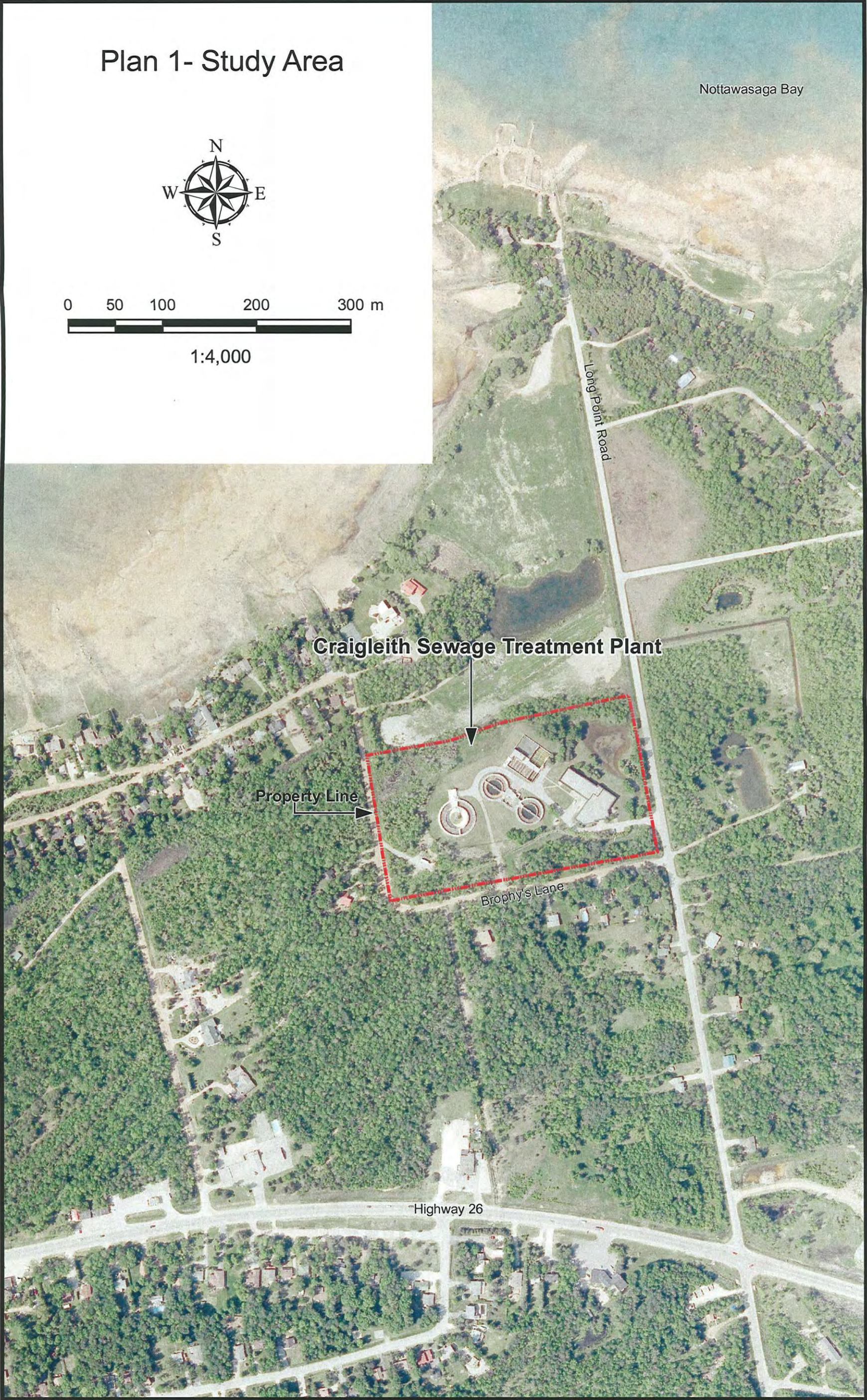
Long Point Road

**Craigleith Sewage Treatment Plant**

Property Line

Brophy's Lane

Highway 26



The Class EA document applies to a group of projects which are approved under the Environmental Assessment Act, as long as they are planned according to the requirements of the Class EA. The specific requirements for each project depend on the complexity of the project and the significance of potential environmental impacts. Four types of projects are identified in the Class EA document:

*Schedule A* projects are limited in scale and have minimal adverse environmental impacts. These projects generally include normal or emergency operational and maintenance activities. An example of a Schedule A wastewater project is the establishment of a sewage collection system and all necessary works to connect the system to an existing sewage outlet, provided all such facilities are in either an existing road allowance or a utility corridor. This type of project is pre-approved and may proceed to construction without further following the Class EA process.

*Schedule A+* was introduced as part of the 2007 amendments to the Class EA process. Schedule A+ projects are similar to Schedule A projects, in that the project is still pre-approved but the municipality is required to advise the public prior to project implementation. It is up to the municipality to determine how best to advise the public about the project. The municipality could put an ad in the newspaper, issue an information bulletin, hold a meeting, deliver notices, etc. An example of a Schedule A+ wastewater project is an increase of pumping station capacity by adding or replacing equipment and appurtenances, where new equipment will be located in an existing building or structure and where its existing rated capacity is exceeded. This type of project is pre-approved and may proceed to construction without further following the Class EA process.

*Schedule B* projects have the potential for some adverse environmental impacts and are approved provided they are “screened” by the public and government review agencies. These projects generally include improvements and minor revisions to existing facilities. An example of a Schedule B wastewater project is the establishment of a sewage collection system and all necessary works to connect the system to an existing sewage outlet, where the infrastructure is not located in an existing road allowance or a utility corridor.

*Schedule C* projects are generally more complex and have the potential for significant environmental impacts. These projects include the construction of new treatment facilities and major expansions to existing treatment facilities. This type of project is subject to the full Class EA process and requires the completion of all aspects (Phases) of the Class EA planning process concluding with the preparation of an Environmental Study Report (ESR).

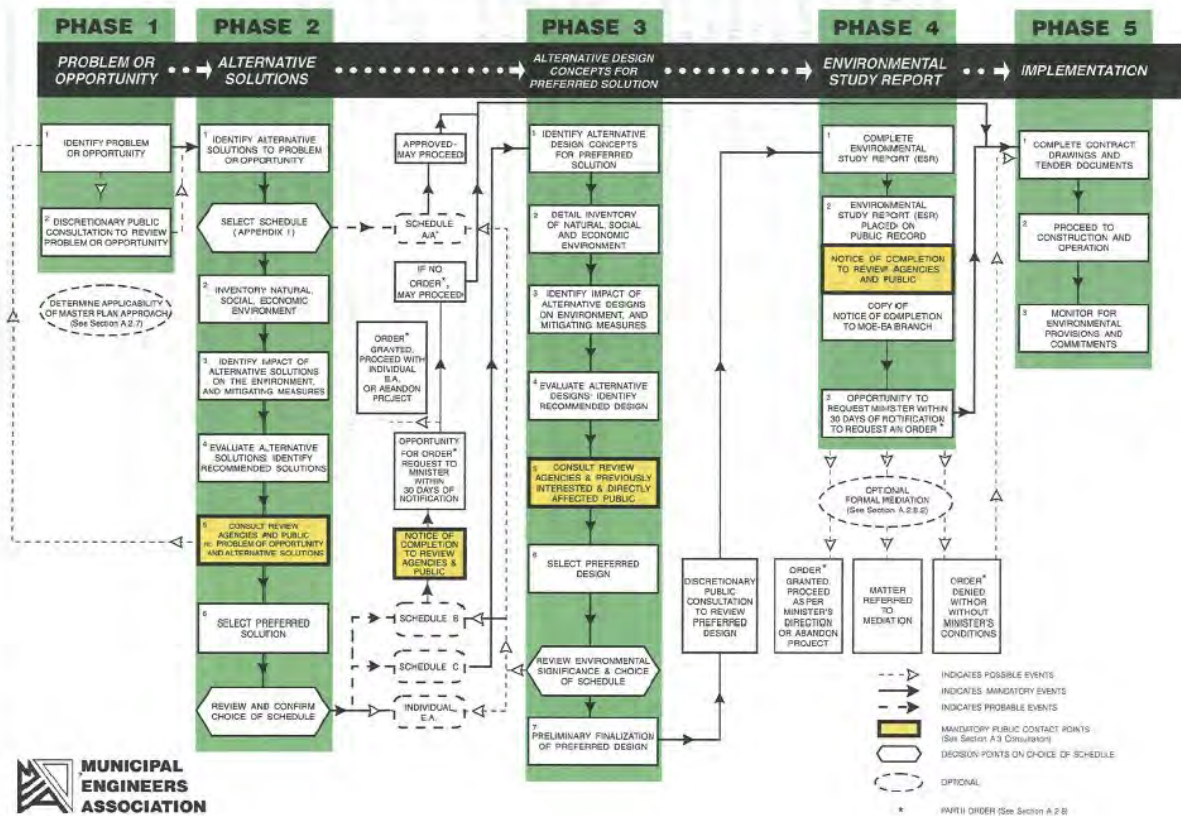
Agreements made or commitments given by the proponent to affected agencies or the public during the course of the Class EA process must be followed through and implemented, otherwise the EA approval will not be granted. If an affected agency or the public has a concern that cannot be resolved by discussion and negotiation with the proponent, then they can request the proponent to comply with Part II of the EA Act. Through issuance of a Part II Order, Schedule B and Schedule C projects may be elevated to an individual EA. It is also possible that Schedule B projects could be elevated to a Schedule C.

Details regarding each Phase of the Class EA process are provided below (additional information regarding the process is provided in Figure 2):

- Phase 1 - Identifying the problem or need for the project;

- Phase 2 - A thorough evaluation of the planning options or alternative solutions to the problem (last phase for a Schedule B);
- Phase 3 - An assessment of design alternatives;
- Phase 4 – Environmental Study Report - The completion of documentation for the public record; and
- Phase 5 - The implementation of the project including design, with appropriate monitoring during construction.

Figure 2 Municipal Class EA Process



In the Class EA process the expansion of an existing wastewater treatment plant is a Schedule C project and therefore Phases 1 to 5 of the Class EA planning process must be completed. A Schedule C Class EA concludes with the Notice of Completion and filing of the Environmental Study Report (ESR) on the public record for a minimum 30-day public review period.

Phases 1 and 2 of the Combined Class EA Process have been completed and are documented in the Combined EA Phase 2 Final Report, June 2006. This ESR reviews the conclusions of Phases 1 and 2 of the Combined EA, however this ESR focuses specifically on Phases 3 and 4 of the Class EA process namely, identifying the preferred design alternative and development of the Environmental Study Report. A review of the assessment of wastewater treatment alternatives documented in the Combined EA Phase 2 Final Report has been included in Appendix A; however it is important to note that the recommendation to expand the existing Craigleith STP has already been accepted by the public and review agencies.

## 2. Problem Statement

The Craigleith Sewage Treatment Plant (STP) currently services the majority of existing residents in the Craigleith Service Area. The existing Craigleith STP does not however have sufficient capacity to supply the proposed developments in the Service Area. Areas adjacent to Craigleith are also developing and will require sewage servicing and treatment, including Osler, Castle Glen, and areas in Collingwood. Based on the projected average sewage flow in the Craigleith Service Area, the existing Craigleith STP will meet or exceed its current rated capacity of 8,133 m<sup>3</sup>/d in approximately 2032.

## 3. Existing Permits and Approvals

The STP operates under the Certificate of Approval (C of A) No. 3-1027-92-006 issued October 7<sup>th</sup>, 1992. A copy of the C of A has been provided in Appendix B. The Certificate of Approval (C of A) for the Craigleith Sewage Treatment Plant identifies effluent objectives and non-compliance limits based on average monthly concentrations and loadings.

The existing plant was constructed in two stages:

- Stage 1 was constructed in 1986 with an average day flow capacity of 4,078 m<sup>3</sup>/d.
- Stage 2 was constructed in 2002/2003 and increased the average day flow to 8,133 m<sup>3</sup>/d with a peak design flow of 19,640 m<sup>3</sup>/d.

Presented in Table 1 below are the plant's current discharge objectives and non-compliance discharge criteria.

**Table 1 Craigleith STP Effluent Objectives and Compliance Limits**

Effluent Parameter	Effluent Objective (mg/L)	Non-Compliance (mg/L)
BOD5	10	15
SS	5	15
TP	0.2	0.3
Un-ionized Ammonia	0.1	0.2

## 4. Review of Existing Sewage Flow and Loads

Sewage from the Craigleith Service Area is pumped to the sewage treatment plant via the Main Pumping Station in Craigleith. Table 2 (as shown on the following page) summarizes the annual average day flows (ADF) and the peak day flows (PDF) from 1999 to 2007, recorded at the Main Pumping Station.

From 2001 to 2007 there has been a significant increase in the number of new connections. The average increase in connections from 1999 to 2007 was approximately 319 units per year. However, as indicated in Table 2 the annual average day flow per connection has continually decreased from 1999 to 2003 and from 2004 to 2006, while the peak flow rates have varied considerably.

**Table 2 Craigleith Sewage Treatment Plant: Yearly Average and Peak Flows**

Year	# of Connections	ADF (m <sup>3</sup> /d)	ADF (m <sup>3</sup> /connection/d)	PDF (m <sup>3</sup> /d)	PDF (m <sup>3</sup> /connection/d)
1999	1,434	1,723	1.20	5,099	3.56
2000	1,552	1,492	0.96	2,928	1.89
2001	1,801	1,706	0.95	8,039*	4.46
2002	2,127	1,764	0.83	3,700	1.74
2003	2,505	2,025	0.81	7,346*	2.91
2004	2,746	2,307	0.84	8,443	3.07
2005	3,305	2,259	0.68	5,229	1.58
2006	3,756	2,616	0.70	7,793	2.07
2007	3,985	2,407	0.60	10,667	2.68
				<b>Max.</b>	<b>4.46</b>

\*Note: values include sewage volumes diverted from the pumping station to the lagoons at the Thornbury Sewage Treatment Plant by pumper truck during a peak flow event. A total of 472 m<sup>3</sup> was diverted on February 9, 2001 and 778 m<sup>3</sup> was diverted on March 16, 2003.

The Blue Mountains experiences seasonal population variations which significantly impact the wastewater generation rate. To understand the effects of the seasonal population variations on the STP a review of the winter (January to March) wastewater generation rates was undertaken and is presented in Table 3 below.

**Table 3 Craigleith Sewage Treatment Plant: Peak Season Average and Peak Flows (January to March)**

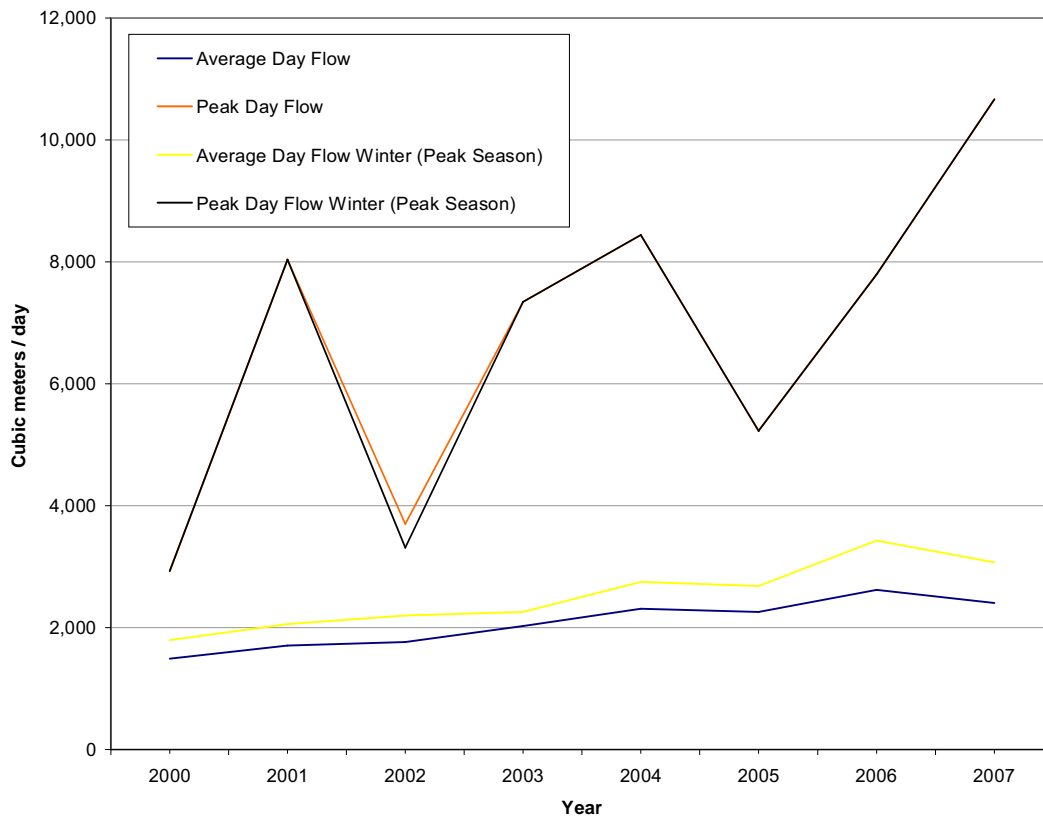
Year	# of Connections <sup>*1</sup>	ADF (m <sup>3</sup> /d)	ADF (m <sup>3</sup> /connection/d)	PDF (m <sup>3</sup> /d)	PDF (m <sup>3</sup> /connection/d)
2000	1,552	1,792	1.15	2,928	1.89
2001	1,801	2,056	1.14	8,039 <sup>2</sup>	4.46
2002	2,127	2,197	1.03	3,312	1.56
2003	2,505	2,260	0.90	7346 <sup>2</sup>	2.93
2004	2,746	2,748	1.00	8,443	3.07
2005	3,305	2,684	0.81	5,229	1.58
2006	3,756	3,429	0.91	7,793	2.07
2007	3,985	3,071	0.82	10,667	2.68
				<b>Max</b>	<b>4.46</b>

<sup>1</sup> The number of connections used to calculate per unit average and peak rates is based on total previous year end connections. Therefore to determine the per unit flow rates during the peak flow and loading season (January to March) the previous year end connection status was used as it provides a more accurate estimate of the actual number of connections. The number of connections has been updated since the completion of the Phase 2 Combined EA.

<sup>2</sup> Values include sewage volumes diverted from the pumping station to lagoons at the Thornbury Sewage Treatment Plant by pump truck during the peak flow event. A total of 472 m<sup>3</sup> was diverted on February 9, 2001, and 778 m<sup>3</sup> was diverted on March 16, 2003.

Based on the data presented in Tables 2 and 3 and illustrated in Figure 3 below, the average day flow to the plant in the winter season has historically been approximately 18% higher than the annual average day flow to the plant. Also, since 2003 the peak day flow to the plant has occurred in the winter. This information is key to establishing the design criteria for the expanded STP because the upgraded / expanded sewage treatment plant must be designed to treat the sustained winter average day flow to the plant.

**Figure 3 Craigeleith Sewage Treatment Plant: Comparison of Peak Season and Average Day Flows**



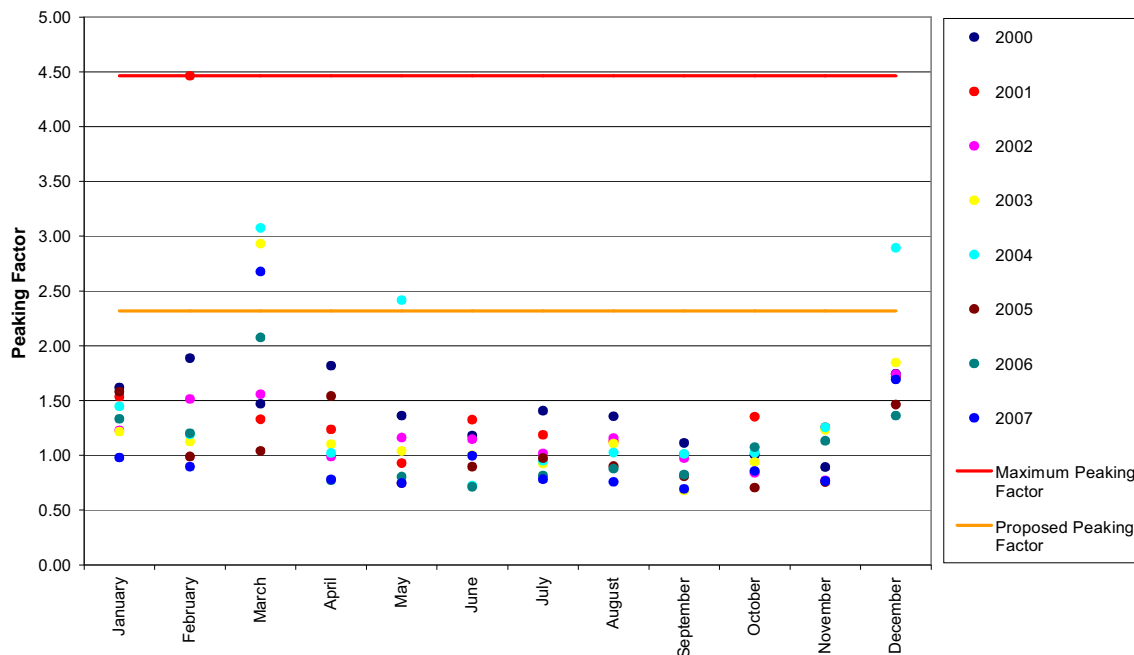
Additional detailed analysis regarding the wastewater generation rates in the Service Area was completed and is provided in Appendix C. A review of the ten highest annual peak flow events and their corresponding temperature and precipitation data (as recorded by Environment Canada at the Collingwood Monitoring Station) was carried out. Weather data was also reviewed to provide an indication of whether the peak flow events were influenced by wet weather conditions, such as a rainfall or snow melt. Over the past 3 years, the peak wastewater flows occurred in January, March, and December. December 31<sup>st</sup> / January 1<sup>st</sup> has consistently been one of the annual peak flow days.

Seasonal plant loadings (total suspended solids and biological oxygen demand) were also analyzed so that a more accurate representation of the plant's influent loadings could be attained. Similar to the flows, the loadings to the plant increase during the winter months. When comparing the six-years of seasonal flow, TSS and BOD loading data for the winter months (January to March) with spring months the following conclusions can be made:

- Average flow during the winter months was 1.3 times the average flow during spring months and therefore the impact of seasonal population variations is higher than inflow and infiltration impacts
- Average raw sewage loading for TSS was 2.4 times higher in winter months
- Average raw sewage loading for BOD was 2.1 times higher in winter months

Due to the impact of seasonal population variations on the wastewater generation rate a more detailed analysis was undertaken to assess the plant's peaking factor. Presented in Figure 4 below is the plant's monthly peaking factor from 2000 to 2006. As shown on the graph the maximum monthly peaking factor is 4.46 which occurred in February 2001. However the majority of the peaking factors were well below 3 with the 90% percent of the peaking factors being below 1.85.

**Figure 4 Monthly Peaking Factor from 2000 to 2006**



## 5. Description of Existing Craigleith Sewage Treatment Plant

### 5.1 Inlet Works

The Craigleith STP is equipped with two (2) manual bar screens and two (2) vertical auto shredders located in the inlet works overflow channel that receives the raw sewage influent through two (2) 300 mm forcemains from the Main pumping station.

Also included as part of the inlet works is the aerated grit removal system consisting of aeration equipment, grit lift pumps, grit classifiers and two aerated grit tanks. The grit removal system is located immediately downstream of the screening equipment. Each grit tank is approximately 4.0 m x 3.0 m x 2.65 m SWD (surface water depth) and provides a hydraulic retention time of 4.4 min. The total peak capacity of the grit removal system is 19,640 m<sup>3</sup>/d.

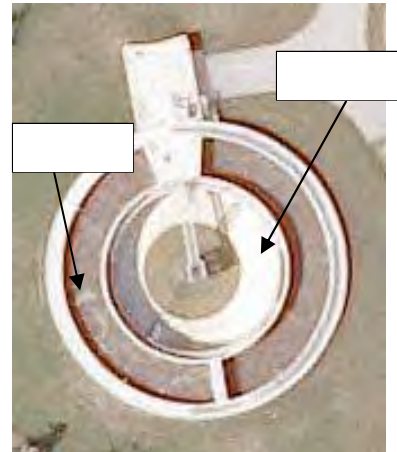
## 5.2 Aeration

Following the screens and grit removal, the flow is directed to the aeration tanks. All sewage contains organic matter, which serves as food for the microorganisms which are also contained in the wastewater. In order for the microorganisms to grow, air must be introduced into the aeration tank. At the Craigleith STP, air is introduced to the tank via fine bubble diffusers which are mounted on the floor of the aeration tank. The diffusers also ensure that the tank is fully mixed at all times.

The aeration tanks are sized to provide sufficient time to allow for the biomass to consume the organic matter contained in the raw sewage. Returned activated sludge (RAS) pumps recirculates organisms from the secondary clarifier to maintain an adequate concentration of activated sludge or microorganisms in the aeration tank to ensure the required degree of treatment is obtained.

The aeration tanks at the plant surround the outer circumference of the clarifiers (see photo below). The shape of this aeration tank/clarifier combination can greatly reduce the effects of ice and cold weather on the treatment process, as the warmer aeration tank provides an insulation shield for the clarifier.

During the original construction, two circular treatment units were constructed. Each aeration tank, has a total volume of 3,168 m<sup>3</sup>, representing a detention time of 18.6 hr at an average design flow of 4,078 m<sup>3</sup>/d. They have been designed to accommodate a total organic loading of 646 kg BOD<sub>5</sub>/d, which represents an organic loading rate of 8.5g BOD<sub>5</sub>/m<sup>3</sup> and are equipped with fine bubble air diffusion equipment. The aeration tank that was constructed during the Stage 2 expansion also consists of two (2) compartments; however this tank is equivalent in size to the 2 original tanks.



## 5.3 Alum Addition

Alum is added to the process in order to aid in the removal of phosphorus suspended solids. The alum reacts with the soluble phosphorus to form precipitous orthophosphate, which is removed by the secondary clarifiers.

Alum is introduced into the aeration mixed liquor overflow chamber or into the clarifier effluent sumps. The system consists of 27,000 L storage tank, which supplies two (2) chemical metering pumps, each rated for 30L/s. During normal operation the alum addition is flow paced off the incoming sewage flow meter to maintain a constant dosage rate.

## 5.4 Secondary Clarification

The secondary clarifiers serve to continuously remove settleable solids from the flow leaving the aeration tanks. The principle of clarification is to separate the solids as quickly as possible from the liquor coming out of the tank. The solids collected are called “activated sludge”. The activated sludge is either returned to the aeration tank to aid in the biological processes as return activated sludge (RAS) or directed to the solids processing facilities as waste activated sludge (WAS).

The Craigleith STP is equipped with three (3) secondary clarifiers. As discussed in section 5.2, the clarifiers are located inside the aeration basins. The clarifier that was constructed as part of Stage 2 has an internal diameter of 22 m and 4.5 m surface water depth (SWD). The two original clarifiers are smaller and have an internal diameter of 15.5 m and 4.5 m SWD.

## 5.5 Filtration

The Craigleith STP is equipped with four (4) automatic backwash (single media effluent filters). The total filtration capacity of the plant is 19,640 m<sup>3</sup>/d which includes an allowance for backwash flows.

## 5.6 Ultraviolet Light Disinfection

The plant is equipped with a UV disinfection system that is capable of disinfecting a peak hydraulic flow of 9,820 m<sup>3</sup>/d, with one extra module (stored on-site). If this extra module is installed the disinfection capacity of the plant increases to 19,640 m<sup>3</sup>/d.

## 5.7 Outfall

Effluent from the Craigleith STP is pumped from the STP through a 3,000 m long outfall into Nottawasga Bay (Georgian Bay). The outfall is designed for an ultimate peak flow of 26,621 m<sup>3</sup>/d.

## 5.8 Digestion

The sludge and scum that have been collected in the clarifiers are pumped to the digestion process. Craigleith STP is equipped with a two-stage aerobic digester, with an approximate volume of 462 m<sup>3</sup> in the first stage and 231 m<sup>3</sup> in the second stage. The aerobic digester is equipped with coarse bubble diffused aeration system and supernatant decanting facility.

# 6. Current Plant Performance

As indicated in Table 4 below, the plant has been performing exceptionally well and at no time (based on effluent concentration data from 2003 to 2006) has the plant's effluent criteria been exceeded.

**Table 4 Craigleith STP Historical Effluent Characteristics**

Year	Effluent Characteristics (Yearly Average – mg/L)/(Yearly Maximum – mg/L)			
	BOD5	SS	TP	Un-ionized Ammonia
2003	2.6/4.5	2.1/2.5	0.11/0.19	0.01/0.1
2004	2.5/5.5	2.3/4.5	0.11/0.28	0.02/0.1
2005	2.5/4.5	2.1/3.5	0.18/0.45	0.005/0.006
2006	3.6/12	2.1/4.0	0.16/0.22	0.01/0.10
2007	2.0/3.5	2.1/3.5	0.09/0.18	0.005/0.005

## 7. Population Projections

Since the completion of the Combined EA the proposed number of connections in the Service Area has been re-evaluated. Current Town planning documentation estimates that the total number of connections in 2028 for the service area will be 8,248. For comparison purposes, the number of connections stated in the Combined EA Phase 2 Final Report was 12,485 this equates to a decrease in the number of connections of 4,237. Also, the ultimate number of connections for the Craigeleith Service Area have been revised and current planning documentation estimates 11,014 connections in 2050 (final build-out).

## 8. Future Wastewater Generation Rates

### 8.1 Design Criteria Approaches

In establishing the design criteria for the new plant a review of relevant design criteria were undertaken.

#### Ministry of the Environment Wastewater Design Guidelines

MOE has developed design guidelines to calculate average day and peak sewage flows for the expansion or the construction of new sewage treatment plants. Generally utilizing the MOE methodology will result in higher projected average and peak day flows as they do not take into consideration the individual water use characteristics of residents in the service area. However, using the MOE design criteria will provide a conservative estimate of the wastewater generation to benchmark against.

The MOE design guidelines assume that the average day wastewater generation rate is equivalent to the average day water demand of 1,125 L/unit/d. The MOE guidelines also recommend an allowance of 90 L/capita/d or 225 L/unit/d for infiltration when calculating the average day wastewater generation rate for a total average wastewater generation rate of 1,350 L/unit/d.

The MOE design guidelines recommend the use of Harmon Formula to calculate the peaking factor for the domestic sewage flows and the incorporate of a peak sewage infiltration rate of 227 L/capita/d or 567.5 L/unit/d. Harmon Formula is presented below:

$$M = 1 + \frac{14}{4 + p^{0.5}}$$

where M is the peaking factor (minimum = 2.0), p is the design population in thousands, and the population density is assumed to be 2.5 people per connection.

In summary, the MOE design guidelines recommend calculating the wastewater generation rates as follows:

Total ADF = (ADF Rate + Base Infiltration Rate) x # of connections

Total PDF = (ADF Rate x M x # of connections) + (Peak Infiltration Rate x # of connections)

## Review of Historical Data

As discussed above, historical data shows loadings to the Craigleith STP increase during winter months, specifically January to March. It is critical that the treatment process is sized to treat flows during this peak loading season while also ensuring that the plant remains compliant with its monthly C of A requirements. Due to this significant difference between annual average day flow and peak season average day flows it is recommended that historical peak season average per unit rates should be used instead of annual average wastewater generation rates to determine the long-term plant capacity requirements. The January to March peak season average day flow (2003 to 2007) is 0.89 m<sup>3</sup>/unit/d. As shown in Figure 5 (on page 14), the projected flows calculated based on the historical yearly average are the lowest as they are heavily influence by low wastewater generation rates in the spring and fall. The projected flows calculated based on the historical peak season are higher as these months are the typical vacation periods and the population of the Town significantly increases. The projected flows calculated using the MOE design criteria were significantly higher than the historical peak season flow projections.

**Table 5 Average Sewage Flow Projections**

Year	# of Connections	Average Unit Rates (m <sup>3</sup> /Connection/d)		Average Flow (m <sup>3</sup> /d)		
		MOE Guideline	Historical	MOE Guideline	Historical Average	Historical Peak Season
2006	3,756	Sanitary 1.125 Infiltration 0.225	Yearly Average Flow = 0.73 Peak Winter Season (Average Flow) = 0.89	5,071	2,742	3,343
2007	3,985			5,380	2,909	3,547
2028	8,248			11,135	6,021	7,341

## 8.2 Timing of Capacity Increase

Currently, Craigleith STP is operating at approximately 30% of its rated capacity therefore an immediate need for an expansion is not demonstrated. To meet long-term wastewater servicing requirements, the timing of the Craigleith STP expansion is dependent upon the method utilized to predict future raw sewage flows. Three methods for predicting future raw sewage flows were analysed, MOE design criteria, annual average day flow, and peak season average day flow.

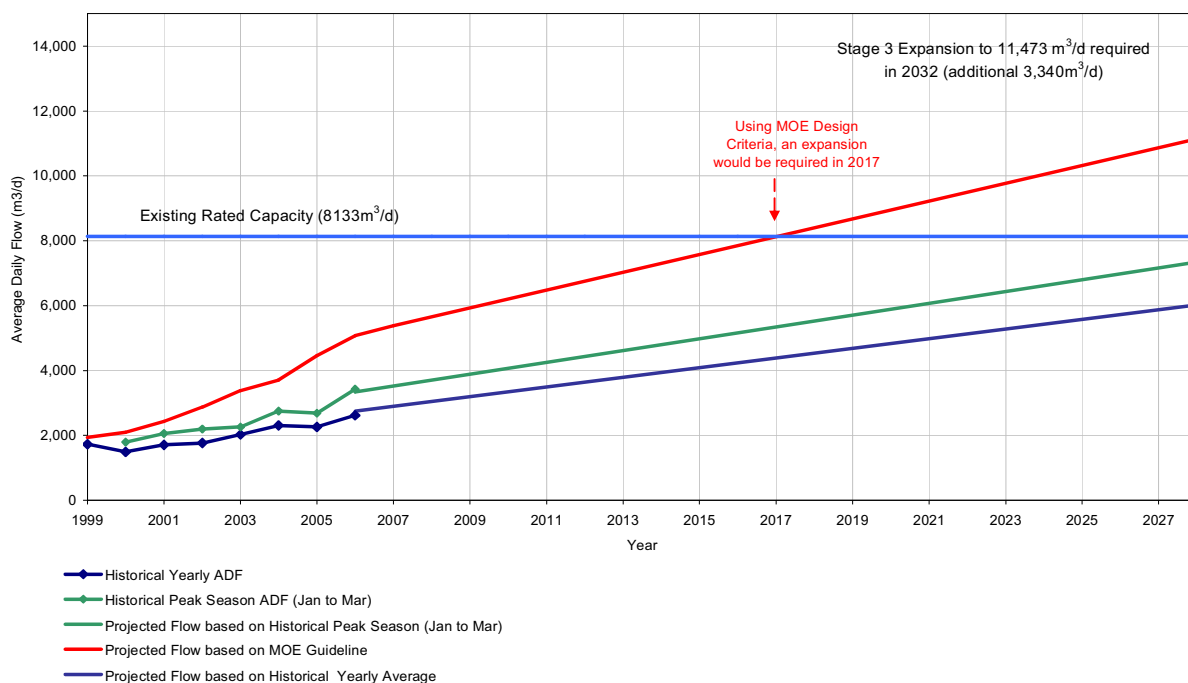
Based on an analysis using the MOE design criteria, the plant would require an expansion in 2017. Since the plant is currently operating at only 30% of its design capacity and there are no significant developments planned over the next eight years, an expansion in 2017 is not required. As shown in Figure 5, there is a significant difference between the MOE design criteria and both the historical peak season and the average day wastewater generation rates. Also, the difference between the plant's historical flows and the MOE design criteria seem to be increasing over time (i.e. in 2001 and difference between the peak season average day flow to the plant and the MOE design criteria was only 375 m<sup>3</sup>/d and in 2008 that difference increased to 1600 m<sup>3</sup>/d). A large contributing factor to the MOE design criteria is the amount of inflow / infiltration into the system. The Town has successfully implemented an inflow and infiltration reduction program and the amount of infiltration contributing to the historical flow rate to the plant has decreased significantly and is currently less than the MOE design criteria. Due to the large discrepancies

between the MOE design criteria and the historical flows to the plant, using the MOE design criteria to determine the timing of plant upgrades is not recommended.

Historically, the average daily flows during the winter season are considerably higher than the annual average daily flows this can be mainly attributed to seasonal population variations in the Service Area. Since the plant must be designed to treat the higher sustained winter flows and loadings, it is recommended that the timing of the capacity increase be based on the historical peak season average daily flows. As illustrated in Figure 5, based on this approach the existing Craigleith STP will have sufficient capacity until 2032.

It is important to note that all of the above methods are dependent on the number of ultimate future service connections in the Service Area which may change according to development applications; therefore, it is recommended that flow capacity assessments be regularly conducted to confirm the timing of the capacity increase.

**Figure 5 Timing of Craigleith Sewage Treatment Plant Expansion based on Projected Flows from Historical Peak Season Flows (January to March)**



### 8.3 Recommended Design Criteria

The Craigleith STP has a current rated capacity of 8,133 m<sup>3</sup>/d which meets the Town’s requirements until 2032. The planned Stage 3 expansion of the Craigleith STP will increase the average day flow capacity at the plant by 3,340 m<sup>3</sup>/d for a total treatment capacity of 11,473 m<sup>3</sup>/d.

According to the Combined EA Phase 2 Final Report, the design peak day flow (PDF) and the design average day flow (ADF) were determined to be 26,387 m<sup>3</sup>/d and 11,473 m<sup>3</sup>/d respectively. This utilizes a peaking factor of 2.3. It is important to note that the outfall is designed for a peak flow of 26,621 m<sup>3</sup>/d and therefore it is recommended that the plant be

designed to maximize the outfall's capacity. It is also recommended that the expanded plant be designed to meet the existing plant's effluent objectives and compliance limits.

## 9. Design Concepts for Preferred Solution

The preferred solution for the provision of additional wastewater treatment capacity for the Craigleith Service Area and in areas adjacent to Craigleith, including Osler, Castle Glen and areas in Collingwood, is to expand the existing Craigleith STP. This section provides an overview of the key components of a wastewater treatment plant and identifies design alternatives for expanding the facility.

### 9.1 Preliminary Treatment

Preliminary treatment is required to remove large solids and grit in the incoming wastewater. It usually involves two key processes screening and grit removal.

#### Screening

As discussed in Section 5, the plant is currently equipped with two manual bar screens and two vertical auto shredders (or comminutors). The two comminutors are capable of handling a peak flow rate of 26,640 m<sup>3</sup>/d, therefore no additional screening equipment would be required for the Stage 3 plant expansion.

#### Grit Chambers

Grit, which includes sand and other heavy particulate matter, such as seeds and coffee grounds, will settle from the wastewater when the velocity of the flow is reduced. If not removed in the preliminary treatment step, grit can cause abnormal abrasive wear on mechanical equipment, clog pipes, and reduce effective volumes by settling and accumulating in process tanks. The Craigleith STP is currently equipped with two aerated grit tanks. These tanks are compatible with all proposed downstream secondary treatment alternatives. A third aerated grit tank was constructed during the last expansion of the plant but the tank does not contain the required mechanical equipment for it to function effectively. It is recommended as part of the Stage 3 expansion that the third aerated grit tank be put into service.

### 9.2 Primary and Secondary Treatment

The main function of primary treatment is to remove easily settleable solids from the preliminary treated wastewater. Primary treatment generally removes 40% to 60% of the influent wastewater total suspended solids (TSS) and approximately 25% to 40% of the influent biological oxygen demand (BOD) and phosphorus. The BOD and phosphorus reduction is mainly due to the concentration of BOD and phosphorus contained in the solids which settle in the bottom of the clarifiers. The existing plant is not equipped with primary clarifiers.

The purpose of secondary treatment is to reduce the concentration of nutrients in the wastewater discharged to the Nottawasaga Bay (Georgian Bay). Secondary treatment utilizes microbes in the wastewater to break down and reduce the wastewater biological oxygen demand (BOD) and ammonia concentration.

Secondary treatment processes can generally be divided into fixed growth (film) and suspended growth. Fixed growth means that the biomass (microorganisms) are attached to media. Suspended growth means that the microorganisms are suspended in the wastewater. Both fixed and suspended growth processes have been evaluated based on the evaluation criteria established below:

Minimize impact on the Natural Environment by considering:

- Impact on aquatic habitat;
- Impact on vegetation and wildlife; and
- Impact on receiving water quality.

Minimize impact on the Social Environment by considering:

- Potential impact on surrounding properties (visual, odours); and
- Protection of public health.

Maximize Technical Suitability by considering:

- Reliability of wastewater treatment system;
- System flexibility (need for long-term modifications);
- Durability (life span of equipment);
- Ease of operation and maintenance;
- Ease of construction; and
- Ability to construct works in stages to defer capital cost requirements.

## 9.3 Evaluation of Primary and Secondary Treatment Alternatives

Rotating Biological Contactors (RBC) and Secondary Clarification

RBCs utilize a fixed growth process where biomass attaches to a series of circular disks located on a large shaft which is then rotated. As biomass accumulates on the RBC discs and becomes heavier, it sloughs off. The RBC effluent is then treated in a secondary clarifier. Generally, RBCs have a smaller footprint than other secondary treatment processes. However this process requires up-front primary clarification.

Trickling Filters / Solids Contact (TF/SC)

TF is a fixed film growth process where primary treated effluent is sprayed over a tower of structured media. The trickling filter effluent then flows into a small solids contact chamber (aeration tank) before secondary clarification. Historically, trickling filter technology has proven to be sensitive to lower temperatures.

Integrated Fixed Film Activated Sludge (IFAS)

In the IFAS treatment process, both fixed film and suspended biological growth occur simultaneously. The fixed film biological growth occurs on plastic media which are placed in the plant's aeration tanks. For existing aeration tanks, retrofitting can be undertaken to incorporate the IFAS technology into an existing treatment process. However, maintenance and operations of

the technology has been a concern in some jurisdictions and there is limited experience with the IFAS process at large scale installations in Ontario.

### Biological Aerated Filters (BAFs)

BAFs utilize an attached growth process whereby inert granular media is used to provide a surface for microbial growth and to facilitate effluent filtration. As with all filters, the process requires that the filter is backwashed intermittently for cleaning purposes. Depending on where the primary treated effluent is introduced in the process, there are two typical BAF configurations, downflow (the primary influent is introduced at the top of the BAF tank and flows down through the filter) or upflow (the primary influent is introduced at the bottom of the BAF tank and flows up through the filter). The BAF process does not require a secondary clarifier and therefore has a smaller footprint than the majority of “typical” secondary treatment processes. Some additional tankage is however required to operate and maintain a BAF system, such as a clean waste storage tank to facilitate the backwash process and an influent equalization tank.

### Membrane Bioreactors

Membrane bioreactors utilize a suspended growth activated sludge process with the membranes themselves being used to filter the wastewater in the aeration tank instead of a secondary clarifier. The membranes filter the wastewater to tertiary treatment quality (with total suspended solids less than 10 mg/L). Membrane plants however require an equalization tank and fine screening upstream of the secondary treatment process.

There are no large-scale wastewater membrane bioreactors currently operating in Ontario. Also, the operations and maintenance costs associated with the membranes are not yet well defined since there is currently insufficient operating data available to accurately determine the lifespan of a membrane.

### Sequencing Batch Reactors (SBRs)

SBRs utilize a suspended growth process in which aeration and clarification occur in the same tank. SBRs are essentially a fill and draw modification of air activated sludge where by the bioreactor is operated in a number of modes sequentially. It fills intermittently or continuously and decants intermittently. Aeration is also intermittent; it stops approximately one hour prior to decanting. Solids-liquid separation occurs in this period, and only the clarified upper layer is decanted, eliminating the need for a separate secondary clarifier. For municipal wastewater treatment with continuous flow, at least two (2) basins are used so that one basin is in the fill mode while the other goes through react, solids settling, and effluent withdrawal mode.

SBRs, BAFs and membrane bioreactors are usually installed on sites with very limited space available for the plant. The Craigeleith wastewater treatment plant site, albeit small, does not have the same space constraints as other jurisdictions who are investigating these aforementioned processes.

### Conventional Activated Sludge (CAS)

CAS system involves directing the effluent from the primary clarifiers to an aeration basin where it mixes with return activated sludge. The mixture, which is referred to as mixed liquor, is aerated. The aeration basin discharges to a secondary clarifier where the solid and liquid

fractions are separated. Most of the sludge is returned to the aeration basin to enhance the microbial community in the aeration basin. A fraction of the solids separated in the secondary clarifiers are diverted to solids handling.

CAS is the most common process for large secondary treatment plants and is therefore a proven wastewater treatment technology. Installing a conventional activated sludge plant would require the construction of both a primary and secondary clarifier. Additional land acquisition would also be required.

#### Extended Aeration

Extended aeration is a modification of the activated sludge process that incorporates a long solids retention time (SRT). Due to the longer SRT and subsequent higher solids concentration in the process, extended aeration is generally more stable and simpler to operate than conventional activated sludge. This type of secondary treatment does not require primary clarifier.

Extended aeration is a proven secondary wastewater treatment plant process and is very well suited for the phased expansion of the plant. The plant is presently utilizing the extended aeration process. From an operational standpoint, implementing the same process throughout the plant would lead to better process control. In term of ease of construction and cost, the extended aeration process would also be the most effective.

### 9.4 Summary of Evaluation of Alternative Designs for Secondary Treatment

A comparison of all secondary treatment options described above has been provided in Table 6.

Of the two fixed growth processes described above, RBCs could achieve better effluent criteria than trickling filters, and would be considered the more appropriate of these two alternatives. However, RBCs require heated enclosures, resulting in increased capital and operating costs. The use of RBCs in Ontario is also limited, likely due to the requirements for heating. Further more, the process is very different to the existing Craigleith STP treatment process and would require significant operational changes. Therefore, fixed growth treatment process will not be considered.

Both integrated fixed film activated sludge and biological aerated filters (BAF) processes lack of sufficient information on the operating and maintenance cost, therefore it is not recommend for this expansion.

In terms of suspended growth processes listed above, conventional activated sludge (CAS) is the most common process for large secondary treatment plants and is therefore a proven wastewater treatment technology. However, the process would be more difficult to implement at the existing site and would be operationally more complex. The CAS process is the only suspended growth process that requires a primary clarifier upstream of the secondary treatment process. As the existing extended aeration process does not require a primary clarifier, new primary clarifiers would need to be constructed for CAS. The capital cost and space required for this alternative would therefore increase. Furthermore, CAS processes are operationally complex due to sludge wasting rates needing to be carefully monitored. When influent flows increase, process changes must be implemented quickly to ensure that sludge washout does not occur. For these reasons, the CAS process was not recommended.

The application of membrane biological reactors is relatively recent, and use of the technology is limited in Ontario. Although MBRs present the advantages of high quality effluent, low space requirements, and ease of staged expansion, these are offset by numerous operational disadvantages and high capital cost. As this is a new technology, there is limited data available on membrane life span, and the cost for periodic membrane replacement is high. Furthermore, the need to control membrane fouling is a significant disadvantage. Overall, this alternative is not preferred.

SBRs are the least costly secondary treatment alternative, however, operationally SBR are more complex than extended aeration and will require retrofitting of the existing facility.

Extended aeration is a proven secondary wastewater treatment plant process and is very well suited for the phased expansion of the plant. Since the infrastructure has already been built for extended aeration process, this alternative is the least expensive secondary treatment process. Based on the above assessment and the wealth of staff experience operating and maintaining the extended aeration plant, it is considered the most suitable and preferred alternative for the expansion of the Craigeith Sewage Treatment Facility. While the other two options are technically feasible, the extended aeration option is preferred.

**Table 6 Secondary Treatment Evaluation Table**

Minimize Impact on Natural Environment								
Capability to consistently meet the plant effluent criteria	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
Minimize Impact on Social Environment								
Process footprint and availability of sufficient space on site for implementation of the process technology	Sufficient land on site.	Sufficient land on site.	Sufficient land on site.	Sufficient land on site.	Sufficient land on site.	Sufficient land on site.	Additional land required.	Additional land required.
Maximize Technical Suitability								
Track record in Southern Ontario (in similar climates and size)	Limited	No	Pilot testing	Yes. Smaller facilities. Pilot testing for larger facilities.	Currently under construction.	Yes. Smaller facilities.	Yes	Yes
Level of experience of Town staff with the treatment technology	No	No	No	No	No	No	Yes	Yes
Compatibility with existing processes	Not compatible	Not compatible	Not compatible	Not compatible	Not compatible	Not compatible	Not compatible	Yes
Additional upstream treatment requirements	Screenings, grit, and primary clarification	Screenings, grit, and primary clarification	Fine screenings, grit, and primary clarification	Fine Screening, grit, primary clarification, and flow equalization.	Fine Screening, grit, primary clarification, and flow equalization.	Screening and grit	Screenings, grit, and primary clarification	Screening and grit
Minimize Cost								
Ease of operations and maintenance	Simple. Few operating parameters.	Difficult, no staff experience.	Maintenance may be difficult.	PLC controlled. No staff experience.	PLC controlled. Difficult, no staff experience.	PLC controlled. Difficult, no staff experience.	Efficient due to significant staff experience.	Efficient due to significant staff experience.
Capital Cost	High	High	Very High	Very High	Very High	Low	Low	Lowest
Preferred Alternative								✓

## 9.5 Phosphorous Removal

Small amounts of phosphorus have been known to cause detrimental algal blooms in the receiving water. Typical phosphorous is removed either biologically or chemically. Removing phosphorus biologically requires both the plant's infrastructure and operating procedures to facilitate the preferential growth of certain types of phosphorus uptaking bacteria. The bacteria (under specific environmental conditions) can be manipulated to store large quantities of phosphorus as part of their survival strategy. Chemical phosphorous removal involves the injection of either alum or an iron salt (ferric or ferrous chloride) into the wastewater to precipitate out the phosphorus for settlement in the secondary clarifiers.

Biological nutrient removal is commonly used in southern Ontario. Chemical phosphorus removal with alum is currently being used effectively Craigleith STP to meet the current phosphorus limit of 0.3 mg/L. It is recommended that chemical phosphorous removal be continued for the Stage 3 plant expansion.

## 9.6 Disinfection

Disinfection is the destruction or inactivation of pathogenic organisms in treated sewage. Disinfection alternatives typically considered include:

- UV Disinfection
- Chlorination / De-chlorination
- Ozonation

Several other disinfection processes, such as hydrogen peroxide, bromine and peracetic acid, have been used in special applications, but have not been proven effective at full-scale wastewater treatment plants similar to the Craigleith STP.

### UV Disinfection

Ultraviolet (UV) light irradiation is an effective bactericide and virucide. Since ultraviolet irradiation is a physical rather than chemical disinfection method, no toxic residuals are produced. The major advantages of UV disinfection are its simplicity of operation, lack of impact on the environment, and short contact times. The disinfection efficiency of UV irradiation depends on the degree of penetration of light into the micro-organisms. Suspended solids in the effluent reduce the effectiveness of UV by shielding micro-organisms from the UV light. For this reason, UV irradiation is most effective on tertiary treatment plants, with low suspended solids concentrations (< 15 mg/L). The major operating costs associated with this process are for power consumption and replacement of ultraviolet lamps. The Craigleith STP is currently using UV disinfection.

### Ozonation

Ozone is a highly effective disinfectant, both as a bactericide and virucide. Unlike chlorine, ozone can exert a beneficial effect on the environment since ozone decomposes rapidly to oxygen shortly after application, thereby increasing the dissolved oxygen levels in the effluent. Ozone residuals are toxic to aquatic life but typically dissipate rapidly and are normally not found in the effluent by the time it reaches the receiving body of water.

Ozone is unstable, and therefore must be generated on-site from air or pure oxygen. The capital costs of ozone generating equipment are generally higher and the equipment must be sized to meet the ozone demand at the peak wastewater flow rate (as opposed to average flow). The operating costs are also high because ozone generation is energy intensive. The ozone contact tank must be covered and the off-gas must be collected and treated to eliminate the remaining ozone.

#### Chlorination / Dechlorination

Chlorination has historically been the most common method for disinfection. Its advantages include reliable equipment, simple and flexible operation, well-developed process control, and effective disinfection. Performance is relatively insensitive to operation and maintenance tasks, and independent of the upstream wastewater treatment processes, unlike UV disinfection. Historically, the most common method used is gaseous chlorination; however, many plants have converted to the use of liquid sodium hypochlorite, due to health and safety concerns associated with gaseous chlorine storage. A relatively long contact time is required to ensure adequate disinfection. Contact chambers for chlorination are typically much larger than tankage required for UV and ozone-based disinfection technologies.

Dechlorination is a process that is carried out after chlorine disinfection, to remove the chlorine residual. New federal Environment Canada guidelines specify a maximum total residual chlorine (TRC) of 0.02 mg/L. Gaseous sulphur dioxide is most commonly used for de-chlorination. Sodium bisulphite is also used at smaller plants to avoid health & safety concerns related to gaseous chemical handling. The reaction of these sulphur-based compounds with residual chlorine is nearly instantaneous, and therefore a separate contact chamber is unnecessary.

#### Comparison of Disinfection Processes

A comparison of the advantages and disadvantages of these effluent disinfection options is provided in Table 7.

**Table 7 Comparison of Disinfection Options**

Chlorination / De-chlorination	<ul style="list-style-type: none"> <li>• Proven technology</li> <li>• Low O&amp;M requirements</li> <li>• Low to Moderate energy use</li> </ul>	<ul style="list-style-type: none"> <li>• Largest footprint</li> <li>• Generates chlorinated organic carbons</li> <li>• Storage and handling of chemicals</li> <li>• Regulations</li> </ul>	Not recommended
Ozonation	<ul style="list-style-type: none"> <li>• Shorter detention time required</li> <li>• Can potentially provide a benefit to the environment</li> <li>• No toxic residuals if process controlled properly</li> <li>• Technology not proven for wastewater applications</li> </ul>	<ul style="list-style-type: none"> <li>• High O&amp;M costs (high electrical costs)</li> <li>• Few installations in North America with still fewer in Canada</li> <li>• Ozone is a respiratory toxicant. Ozone emission controls would need to be installed</li> <li>• Pilot plant testing would be required to determine correct ozone dosages</li> <li>• No local operator experience on the technology</li> </ul>	Not recommended
UV Irradiation	<ul style="list-style-type: none"> <li>• Very small footprint</li> <li>• Proven technology</li> <li>• Capital costs would be similar to chlorination/dechlorination</li> <li>• No chemicals added to effluent</li> </ul>	<ul style="list-style-type: none"> <li>• Lamp cleaning can be excessive where wastewater has high Fe and Ca levels</li> <li>• Sensitive to Wastewater Treatment Plant performance</li> <li>• High energy use</li> </ul>	<b>Recommended with tertiary filtration</b>

## 9.7 Tertiary Treatment

To consistently meet the expected TSS concentration regulation of 15 mg/L, tertiary treatment is recommended. The most common form of tertiary treatment is filtration. There are several different types of filters utilized in wastewater treatment plants to remove suspended particles and residual phosphorus compounds from the treated effluent. Despite the different types of equipment, the filtration principle remains essentially the same for all filters. There are however two (2) very different modes of operation with regard to the cleaning phase, semi-continuous filtration and continuous filtration.

In a semi-continuous filtration system, the filtration phase and backwash phase occur sequentially. In other words, when the filter has reached the end of its cycle the flow of water is reversed and the filter enters the backwash phase. In a continuous filter system, the filtration and backwash phases occur simultaneously.

The Craigleith STP is equipped with four (4) automatic backwash sand filters (continuous filtration system). The normal operations of the filters are completely automatic, however the filter backwash sequence timing can be adjusted by the operators when it is required. Following a backwash, the backwash water is pumped to the main plant waste pumping station. From the main plant waste pumping station, the backwash water is transferred back to the inlet works. Since the existing plant is utilizing continuous filtration and have no significant operations and maintenance concerns regarding the technology, it is recommended that it be continued for the Stage 3 expansion.

## 9.8 Biosolids Stabilization

Biosolids stabilization processes are generally selected to be compatible with the existing wastewater treatment processes and are necessary to reduce pathogenic levels in the sludge.

For Craigleith STP, it is recommended that on-site aerobic digestion be continued and land applications of the digested biosolids be carried out. The requirement for additional primary and secondary digester capacity will be assessed based on forecasted flows, existing digester capacity, estimated additional needs and land space available. Conversion of one (or both) of the existing two secondary digesters to primary digester is one available option for increasing plant's sludge management capacity.

## 9.9 Preferred Design Alternative

To achieve the above design criteria, the following unit processes are recommended for the Craigleith STP Stage 3 expansion:

- Grit Removal
- Extended Aeration
- Secondary Clarification
- Phosphorus Removal
- UV Disinfection
- Tertiary Filtration
- Aerobic Digestion

# 10. Conceptual Design for Preferred Alternative

## 10.1 Confirmation of Design Criteria for the Planned Stage 3 Expansion

Table 8 below presents the influent wastewater parameters for this conceptual design.

**Table 8** Design parameters

Parameters	Value
Population	28,973
Average Day Flow	11,473 m <sup>3</sup> /d
Peaking Factor	2.32
Peak Day Flow	26,621 m <sup>3</sup> /d
BOD <sub>5</sub> Loading	77g/capita.day
SS Loading	90 g/capita.day
TKN Loading	18 g/capita.day

## 10.2 Inlet Works

### Screening/Grit Removal

The existing two comminutors are currently rated for the design peak flow of 26,621 m<sup>3</sup>/d. The two manually raked bar screens which are installed in the bypass channel are utilized only during unusually high peak flows or during comminutor maintenance.

The plant is currently equipped with three aerated grit tanks with a total volume of 96 m<sup>3</sup>. However, only two of the grits tanks have been equipped with aeration equipment, grit pumps and related appurtenances. In Stage 3, the remaining 3<sup>rd</sup> aerated grit tank will need to be put into service. A review of the existing grit tank capacities and verification that they will meet the Ministry of the Environment design standards is presented in the table below.

**Table 9 Grit Tank Sizing**

Expansion	Numbers	Volume (m3)
Stage 1	1	32
Stage 2	1	32
Stage 3	1	32
Total	3	96
Detention time at PF	5.19 mins	Meets MOE Guidelines

### 10.3 Aeration Basin and Clarifier

Extended aeration is the recommended alternative for the Stage 3 expansion. The new aeration tank will be constructed identical to the existing Stage 2 tank. The tank will have a side-water depth of 4.5 m.

The microorganisms that consume the nutrients contained in the wastewater require oxygen to grow and reproduce. Generally, a dissolved oxygen concentration of 2 mg/L should be maintained in the aeration tanks at all times. There are four common types of aeration systems:

1. Mechanical aerators
2. Coarse bubble submerged diffusers
3. Fine bubble submerged diffusers
4. Fine bubble full floor diffused air system

The existing aeration basins are equipped with a fine bubble full floor diffused air system. There are many types of fine bubble diffusers currently available with the most common diffusers being ceramic or membrane disks or membrane tubes. The type of diffusers will be confirmed in preliminary design phase. However, it is recommended that a fine bubble full floor diffused air system be used in the new aeration basins.

Blowers will be required to supply air to the aeration tanks. The blower type will be selected during the preliminary design phase of the project. At this stage of the conceptual design, it is recommended that the highest efficiency blowers available be selected (i.e. high efficiency single stage centrifugal blowers). The existing blower adjustments are based on automatic dissolved oxygen (D.O) probes in the aeration cells. Continued use of the D.O probes is recommended.

The aeration tank will be constructed in the form of an annular ring surrounding the outer circumference of the clarifier units. This type of construction is the same as the Stage 2 expansion. Design parameters for the extended aeration tank are presented in the Table 10 below.

**Table 10 Extended Aeration Tank – Design Parameters**

Parameter	Dimension
Average Day Flow (m <sup>3</sup> /d)	11,473
Peak Day Flow (m <sup>3</sup> /d)	26,621
Number of Tanks	4 (Total, Including 3 of existing tanks)
Number of Tanks (Stage 1)	2
Aeration Tank Volume (m <sup>3</sup> )	1,584/tank
Number of Tanks (Stage 2)	1
Aeration Tank Volume (m <sup>3</sup> )	3,167
Number of Tanks (Stage 3)	1
Surface Area (m <sup>2</sup> )	704
Water Depth (m)	4.5
Aeration Tank Volume (m <sup>3</sup> )	3,167
Total BOD Loading (kg/d)	2,231
BOD Loading for Stage 3 (kg/d)	744
Stage 3 ADF (m <sup>3</sup> /d)	3,340
Detention Time (hrs)	23
Air Requirements (L/s)	2,216

For the Stage 3 expansion, one additional secondary clarifier is recommended. Design parameters for the new clarifier are presented in Table 11.

**Table 11 Clarifier – Design Parameters**

Parameter	Dimension
Number of Basins	4 (Total, Including 2 of existing tanks)
Number of Basins (Stage 1)	2
Diameter (m)	15.5/tank
Total Surface Area (m <sup>2</sup> )	185/tank
Number of Basins (Stage)	1
Diameter (m)	22
Total Surface Area (m <sup>2</sup> )	380
Stage 3	
Number of Basins	1
Diameter (m)	22
Total Surface Area (m <sup>2</sup> )	380
Total Volume (m <sup>3</sup> )	1,521
Surface Overflow Rate (m <sup>3</sup> /m <sup>2</sup> .day)	23
Side Water Depth (m)	4.5
Detention time at ADF 3824 m <sup>3</sup> /d (hr)	9.5

## 10.4 Tertiary Filtration

The proposed new tertiary filters will consist of sand beds, internal flow directional components, filtrate weirs, filtrate flumes, and internal sand washing systems. It is recommended that a local control panel, air compressor, reject sumps (equipped with pumps) and associated appurtenances be included as part of the tertiary filtration equipment package. Design parameters for the new tertiary filters are presented in Table 12. It is proposed that the filters be located north of the existing filters.

**Table 12 Filtration – Design Parameters**

Parameter	Dimension
Number of Modules per Channel	26
Number of Channels	3 (Total, Including 2 existing channel)
Number of Filter per Channel	2
Area per Filter (m <sup>2</sup> )	31.2
Filter Dimensions (m) L x W	11.38 x 2.74
Backwash Flow Rate (m <sup>3</sup> /d)	1,147
Total Peak Flow + Backwash Flow (m <sup>3</sup> /d)	27,768
Peak Flow + Backwash Flow (m <sup>3</sup> /d) for each filter	4,628/filter
Hydraulic Loading (m <sup>3</sup> /m <sup>2</sup> .hr)	6.18/filter
Solid Loading (kg/m <sup>2</sup> .day)	3.71/filter

## 10.5 Chemical Addition

In order to reduce phosphorus compounds in the effluent wastewater, aluminum sulphate or ‘alum’ will be added upstream of the tertiary filters to promote the creation of a floc which can be removed during the filtration process.

The existing administration building is equipped with a 27,300 L bulk alum storage tank designed for an assumed influent phosphorus concentration of 5 mg/L. Given the actual influent phosphorus concentration range between 2.6 to 3.8 over the last seven years, the existing bulk tank is sufficient for the Stage 3 expansion. As discussed above, the effluent objective for TP is 0.2 mg/L, therefore 55 kg of phosphorus will need to be removed daily. The estimated daily alum usage is 115.65 kg with a dosage rate of liquid alum of 110.77 mg/L and 170.41 mg/L respectively.

Two new metering pumps rated at 64 L/hr will need to be added to the alum addition system.

## 10.6 UV Disinfection

The Craigleith WWTP is currently equipped with two UV treatment trains with each train capable of treating 4,910 m<sup>3</sup>/d of flow for a total peak flow capacity of 9,820 m<sup>3</sup>/d. To meet the peak flow requirement of Stage 3 the UV system will need to be upgraded. It is recommended that a new UV channel be added adjacent to the existing channel. The new channel will be equipped with one additional UV treatment train.

## 10.7 Aerobic Digesters and Sludge Storage

Currently, the waste activated sludge is stabilized using a two stage aerobic digester. For the Stage 3 expansion, one additional two stage digester of approximately equal volume to the Stage 1 and 2 digesters will be required. The new digester needs to provide a biosolids storage period of approximately 180 days.

## 10.8 Effluent Pumping Station and Outfall

Effluent from the Craigleith STP is pumped from the STP through a 3,000 m long outfall into Nottawasaga Bay (Georgina Bay). In an outfall analysis summarized in the Technical

Memorandum titled Craigeleith STP – Effluent Outfall Capacity, the effluent pumping station and outfall capacity were reviewed for the Stage 3 expansion. According to the Technical Memorandum, the existing effluent pumping station has a total installed capacity of 18,490 m<sup>3</sup>/d and it is recommended as part of the Stage 3 expansion that the capacity of this pumping station is increased. This can be achieved by either replacing one or two of the existing pumps or adding a third pump.

The outfall was originally designed for an ultimate peak flow of 26,621 m<sup>3</sup>/d. Currently, nine diffuser ports are opened. According to the outfall analysis that was performed in the Combined EA, three additional diffuser ports would require to be opened to accommodate the effect of increasing the existing outfall capacity from 19,640 m<sup>3</sup>/d to 26,621 m<sup>3</sup>/d.

## 10.9 Cost Estimation for Stage 3 Expansion

The total estimated cost for the Stage 3 expansion is presented in the Table 13 below.

**Table 13 Cost Estimation for Stage 3 Expansion**

Stage 3 Upgrades	Cost Estimation in 2008 dollars
One Grit Channel	\$150,000
One Aeration/Clarifier	\$2,900,000
One Aerobic Digester	\$1,700,000
Tertiary Filtration	\$1,700,000
UV System	\$500,000
Effluent Pumping Station Upgrade	\$100,000
Land Acquisition	\$250,000
Site Work/Landscaping	\$100,000
Site Pipework	\$150,000
Electrical	\$300,000
<b>Construction</b>	<b>\$7,850,000</b>
Project Contingency (15%)	\$1,177,500
<b>Total Construction Cost</b>	<b>\$9,027,500</b>
Engineering (15%)	\$1,354,125
<b>Total Project Cost</b>	<b>\$10,381,625</b>

These cost estimates have been developed at a planning level of accuracy and will be reviewed and updated during the preliminary and detailed design stages of the Stage 3 Expansion.

## 10.10 D-2 Guideline Compliance

The Ministry of the Environment’s D-2 Guideline (1996), Compatibility Between Sewage Treatment and Sensitive Land Use, establishes recommended buffer area requirements for separation distances between sewage treatment facilities and sensitive land uses, which includes residential/commercial developments. Section 3.4.2 of the Guideline states that facilities with design capacities between 5,000 and 25,000 m<sup>3</sup>/d should have a minimum separation distance of 100 m between the periphery of the noise/odour-producing source-structure to the property/lot line of the sensitive land use and a recommended separation distance of 150 m.

It is recognized that sewage treatment facilities should not be placed adjacent to sensitive land uses; therefore a minimum separation distance must be maintained. The conceptual design of the Craigleith STP Stage 3 expansion under the current Class EA study is based on the assumption that, given the minimal noise and odour concerns historically identified at the plant, a minimum separation distance of 100 m will be adequate. However, upon the construction of the Stage 3 aeration/clarifier unit, the buffer zone will extend into approximately 18 m of the north limit of the existing site as shown in Plan 2. It is therefore recommended that the land directly to the North of the site be purchased to maintain an adequate buffer from any potential noise/odour emissions from the Stage 3 expansion and to utilize the buffer zone to install noise and/or odour mitigating infrastructure if they are identified as a concern.

It is expected that since the Stage 3 expansion is utilizing the same process technologies, odour and noise issues should not be a concern. However, should any odour/noise issues arise due to the Stage 3 expansion in the future; these issues should be investigated and the potential for implementing further noise/odour control strategies should be assessed.

## 11. Potential Effects and Mitigating Measures

This Environmental Study Report describes the process by which the various alternatives were analysed and the most suitable design is chosen.

It has been recognized that with the construction or modification of infrastructure, some environmental impacts will be unavoidable. Measures will have to be taken to either minimize or offset these effects. Actions taken to reduce the effects of a certain project on the environment are called “mitigating measures”.

During recommended or proposed works, the environment affected by a project will be established and the specific net effects identified. Measures that must be taken to minimize the negative effects will be worked out such that project designs are tailored to recognize them. Contract drawings and documents may then include special provisions to ensure the least impact on the environment.

Many projects that undergo the Class EA planning process are carried out by a contractor who was awarded the project by competitive tender and the contractor is normally the low bidder. The contractor will have estimated costs and the planned method of operation during the tendering stage subject to the specifications and special provisions in the contract and any relevant legislation.

Contractors differ in their approach regarding sequence of operation, techniques, methods of operation, type, make and size of equipment utilized, and speed of operation. There is, however, a fairly general uniformity in construction operation, being the natural result of economic competition.

Some of these construction operations have potential for environmental impacts, and where these can be anticipated in the design stage, special provisions shall be written into the construction package. The provision will spell out what can or cannot be done during construction. Unforeseen problems that arise during construction shall be addressed on the site, and the proponent’s best judgement used to ensure that changes to the contract do not cause negative environmental impacts.

# Plan 2 - Proposed Stage 3 Expansion & Required D - 2 Buffer Zone



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Staff responsible for inspecting the contractor's work must be made aware of such provisions in order to ensure compliance during construction. It shall be the responsibility of the proponent to ensure that inspectors enforce compliance with the environmental provisions, as well as the traditional engineering provisions of the construction package.

## 11.1 Social, Economic and Cultural

### 11.1.1 Traffic

It is expected that any infrastructure work will increase the occurrence of truck traffic and have impacts on traffic patterns within the study area. This will result in an increase in levels of noise, vibration and air pollution. Temporary closures of one or more lanes along any access roads or within project sites may be required. Impacts will be minimized by implementation of the following procedures:

- A traffic management plan will be prepared in consultation with staff of The Blue Mountains to minimize traffic disruptions during construction.
- The methods and timing of construction will be reviewed to minimize traffic impacts including weekend closures, longer work hours while in the roadway and tunnelling road crossings.
- All adjacent property owners and businesses adjacent to any works will be notified of construction and scheduling.
- Temporary access or alternative parking will be provided to residents and businesses if their usual access is interrupted for extended periods of time.
- In accordance with standard procedures and wherever warranted, work areas will be clearly delineated and flag staff will be engaged to ensure a safe and expedient traffic flow.

### 11.1.2 Noise, Dust and Vibrations

The potential sources of noise, dust and vibration are truck traffic and regular construction activities. These impacts can be mitigated as follows:

- All truck traffic, excavation equipment and other activity that potentially generates significant noise levels will be restricted to normal work hours;
- Excavated soil and rock materials should be used on-site as much as possible in order to minimize truck haulage to off-site disposal areas;
- Truck traffic and excavation equipment operation should be limited to daylight hours according to seasonal variation in day length;
- Construction activities will comply with Town noise by-laws;
- A dust control agent will be applied as necessary;
- Dry exposed soil will be sprayed with water to make it less susceptible to wind erosion, and covered if left for extended periods of time; and
- Pre-construction and post-construction building surveys will be completed to ensure that any impacts associated with construction can be clearly identified.

### 11.1.3 Public Notification

Public notification of any construction related activities might include newspaper ads, fliers and signs. Keeping the public informed of the pending and ongoing work will be beneficial to good public relations. Notices will include traffic restrictions, lane closures, detour routes, description or status of work, and contact information for the site supervisor.

### 11.1.4 Cultural Environment

It has been recognized that any areas outside road allowances that are undisturbed might have potential for archaeological impacts. If buried archaeological remains are encountered during construction, the office of Regulatory and Operations Group, Ministry of Tourism, Culture and Recreations will be contacted immediately.

## 11.2 Natural Environmental Impacts

In any project where vegetation removal is required, restoration plans will be developed as part of the detailed design.

Roadways within the service areas of The Blue Mountains facilitate wildlife movement, however it is expected that wildlife habitat will be largely designated to woodlands or wetland tracts or stream corridors that are located outside any proposed works areas. Since construction activities are expected to have only minimal and temporary disturbance to wildlife and result in no loss of habitat for any species, no mitigation measures have been proposed.

All planned construction activities, in areas with karst topography, require the review and approval of a karst specialist to ensure all planned construction activities are feasible from the karst perspective.

### 11.2.1 Dewatering

There is always the possibility of localized dewatering during any excavation. A geotechnical investigation will be carried out during the design phase of the projects, which will identify potential dewatering requirements. Should dewatering be needed, a dewatering plan will be prepared to assess and reduce the potential impacts of dewatering in the study area. The dewatering plan will be carried out in consultation with the Nottawasaga Valley and Grey Sauble Conservation Areas and the MNR. The plan will address impacts that may occur during construction as a result of dewatering on private wells and/or flow in adjacent watercourses. If the removal of more than 50,000 litres of water per day is necessary, from either a surface or groundwater source, a “Permit to Take Water” must be obtained from the MOE.

## 11.3 Utility Impacts

Any existing utilities within the service areas that may be impacted during construction will be taken into consideration during design. This includes existing watermains, sewers, gas mains, buried cable and telephone lines, and hydro poles and overhead wires. During the design phase, preliminary drawings will be circulated to the utility companies to determine the location of existing utilities.

## 11.4 General Mitigating Measures

Table 14 provides a summary of typical potential effects and mitigating measures that will be considered.

**Table 14 Typical Mitigating Measures for Potential Adverse Environmental Effects**

Effect	Mitigating Measures	Application Where/When
<b>Surface Drainage System</b>		
Sedimentation and Turbidity of adjacent water bodies	<ul style="list-style-type: none"> <li>erosion control measures</li> <li>buffers and setbacks</li> <li>sediment traps</li> <li>staging work</li> <li>bio-engineering techniques</li> </ul>	<ul style="list-style-type: none"> <li>After site grading and during construction on slopes and channels</li> <li>Collect sediment before entering drainage channel</li> <li>During biologically critical periods</li> </ul>
Ponding effects on adjacent properties due to natural drainage disruption	<ul style="list-style-type: none"> <li>appropriate use of culverts, porous backfill and tile drains</li> <li>apply natural channel design principles</li> </ul>	<ul style="list-style-type: none"> <li>In new construction projects and expansion</li> </ul>
Streambank erosion from diversion, construction or channelization of watercourse	<ul style="list-style-type: none"> <li>erosion control measures</li> <li>bio-engineering techniques</li> </ul>	<ul style="list-style-type: none"> <li>River crossings, drainage outlets</li> </ul>
Contamination of surface waters through runoff, spills, leaks and disinfection activities	<ul style="list-style-type: none"> <li>provision for spill control</li> <li>fast accurate reporting of spill</li> <li>spill containment</li> <li>stockpile materials or devices for spill control</li> <li>avoid adverse soil conditions</li> <li>monitor facility for leaks</li> <li>implement disinfection techniques in concert with fisheries requirements</li> <li>pollution prevention and source control by best management land use practices and best management stormwater practices</li> <li>buffers and setbacks</li> <li>install check dams on drainage swales</li> </ul>	<ul style="list-style-type: none"> <li>As a general practice and particularly in vicinity of waterbodies, wetlands</li> </ul>
Changes in volume of surface runoff	<ul style="list-style-type: none"> <li>use design measures to minimize increase in surface runoff</li> </ul>	<ul style="list-style-type: none"> <li>New impervious surfaces</li> </ul>
Flood storage capacity / obstructions to flow	<ul style="list-style-type: none"> <li>avoid or minimize fill placement/structures in Regional Storm Floodplains</li> <li>obtain "Fill, Construction, Alteration to Waterways" permits from local Conservation Authority prior to any works</li> </ul>	<ul style="list-style-type: none"> <li>Construction within river valleys. Disposal of excess fill</li> </ul>
<b>Groundwater</b>		
Through blasting, exposed rocks containing soluble minerals that could potentially contaminate groundwater, e.g., sulfate, lead, arsenic	<ul style="list-style-type: none"> <li>subsurface investigation, i.e. geotechnical analysis of bedrock</li> <li>avoid blasting in areas containing toxic minerals</li> </ul>	<ul style="list-style-type: none"> <li>Areas of shallow soil over bedrock. Rock cuts and excavations</li> </ul>

**Table 14 Typical Mitigating Measures for Potential Adverse Environmental Effects**

Effect	Mitigating Measures	Application Where/When
Interference of shallow aquifers and springs	<ul style="list-style-type: none"> <li>hydrogeologic investigation to identifying such areas in advance</li> <li>develop alternatives to avoid impacts</li> </ul>	<ul style="list-style-type: none"> <li>Excavation</li> </ul>
Reduce groundwater quantity through construction dewatering	<ul style="list-style-type: none"> <li>locate construction activities away from groundwater users and water bearing formations (soils) where possible</li> <li>proper dewatering techniques</li> <li>seasonal constraints on construction</li> </ul>	<ul style="list-style-type: none"> <li>Depletion or lowering of shallow aquifers and springs by groundwater utilization</li> </ul>
Spills or leaks resulting in contamination of groundwater supply	<ul style="list-style-type: none"> <li>construction refuelling precautions</li> <li>land filling precautions</li> <li>operation and storage precautions</li> </ul>	<ul style="list-style-type: none"> <li>Near watercourses and on site generally</li> <li>Areas of high infiltration capability</li> </ul>
Drainage of wetland areas resulting in reduced groundwater contribution to surface waterbodies	<ul style="list-style-type: none"> <li>avoid wetland areas</li> <li>utilize appropriate backfill material, i.e. highly permeable backfill is unsuitable</li> </ul>	<ul style="list-style-type: none"> <li>Trenching, excavation, placing fill, dewatering</li> </ul>
Reduced surface water recharge to groundwater particularly in soils with high infiltration characteristics	<ul style="list-style-type: none"> <li>restrict extent of impervious surfaces in zones of high infiltration</li> </ul>	<ul style="list-style-type: none"> <li>Subsurface barriers, e.g., foundations, areas of impervious surfaces, e.g. parking lots, roads, compaction of soils</li> </ul>
Interference with groundwater movement	<ul style="list-style-type: none"> <li>maintenance of the existing groundwater regime through engineering design</li> </ul>	<ul style="list-style-type: none"> <li>Excavations, drainage, construction, dewatering, e.g. in roadbeds, foundations and trenches</li> </ul>
Contamination of adjacent wells through runoff from construction	<ul style="list-style-type: none"> <li>erosion and sediment control</li> <li>locate projects appropriately</li> <li>setbacks</li> </ul>	<ul style="list-style-type: none"> <li>Construction adjacent to well sites and exposed aquifers</li> </ul>
<b>Fish, Aquatic Wildlife and Vegetation</b>		
Introduction of warmer water from ponds into colder surface watercourse	<ul style="list-style-type: none"> <li>appropriate selection of ponding site</li> <li>pond design</li> <li>infiltrate into groundwater system</li> <li>planting to provide shade</li> </ul>	<ul style="list-style-type: none"> <li>Dewatering of trench and excavations. Sediment traps. Extend detention ponds</li> </ul>
Modification or removal of aquatic habitat; displacement of plants and animals	<ul style="list-style-type: none"> <li>Stage work to non-critical times</li> <li>restore stream substrate</li> <li>choose suitable site for stream diversions</li> <li>seasonal constraints</li> </ul>	<ul style="list-style-type: none"> <li>During construction, e.g. river crossings, dewatering of excavations</li> </ul>
Reduced water quality of nearby surface water having value as wildlife habitat	<ul style="list-style-type: none"> <li>provisions for spill control</li> <li>fast and accurate reporting of spill</li> <li>spill containment</li> <li>stockpile materials or devices for spill control</li> <li>avoid adverse soil conditions</li> <li>minimize tree removal</li> <li>buffers and setbacks</li> </ul>	<ul style="list-style-type: none"> <li>Storm sewers, ditches, diversions and by-passing</li> </ul>
Timing effects of construction on spawning, nesting and breeding	<ul style="list-style-type: none"> <li>staging of work to avoid spawning and breeding</li> </ul>	<ul style="list-style-type: none"> <li>For stream crossings and diversions</li> </ul>

**Table 14 Typical Mitigating Measures for Potential Adverse Environmental Effects**

Effect	Mitigating Measures	Application Where/When
periods	<ul style="list-style-type: none"> <li>periods</li> <li>seasonal constraints for cold and warm water systems</li> </ul>	
Lowering of water table resulting in reduced contribution to streams and stress of riparian vegetation	<ul style="list-style-type: none"> <li>design to maintain existing groundwater flows</li> <li>restrict extent of impervious surfaces in zones of high filtration</li> </ul>	<ul style="list-style-type: none"> <li>Dewatering of trenches, excavations and aquifers. Areas of newly created impervious surfaces</li> </ul>
Increased nutrient loading of existing habitats	<ul style="list-style-type: none"> <li>buffers and setbacks</li> <li>provisions for spill control</li> <li>land filling precautions</li> </ul>	<ul style="list-style-type: none"> <li>Near watercourses and on site generally</li> </ul>
Drainage of wetland areas causing mortality or stress to animals and possible changes in species composition	<ul style="list-style-type: none"> <li>maintain existing groundwater regime</li> <li>avoid wetland area</li> <li>utilize appropriate backfill material</li> </ul>	<ul style="list-style-type: none"> <li>Trenching or excavating</li> </ul>
Stress on biological communities	<ul style="list-style-type: none"> <li>consider the carrying capacity of the local natural environment</li> <li>avoid sensitive periods such as breeding seasons</li> </ul>	<ul style="list-style-type: none"> <li>Municipal infrastructure is necessary to service projected population growth. This increases stress on recreational and natural resources</li> </ul>
Tree removal will affect the amount of sunlight reaching waters and affect plant productivity and increase watercourse temperatures	<ul style="list-style-type: none"> <li>avoid tree removal near surface waterbodies</li> <li>restoration planting</li> </ul>	<ul style="list-style-type: none"> <li>Stream crossings</li> </ul>
<b>Terrestrial Vegetation and Wildlife</b>		
Introduction of exotic plant species through erosion control restoration	<ul style="list-style-type: none"> <li>restoration planting</li> <li>use annuals which later die out</li> <li>use indigenous (native) species only</li> </ul>	<ul style="list-style-type: none"> <li>On slopes and other areas to control erosion</li> <li>In any distribution area requiring restoration work</li> </ul>
Changes in vegetative composition as a result of loss of topsoil and subsoil mixing	<ul style="list-style-type: none"> <li>restore site by replacing soils in preconstruction horizons</li> </ul>	<ul style="list-style-type: none"> <li>Trenching or excavating</li> </ul>
Removal or disturbance of significant trees and/or ground flora	<ul style="list-style-type: none"> <li>review status of species</li> <li>avoid these areas</li> <li>employ tree protection measures</li> </ul>	<ul style="list-style-type: none"> <li>During site grading and construction phase of any project</li> </ul>
<b>Heritage Resources</b>		
Deterioration of sites, structures or landscapes having archaeological, historical or architectural values, as a result of environmental changes	<ul style="list-style-type: none"> <li>avoid where possible</li> <li>employ necessary steps to decrease harmful environmental impacts such as vibration, alteration of water table, etc.</li> </ul>	<ul style="list-style-type: none"> <li>Where appropriate with respect to archaeological, historical or architectural resources</li> </ul>
Unwanted increase in public access and potential vandalism	<ul style="list-style-type: none"> <li>fence off area of concern</li> <li>prevent public access</li> </ul>	<ul style="list-style-type: none"> <li>Where appropriate with respect to archaeological heritage resource</li> </ul>
Threatened viability of, or opportunity for, retention of sites having heritage value	<ul style="list-style-type: none"> <li>avoid these areas</li> <li>record or salvage information on features to be lost</li> </ul>	<ul style="list-style-type: none"> <li>Where appropriate with respect to significance of the heritage resource</li> </ul>
Unavoidable alteration to, or destruction of, heritage structures or archaeological sites	<ul style="list-style-type: none"> <li>record or salvage information on features to be lost</li> </ul>	<ul style="list-style-type: none"> <li>Where appropriate with respect to significance of the heritage resource</li> </ul>
Disruption of quiet enjoyment	<ul style="list-style-type: none"> <li>staging of construction to cause least disruption</li> </ul>	<ul style="list-style-type: none"> <li>As general practice</li> </ul>

**Table 14 Typical Mitigating Measures for Potential Adverse Environmental Effects**

Effect	Mitigating Measures	Application Where/When
	<ul style="list-style-type: none"> <li>employ noise and dust control measures</li> </ul>	
<b>Residential, Institutional, Commercial and Industrial</b>		
Disruption of pedestrian movements between adjacent uses	<ul style="list-style-type: none"> <li>maintain continuity of pedestrian walkway system as much as possible</li> <li>provide walkway strips to adjacent residential areas</li> </ul>	<ul style="list-style-type: none"> <li>As general practice</li> <li>Where possible</li> </ul>
Facilities inconsistent with or which disrupt character of areas	<ul style="list-style-type: none"> <li>preserve existing amenities as much as possible</li> <li>design and site structures to blend with adjacent building forms and materials</li> <li>site grading; utilize berms or other screening devices</li> </ul>	<ul style="list-style-type: none"> <li>As general practice</li> <li>Where suitable</li> </ul>
Temporary disruption during construction and/or inconvenience to users of adjacent properties and building	<ul style="list-style-type: none"> <li>notify public agencies and adjacent owners of construction scheduling</li> <li>prepare emergency program to ensure quick resolution of servicing problems</li> <li>consult with public agency and/or adjacent landowners regarding temporary access routes</li> <li>schedule construction so as to minimize period of disruption in proximity of adjacent uses and structures</li> <li>ensure access for emergency response vehicles/personnel</li> <li>apply noise and vibration control measures</li> </ul>	<ul style="list-style-type: none"> <li>Where substantial inconvenience or disruption to adjacent uses would be experienced and where measures would substantially reduce effects</li> <li>As general practice</li> </ul>
<b>Outdoor Recreation</b>		
Temporary disruption of open space activities during construction	<ul style="list-style-type: none"> <li>employ noise and dust control measures</li> <li>staging of construction to cause least disruption</li> </ul>	<ul style="list-style-type: none"> <li>In areas within or adjacent to public open space</li> </ul>
<b>Public Health</b>		
Exhaust emissions from construction equipment and vehicles	<ul style="list-style-type: none"> <li>minimize operation on site, control location on site</li> </ul>	<ul style="list-style-type: none"> <li>Where adjacent uses or natural vegetation could be adversely affected</li> </ul>
Effects on groundwater elevation of existing subsurface sewage disposal systems (e.g. septic systems)	<ul style="list-style-type: none"> <li>monitor groundwater levels and, if necessary, take appropriate action</li> </ul>	<ul style="list-style-type: none"> <li>Where appropriate</li> </ul>
Groundwater contamination	<ul style="list-style-type: none"> <li>construction refuelling precautions</li> <li>fill design and operation precautions</li> <li>precautions in operation and storage facilities</li> <li>containment of leachate maintenance facilities</li> </ul>	<ul style="list-style-type: none"> <li>On site generally</li> </ul>

**Table 14 Typical Mitigating Measures for Potential Adverse Environmental Effects**

Effect	Mitigating Measures	Application Where/When
Effects of emergency by passing of sewage	<ul style="list-style-type: none"> <li>contact potentially affected government agencies and public downstream within 24 hours of by-pass event</li> </ul>	<ul style="list-style-type: none"> <li>In all cases</li> </ul>
<b>Karst Topography</b>		
Blockage of underground karst features such as sink holes or caverns	<ul style="list-style-type: none"> <li>no blasting will be allowed in the karst formation area</li> <li>consultation with a karst specialist regarding the design and construction of the development in Castle Glen is required at the detailed planning Stage</li> <li>consideration will be given to leak proof water distribution and sanitary collection systems</li> </ul>	<ul style="list-style-type: none"> <li>All areas where karst formations are present</li> </ul>

## 12. Public and Agency Consultation

Consultation with the public, which includes stakeholders, interested parties and government review agencies, is a necessary and important component of the Class Environmental Assessment process. To meet the Class EA consultation requirements for this Study, the Study Team ensured that the public and review agencies were informed of the study and given the opportunity to provide input (both written and verbal) on the assessment and evaluation processes. Public open houses were held throughout Phases 1 and 2 and documented in the Phase 2 Combined EA Master Plan to provide information to interested members of the public about the study and solicit input. A Public Information Centre (PIC) was held on June 13<sup>th</sup> 2009 to present the Phase 4 recommendations. There were no comments received from the PIC. Copies of specific documentation from the public and agency consultation program are provided in Appendix D.

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**APPENDIX A**

**EXCERPTS FROM THE COMBINED EA PHASE 2 FINAL REPORT**

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## **6. Wastewater Treatment Alternatives**

The existing Craigleith STP does not have enough capacity to service the projected wastewater flows from the Craigleith service area. Areas adjacent to Craigleith, including Osler, Castle Glen, and areas in Collingwood, are also developing and will require sewage servicing and treatment. Several alternatives for treating sewage flows from these areas were identified. The following section provides an overview of the alternatives, assessment process and recommendations.

### **6.1 Wastewater Treatment Alternatives**

Sewage treatment alternatives identified for the study area include:

1. Do Nothing;
2. Construct communal systems;
3. Expand the existing Craigleith STP;
4. Construct a new plant at a different location;
5. Reduce sewage flows; and,
6. Any combination of alternatives 2 through 5.

#### **6.1.1 Do Nothing**

This alternative would result in no further changes to the current sewage treatment capacity within the Craigleith service area. This alternative is inconsistent with approved planning policies, will not meet the Town's planning objectives, and will result in negative impacts on the natural and social environments; therefore, this option is not considered suitable and will not be considered further.

#### **6.1.2 Construct Communal Systems**

Communal systems such as sub-surface disposal systems are typically used to service populations less than 400 people. Other types of communal systems such as primary treatment and constructed wetlands are usually limited to service population of less than 1000 people. The Town's planning policies indicate that the areas of Craigleith and Castle Glen should be developed with municipal sewage servicing. The existing communal system in Castle Glen is at capacity and an expansion of the existing system will not meet MOE requirements for further development.

The Osler development is relatively small (approximately 360 units) and could be developed with a communal system; however, given that an extension of municipal servicing to Castle Glen will be required, it would be more practical to provide municipal sewage servicing to Osler as part of the Castle Glen sewage servicing project.

As such, the extension of the existing communal systems or the construction of new communal systems is not considered an adequate long-term solution and this alternative will not be considered further.

### **6.1.3 Expand Existing Craigleith Sewage Treatment Plant**

The existing sewage treatment plant in Craigleith was designed to be constructed in 3 stages; therefore, the facility can be readily expanded to accommodate additional flows. Current flow projections indicate that the ultimate development of all areas being considered will result in flows greater than the original Stage 3 flows. For expansion beyond Stage 3, additional land would be required, as well as increasing the outfall capacity.

### **6.1.4 Construct a new plant at a different location**

Constructing a new plant would require a new site and acquisition of property. The site would need to have sufficient space for the facility as well as a buffer between adjacent properties. In addition, a new outfall for the plant would be required. Unfortunately, suitable land is limited within Craigleith area for a new site due to the constraints of existing and proposed development. As there are no suitable receiving watercourses within the area, the outfall would need to extend into Nottawasaga Bay.

### **6.1.5 Reduce Sewage Flows**

The Town currently has programs in place to reduce water consumption including installation of water meters and restrictions in water use during peak demand periods. The building code requires new building to be equipped with low flow toilets to reduce water use. To reduce sewage flows further, the Town should undertake a program to identify and reduce extraneous flows into the sewage system. However, regardless of measures taken to reduce sewage flows, additional sewage treatment capacity will be required in order to accommodate planned growth and development.

## **6.2 Evaluation Criteria**

A range of criteria was used to evaluate alternatives for expanding sewage treatment capacity and assess potential impacts on the natural, social, technical and economic environments. The criteria include:

- Minimize impact on the natural environment by considering potential impact on natural landscape, vegetation, aquatic habitat, wildlife, valley lands and watercourses and receiving water quality.
- Minimize impacts on the social environment by considering planned land use at the site, compatibility with surrounding land use, construction impacts (noise, dust, traffic, etc.).
- Maximize technical suitability by considering ability for staged construction, operation and maintenance requirements, ease of construction, impact on existing utilities.
- Minimize capital and operating costs.

## **6.3 Assessment of Alternatives**

Of the alternatives listed above, the most feasible alternatives are to expand the existing sewage treatment facility or construct a new facility. These alternatives were assessed using the above noted criteria. The assessment is summarised in the following table.

**Table 6-1: Assessment of Sewage Treatment Alternatives**

Criteria	Expand Existing Facility	Construct a new Facility
Natural Environment	<ul style="list-style-type: none"> <li>The existing site is large enough to accommodate the third stage expansion; therefore there will be minimal impact on the natural environment</li> <li>Expansion beyond Stage 3 will require additional land.</li> <li>A portion of the Silver Creek Provincially Significant Wetland Complex is located to the east of the existing site and across Long Point Road from the site. These areas are not considered suitable for future expansion.</li> <li>Twinning the outfall would be required for expansion beyond Stage 3. Impacts on aquatic habitat and receiving water quality would need to be assessed.</li> </ul>	<ul style="list-style-type: none"> <li>Construction of a new facility would require a 'green field' site</li> <li>The effluent would need to be discharged to Georgian Bay; depending on the location, a new outfall may be required. Impacts on aquatic habitat and receiving water quality would need to be assessed.</li> <li>Areas that are part of the Silver Creek Provincially Significant Wetland are considered unsuitable; this includes all lands along the shoreline in Craigleith.</li> <li>The natural landscape may be impacted if the site requires significant regrading.</li> <li>Impacts on vegetation and wildlife may occur if vegetation removal is required.</li> </ul>
Social Environment	<ul style="list-style-type: none"> <li>This alternative will use the existing site for the third phase expansion, and additional lands adjacent to the site to accommodate the ultimate facility.</li> <li>Residential areas to the south and east of the site require a sufficient buffer around the site. Additional land would need to be acquired to the north.</li> <li>Construction activities will have a short term impact due to increased noise, traffic.</li> <li>Long-term impacts could include odour and visual impacts; however, overall impact considered to be less because it is in one location</li> </ul>	<ul style="list-style-type: none"> <li>The construction of a new plant within Craigleith may impact planned land use. Property acquisition would be required.</li> <li>Construction activities will have a short term impact due to increased noise, traffic.</li> <li>Long-term impacts could include odour and visual impacts; overall impact considered greater than expanding on the existing site, as impacts would be in two locations.</li> </ul>
Technical Suitability	<ul style="list-style-type: none"> <li>Upgrades to existing infrastructure would be required in the long-term to convey sewage to the plant; however, minimal changes to the existing collection system required.</li> <li>Existing outfall can be used up to Stage 3 expansion</li> </ul>	<ul style="list-style-type: none"> <li>Changes to existing sewage collection system would be required to convey flows to new plant; impact would be based on site location.</li> <li>Town would be required to operate two facilities.</li> </ul>
Cost	<ul style="list-style-type: none"> <li>Expenditures for next phase expansion are minimized because existing facility has provision for expansion.</li> <li>Expansion beyond planned Phase 3 will require land acquisition, outfall twinning, and construction of additional treatment capacity.</li> </ul>	<ul style="list-style-type: none"> <li>Initial expenditure would be greater for this alternative, and would include land acquisition, construction of a new facility, outfall, and changes to the collection system.</li> <li>Operation and maintenance of two facilities would be required, thereby increasing overall cost.</li> </ul>

## 6.4 Selection of Preferred Alternative

Expansion of the existing facility as planned is preferred over constructing a new facility as it will have the least overall impact on the social, natural and technical environments with the least overall cost. To provide the treatment capacity for the ultimate sewage flows identified in Section 3, expansion beyond Stage 3 will be required. This will require acquisition of land adjacent to the existing site. Expansion beyond the boundaries of the existing site is constrained by existing residential areas and the Silver Creek Wetland. The most suitable location for expansion is to the north of the existing property.

## 6.5 Class EA Process

In the Class EA process the expansion of an existing wastewater treatment plant is a Schedule C project. Schedule C projects are more complex and have the potential for significant environmental impacts. These types of project are subject to the full Class EA process and require the completion of Phases 3 and 4 of the Class EA process. Phase 3 will include an assessment of the design alternatives for the recommended approach and Phase 4 will include the completion of an Environmental Study Report for the public record.

## 6.6 Next Steps

Sewage flow and loading data reviewed in Section 3 show that sewage loadings increase during the winter months. As the Certificate of Approval for the facility requires monthly compliance with effluent discharge criteria, the extended aeration activated sludge process must be sized to treat the seasonal peak flows and loadings. Previously, the Town sampled raw sewage on a biweekly basis, and as such, fluctuations in loading during peak loading periods are not known. Presently, the Town is completing daily sampling during the peak periods in order to provide more detailed data, which will be used during the development of the detailed design requirements for the treatment facility.

It is recognised that based on current flow trends, the Craighleith Sewage Treatment facility may need to be expanded to treat peak season flows that occur during specific periods of the year. This may result in under utilization of capacity on an average basis. Currently plant operations and maintenance costs are reduced and treatment capacity optimized by operating only treatment trains and capacity needed during the off-peak seasons. Additional options that could be considered to optimise the treatment of peak seasonal sewage flows and assist in deferring expansion of the facility in the short term are:

- Determine breakdown of raw sewage generation rates based on property uses (i.e.: full time residential, resort residential etc.) to more accurately project flow rates and required capacity;
- Increase the wet well storage capacity to reduce peak hourly flows; and,
- Evaluate aerated flow equalization or off-line storage to reduce the peak daily flows to the facility.

These options will be reviewed in Phases 3 and 4 of the Class EA process once more detailed sewage loading data is available.

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**APPENDIX B**

**CRAIGLEITH STP CERTIFICATE OF APPROVAL**

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RECEIVED  
FEB 08 2000



Ontario

Ministry of the Environment  
Ministère de l'Environnement

AMENDMENT TO CERTIFICATE OF APPROVAL  
MUNICIPAL AND PRIVATE SEWAGE WORKS  
NUMBER 3-1027-92-006

Notice No. 1

Town of Blue Mountains  
P.O. Box 310, 26 Bridge Street  
Thornbury, Ontario  
N0H 2P0

Site Location: Craigeleith Sewage Treatment Plant Expansion  
Part Lots 20 & 21, Concession 1  
Town of Blue Mountains (formerly Township of Collingwood),  
N0H 2P0

*You are hereby notified that I have amended Certificate of Approval No. 3-1027-92-006 issued on October 07, 1992 for sewage treatment plant serving the Craigeleith Area in the Town of Blue Mountains (formerly Township of Collingwood) , as follows:*

**Refer to Terms and Conditions**

Amend Condition No. 18 to permit construction of Stage 2 expansion in order to increase the rated capacity of the sewage treatment plant from 4,078 m<sup>3</sup>/day to 8,133 m<sup>3</sup>/day average daily flow rate, consisting of the following works:

**Influent Works**

installation of one (1) comminutor capable of handling a peak flow rate of 13,311 m<sup>3</sup>/day, to increase the total peak hydraulic capacity to 26,640 m<sup>3</sup>/day;

installation of aeration equipment, grit lift pumps and appurtenances in the existing aerated grit tank to increase the total peak hydraulic flow capacity to 19,640 m<sup>3</sup>/day;

**Aeration Tank/Secondary Clarifier**

construction of one (1) circular treatment unit, consisting of a central secondary clarifier with an aeration tank provided in the annular ring, consisting of:

- one (1) aeration tank, consisting of two (2) compartments, with a total volume of approximately 3,167 m<sup>3</sup>, equipped with a full floor coverage fine bubble diffused aeration system;

- modification to the existing air supply piping to provide air to the aeration tank from the existing blowers;
- one (1) secondary clarifier with an internal diameter of 22 m and 4.5 m SWD, equipped with sludge scraping mechanism and scum skimming device;
- one (1) scum and waste activated sludge collection chamber;

### **Sludge Pumping Station**

construction of a sludge pumping station located adjacent to the circular treatment unit, equipped with two (2) return sludge pumps, each rated at 94 L/s and one (1) waste activated sludge pump rated at 16 L/s;

### **Effluent Filtration**

installation of two (2) automatic backwash, single media effluent filters, each rated at 4,910 m<sup>3</sup>/day with an overall dimensions of approximately 11.38 m x 2.74 m to increase the total filtration capacity of the plant to 19,640 m<sup>3</sup>/day plus an allowance for backwash flows;

construction of a wastewater and filter backwash pumping station equipped with two (2) pumps, each rated at 4 L/s;

### **Sludge Digestion and Storage**

construction of an aerobic two stage digester, with an approximate volume of 462 m<sup>3</sup> in the first stage and 231 m<sup>3</sup> in the second stage, equipped with coarse bubble diffused aeration system, and supernatant decanting facility;

installation of four (4) 755 L/s air blowers (three duty, one standby) with a total firm capacity of approximately 2,265 L/s and one (1) 378 L/s air blower to deliver air to aerobic digesters and sludge storage tanks (existing and new);

construction of a digested sludge storage tank with a total volume of approximately 1,300 m<sup>3</sup>, equipped with a submersible mixer;

construction of a sludge pumping station adjacent to the digesters and sludge storage tank equipped with two (2) pumps rated at 9 L/s;

### **Phosphorus Removal**

installation of one (1) liquid coagulant metering pump rated at 30 L/s;

### **Disinfection**

installation of an ultra-violet disinfection system capable of disinfecting a peak hydraulic flow of 9,820 m<sup>3</sup> /day, with one extra module (for storage within the plant), to increase the disinfection capacity of the plant to 19,640 m<sup>3</sup>/day;

including structural work, piping, associated appurtenances, heating and ventilation, process instrumentation, electrical and control systems;

*The reason for this amendment is that the detailed plans, supporting information and documentation prepared by C.C. Tatham & Associates Limited, Consulting Engineers dated January 2000 were reviewed and found to be in accordance with the Ministry's requirements.*

**This Notice shall constitute part of the approval issued under Certificate of Approval No. 3-1027-92-006 dated October 07, 1992.**

*In accordance with Section 100 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, as amended, you may by written notice served upon me and the Environmental Appeal Board within 15 days after receipt of this Notice, require a hearing by the Board. Section 101 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, provides that the Notice requiring the hearing shall state:*

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

*The Notice should also include:*

1. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the works are located;

*And the Notice should be signed and dated by the appellant.*

*This Notice must be served upon:*

The Secretary\*  
Environmental Appeal Board  
2300 Yonge St., 12th Floor  
P.O. Box 2382  
Toronto, Ontario  
M4P 1E4

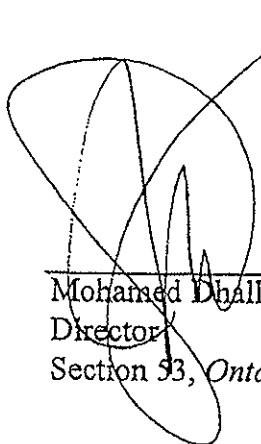
AND

The Director  
Section 53, *Ontario Water Resources Act*  
Ministry of the Environment  
2 St. Clair Avenue West, Floor 12A  
Toronto, Ontario  
M4V 1L5

\* Further information on the Environmental Appeal Board's requirements for an appeal can be obtained directly from the Board at: Tel: (416) 314-4600, Fax: (416) 314-4506 or [www.ert.gov.on.ca](http://www.ert.gov.on.ca)

*The above noted sewage works are approved under Section 53 of the Ontario Water Resources Act.*

DATED AT TORONTO this 1st day of February, 2000



\_\_\_\_\_  
 Mohamed Dhalla, P.Eng.  
 Director  
 Section 93, Ontario Water Resource Act

GM/

c: District Manager, MOE Barrie  
 Barry R. Rawn, P.Eng., C.C. Tatham & Associates Limited

THIS IS A TRUE COPY OF THE  
 ORIGINAL CERTIFICATE ISSUED  
 ON FEB 4/00  
an  
 \_\_\_\_\_  
 Signature

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**APPENDIX C**

**HISTORICAL CRAIGLEITH STP DATA**

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Tables C1-C7: Top 10 Highest Daily Flows, Craigleith 2000-2006

Table C1 - 2000

Rank	Month	Day	Flow (m <sup>3</sup> )	Units	m <sup>3</sup> /d/unit	Mean Temp (°C)	Total Precip (mm)
1	February	26	2928	1552	1.89	7.2	
2	February	25	2829	1552	1.82	4.2	
3	April	21	2822	1552	1.82	5.1	
4	February	24	2768	1552	1.78	6	
5	April	20	2730	1552	1.76	6.7	
6	December	31	2708	1552	1.74	-7.2	
7	February	23	2702	1552	1.74	9.2	
8	January	2	2513	1552	1.62	5.4	
9	February	27	2493	1552	1.61	11.2	
10	December	29	2419	1552	1.56	-9.9	
			Average =		2691.2		

Table C3 - 2002

Rank	Month	Day	Flow (m <sup>3</sup> )	Units	m <sup>3</sup> /d/unit	Mean Temp (°C)	Total Precip (mm)
1	December	31	3700	2127	1.74	4	
2	March	9	3312	2127	1.56	10.7	6.5
3	February	20	3221	2127	1.51	4.9	4.2
4	December	30	3187	2127	1.50	1.6	4
5	December	27	3155	2127	1.48	-1.9	
6	March	3	3136	2127	1.47	-0.2	
7	December	29	3132	2127	1.47	-0.7	
8	March	10	3091	2127	1.45	-5.7	
9	December	28	3073	2127	1.44	-1.4	
10	March	30	3006	2127	1.41	4.4	1
			Average =		3201.3		

Table C6 - 2005

Rank	Month	Day	Flow (m <sup>3</sup> )	Units	m <sup>3</sup> /d/unit	Mean Temp (°C)	Total Precip (mm)
1	March	5	8443	2746	3.07	8	15.5
2	December	31	7944	2746	2.89	6.1	0
3	May	23	6631	2746	2.41	12.8	54.6
4	March	2	5918	2746	2.16	5.4	0
5	March	6	5720	2746	2.08	-2.3	0
6	May	24	5314	2746	1.94	15	3.2
7	March	30	4782	2746	1.74	4.8	13.6
8	January	2	3975	2746	1.45	5.2	10.9
9	January	3	3966	2746	1.44	7.4	0
10	December	30	3955	2746	1.44	4.4	8.9
			Average =		5664.8		

Table C7 - 2006

Rank	Month	Day	Flow (m <sup>3</sup> )	Units	m <sup>3</sup> /d/unit	Mean Temp (°C)	Total Precip (mm)
1	March	13	7793	3756	2.07	6.3	0.6
2	March	10	6901	3756	1.84	5	0
3	March	9	6593	3756	1.76	0.1	0
4	March	12	5840	3756	1.55	5.1	2.1
5	March	14	5427	3756	1.44	6.9	2.6
6	March	11	5425	3756	1.44	4.8	0.6
7	December	1	5111	3756	1.36	1.8	28.8
8	January	29	5001	3756	1.33	4	13.3
9	January	14	4961	3756	1.32	-1.1	1.7
10	January	13	4700	3756	1.25	7.5	5.9
			Average =		5775.2		

Table C2 - 2001

Rank	Month	Day	Flow (m <sup>3</sup> )	Units	m <sup>3</sup> /d/unit	Mean Temp (°C)	Total Precip (mm)
1	February	9	8039	1801	4.46	4	
2	February	10	4698	1801	2.61	-7.4	
3	February	25	3372	1801	1.87	3.7	2.4
4	December	31	3088	1801	1.71	-3.3	
5	February	11	3039	1801	1.69		
6	January	25	2763	1801	1.53	-6	
7	December	29	2691	1801	1.49	-4.9	
8	December	30	2647	1801	1.47	-4.5	
9	February	12	2502	1801	1.39		0
10	December	28	2446	1801	1.36	-3.5	
			Average =		3528.5		

Table C4 - 2003

Rank	Month	Day	Flow (m <sup>3</sup> )	Units	m <sup>3</sup> /d/unit	Mean Temp (°C)	Total Precip (mm)
1	March	17	7346	2502	2.94	5.4	0
2	March	16	7261	2502	2.90	7.4	0
3	December	29	4626	2502	1.85	6	8.8
4	December	31	4280	2502	1.71	3	0.6
5	December	30	4242	2502	1.70	2.6	0
6	March	18	4028	2502	1.61	3.1	0
7	March	22	3833	2502	1.53	4.9	0
8	March	21	3807	2502	1.52	5.2	6.3
9	December	28	3732	2502	1.49	5.8	0.9
10	December	26	3584	2502	1.43	1.2	0.8
			Average =		4673.9		

Table C6 - 2005

Rank	Month	Day	Flow (m <sup>3</sup> )	Units	m <sup>3</sup> /d/unit	Mean Temp (°C)	Total Precip (mm)
1	January	13	5229	3305	1.58	7.7	7.7
2	April	24	5096	3305	1.54	3.2	14.1
3	December	25	4834	3305	1.46	1.8	11.9
4	March	31	3434	3305	1.04	12.1	2.5
5	February	19	3270	3305	0.99	-6.4	0.6
6	July	31	3217	3305	0.97	20.2	18.4
7	August	1	2980	3305	0.90	23.7	0
8	June	13	2959	3305	0.90	21.9	43.8
9	September	4	2676	3305	0.81	16	0
10	November	15	2496	3305	0.76	4	33.3
			Average =		3619.1		

= Peak On Season  
 = Off Season  
 = On Season

\* Precipitation data source: www.climate.weatheroffice.ec.gc.ca (Collingwood Monitoring Station)  
 \*\* 1999-2001 precipitation data very sparse or unavailable











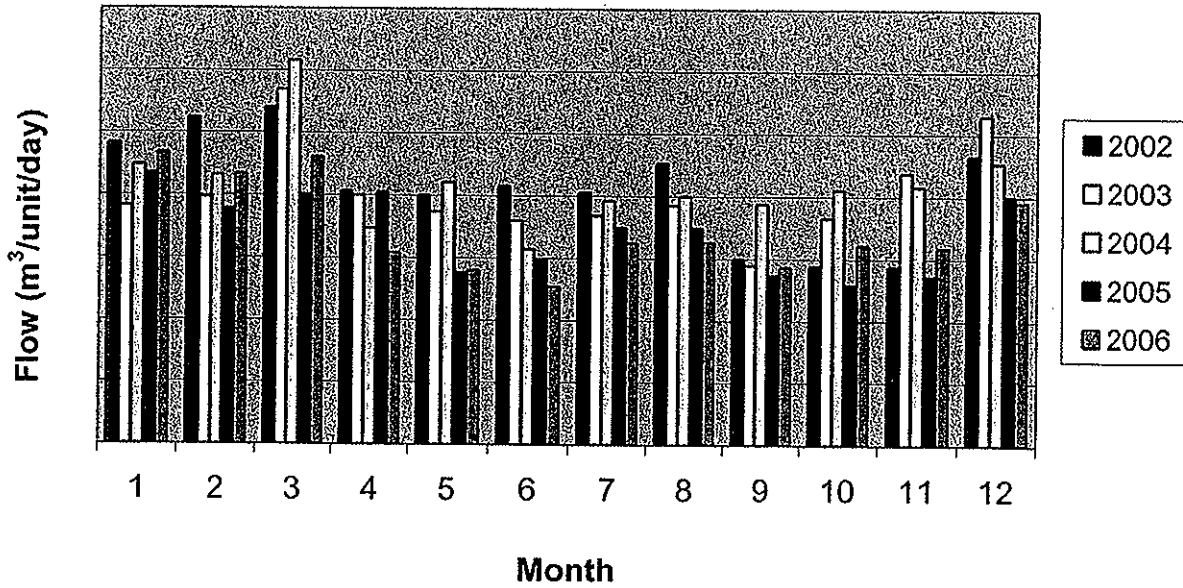
Table C12 - Monthly Average and Peak Sewage Flow Data, 2005

3305 units x 2.37 people/unit = 7833

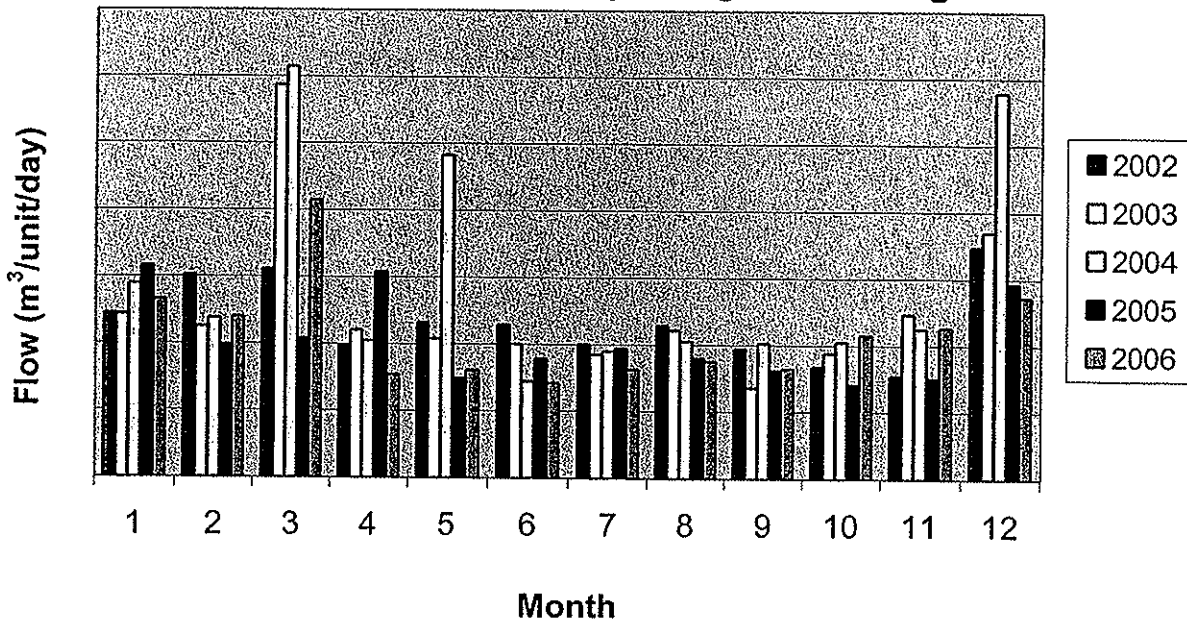
Month	Avg. Flow m3/d	Avg. Flow m3/unit/d	Peak Flow m3/d	Peak Flow m3/unit/d	BOD (mg/L)	SS (mg/L)	TKN (mg/L)	TP (mg/L)	ADF (L/cap/day)	BOD (g/cap/day)	S.S. (g/cap/day)	TKN (g/cap/day)	TP (g/cap/day)
Jan	2877	0.87	5229	1.58	161	213	17.8	2.5	348	56	74	6.2	1.6
Feb	2501	0.76	3270	0.99	91	214	27.9	5.2	303	28	65	8.4	2.1
Mar	2654	0.80	3434	1.04	130	187	24.2	3.9	321	42	60	7.8	1.6
Apr	2683	0.81	5096	1.54	56	98	6	1.6	325	18	32	1.9	1.0
May	1828	0.55	2465	0.75	94	104	9.2	2	221	21	23	2.0	0.6
Jun	1974	0.60	2959	0.90	76	101	12.7	2.5	239	18	24	3.0	0.9
Jul	2311	0.70	3217	0.97	69	115	14.2	2.8	280	19	32	4.0	1.1
Aug	2309	0.70	2980	0.90	103	186	18.6	4.5	279	29	52	5.2	1.6
Sep	1810	0.55	2676	0.81	82	113	12.5	3.2	219	18	25	2.7	1.0
Oct	1709	0.52	2333	0.71	108	180	11.9	4.6	207	22	37	2.5	1.3
Nov	1801	0.54	2496	0.76	109	139	12.5	3.5	218	24	30	2.7	1.1
Dec	2650	0.80	4834	1.46	74	124	9.8	2.5	321	24	40	3.1	1.5
Monthly Average	2259		3416		96	148	15	3	273	27	41	4	1
Minimum Month	1709		2333		56	98	6	1.6	207	18	23	1.9	0.6
Maximum Month	2877		5229		161	214	27.9	5.2	348	56	74	8.4	2.1
Expected Value - Typical (Range)													
PF - Monthly	1.27				1.68	1.45	1.89	1.61	1.27	2.11	1.80	2.04	1.61
PF - Daily			2.26										
									450.75 (50-120)	90 (60-150)	15 (9-22)	3	



**Figure C1 - Average Craigleith Sewage Flows**



**Figure C2 - Maximum Day Craigleith Sewage Flows**



## Craigleith Water Pollution Control Plant

### 2006 PERFORMANCE MONITORING - IN-PLANT (Month / Average / mg/L)

		2006	2005	2004	2003	2002
Influent pH	AVG	8.2	8.1	8.2	8.0	7.8
	MIN	7.9	7.9	7.9	7.8	7.3
	MAX	8.7	8.4	8.4	8.4	8.7
	# of Samples	243	117	108	108	108
Influent SS mg/L	AVG	222	186	158	137	143
	MIN	96	121	95	40	60
	MAX	371	298	204	340	320
	# of Samples	245	117	108	108	108
Influent P+ mg/L	AVG	2.9	3.9	4.2	4.2	4.3
	MIN	1.1	2.8	2.8	2.2	2.5
	MAX	4.8	5.4	6.3	6.6	5.5
	# of Samples	240	117	108	108	108
Grit Accumulation	Total	5136	3131	2955	2280	3527
	ml/m <sup>3</sup>	5.3	3.8	3.5	3.2	5.4
MLSS mg/L	AVG	4941	4594	4941	3873	4383
	MIN	2857	2293	3600	2460	3150
	MAX	5950	6408	7711	4835	7360
	# of Samples	106	108	108	108	108
MLVSS %	AVG	65	64	64	62	63
	MIN	46	59	59	56	59
	MAX	77	71	68	69	67
	# of Samples	99	108	108	108	108
Solid Retention Time (Days)	AVG	72	55	32	52	32
	MIN	23	31	18	31	29
	MAX	124	118	51	69	55
	# of Samples	84	108	108	108	108
RAS - TSS %	AVG	1.1	1.0	1.0	0.7	0.9
	MIN	0.7	0.45	0.66	0.50	0.63
	MAX	1.9	1.7	1.3	1.1	1.1
	# of Samples	86	108	108	108	108

## Craigleith Water Pollution Control Plant

### 2006 PERFORMANCE MONITORING - IN-PLANT (Month / Average / mg/L)

		2006	2005	2004	2003	2002
Primary Digesters # 1 & # 2 TSS - %	AVG	2.3	2.2	2.1	1.3	1.9
	MIN	1.4	1.1	1.3	1.4	1.6
	MAX	2.8	3.7	2.8	2.3	2.6
	# of Samples	96	94	59	48	48
Primary Digester # 1 & 2 - Volatile %	AVG	61	52	56	55	57
	MIN	58	51	53	49	49
	MAX	67	63	60	63	63
	# of Samples	96	94	59	48	48
Secondary Digesters # 1 & 2 -TSS %	AVG	2.5	2.6	2.3	2.4	2.5
	MIN	2.2	2.1	1.5	2.1	2.1
	MAX	2.8	3.5	3.3	3.2	3.3
	# of Samples	60	47	48	48	48
Secondary Digesters # 1 & 2 - Volatile %	AVG	62	60	54	54	55
	MIN	56	50	50	49	45
	MAX	71	63	60	60	62
	# of Samples	60	47	48	48	48
Digesters Supernatant m <sup>3</sup>		9007	7,686	8,666	10,998	9,160
Clarifier Effluent SS - mg/L	AVG	7.4	6.1	6.5	7.5	8.5
	MIN	3.7	4.0	2.8	5.0	5.3
	MAX	13	11	20	12	18
	# of Samples	102	108	110	108	108
Final Effluent CL2 Residual mg/L	AVG	0.005	0.006	0.004	0.007	0.006
	MIN	0.002	0.002	0.001	0.002	0.002
	MAX	0.008	0.007	0.007	0.009	0.008
	# of Samples	62	108	51	22	87
Final Effluent Temperature C°	AVG	15.2	13.4	13.2	13	13.1
	MIN	9.7	8.1	7.7	7.8	8.5
	MAX	21.2	21.1	19.4	20.2	20.3
	# of Samples	108	108	108	108	108

## Craigleith Water Pollution Control Plant

### 2006 PERFORMANCE MONITORING - IN-PLANT (Month / Average / mg/L)

		2006	2005	2004	2003	2002
Final Effluent SS mg/L	AVG	1.3	1	1.7	1.4	1.6
	MIN	1	1	1	1	1
	MAX	2.6	2	5.2	2.5	2
	# of Samples	215	108	108	108	108
Final Effluent P+ mg/L	AVG	0.15	0.11	0.11	0.11	0.13
	MIN	0.09	0.06	0.05	0.08	0.11
	MAX	0.21	0.17	0.23	0.16	0.16
	# of Samples	210	130	155	122	123
Final Effluent pH	AVG	8	7.8	7.8	7.8	7.7
	MIN	7.4	7.4	7.4	7.4	7.3
	MAX	8.4	8.2	8.4	8.3	8.4
	# of Samples	209	108	108	108	108
Hauled Waste m <sup>3</sup>	Hold Tank Septage	11,008 66	7,797 53	11,268 220	9,429 76	13,414 25

---

**APPENDIX D**

**PUBLIC CONSULTATION DOCUMENTATION**

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## *Environmental Assessment for the Craigleith Wastewater Treatment Plant Expansion*

### **NOTICE OF PUBLIC INFORMATION CENTRE**

#### **STUDY OBJECTIVE**

The Town of The Blue Mountains is finalizing a Municipal Class Environmental Assessment (EA) study for the provision of additional wastewater treatment capacity to service future flows from the Craigleith Service Area and its adjacent developments in Castle Glen, Osler and areas in Collingwood. Based on population growth and wastewater flow forecasts, the Craigleith Sewage Treatment Plant will meet or exceed its current rated capacity within the next five years. The objective of this study is to evaluate design alternatives to expand the existing Craigleith facility and achieve the increased capacity required.



#### **THE PROCESS**

This project follows the planning and design process as defined in the Municipal Engineers Association Municipal Class Environmental Assessment document (June 2000). The project is being planned under Schedule C of the Municipal Class Environmental Assessment Act. Upon completion of the study and this PIC, a project file will be available for public review and comment. A Notice of Completion will be published at that time indicating where and how the public can obtain access to the report.

#### **PUBLIC INFORMATION CENTRE**

A Public Information Centre (PIC) will be held to present to the public the background information on the study, provide various solutions for the expansion, and the next steps that will be followed in the study process. The Public Information Centre will be held:

Date: Saturday, June 13, 2009

Time: 10:00 a.m. to 12:00 noon

Location: L.E. Shore Memorial Library, 183 Bruce Street South, Thornbury, ON N0H 2P0

We are interested in hearing any comments or concerns you may have with respect to this study. For further information or if you are unable to attend the Public Information Centre and wish to provide your views, please contact one of the following:

#### **Town of The Blue Mountains**

John Caswell  
Manager of Water and Wastewater Services  
Phone: (519) 599-3131 ext. 224  
Fax: (519) 599-7723  
E-mail: [jcaswell@thebluemountains.ca](mailto:jcaswell@thebluemountains.ca)

#### **GENIVAR**

Michelle Albert, P.Eng.  
Project Manager  
Phone: (905) 475-7270 ext. 304  
Fax: (905) 475-5994  
E-mail: [michelle.albert@genivar.com](mailto:michelle.albert@genivar.com)

#### **Town of The Blue Mountains**

26 Bridge Street., P.O. Box 310, THORNBURY ON N0H 2P0  
[www.thebluemountains.ca](http://www.thebluemountains.ca)



# WELCOME

## **Class Environmental Assessment for the Craigleith Sewage Treatment Plant Expansion**

### **PUBLIC INFORMATION CENTRE**

Please Complete the Sign-in Sheet and review the display materials.

The Project Team is available to answer your questions and address any concerns.

Your input is valued!

Please fill out a comment sheet.





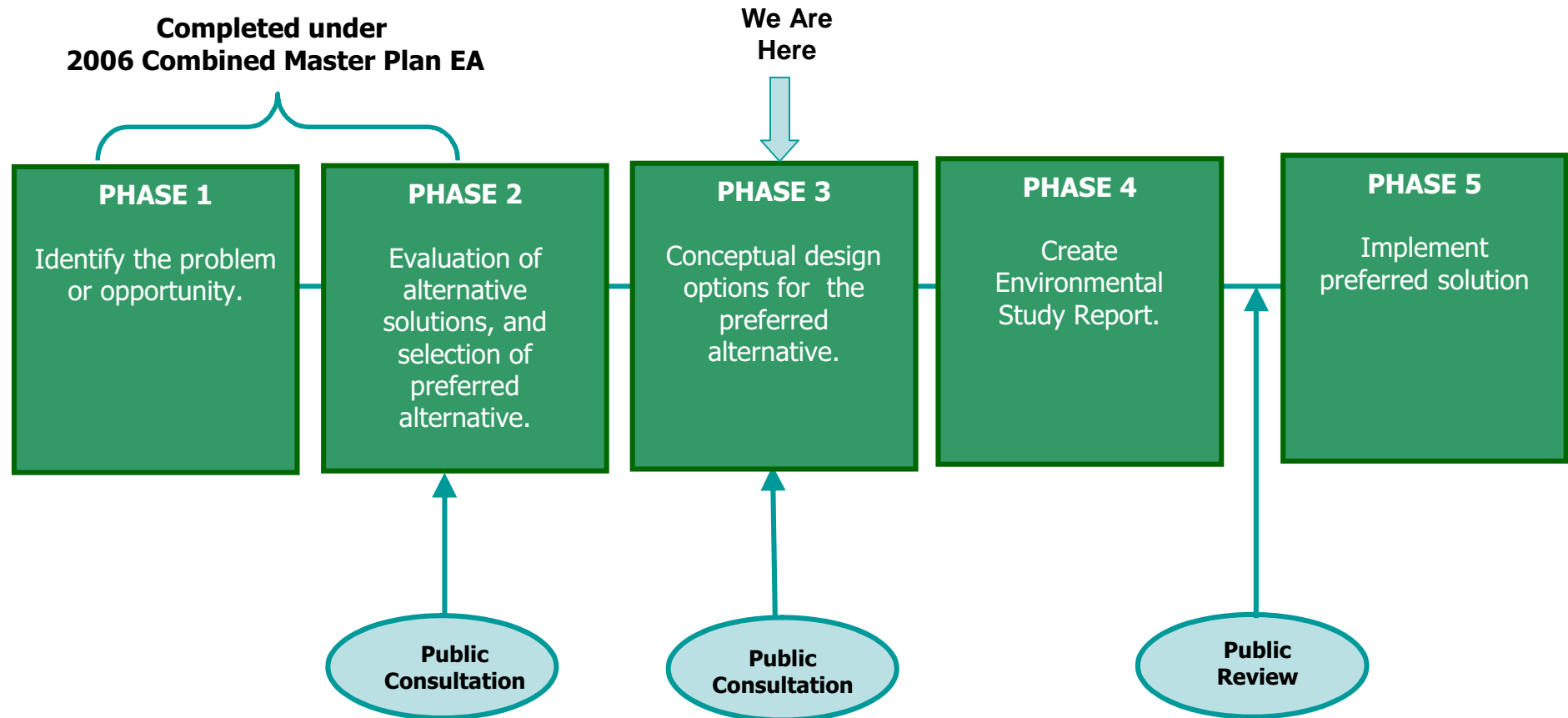
# Introduction to the Class Environmental Assessment

- A Class Environmental Assessment (EA) is a study that examines alternatives and impacts for proposed projects and confirms the best alternative solution.
- Public consultation is a requirement of the Municipal Class EA process. Public input is valuable for confirming the best alternative solution.
- The Class EA process consists of 5 phases. The project is currently in Phase 3. Phases 1 and 2 were completed in 2006 under the Combined Master Plan EA.





# Overview of the Class Environmental Assessment Process

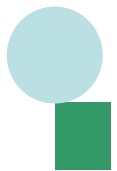
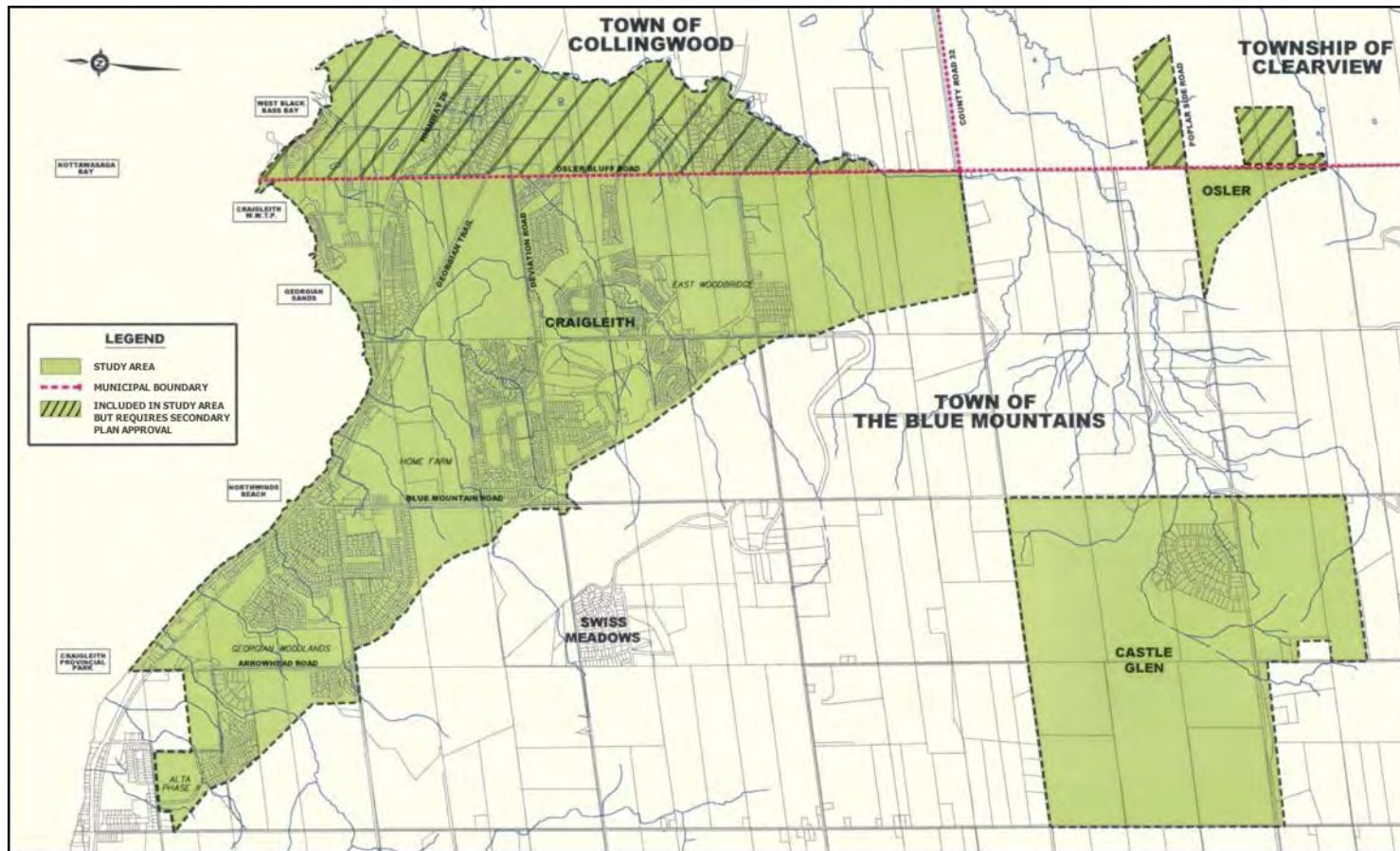




# Phase 1: Problem Statement

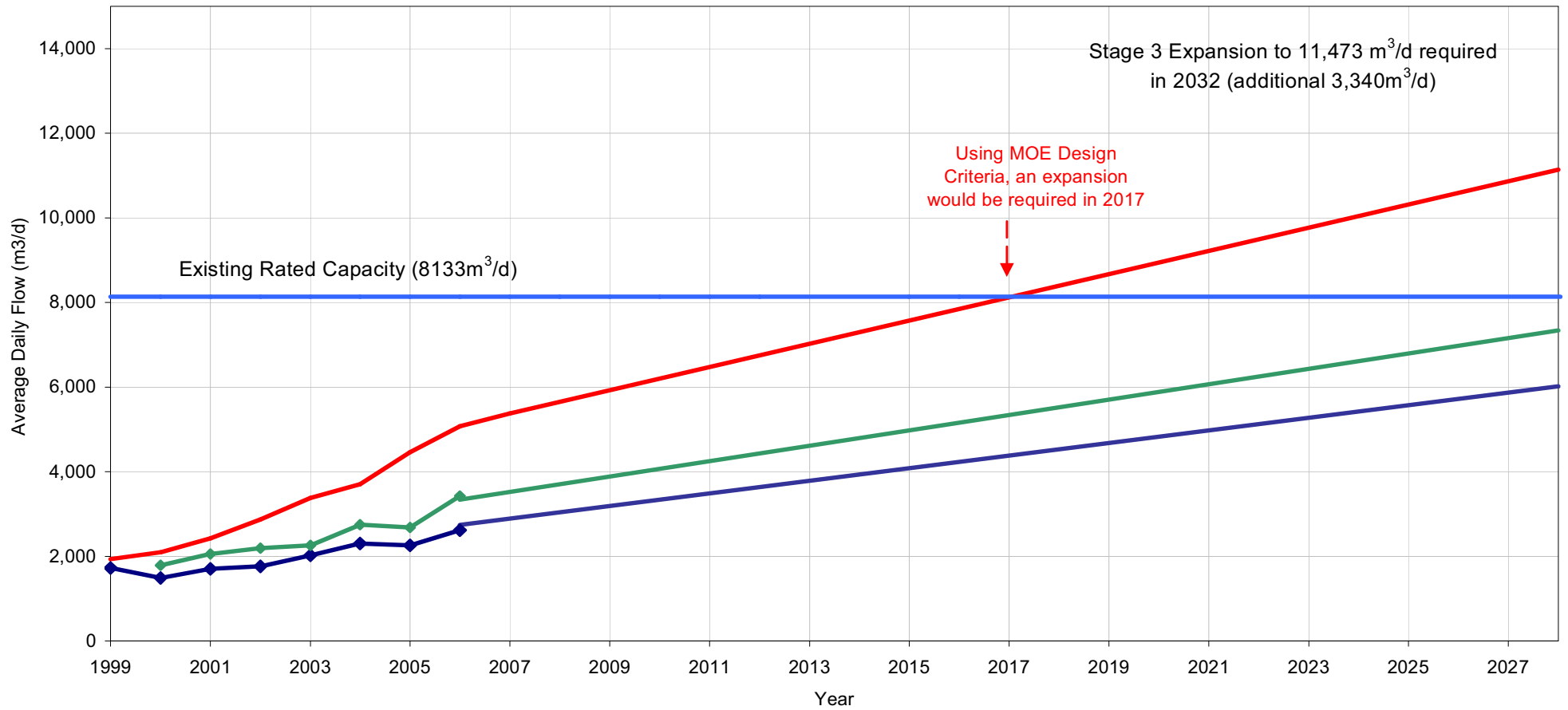
The existing Craigleith Sewage Treatment Plant (STP) does not have sufficient capacity to service the projected amount of wastewater for the Service Area, which includes Craigleith and the developing areas of Osler and Castle Glen. As referenced in the 2006 Combined Master Plan EA, parts of Collingwood and Clearview have also been included in the study area for this Class EA.

## Proposed Craigleith STP Service Area

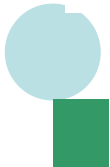




# Sewage Treatment Flow Projection



- ◆ Historical Yearly ADF
- ◆ Historical Peak Season ADF (Jan to Mar)
- Projected Flow based on Historical Peak Season (Jan to Mar)
- Projected Flow based on MOE Guideline
- Projected Flow based on Historical Yearly Average





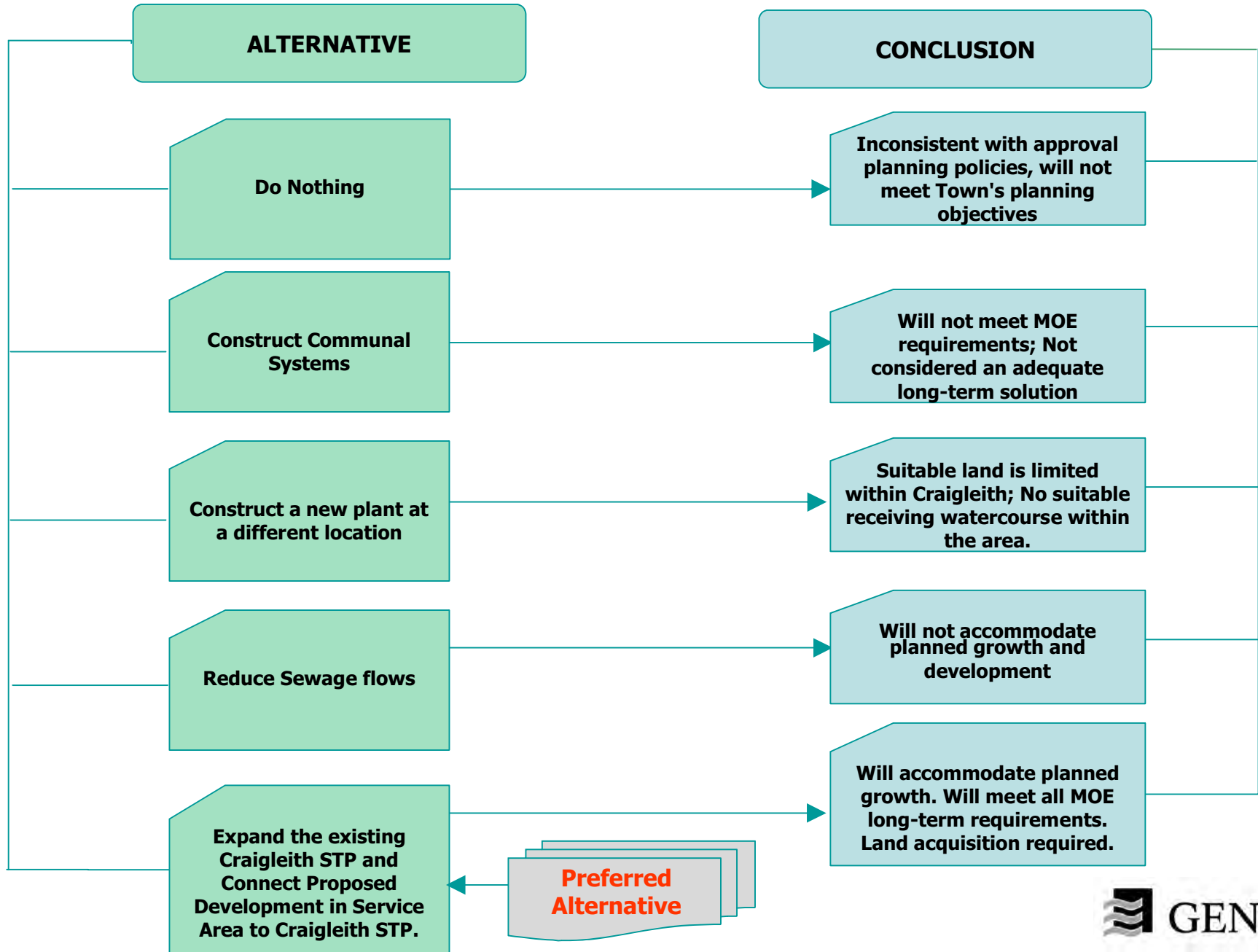
## Project Information: The Existing System

- Existing facility has a total average day flow capacity of 8,133 m<sup>3</sup>/day and total peak day flow capacity of 19,640 m<sup>3</sup>/day.
- Raw sewage is pumped to the STP from Craigeith Main Pumping Station
- The treatment facility is comprised of comminution, aerated grit removal, extended aeration, phosphorus removal by alum addition, secondary clarification, filtration, disinfection by ultra violet irradiation and 2 stage aerobic sludge digestion.
- Treated effluent is discharged into Nottawasaga Bay via a 3km outfall.





# Phase 2: Evaluation of Alternative Solutions and Selection of the Preferred Alternative





## Phase 3: Identification of Design Options for the Preferred Alternative

The secondary treatment design options for the preferred alternative are as follows:

- Rotating Biological Contractors
- Trickling Filters / Solids Contact
- Integrated Fixed Film Activated Sludge
- Membrane Bioreactors
- Biological Aerated Filters
- Sequencing Batch Reactors
- Conventional Activated Sludge
- Extended Aeration





## Phase 3: Evaluation Criteria

The secondary treatment design options for the preferred alternative are evaluated based on the following criteria:

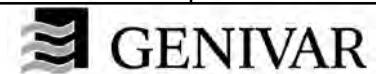
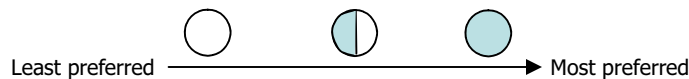
- Minimize Impact on Natural Environment: Capability to consistently meet the plant effluent criteria
- Minimize Impact on Social Environment: Process footprint and availability of sufficient space on site for implementation of the process technology
- Maximize Technical Suitability:
  - System Track Record: In Southern Ontario (in similar climates and size)
  - Level of Experience: Experience of Town staff with treatment technology
  - Compatibility: Compatibility with existing processes
- Minimize Cost: Capital Cost





# Phase 3: Evaluation of Design Options for the Preferred Solution

Evaluation Criteria	Identified Alternatives							
	Rotating Biological Contactors	Trickling Filters / Solids Contact	Integrated Fixed Film Activated Sludge	Membrane Bioreactors	Biological Aerated Filters	Sequencing Batch Reactors	Conventional Activated Sludge (CAS)	Extended Aeration
<b>Minimize Impact on Natural Environment</b>								
<b>Minimize Impact on Social Environment</b>	 Sufficient land on site.	 Sufficient land on site.	 Sufficient land on site.	 Sufficient land on site.	 Sufficient land on site.	 Sufficient land on site.	 Land acquisition required	 Land acquisition required
<b>Maximize Technical Suitability: System Track Record</b>	 Limited		 Pilot testing	 Smaller facilities. Pilot testing for larger facilities.	 Currently under construction.	 Smaller facilities.		
<b>Maximize Technical Suitability: Level of Experience</b>								
<b>Maximize Technical Suitability: Compatibility</b>	 Not compatible	 Not compatible	 Not compatible	 Not compatible	 Not compatible	 Not compatible	 Not compatible	 Compatible
<b>Minimize Cost</b>	 High	 High	 Very High	 Very High	 Very High	 Low	 Low	 Lowest
<b>Preferred Alternative</b>								





## Phase 3: Preferred Alternative Design

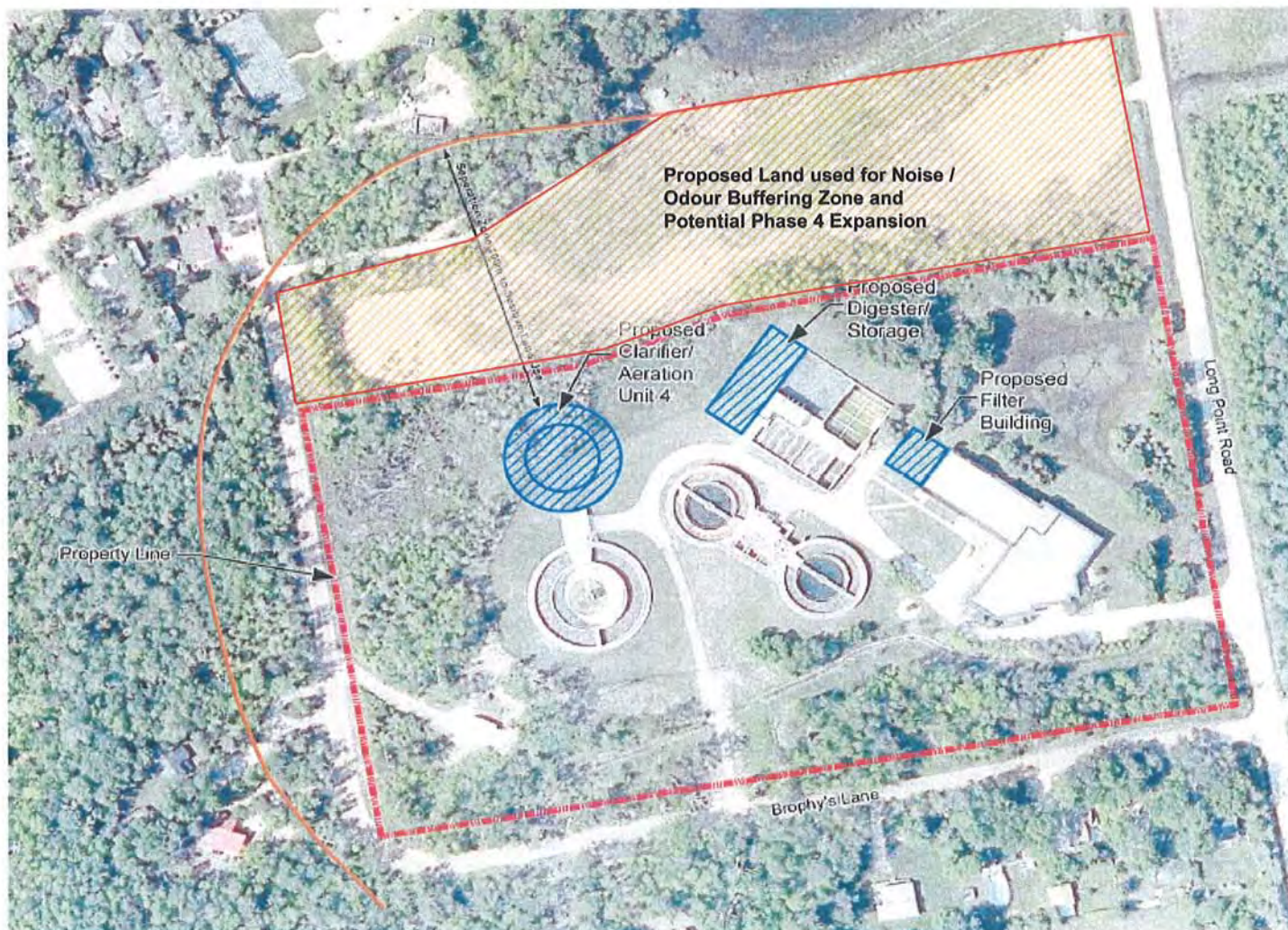
The preferred alternative design also includes the following processes:

- **Grit Chamber:** A third aerated grit tank already exists at the site and will be put in service with the installation of related equipment.
- **Disinfection Technology:** Expansion of the existing Ultra-violet (UV) disinfection process is recommended.
- **Tertiary Treatment:** Expansion of the existing filter is recommended.





# Recommended Stage 3 Expansion Layout





# Overview of Potential Impacts and Mitigation Measures

Controls will be implemented to lessen the severity of environmental effects due to construction work.

## ▪ **Sedimentation and Erosion Control:**

- Comprehensive sedimentation and erosion control strategy
- Stabilization and sedimentation ponds if required

## ▪ **Operational Issues and Concerns:**

- Automation for additional operational activities

## ▪ **Traffic and Access to Property:**

- Traffic management plan (e.g. Detour Plan)
- Access for local traffic and emergency vehicles
- Access to private property maintained at all times
- Individual notification in advance to affected property owners on construction schedule/duration

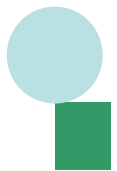
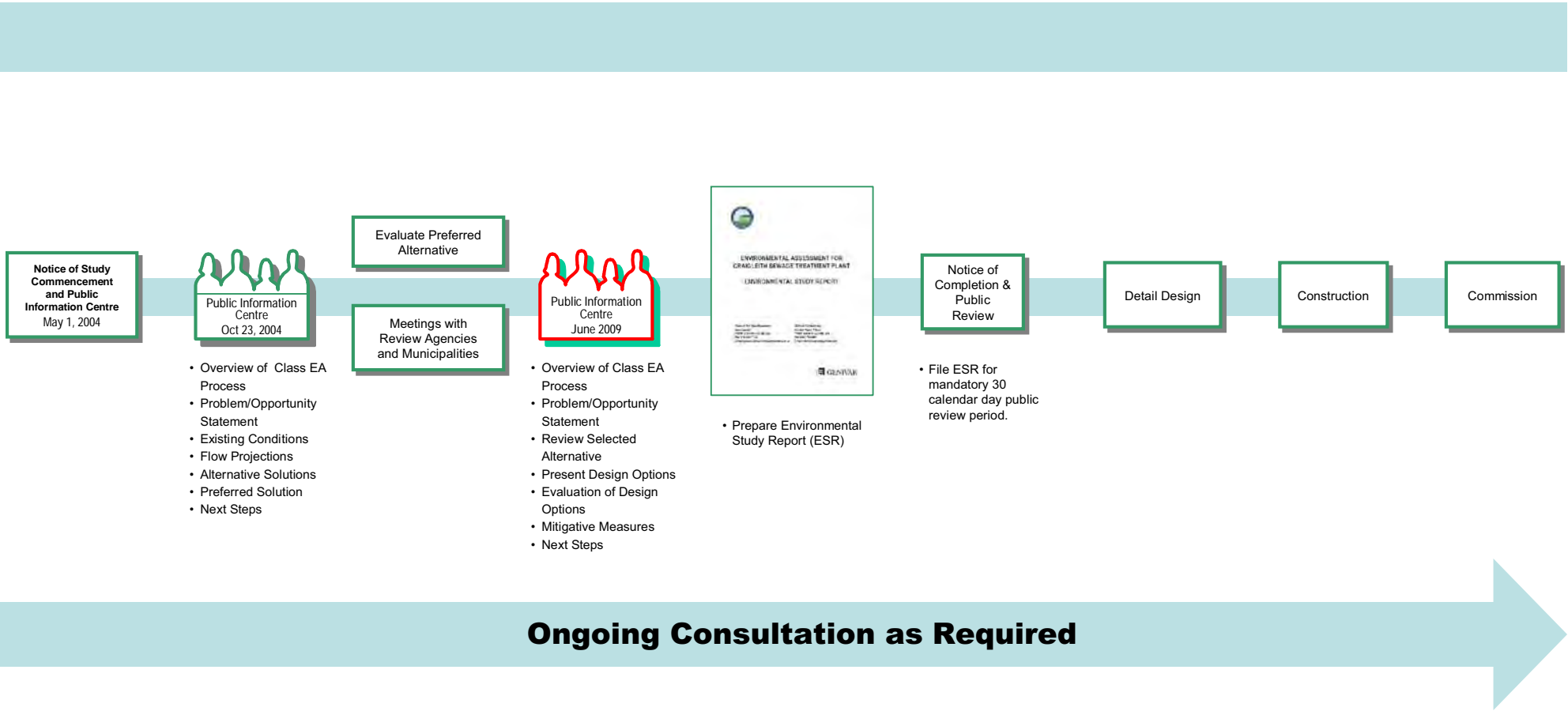
## ▪ **Removal of Vegetation and Temporary Impacts (e.g. noise, vibration) to Adjacent Properties:**

- Preferred design concept avoids removal
- All construction practices having regard to area land uses will be outlined in the detailed design
- Construction operations restricted to the day shift (wherever possible) and adherence to local noise by-laws by contractor
- Dust control by spraying water/street sweeping





# Next Steps....





## How to Get Involved?

### **Mr. John Caswell, Project Manager**

Water & Wastewater Division  
The Town of The Blue Mountains  
26 Bridge Street,  
Thornbury, ON N0H 2P0  
Phone: 519-599-3131, Ext. 226  
Fax: 519-599-7723  
Email: [jcaswell@thebluemountains.ca](mailto:jcaswell@thebluemountains.ca)

### **Ms. Michelle Albert, P.Eng., Consultant**

GENIVAR Ontario Inc.  
600 Cochrane Drive, Suite 500  
Markham, Ontario L3R 5K3  
Phone: 905.475.7270 Ext. 304  
Fax: 905.475.5994  
Email: [michelle.albert@genivar.com](mailto:michelle.albert@genivar.com)

**We Would Like to Hear From You**





NOTE:  
 The Public Information Centre for the  
 Craigleith Sewage Treatment Plant Class  
 Environmental Assessment (Class EA)  
 and the Long Term Water Supply Class  
 EA were held together and therefore only  
 one Sign-In Sheet was used.

# Town of The Blue Mountains

## Environmental Study Report for the Long Term Water Supply Schedule 'C' Class Environmental Assessment

**Public Information Centre #2**

**June 13, 2009**

### SIGN-IN SHEET

Please Print Clearly

NAME	ADDRESS	POSTAL CODE	PHONE #	ADD TO MAILING LIST	
				YES <input type="checkbox"/>	NO <input type="checkbox"/>
J MCGEE	COUNCIL			YES <input type="checkbox"/>	NO <input type="checkbox"/>
DEA YAXLEY	CASTLE CLON 266 NORTHMOUNT		705 444-1248	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>
George Fleming	120 Blawie George Cr. T Bin		705 4450441	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>
Jon Proctor	110 Pine St. Collingwood L9Y 2N9	L9Y 2N9	705 446-3510	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>
Kevin Sanson	22 Highlands Cr, Wood,	L9Y 5H3	444-6343	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>
John Capor	241 Sunset Blvd.		599-5582	YES <input type="checkbox"/>	NO <input type="checkbox"/>
<i>[Signature]</i>	114 CRAIGMORE CR.	L9Y 3Z2 <del>114</del> AT LEAST TODAY!	-	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>

Information gathered is for use in this study only

Thank you for your participation in this study



NOTE:  
 The Public Information Centre for the  
 Craigleith Sewage Treatment Plant Class  
 Environmental Assessment (Class EA)  
 and the Long Term Water Supply Class  
 EA were held together and therefore only  
 one Sign-In Sheet was used.

## Town of The Blue Mountains

### Environmental Study Report for the Long Term Water Supply Schedule 'C' Class Environmental Assessment

**Public Information Centre #2**

**June 13, 2009**

### SIGN-IN SHEET

Please Print Clearly

NAME	ADDRESS	POSTAL CODE	PHONE #	ADD TO MAILING LIST	
				YES <input type="checkbox"/>	NO <input type="checkbox"/>
Senach Wilson	P.O. Box 390, Collingwood	L9Y 3Z7	445-9333	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>
Ann Johnston	Box B2 Clarksburg	L4M 2J0 <del>579-7</del>	599 2894	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>
				YES <input type="checkbox"/>	NO <input type="checkbox"/>
				YES <input type="checkbox"/>	NO <input type="checkbox"/>
				YES <input type="checkbox"/>	NO <input type="checkbox"/>
				YES <input type="checkbox"/>	NO <input type="checkbox"/>
				YES <input type="checkbox"/>	NO <input type="checkbox"/>

Information gathered is for use in this study only

*Thank you for your participation in this study*



## Town of The Blue Mountains

# Environmental Study Report for the Craigleith Sewage Treatment Plant Schedule 'C' Class Environmental Assessment

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COMMENT SHEET PIC #2

June 13, 2009

The Town of the Blue Mountains is interested in hearing the community's comments, questions, concerns and suggestions regarding the process and criteria for the evaluation of the design alternatives for the existing Craigleith Sewage Treatment Plant expansion. Please take a few minutes to complete this brief comment sheet. All comments will be carefully considered in the Class EA Study.

1. Do you have any comments related to the existing conditions in the study area?

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2. Do you have any comments, concerns, questions or suggestions regarding the approach and decision-making process being used to identify and develop the design alternative for the existing Craigleith Sewage Treatment Plant expansion?

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3. Do you have any comments, concerns, questions or suggestions regarding any of the proposed design alternatives identified including the preferred alternative?

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4. Additional comments related to the Class EA study.

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5. How useful did you find the Public Information Centre? (Please circle one.)

Very Useful

Not Very Useful

1

2

3

4

5

6. How would you describe the nature of your interest in this study?

\_\_\_\_\_ Member of the General Public (including resident)

\_\_\_\_\_ Member of an Interest Group (Please specify: \_\_\_\_\_ )

\_\_\_\_\_ Consultant

\_\_\_\_\_ Agency Representative (Please specify: \_\_\_\_\_ )

\_\_\_\_\_ Other (Please specify: \_\_\_\_\_ )

7. Please provide any other comments regarding the Public Information Centre (i.e., location, help received on understanding study and your concerns, opportunity provided to ask questions/comments/express concern).

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(NOTE: Your completed Comment Sheet will be included in the Environmental Study (Class EA) Report.)

Please return this completed Comment Sheet to staff at the Registration Table or you can fax or mail it by, June 23, 2009 to:

Mr. John Caswell  
Project Manager  
The Town of the Blue Mountains  
26 Bridge Street East  
Thornbury, Ontario N0H 2P0  
Telephone: 519-599-3131  
Fax: 519-599-3664  
Email: jcaswell@thebluemountains.on.ca

Ms. Michelle Albert, P.Eng  
Consultant Project Manager  
GENIVAR Ontario Inc.  
600 Cochrane Drive, Suite 500  
Markham, Ontario L3R 5K3  
Telephone: 905-475-7270, Ext. 304  
Fax: 905-475-5994  
Email: michelle.albert@genivar.com



## ***Environmental Assessment for the Craigleith Wastewater Treatment Plant Expansion***

### **NOTICE OF STUDY COMPLETION**

#### **STUDY OBJECTIVE**

The Town of The Blue Mountains has completed an Environmental Study Report as a continuation of the Combined Environmental Assessment Master Plan Phase 2 Final Report for the Craigleith, Castle Glen, Osler Service Areas, which completed Phases 1 and 2 of the Municipal Class Environmental Assessment (EA) process for water and wastewater infrastructure in the Craigleith Service Area. Based on population growth and wastewater flow forecasts, the Craigleith Sewage Treatment Plant will meet or exceed its current rated capacity within the next five years. The objective of this study is to evaluate design alternatives to expand the existing Craigleith facility and achieve the increased capacity required.



#### **THE PROCESS**

The project follows the planning and design process as defined in the Municipal Engineers Association Municipal Class Environmental Assessment document (June 2000). The project is being planned under Schedule C of the Municipal Class Environmental Assessment Act. A Public Information Centre (PIC) was held on June 13<sup>th</sup> 2009 to present to the public the background information on the study, provide various alternatives for the expansion, and present the preferred alternative.

#### **30-DAY REVIEW PERIOD**

The Environmental Study Report for the Craigleith Sewage Treatment Plant Expansion is available for a 30-day review period at the Town of The Blue Mountains Municipal Office, located at 26 Bridge Street in Thornbury or on the Town website at [www.thebluemountains.ca](http://www.thebluemountains.ca). The intention of the 30-day review period is to resolve any remaining issues or concerns regarding the project through discussions by contacting:

##### **Town of The Blue Mountains**

Mr. John Caswell  
Manager of Water and Wastewater Services  
Phone: (519) 599-3131 ext. 224  
Fax: (519) 599-7723  
E-mail: [jcaswell@thebluemountains.ca](mailto:jcaswell@thebluemountains.ca)

##### **GENIVAR**

Ms. Michelle Albert, P.Eng.  
Project Manager  
Phone: (905) 475-7270 ext. 304  
Fax: (905) 475-5994  
E-mail: [michelle.albert@genivar.com](mailto:michelle.albert@genivar.com)

Interested persons should provide written comments to the municipality on the Environmental Study Report within 30 calendar days from the date of this Notice. Comments should be directed to the Manager of Water and Wastewater Services.

If concerns regarding this project arise that cannot be resolved through discussions with the Town, a person/party may request that the Minister of the Environment issues an order for the project to comply with Part II of the Environmental Assessment Act (referred to as a "Part II Order"), which addresses individual environmental assessments. A copy of the request must also be sent to Mr. John Caswell. The Minister must receive requests for Part II Orders by **December 18<sup>th</sup> 2009** at the address below:

The Honourable John Gerretsen  
Minister of the Environment  
12th Floor, 135 St. Clair Avenue West  
Toronto, Ontario  
M4V 1P5

Thank you for your participation in this study

**Town of The Blue Mountains**  
26 Bridge Street, P.O Box 310, Thornbury ON N0H 2P0  
[www.thebluemountains.ca](http://www.thebluemountains.ca)

This Notice was issued on November 18<sup>th</sup> 2009

From the new trunk main that would be established on Osler Bluff Road, watermains could be extended into Trail's End, Slalom Gate and Mountain View Estates. The main on Slalom Gate would connect through to the existing main from the Collingwood system on Evergreen Road. There is a pressure zone boundary in this area, so the east part of Slalom Gate would be fed from the Collingwood system at Evergreen Road (similar lower pressure zone), while the west part and Trail's End would be serviced from the higher pressure zone from the Town of The Blue Mountains. The Town of Collingwood has recently constructed 50% of the proposed trunk watermain extension along Mountain Road from 10<sup>th</sup> Line to Osler Bluff Road. The existing main (lower pressure zone) that previously terminated at the 10th Line has been extended to Blind Line Road ( 11<sup>th</sup> Line); and extension to Osler Bluff Road to service areas below 213 meters is available at any time that financial commitment is made from Developers or the Town of the Blue Mountains. This will provide a greater reliability for the Collingwood supply in this area.

The one other recommendation for the Collingwood area is to construct about another 550 metres of 300 mm dia. watermain on Osler Bluff Road between Forest Drive and Silver Creek Drive in the lower pressure zone. The feed to Osler Bluff Road is currently via a 200 mm dia. main on Forest Drive, even though a 300 mm main exists on Silver Creek Drive. Closing the loop would make for a better trunk system on Osler Bluff Road, as well as providing a better system for Silver Creek Drive itself. The Town of Collingwood has indicated that this section of watermain is required to increase the supply to the Mountain Road Booster Pump Station to 4,000 m<sup>3</sup>/day. The main could also be extended another 150 metres further north to link with the Town of The Blue Mountains system at Highway 26. This connection would provide a better emergency feed for both areas should the need arise. In doing this, however, there would be issues that need to be addressed relating to the fact that the water is coming from two different supply sources.

## **8.2 Identification & Assessment of Sewage Servicing Alternatives**

### **8.2.1 Craigleith**

#### **West Trunk System**

The West Trunk Sanitary Sewer Collection System generally includes the Alta and Georgian Woodlands Subdivisions plus the Home Farm property, as delineated on Drawing 1862-SCC1. Its service area is bound to the northwest abutting the Camperdown sanitary service area near Hidden Lake Road and to the southeast encompassing the Home Farm property.

#### **Extension of Western Trunk**

In conjunction with servicing the Georgian Woodlands development and to facilitate servicing of the Hidden Lake Road area and the potential decommissioning of the local sewage pumping station on Arrowhead Road at Margaret Drive, the western trunk system must be extended. From its present terminus at Old Lakeshore Road and Aspen Way, the proposed 375 mm dia. trunk sewer would follow along the Georgian Trail to a point about 700 metres west of Aspen Way. A new sewer from the future Georgian Woodlands subdivision would connect to the trunk sewer at this location. There may however be alternative routing options for this sewer through the proposed new development in the area, which may mitigate some of the possible construction

impacts on the Georgian Trail. In the detailed planning phases for this area alternative sewer routings can be discussed with the Town.

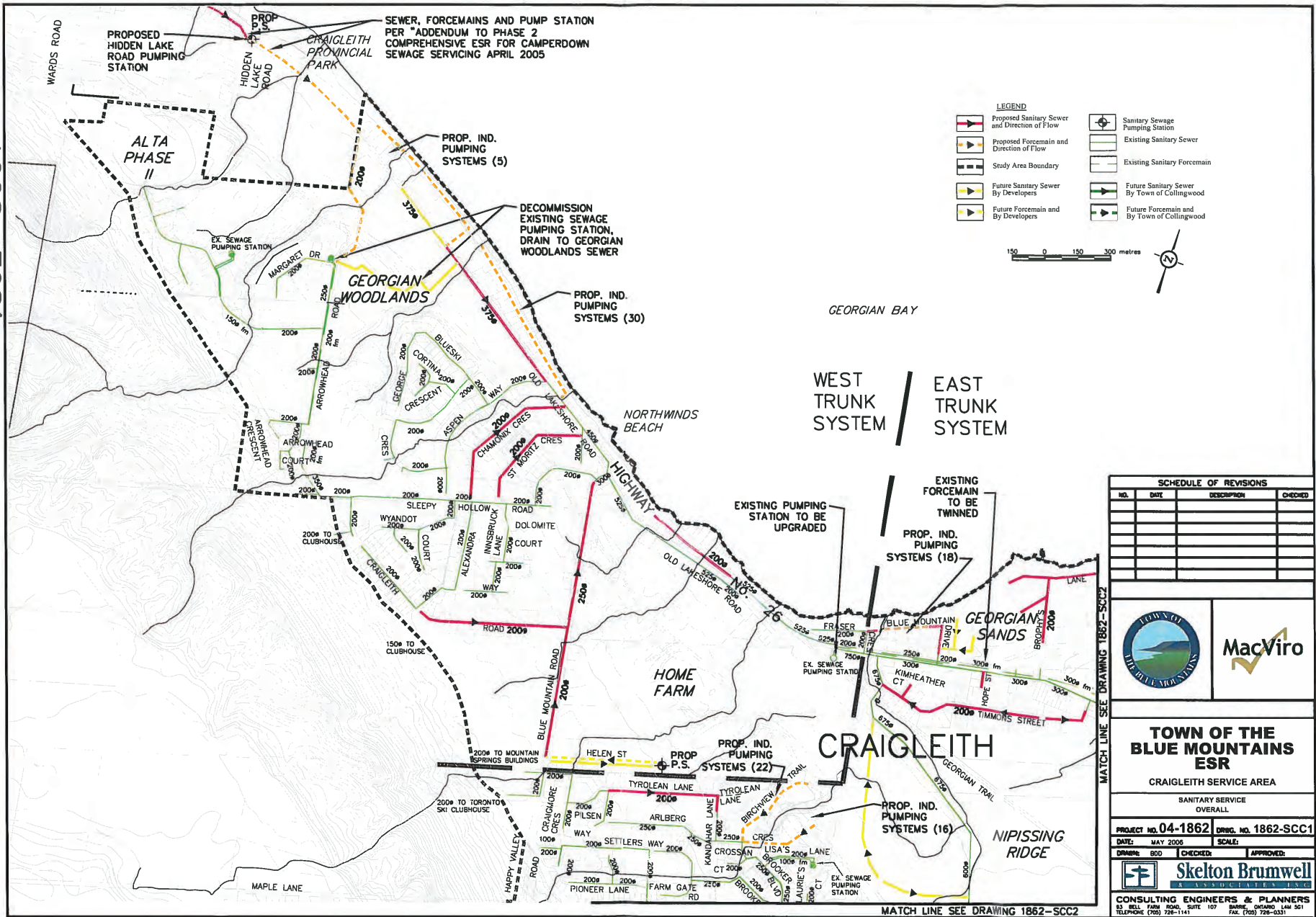
### **Margaret Drive Pump Station**

There are two servicing issues within this part of the servicing area. The first is the status of the Margaret Drive sewage pump station (SPS) located at Arrowhead Road and Margaret Drive. The SPS presently discharges 10 L/s via a 200mm dia. forcemain to a 200mm dia. sanitary sewer on Sleepy Hollow Road, with a capacity of 38 L/s. The Sleepy Hollow Road sewer has insufficient capacity to convey the 60 L/s design capacity of the Margaret Drive SPS. Therefore with new sewers being constructed in this area, consideration should be given to decommissioning the SPS, and draining the sewage by gravity into the new system. One option would be to construct a new sewer down Arrowhead Road to Lunan Court (part of the Georgian Woodlands subdivision), a total length of about 450 metres. A second option would be to install a gravity connection between the existing SPS and Sandford Trail, which is also a proposed street within Georgian Woodlands. The distance to the proposed sewer at this location is only about 100 metres, however an easement would be required to install the sewer between proposed residential lots. Options for the Arrowhead Road SPS are therefore as follows:

- Alternative No. 1: Do nothing – continue Arrowhead Road SPS operations as is
- Alternative No. 2: Decommission the Margaret Drive SPS and drain sewage with a gravity feed to a new sewer at Lunan Court in the Georgian Woodlands subdivision
- Alternative No. 3: Decommission the Margaret Drive SPS and drain sewage with a gravity feed to a new sewer on Sandford Trail in the Georgian Woodlands subdivision

The Sewage Servicing Alternatives for the Margaret Drive SPS located in the Craigleith West Trunk System are to maintain the existing facility or decommission the SPS with optional gravity feed connections to new sewers. The three alternatives were assessed using the above noted criteria and are summarized in the following table.

1862 - SCC1



MATCH LINE SEE DRAWING 1862-SCC2

**Table 8-4: Assessment for Sewage Servicing Alternatives for Arrowhead Road SPS**

Criteria	Alternative 1	Alternative 2	Alternative 3
Natural Environmental Impacts	Future watercourse crossing same as Alt 2 or 3 after decommissioning Arrowhead Rd SPS  Potential impact on watercourse and fisheries in the event of an overflow	One watercourse crossing maybe required to construct the sewer from the Arrowhead Rd SPS to Lunan Court. Crossing above the concrete box culvert maybe feasible to avoid the watercourse crossing	No watercourse crossing required to construct the gravity feed to the new Sandford Trail sewer
Social & Cultural Impacts	Long-term impacts associated with maintaining the Arrowhead Rd SPS including periodic maintenance, odours and noise from the emergency standby power  Short term impacts same as in Alt 2 or 3 after future decommissioning of Arrowhead Rd SPS	Short term impacts due to construction on Arrowhead Rd including noise, vibration, dust and traffic  Remove medium impacts in Alt1 by decommissioning Arrowhead Rd SPS	Short term impacts due to construction within easement to Sandford Trail including noise, vibration, dust and traffic  Remove medium impacts in Alt1 by decommissioning Arrowhead Rd SPS
Technical Suitability	Arrowhead Rd SPS Design Flow (60 L/s) exceeds Sleepy Hollow Rd sewer capacity of 38 L/s  Arrowhead Rd SPS presently discharges 10 L/s to Sleepy Hollow Rd sewer  Proposed Hidden Lake Rd SPS design flow of 15 L/s discharging to Arrowhead Rd SPS	Facilitates servicing Georgian Woodlands, Hidden Lake Rd SPS and decommissioning Arrowhead Rd SPS  Potentially reduces length of Hidden Lake Rd SPS - Forcemain by 450m and pumping static head by 25 m, if similar timing of projects  450m -200 mm dia. sewer on Arrowhead Rd with 7 – 5m drop Manholes and 2 – 3m Manholes from the SPS to Lunan Court	Facilitates servicing Georgian Woodlands, Hidden Lake Rd SPS and decommissioning Arrowhead Rd SPS  100m - 200 mm dia. sewer from the SPS to Sandford Trail
Capital Cost	N/A	\$ \$213,650	\$ \$97,650
Preferred Alternative	No	No	<b>Yes</b>

### Recommended Alternative

The Preferred Sewage Servicing for the Margaret Drive SPS outlined in Table 8.4 is Alternative 3. The Preferred Alternative incorporates decommissioning of the SPS with a gravity feed to the new sewer on Sandford Trail in the Georgian Woodlands subdivision. Alternative 1 is not technically feasible considering the minimal capacity of the existing Sleepy Hollow Road Sewer. This leaves Alternatives 2 and 3, both proposing decommissioning as the only feasible options. Alternative 3 is similar to Alternative 2 with regard to natural environmental and social impacts; but it has a 62 % lower capital cost. Therefore Alternative 3 was selected as the Preferred Alternative.

### Eastern Camperdown Service Area

In 2004, the Town retained MacViro and Skelton Brumwell to undertake the detailed design of the Camperdown Phase 1 Trunk sewer works as identified in the Phase 2 Comprehensive Class Environmental Study Report. Information obtained during the detailed design stage indicated

that the geotechnical and topographical conditions varied from those assumed during the initial assessment. The changed conditions had a significant impact on the capital cost and constructability of the Highway 26 trunk sewer from Hidden Lake Road to west of Peaks Road and the overall servicing strategy and subsequent phasing of infrastructure. As such the Town re-assessed the trunk servicing alternatives for the eastern portion of the Camperdown Service Area, identified a new recommended Camperdown Wastewater Servicing Option, and prepared an Addendum to the Phase 2 Comprehensive ESR for the Camperdown Sewage Servicing.

The Addendum covered the servicing of the extreme eastern portion of the Camperdown Service Area, which includes the proposed Alta Phase 2 subdivision, and the existing residential areas of Hidden Lake and Ward's Roads. The recommended alternative for servicing the eastern portion of the Camperdown Area identified in the Addendum is the construction of a gravity sewer on Highway 26 from Wards Road to Hidden Lake Road with a pump station at Hidden Lake Road and forcemain running east on Highway 26 and then south on Arrowhead Road to the existing SPS at Margaret Drive in the Craigleith Service Area. Therefore, sewage flows from these areas (15.3 L/s) will be conveyed to the Craigleith Sewage Collection system and ultimately the Craigleith Sewage Treatment Plant. Overall, 224 equivalent residential units including Alta Phase II from the Camperdown Service Area, most of which are existing will be serviced by the Craigleith Sewage Treatment Plant. As noted previously, it is recommended that the Margaret Drive SPS ultimately be decommissioned once a gravity service is available through the Georgian Woodlands Subdivision.

### **Alta Phase 2**

Alta Phase 2 was included in the Study Area for the Combined EA Master Plan, although it is technically in the Camperdown Servicing Area. The original Comprehensive EA for Camperdown recommended that Alta Phase 2 be serviced by the trunk sewer system being built along Highway 26 which drains to the Thornbury Sewage Treatment Plant. As noted above, however, the eastern part of the Camperdown Servicing Area, including Alta Phase 2, Ward's Road and Hidden Lake Road are now to be serviced by a new pumping station on Hidden Lake Road. A new gravity sewer will need to be constructed by the developer along Hidden Lake Road between Alta Phase 2 and the new pumping station.

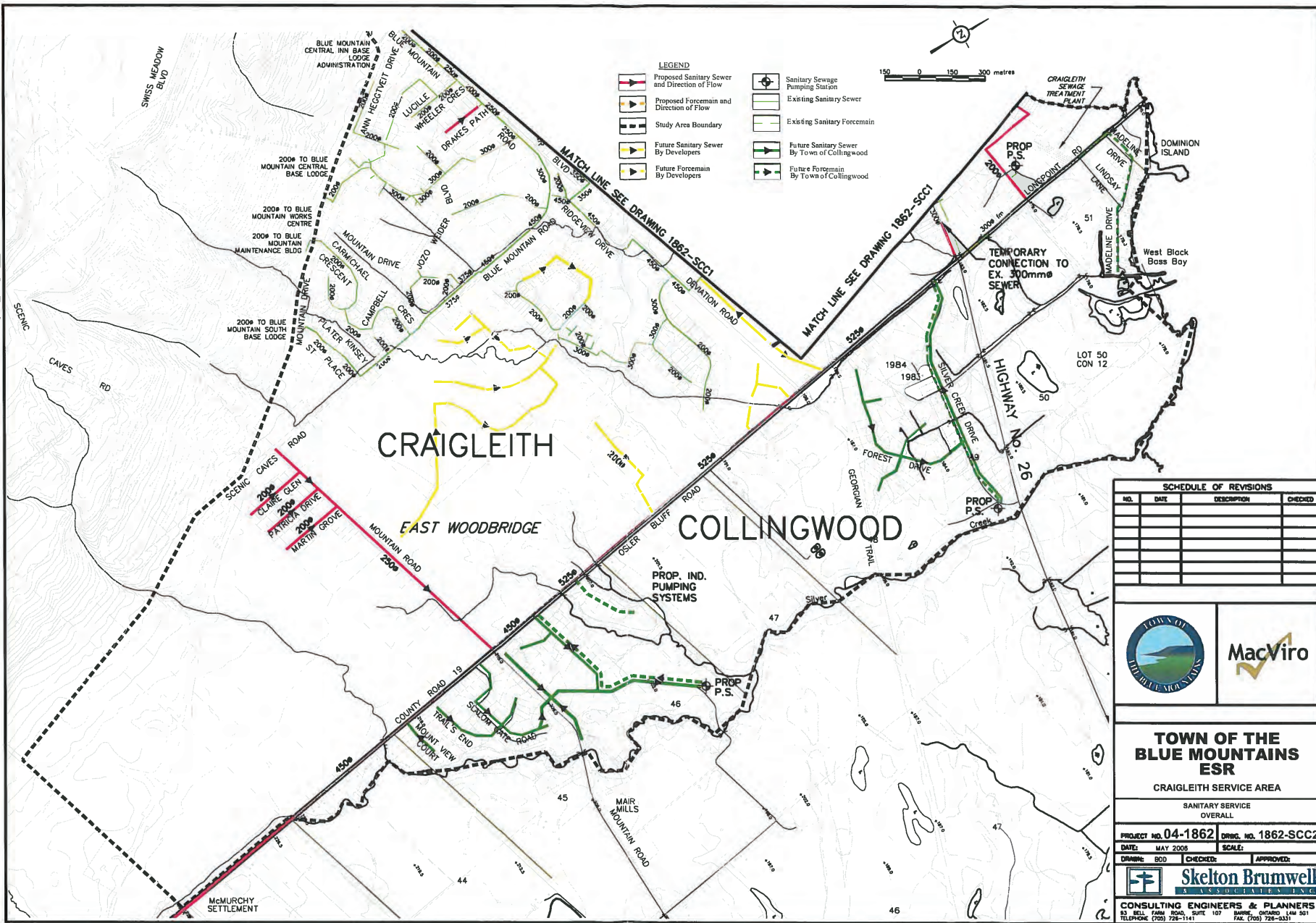
### **Local Sewer Extensions**

Grey Road 19 (Old Lakeshore to Helen) and Craigleith Road (Craigleith Walk to Grey Road 19) will be serviced with 200 mm dia. sewers, connecting to the Lakeshore Road sewer, as described in the Class EA by Henderson Paddon dated February 2004. The Class EA also describes a SPS to be located at the east end of Helen Street, which would pump sewage from that street to the new sewer on Grey Road 19. This SPS would also provided service to the proposed "Home Farm" development located north of Helen Street.

### **East Trunk System**

The East Trunk Sanitary Sewer Collection System generally includes the Georgian Sands, East Woodbridge, Nipissing Ridge and Snowbridge subdivisions, as delineated by Drawings 1862-SCC1 and SCC2. Issues affecting the eastern trunk relate to the provision of sewers on unserviced streets, and providing services to the Nipissing Ridge, East Woodbridge and Georgian Sands developments.

1862 - SCC2



SCHEDULE OF REVISIONS			
NO.	DATE	DESCRIPTION	CHECKED



**TOWN OF THE BLUE MOUNTAINS ESR**

CRAIGLEITH SERVICE AREA

SANITARY SERVICE OVERALL

PROJECT NO. 04-1862 DRWG. NO. 1862-SCC2

DATE: MAY 2005 SCALE: DRAWN: BOD CHECKED: APPROVED:



**Skelton Brumwell**

CONSULTING ENGINEERS & PLANNERS  
 83 BELL FERRY ROAD, SUITE 107 MARKHAM, ONTARIO L4M 5G1  
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### Extension of Local Sewers

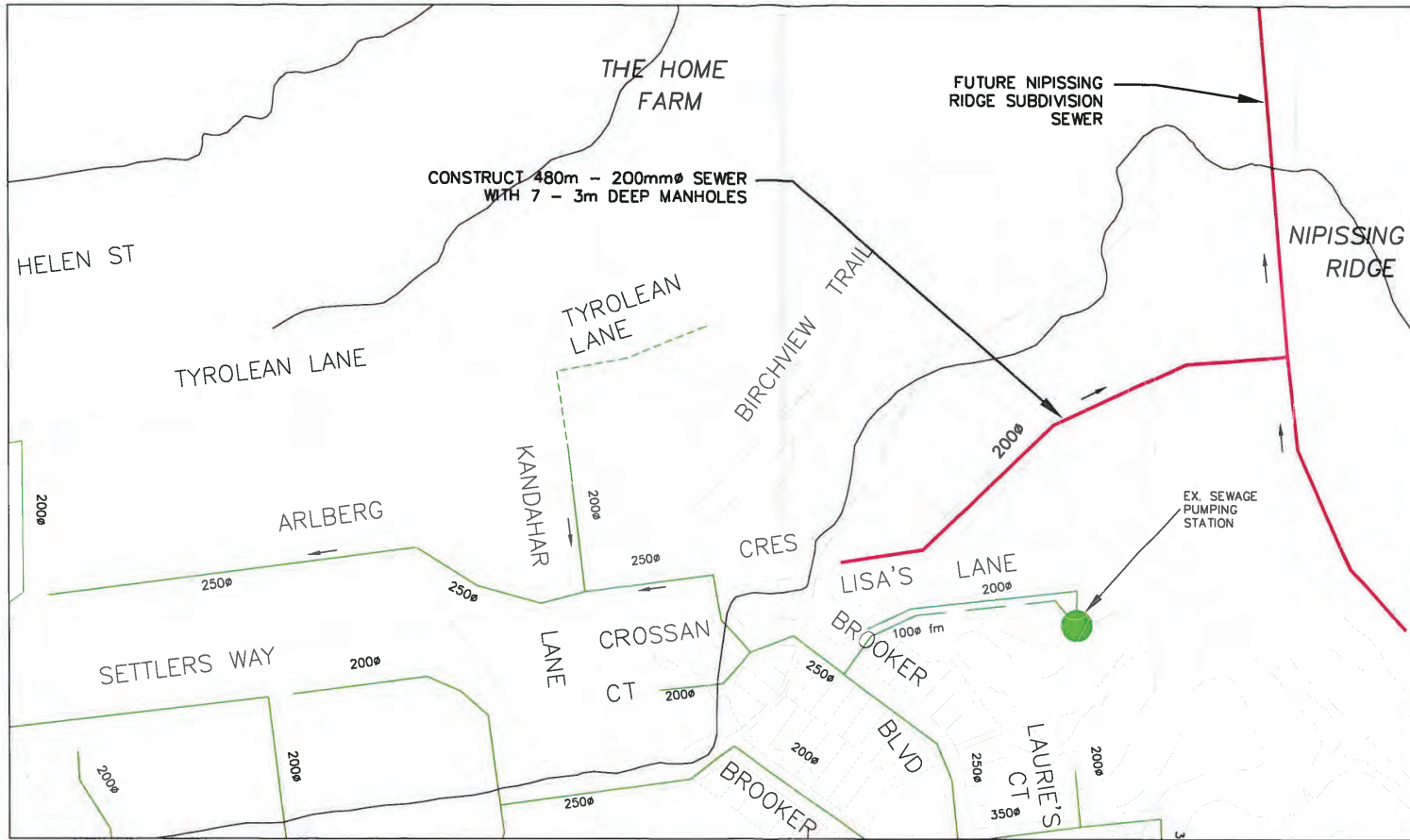
Timmons Street would be serviced by extending sewers from the main trunk at the west side, and from the 300 mm dia. sewer located along the south side of Highway 26 at the east side. A sewer would also be constructed up Hope Street, from the existing stub from the 300 mm dia. main. A new sewer would be constructed on Tyrolean Lane, connecting to the existing sewer on Kandahar Lane.

### Alternatives for Servicing Arlberg Crescent

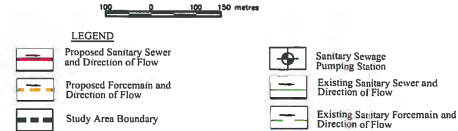
Also in this area, the end of Arlberg Crescent is not presently serviced, and requires a new sewer system. The grade of the road falls to the east, away from the existing sanitary sewer, so the 16 lots would need to be serviced using a pumping system, or by a gravity outlet that would drain east to the proposed Nipissing Ridge development, as described in the servicing report for that subdivision. This gravity sewer would have to be built down a relatively steep slope before connecting to the future sewer within the Nipissing Ridge subdivision. Alternatively, a small municipally owned SPS could be built with a capacity of about 1 L/s, or the dwellings could be serviced with individual pumping stations and a small diameter common forcemain. Options for servicing Arlberg Crescent are as follows:

- Alternative No. 1: Do Nothing (continue to service with individual septic systems)
- Alternative No. 2: Gravity service through the Nipissing Ridge Development (Drawing 1862-SARL2)
- Alternative No. 3: Individual pumping systems (Drawing 1862-SARL3)
- Alternative No. 4: Small municipally owned pumping station (Drawing 1862-SARL4)

The sewage servicing alternatives for Arlberg Crescent located in the Craigleith East Trunk System are to continue with individual on-site systems or abandon existing septic systems and provide municipal services. The municipal sewage systems would include either a gravity sewer or optional pumped service(s). The four alternatives were assessed using the above noted criteria. The assessment is summarized in the following table:



Alternative 1 is existing conditions



SCHEDULE OF REVISIONS			
NO.	DATE	DESCRIPTION	CHECKED

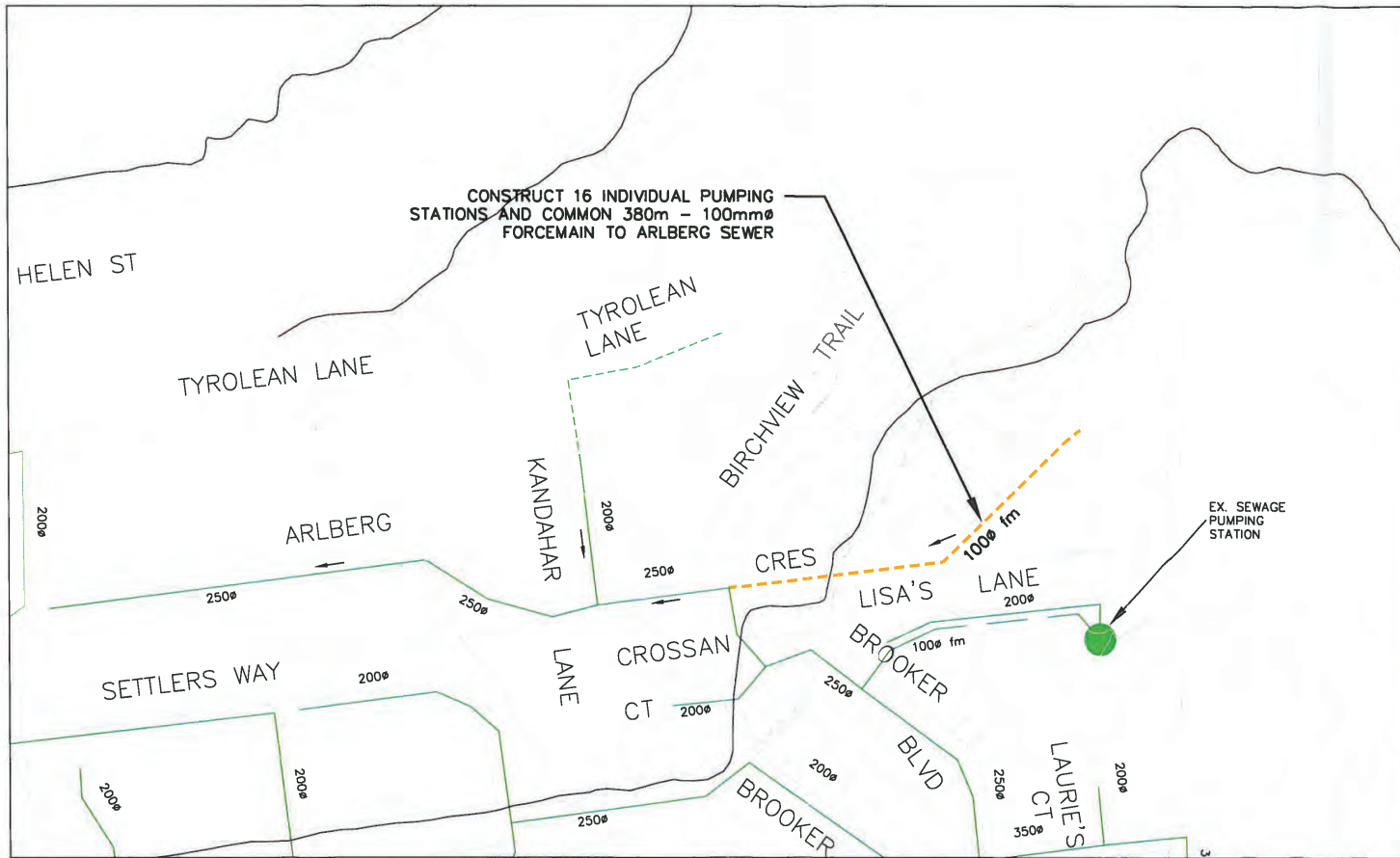


**TOWN OF THE BLUE MOUNTAINS ESR**  
 CRAIGLEITH SERVICE AREA  
 SANITARY SEWER COLLECTION - ARLBERG CRES ALTERNATIVE 2

PROJECT NO. 04-1862    DRWG. NO. 1862-SARL2  
 DATE: MAY 2006    SCALE:  
 DRAWN: BDD    CHECKED:    APPROVED:

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 TELEPHONE (705) 728-1141    FAX (705) 728-0331

1862-SARL3



0 100 200 metres

- LEGEND**
- Proposed Sanitary Sewer and Direction of Flow
  - Proposed Forcemain and Direction of Flow
  - Study Area Boundary
  - Sanitary Sewage Pumping Station
  - Existing Sanitary Sewer and Direction of Flow
  - Existing Sanitary Forcemain and Direction of Flow

SCHEDULE OF REVISIONS			
NO.	DATE	DESCRIPTION	CHECKED



MacViro

**TOWN OF THE BLUE MOUNTAINS  
ESR**

CRAIGLEITH SERVICE AREA

SANITARY SEWER COLLECTION - ARLBERG CRES  
ALTERNATIVE 3

PROJECT NO. 04-1862    DRWG. NO. 1862-SARL3

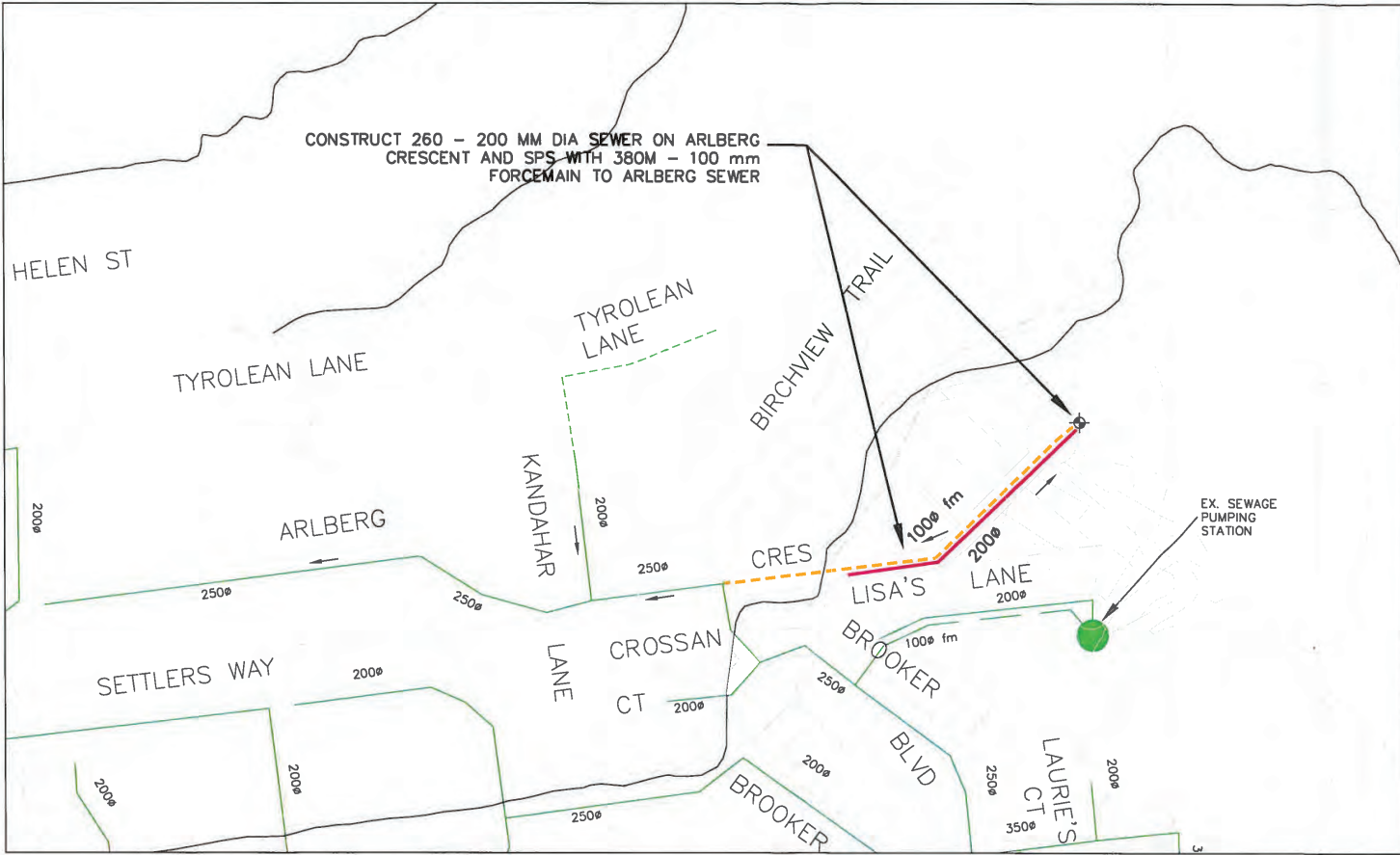
DATE: MAY 2006    SCALE:

DRAWN: BDD    CHECKED:    APPROVED:



**Skelton Brumwell**  
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1862-SARL4



100 0 100 150 metres

- LEGEND**
- Proposed Sanitary Sewer and Direction of Flow
  - Proposed Forcemain and Direction of Flow
  - Study Area Boundary
  - Sanitary Sewage Pumping Station
  - Existing Sanitary Sewer and Direction of Flow
  - Existing Sanitary Forcemain and Direction of Flow

SCHEDULE OF REVISIONS			
NO.	DATE	DESCRIPTION	CHECKED



**TOWN OF THE BLUE MOUNTAINS ESR**  
CRAIGLEITH SERVICE AREA  
SANITARY SEWER COLLECTION - ARLBERG CRES ALTERNATIVE 4

PROJECT NO. 04-1862 DRWG. NO. 1862-SARL4  
DATE: MAY 2006 SCALE:

DRAWN: BDD CHECKED: APPROVED:

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**Table 8-5: Assessment for Sewage Servicing Alternatives for Arlberg Crescent**

Criteria	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Natural Environmental Impacts	Potential contamination of groundwater (nitrate) and surface water (nitrate / un-ionized ammonia / phosphorus) from malfunctioning individual septic tank systems	Vegetation removal on treed steep slope (Nipissing Ridge) required to construct local sewer  Potential for erosion and siltation from slope area during construction	Some vegetative removal to construct individual pumping stations at back of building lots but common forcemain within Arlberg Crescent	No vegetative removal with construction of SPS, Manholes and sewer within Arlberg Crescent only  Potential impact on watercourse and fisheries in the event of an overflow
Social & Cultural Impacts	Long-term impacts due to potential tile field failures including raw sewage at the surface and odour  Presence of leaching beds may limit use of property	Short term impacts due to construction through the Nipissing Ridge development including noise, vibration, dust and traffic  Removal of trees is required adjacent to existing residences	Short term impacts due to construction on Arlberg Crescent including noise, vibration, dust and traffic  Long term impacts associated with maintaining the 16 individual SPS including periodic maintenance and odours	Short term impacts due to construction on Arlberg Crescent including noise, vibration, dust and traffic  Long term impacts associated with maintaining the Arlberg Crescent SPS including periodic maintenance, odours and noise from the emergency standby power
Technical Suitability	In situ clay soils are not conducive to existing individual on-site sewage treatment and disposal systems; and are prone to tile bed failures  Town of Blue Mountain Council's mandate to replace septic systems in designated areas with municipal sewers	Construct 480mm – 200 mm dia sewer on Arlberg Crescent through the Nipissing Ridge development with 7 – 3m Manholes  Steep slope north of Arlberg Crescent may make construction difficult  Easement required through golf course on Home Farm property	Construct 16 individual pumping stations and common 380mm – 100 mm forcemain to Birchview Trail	Construct 260 – 200 mm dia sewer on Arlberg Crescent and SPS with 380mm – 100 mm forcemain to Birchview Trail  Land required for pumping station
Capital Cost	N/A	\$ 142,000	\$153,720	\$ 238,000
Preferred Alternative	No	No	Yes	No

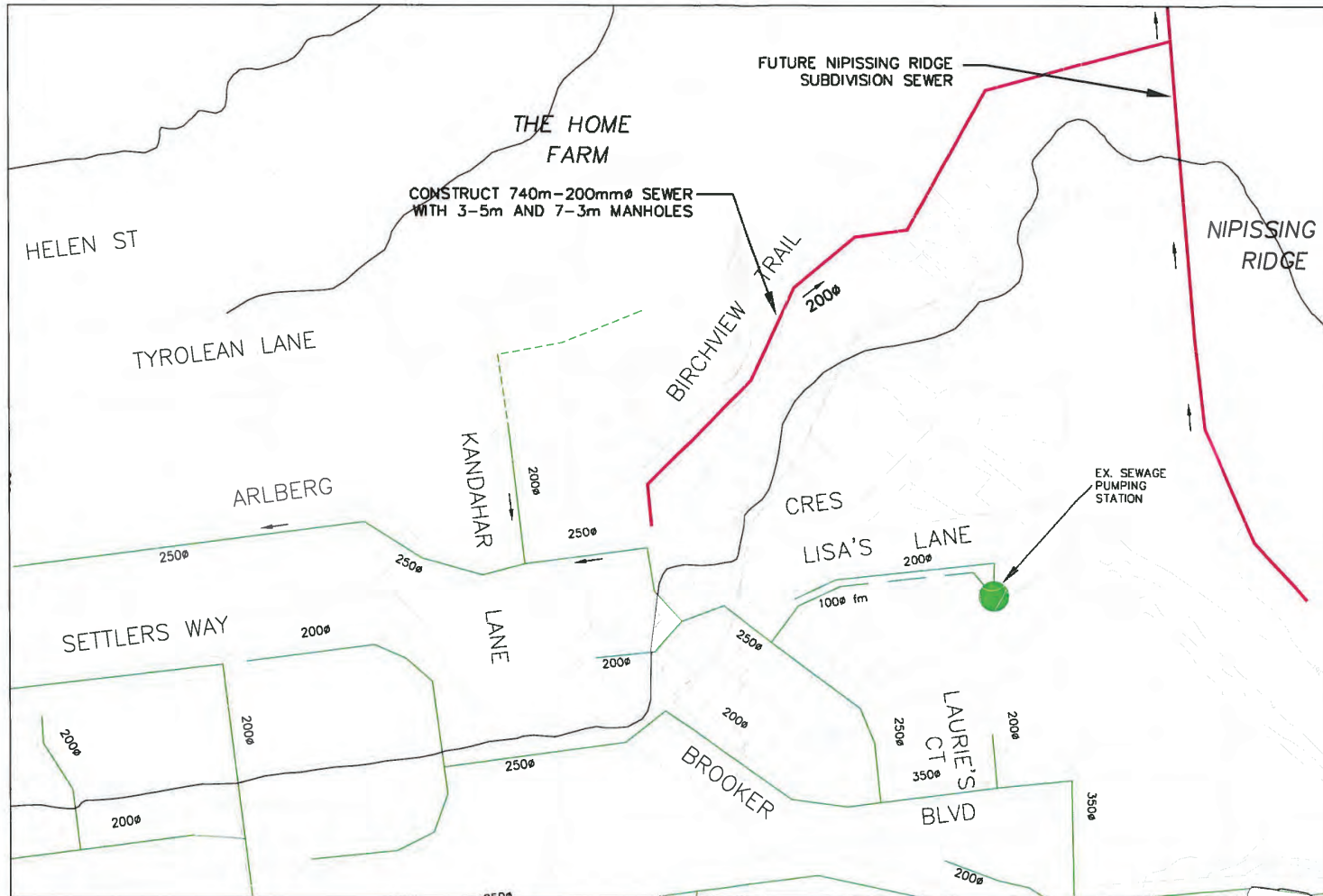
### Recommended Alternative

The Arlberg Crescent Preferred Sewage Servicing Option outlined in Table 8.5 is Alternative 3, which involves the provision of individual pumping stations and a small diameter forcemain to service the residents. This alternative is preferred as it has the lowest environmental impact and the second lowest capital cost.

### Alternatives for Servicing Birchview Trail

Birchview Trail is located between the Tyrolean Lane and Arlberg Crescent, and includes about 22 residential lots. Similar to Arlberg Crescent, the street grade falls to the east, so it would have to be serviced with either a SPS, or it would need a gravity outlet to the east. A gravity outlet would have to cross the south-east corner of the golf course within the “Home Farm” development, and then connect to the proposed sewer within the Nipissing Ridge subdivision.

1862 - SBT2



100 0 100 150 metres

- LEGEND**
- Proposed Sanitary Sewer and Direction of Flow
  - Proposed Foremain and Direction of Flow
  - Study Area Boundary
  - Sanitary Sewage Pumping Station
  - Existing Sanitary Sewer and Direction of Flow
  - Existing Sanitary Foremain and Direction of Flow

SCHEDULE OF REVISIONS			
NO.	DATE	DESCRIPTION	CHECKED



MacViro

**TOWN OF THE BLUE MOUNTAINS  
ESR**

CRAIGLEITH SERVICE AREA

SANITARY SEWER COLLECTION - BIRCHVIEW TRAIL  
ALTERNATIVE 2

PROJECT NO. 04-1862 DRWG. NO. 1862-SBT2

DATE: MAY 2006 SCALE:

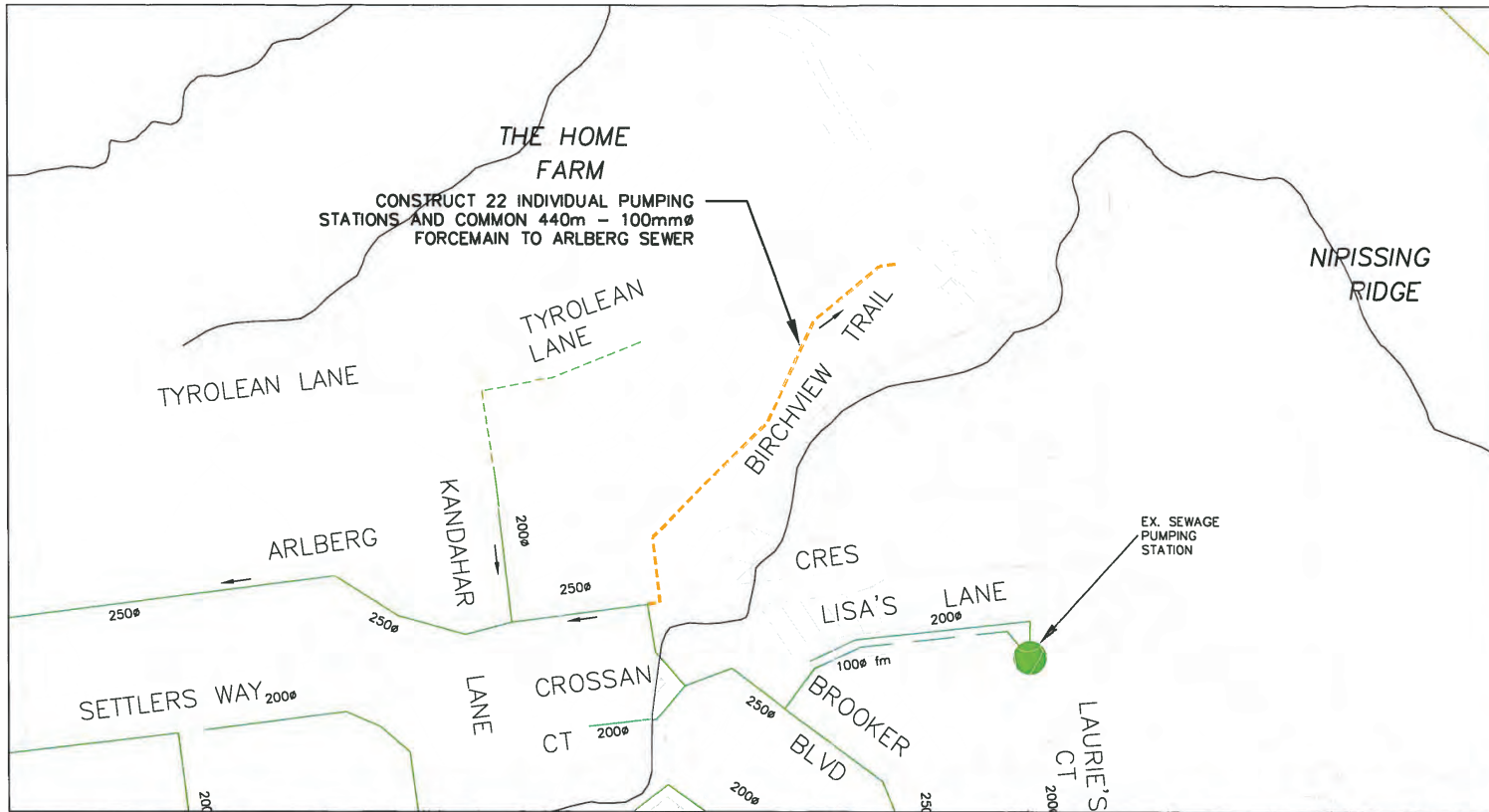
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**Skelton Brumwell**  
A DIVISION OF VITRUM CONSULTING

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25 BELL ST. 2ND FLOOR, SUITE 107 MARKHAM, ONTARIO L3R 5G1  
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1862 - SBT3



0 100 150 metres

- LEGEND**
- Proposed Sanitary Sewer and Direction of Flow
  - Proposed Forcemain and Direction of Flow
  - Study Area Boundary
  - Sanitary Sewage Pumping Station
  - Existing Sanitary Sewer and Direction of Flow
  - Existing Sanitary Forcemain and Direction of Flow

SCHEDULE OF REVISIONS			
NO.	DATE	DESCRIPTION	CHECKED



MacViro

**TOWN OF THE BLUE MOUNTAINS ESR**

CRAIGLEITH SERVICE AREA

SANITARY SEWER COLLECTION - BIRCHVIEW TRAIL ALTERNATIVE 3

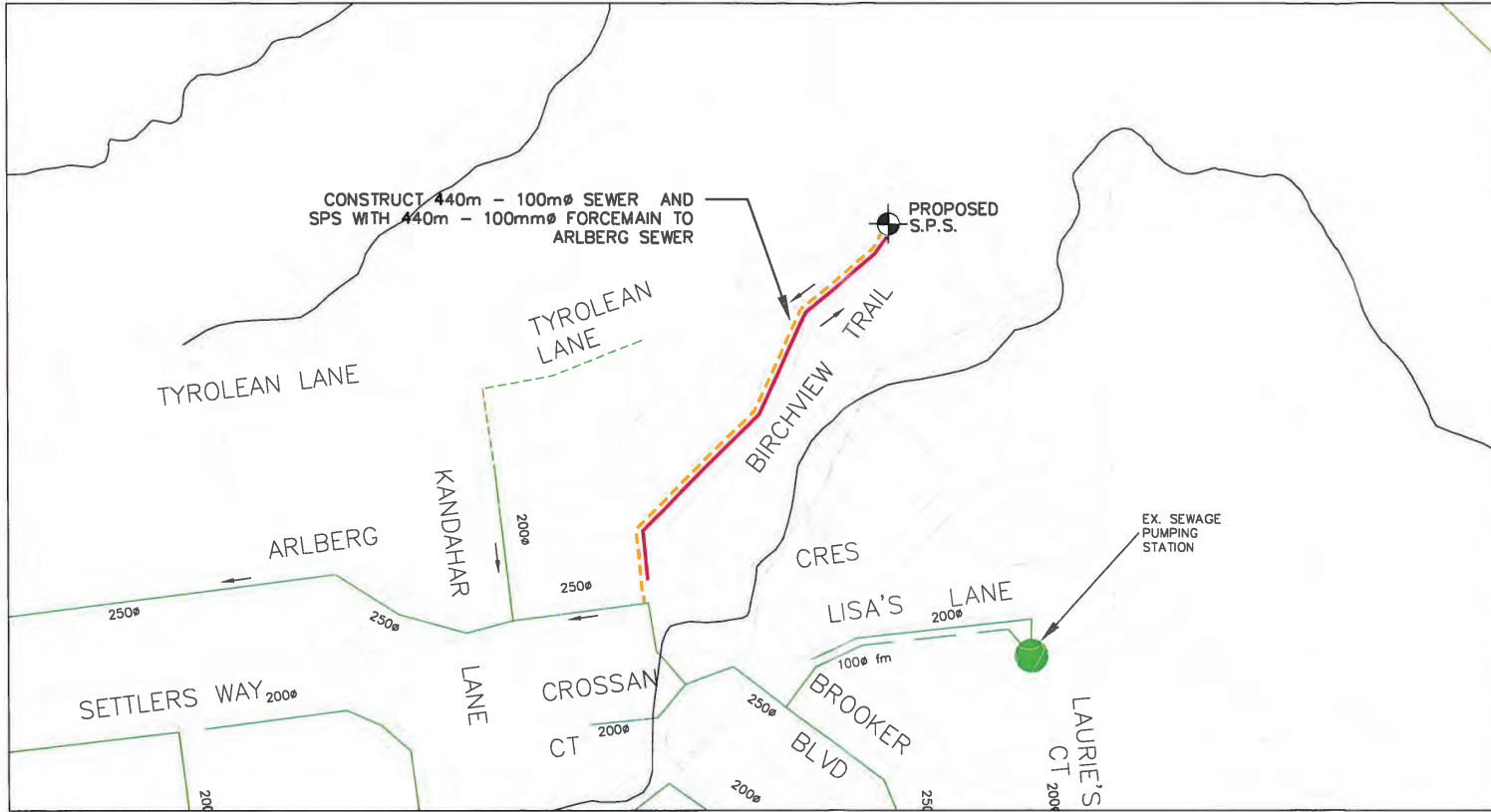
PROJECT NO. 04-1862    DSRP. NO. 1862-SBT3

DATE: MAY 2006    SCALE:    DRAWN: BDD    CHECKED:    APPROVED:



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 55 BELLAIR ROAD, SUITE 107, BIRMGHAM, ONTARIO, L4H 5G1  
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1862 - SBT4



CONSTRUCT 440m - 100mm SEWER AND SPS WITH 440m - 100mm FORCEMAIN TO ARLBERG SEWER

PROPOSED S.P.S.

EX. SEWAGE PUMPING STATION

SCHEDULE OF REVISIONS			
NO.	DATE	DESCRIPTION	CHECKED



**TOWN OF THE BLUE MOUNTAINS ESR**

CRAIGLEITH SERVICE AREA

SANITARY SEWER COLLECTION - BIRCHVIEW TRAIL ALTERNATIVE 4

PROJECT NO. 04-1862	DRWG. NO. 1862-SBT4
DATE: MAY 2006	SCALE:
DRAWN: BDD	CHECKED:
APPROVED:	



CONSULTING ENGINEERS & PLANNERS  
 63 BELL FARM ROAD, SUITE 107 BARRIE, ONTARIO L4M 5G1  
 TELEPHONE: (705) 728-1141 FAX: (705) 728-0331

- LEGEND**
- Proposed Sanitary Sewer and Direction of Flow
  - Proposed Forcemain and Direction of Flow
  - Study Area Boundary
  - Sanitary Sewage Pumping Station
  - Existing Sanitary Sewer and Direction of Flow
  - Existing Sanitary Forcemain and Direction of Flow

There is a very steep slope immediately to the north-east of the end of Birchview, so the sewer would have to be constructed down this slope. The street could also be serviced using individual pumping systems with a small diameter common forcemain. Alternatively, a gravity sewer could be built to drain to a small SPS (approximately 1.5 L/s capacity), which would pump back to Arlberg Crescent. Because there is no land available at the end of Birchview Trail, it would be necessary to locate such a station on the Home Farm lands to the north, near the proposed tee locations for the 7th hole of the golf course. Options for servicing Birchview Trail are therefore as follows:

- Alternative No. 1: Do Nothing (continue to service with individual septic systems)
- Alternative No. 2: Gravity service through the Home Farm and Nipissing Ridge Developments (Drawing 1862-SBT2)
- Alternative No. 3: Individual pumping systems (Drawing SBT3)
- Alternative No. 4: Small municipally owned pumping station (Drawing-SBT)

The sewage servicing alternatives for Birchview Trail located in Craigleith East Trunk System are to either continue with individual on-site sewage systems or abandon existing septic systems and provide municipal servicing. The municipal sewage services would include either a gravity sewer or optional pumped service(s). The four alternatives were assessed using the above noted criteria. The assessment is summarized in the following table:

**Table 8-6: Assessment for Sewage Servicing Alternatives for Birchview Trail**

Criteria	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Natural Environmental Impacts	Potential contamination of groundwater (nitrate) and surface water (nitrate / un-ionized ammonia / phosphorus) from malfunctioning individual septic tank systems	Vegetation removal on treed steep slope (Nipissing Ridge) required to construct local sewer  Potential for erosion and siltation from slope area during construction	Some vegetative removal to construct individual pumping stations at back of building lots but common forcemain within Birchview Trail	Construction of manholes and sewer within Birchview Trail only  Potential impact on watercourse and fisheries in the event of an overflow
Social & Cultural Impacts	Long-term impacts due to potential tile field failures including breakout of raw sewage within the mantle at the surface resulting in public health concerns and odour problems  Presence of leaching beds may limit use of property	Short term impacts due to construction through Home Farm and Nipissing Ridge developments including noise, vibration, dust and traffic	Short term impacts due to construction on Birchview Trail including noise, vibration, dust and traffic  Long term impacts associated with maintaining the 22 individual SPS including periodic maintenance and odours	Short term impacts due to construction on Birchview Trail including noise, vibration, dust and traffic  Long term impacts associated with maintaining the Birchview Trail SPS including periodic maintenance, odours and noise from the emergency standby power  Land required for pumping station
Technical Suitability	In situ clay soils are not conducive to existing individual on-site sewage treatment and disposal systems; and are prone to tile bed failures  Town of Blue Mountain Council's mandate to replace septic systems in designated areas with municipal sewers	Construct 740 m – 200 mm dia sewer on Birchview Trail through Home Farm and Nipissing Ridge with 3 -5m drop Manholes and 7–3m Manholes  Steep slope north of Birchview Crescent may make construction difficult  Easement required through golf course on Home Farm property	Construct 22 individual pumping stations and common 440 m – 100 mm forcemain to Arlberg Crescent	Construct 440 – 200 mm dia sewer on Birchview Trail and SPS with 440m – 100 mm forcemain to Arlberg Crescent
Capital Cost	N/A	\$ 213,000	\$203,610	\$301,000
Preferred Alternative	No	No	Yes	No

### Recommended Alternative

Similar to Arlberg Crescent, the preferred alternative for Birchview Trail as outlined in Table 8.6 is Alternative 3, which comprises individual pumping stations and a small diameter forcemain. It has the lowest environmental impact with a capital cost slightly lower than that for Alternative 2.

### East Woodbridge, Nipissing Ridge and Georgian Sands Developments

It is intended that the west portion of the East Woodbridge lands be serviced by a sewer system that would drain northward through adjacent lands proposed for development towards the Historic Snowbridge development, and then into the existing collection system. The eastern part of East Woodbridge would drain into the proposed Osler Bluff Road sewer (see Section 8.2.2).

As an alternative, it is feasible to drain the entire East Woodbridge property to the Osler Bluff Road sewer. The selection of the final method of providing sanitary sewage servicing to East

Woodbridge will depend on the timing of the availability of the outlet sewers. For example, it may be appropriate to drain the entire property to Osler Bluff Road if that sewer is in place prior to the development sewers north of East Woodbridge that are needed to drain the west portion.

The majority of the Nipissing Ridge subdivision would drain into the existing trunk sewer system that runs through the property. There are some small parts of that development that are adjacent to Osler Bluff Road and would be serviced from the new Osler Bluff Road sewer.

The servicing report for Georgian Sands states that the development is to drain to the existing sewer on Highway 26, although the northern part of the property may need to be pumped. If those lands cannot be served by gravity, the preferred servicing method would be to drain them north-east towards Brophy's Lane.

### **Main Pumping Station and Forcemain**

The main pumping station on Highway 26, west of Timmons Street, has a capacity of 122 L/s, and is scheduled to be expanded to 215 L/s by adding a third pump and a parallel forcemain to convey flows to the Sewage Treatment Plant. The existing forcemain was estimated to have a capacity of about 141 L/s. Based on development that is presently proposed in the Craigleith Service Area (290.7 L/s) plus the Hidden Lake Road pump station (15.3 L/s), it is estimated that the minimum pumping station capacity will need to be 306 L/s. This compares to a flow of 323 L/s that was estimated in the 2000 Master Servicing Plan prepared by Ainley.

Ainley & Associates Limited has completed the design of the proposed pumping station upgrade and forcemain twinning, and construction is anticipated in 2006. Based on the detailed design, the anticipated phasing of the pumping station expansion is as follows:

- Stage 1 expansion to upgrade the existing piping in the chamber and install an additional forcemain to increase the total forcemain capacity to 323 L/s.
- Stage 2 expansion to add a third pump to increase the capacity to about 215 L/s
- Stage 3 expansion to replace the original two pumps and increase the capacity to an ultimate flow of 323 L/s.

Since the design of the expanded pumping station and new forcemain is already underway (in accordance with the 2000 MSP), no further analysis of options is being undertaken within this study.

### **8.2.2 Castle Glen**

If all of the Castle Glen development ultimately receives approval, there will be a total of about 2,119 residential and non-residential equivalent units to be serviced. The peak flow from this area is estimated to be 98 L/s.

#### **Background Information**

As discussed in Section 1.2.2, the existing Thunderhill Subdivision in Castle Glen is serviced with a communal sewage lagoon / spray irrigation system. The system was installed as a temporary measure to accommodate the development, with the intent that a trunk sewer would be available for discharging to the sewer system in Craigleith in the future to provide municipal sewage servicing to the area.

To facilitate the development of the Castle Glen lands, a design for a gravity sewage forcemain system was prepared by C.C. Tatham and Associates. In 1988, the Ministry of the Environment issued a conditional Certificate of Approval for the sewer to Castle Glen Developments. Final approval was given by the MOE in 1990, and in 1991 the design was approved by the Township of Collingwood's Consulting Engineers, Ainley & Associates. The proposal consists of 9,580 metres of 250 mm dia. Ductile Iron pipe, which would run east from Castle Glen, along County Road 19 to Osler Bluff Road, then north on Osler Bluff Road to Long Point Road and into the Craigleith Sewage Treatment Plant. The design does not include any pumping stations, as it relies only on the pressure head resulting from the elevation difference between Castle Glen and the sewage plant. The design allows for the addition of sodium hypochlorite at the inlet to the system in an effort to reduce the potential for hydrogen sulphide build-up in the sewer during periods of low flow. In August of 2004, C.C. Tatham's provided an updated cost estimate of \$2,255,485 for the proposed system.

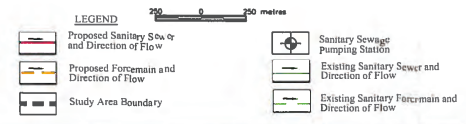
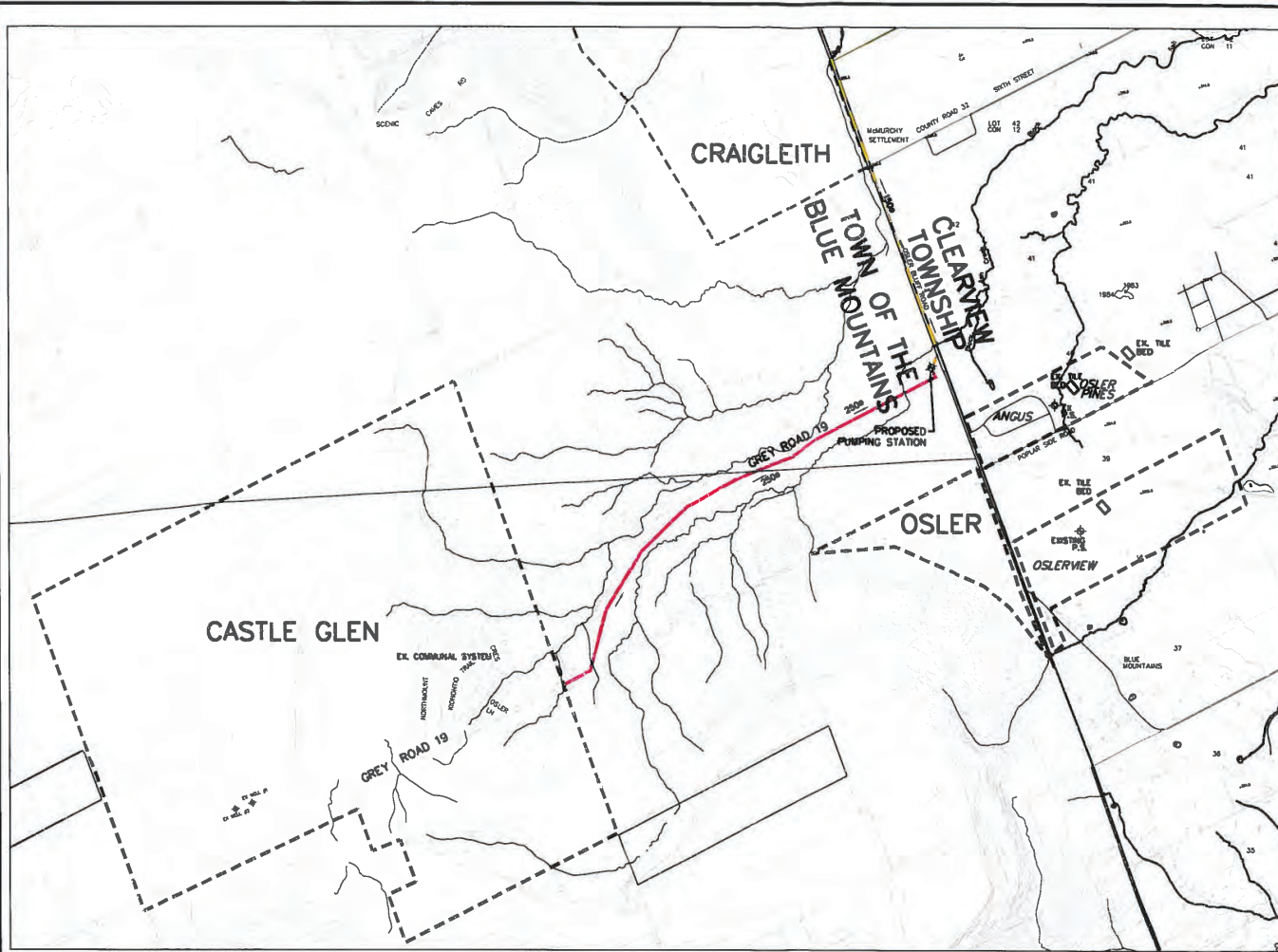
Although the gravity forcemain system represents an option for providing service to Castle Glen, there are concerns regarding the ability to service future adjacent properties in Osler and Craigleith. It is understood that future development can be serviced by pumping into the closed sewer system, however, this will require the construction and future operations and maintenance of additional pumping stations (possibly containing odour control facilities) by the Town of The Blue Mountains. There are also concerns regarding the design and operation and maintenance of a closed sewer system for example, what are the long-term operations and maintenance costs of the system, would chemicals need to be added to reduce odour generation, what would be the retention time in the gravity forcemain, how would scouring velocity in the gravity forcemain be attained, what are the possible impacts on the treatability of the wastewater once it reaches the plant, etc. Therefore a gravity sewer from Castle Glen easterly on County Road 19 then northerly on Osler Bluff Road to a new trunk sewer is recommended as the preferred alternative.

### **Key Considerations**

To provide a permanent service to the Osler area, as well as to other properties that have frontage on or are near Osler Bluff Road, a trunk sewer system would need to be built on Osler Bluff Road. Because the Craigleith Sewage Treatment Plant is elevated above the adjacent ground, the sewer would have to drain to a pumping station, which would then pump the sewage into the treatment plant. Ideally, such a station would be located near the plant, which could then allow gravity servicing to the Brophy's Lane area.

The trunk sewer would run from the plant to Long Point Road, and then south on Long Point Road to Highway 26 and Osler Bluff Road. On Osler Bluff Road, the sewer would continue to at least Mountain Road; however, it could go 1200 metres further in order to service residential lots located along the road, primarily within the Town of Collingwood. If there were other development interests south of this location, the sewer could continue further south, possibly terminating at County Road 32, or even continuing another 900 metres south of County Road 32, if necessary. To carry the flows generated by the contributing areas, the north portion of the sewer would need to have a diameter of 525 mm, while the south portion would need a diameter of 450 mm. The east part of the Nipissing Ridge and East Woodbridge developments would drain into this sewer, as would some undeveloped parts of the Intrawest lands that are adjacent to Osler Bluff Road. With a trunk sewer being constructed on Osler Bluff Road, there are several available options for dealing with the flows from Castle Glen.

1862 - SCG1



SCHEDULE OF REVISIONS			
NO.	DATE	DESCRIPTION	CHECKED



**TOWN OF THE BLUE MOUNTAINS ESR**  
**CASTLE GLEN SERVICE AREA**  
 SANITARY SEWER COLLECTION ALTERNATIVE 1

PROJECT NO. 04-1862    DRAWG. NO. 1862-SCG1  
 DATE: MAY 2006    SCALE:  
 DRAWN: BDD    CHECKED:    APPROVED:

**Skelton Brumwell**  
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 13 BELL FARM ROAD, SUITE 107 SHORE BRIDGE NSW 2140  
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The Topography of Osler Bluff Road generally falls from an elevation of 330 meters at the south limits of Osler to an elevation of 185 meters at Highway 26. The one exception being at the Black Ash Creek crossing approximately 165 meters north of County Road 19. In this area Osler Bluff Road has a concave profile, which drops and then rises 5 meters through the Black Ash Creek Valley. Each of the four Alternatives address the creek crossing differently as listed below:

**Alternative 1:** Pumping station servicing both Castle Glen and Osler located on Osler Bluff Road, just north of the County Road 19 intersection, as shown on Drawing 1862-SCG1. The pump station would be needed to allow for the creek crossing and convey the sewage to the gravity trunk sewer. It would have an ultimate capacity of about 110 L/s, and a 300 mm dia. forcemain.

There are several sub-alternatives of Alternative 1, which vary only with the extent of the gravity sewers. The project cost would increase with the additional length of gravity sewer, however the additional costs would not be that significant.

**Alternative 2:** Gravity sewer from Castle Glen following the high ridge of land around the Black Ash Creek Valley within the private property at the north-west corner of County Road 19 and Osler Bluff Road, thus avoiding the creek crossings and allowing for free gravity flow to the trunk sewer (Drawing 1862-SCG2). A smaller pumping station including a forcemain would be needed to service Osler.

**Alternative 3:** Eliminate the pump station (alternative 1) by extending the trunk sewer to service both Castle Glen and Osler, as shown on Drawing 1862-SCG3. A 6 to 7 metre deep sewer would be required to pass underneath the creek and extend through the high point north of County Road 19. A 450 mm dia sewer would be required to convey 110 L/s.

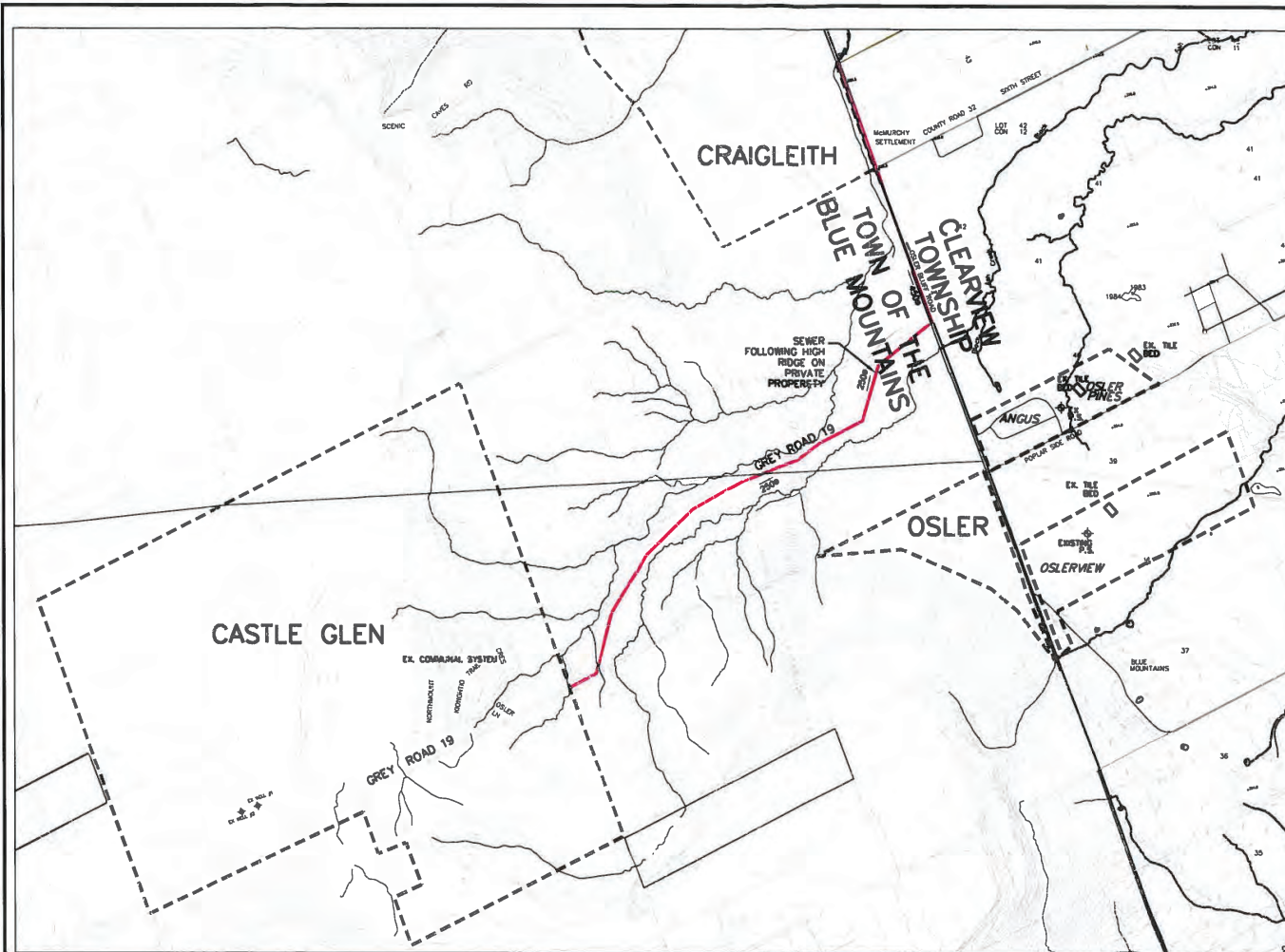
**Alternative 4:** Eliminate the pumping station (alternative 1) and reduce the deep sewer depths (alternative 3) by using a twin inverted siphon servicing both Castle Glen and Osler, as shown on Drawing 1862-SCG4. It would be located at Osler Bluff Road, just north of the County Road 19 intersection. A twin siphon consisting of 250 mm and 300 mm dia. sewers approximately 300 meters in length crossing the creek in conjunction with a 450 mm dia. gravity sewer both with a capacity of 110 L/s would be required to convey sewage to the gravity trunk sewer.

There could be phasing of construction within these alternatives, which would help to lower the initial cost. It may also be possible to eliminate many of the manholes along the trunk sewer, which could be installed later as development adjacent to those sections of sewer comes on stream.

### **Pumping Station at Craighleith Sewage Treatment Plant**

As mentioned above, a new pumping station (224.1 L/s) will ultimately be required to convey flows from the gravity sewer to the head works at the sewage treatment plant. Approximately 22% of this capacity is an allowance for 1,128 residential units from Collingwood. The pumping station could be phased so that the initial station size and pumping capacity is smaller, with an allowance for enlarging it later.

To lower the initial capital cost of providing sewer servicing to Castle Glen and Osler areas, the new sewer on Osler Bluff Road could connect to existing sewers, which drain to the existing



- LEGEND**
- Proposed Sanitary Sewer and Direction of Flow
  - Proposed Forcemain and Direction of Flow
  - Study Area Boundary
  - Sanitary Sewage Pumping Station
  - Existing Sanitary Sewer and Direction of Flow
  - Existing Sanitary Forcemain and Direction of Flow

SCHEDULE OF REVISIONS			
NO.	DATE	DESCRIPTION	CHECKED



**TOWN OF THE BLUE MOUNTAINS ESR**  
**CASTLE GLEN SERVICE AREA**

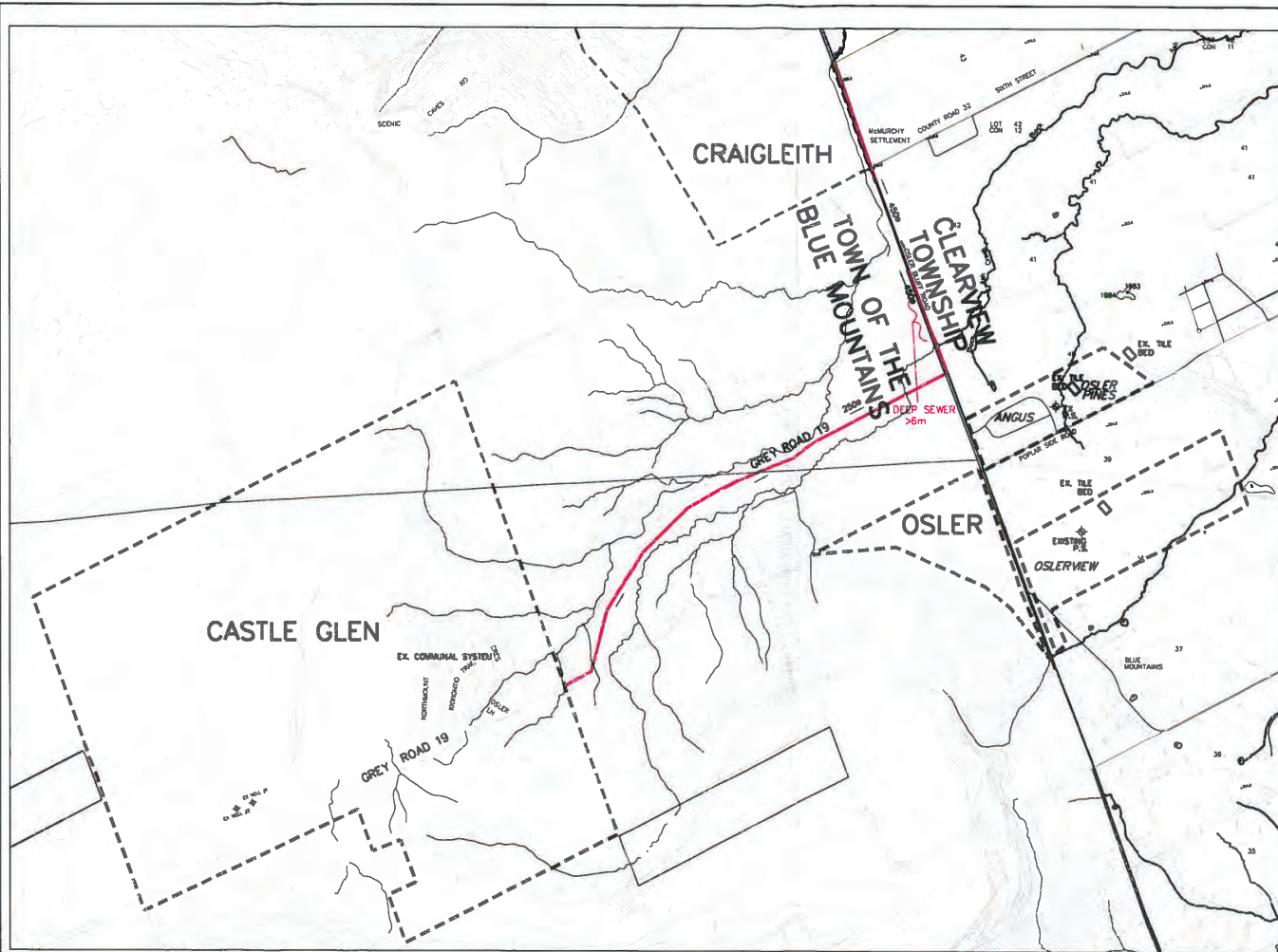
SANITARY SEWER COLLECTION  
 ALTERNATIVE 2

PROJECT NO. 04-1862    DRAWG. NO. 1862-SCG2  
 DATE: MAY 2006    SCALE:

DRAWING: BDD    CHECKED:    APPROVED:



CONSULTING ENGINEERS & PLANNERS  
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 TELEPHONE (705) 728-1141    FAX (705) 728-0531



- LEGEND**
- Proposed Sanitary Sewer and Direction of Flow
  - Proposed Foremain and Direction of Flow
  - Study Area Boundary
  - Sanitary Sewage Pumping Station
  - Existing Sanitary Sewer and Direction of Flow
  - Existing Sanitary Foremain and Direction of Flow



SCHEDULE OF REVISIONS			
NO.	DATE	DESCRIPTION	CHECKED



**TOWN OF THE BLUE MOUNTAINS ESR**

CASTLE GLEN SERVICE AREA

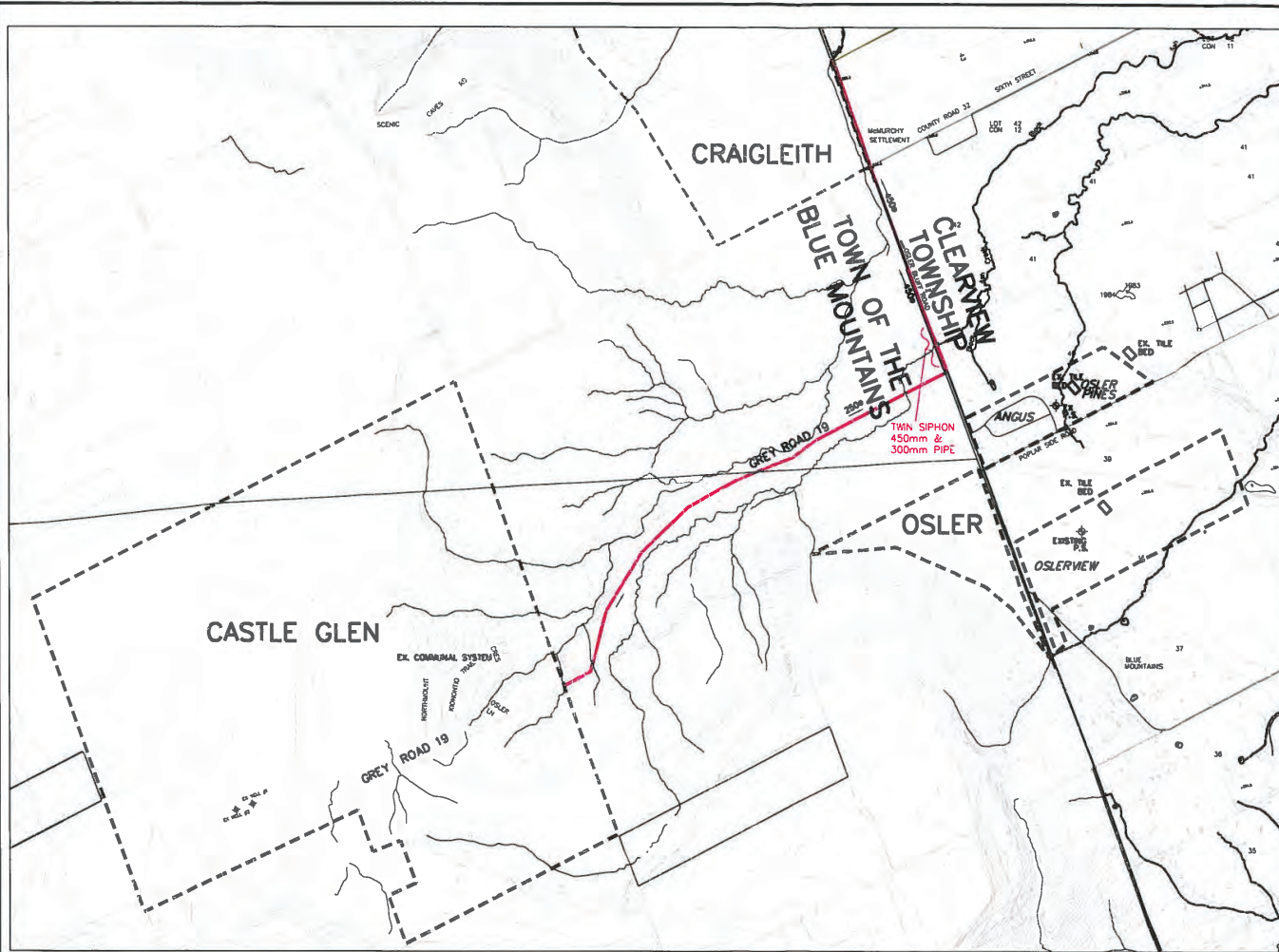
SANITARY SEWER COLLECTION ALTERNATIVE 3

PROJECT NO. 04-1862    DRAWG. NO. 1862-SCG3  
 DATE: MAY 2006    SCALE:

DRAWING BOB    CHECKED:    APPROVED:



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 TELEPHONE (705) 728-1141    FAX (705) 728-0331



- LEGEND**
- Proposed Sanitary Sewer and Direction of Flow
  - Proposed Forcemain and Direction of Flow
  - Study Area Boundary
  - Sanitary Sewage Pumping Station
  - Existing Sanitary Sewer and Direction of Flow
  - Existing Sanitary Forcemain and Direction of Flow

SCHEDULE OF REVISIONS			
NO.	DATE	DESCRIPTION	CHECKED



**TOWN OF THE BLUE MOUNTAINS ESR**  
**CASTLE GLEN SERVICE AREA**

SANITARY SEWER COLLECTION ALTERNATIVE 4

PROJECT NO. 04-1862    DRAWG. NO. 1862-SCG4  
 DATE: MAY 2006    SCALE:

DRAWN: BDD    CHECKED:    APPROVED:



CONSULTING ENGINEERS & PLANNERS  
 83 BELL FARM ROAD, SUITE 107    DUNMUR, QUEENSLAND 4011  
 TELEPHONE (755) 728-1141    FAX (755) 728-0331

pumping station at Timmons Street. The construction of a new pumping station at the sewage treatment plant could then be deferred until the sewage treatment plant is expanded.

Two alternatives for discharging to the sewer system in Craigleith are as follows:

**Short Term Alternative 4A:** This alternative would be a modification of Alternative 4 listed above. It involves a gravity sewer and intermediate twin siphon discharging to the new Craigleith trunk sewer on Osler Bluff Road and connecting to the existing Craigleith sewers to defer construction of a Pumping Station at the Sewage Treatment Plant. This Alternative proposes to connect to the existing Nipissing Ridge sewer south of Deviation Road. Construction of a temporary sewer along Deviation Road would connect to the existing 600 mm dia. trunk located in an easement through the Nipissing Ridge development.

**Short Term Alternative 4B:** This alternative would be a modification of Alternative 4 listed above. It involves a gravity sewer and intermediate twin siphon discharging to the new Craigleith trunk sewer on Osler Bluff Road and connecting to existing Craigleith sewers to defer construction of a Pumping Station at the Sewage Treatment Plant. This Alternative proposes to connect to the existing 300 mm dia. sanitary sewer located on the south side of the Highway, just west of Osler Bluff Road.

These solutions could also provide temporary service to Castle Glen, Osler and other developments that front the sewer, until such time as the capacity of the main pumping station becomes a problem.

### **Assessment for Castle Glen Sewage Servicing**

The sewage servicing alternatives for Castle Glen are a gravity sewer to a new pumping station and forcemain or optional gravity sewers, discharging to the new Craigleith trunk sewer on Osler Bluff Road to the new Pumping Station at the Sewage Treatment Plant. The proposed gravity sewer options are to follow a high ridge around the Black Ash Creek Valley on private property to avoid the creek crossing or include a deep sewer section or siphon at the creek crossing. The four alternatives were assessed using the above noted criteria. The assessment is summarized in the following table.

**Table 8-7: Assessment for Ultimate Sewage Servicing Alternatives for Castle Glen**

Criteria	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Natural Environmental Impacts	One watercourse crossing required on County rd 19. Jack and Bore Crossing will mitigate impacts on fisheries  Disturbance of lands to construct SPS bound to the north and west by Black Ash Creek  Potential bypass of raw sewage into Black Ash Creek	One watercourse crossing required on Osler Bluff Rd. Jack and Bore Crossing will mitigate impacts on fisheries  Disturbance of private property at the northwest corner of County Rd 19 and Osler Bluff Rd	One watercourse crossing required on County rd 19. Two watercourse crossings on Osler Bluff Rd. Jack and Bore Crossings will mitigate impacts on fisheries  Greatest dewatering requirements due to depth of sewers	One watercourse crossing required on County rd 19. Two watercourse crossings on Osler Bluff Rd. Jack and Bore Crossings will mitigate impacts on fisheries  Directional drilling of twin barrel siphon does not require dewatering
Social & Cultural Impacts	Short term impacts due to construction on County Rd 19 and Osler Bluff Rd including noise, vibration, dust and traffic  Long term impacts associated with maintaining the County Rd 19 and Osler Bluff Rd SPS including periodic maintenance, odours and noise from the emergency standby power	Short term impacts due to construction on County Rd 19 and Osler Bluff Rd including noise, vibration, dust and traffic  Long-term impacts associated with maintaining the Osler Bluff Rd SPS including periodic maintenance, odours and noise from the emergency standby power	Short term impacts due to construction on County Rd 19 and Osler Bluff Rd including noise, vibration, dust and traffic	Short term impacts due to construction on County Rd 19 and Osler Bluff Rd including noise, vibration, dust and traffic
Technical Suitability	Construct 3000m – 250 mm dia sewer east on County Rd 19 to SPS at Osler Bluff Rd and 1900m – 150 mm forcemain north on Osler Bluff Rd to gravity sewer	Construct 3200 m – 250 mm dia sewer east on County Rd 19, across NE corner with Osler Bluff Rd and then 1600m – 450 mm dia sewer north on Osler Bluff Rd to gravity sewer  Facilitates servicing Castle Glen however a separate Osler SPS and forcemain is required	Construct 3000m – 250 mm dia sewer east on County Rd 19 then 1950m – 450 mm dia sewer north on Osler Bluff Rd to gravity sewer, which includes 340m -450 mm dia deep sewer at a burial depth > 6 m.	Construct 3000m – 250 mm dia sewer east on County Rd 19 then 1650m – 450 mm dia sewer north on Osler Bluff Rd to gravity sewer plus an intermediate 300m - 300 mm & 450 mm dia twin siphon
Capital Cost	\$ 6,397,000	\$ 5,506,000	\$ 5,539,000	\$5,510,780
Preferred Alternative	No	No	No	Yes

The costs identified in the above table allow for the project to be staged. Stage 1 would involve upgrading the existing two pumps (180 L/s) and forcemain twinning (323L/s) to increase the Main Pumping Station capacity and eliminating some of the manholes along the trunk sewer route. Stage 2 would add a third pump to increase total pump capacity to 215 L/s. Stage 3 would replace the original two pumps to increase the total pump capacity to 323 L/s, and would include the installation of additional manholes along the trunk sewer. The costs in the table are the total costs for all three stages. If the works were to be constructed all at once in a single stage, the total cost would be about \$250,000 less for each alternative.

The Short Term Sewage Servicing Alternatives for Castle Glen are modifications to Alternative 4 (Table 8.7). These alternatives involve a gravity sewer and intermediate twin siphon discharging to the new Craighleith trunk sewer on Osler Bluff Road to existing Craighleith sewers to defer construction of a Pumping Station at the Sewage Treatment Plant. The Alternatives propose connecting the new trunk sewer on Osler Bluff Road to the existing Nipissing Ridge

sewer south of Deviation Road or to the existing Highway 26 sewer. These alternatives were assessed using the above noted criteria and are summarized in the following table:

**Table 8-8: Assessment for Short Term Sewage Servicing Alternatives for the Castle Glen**

Criteria	Alternative 4A	Alternative 4B
Natural Environmental Impacts	No watercourse crossing required on Deviation Rd. Plus Table 7.6 Alternative 4	One watercourse crossing required on south side of Hwy 26. Jack and Bore Crossing will mitigate impacts on fisheries  Plus Table 7.6 Alternative 4
Social & Cultural Impacts	Short term impacts due to construction on Deviation Rd including noise, vibration, dust and traffic  Greater traffic impact due to construction of sewer within roadway and 5 times the length of Alt 2. Impact during construction of ultimate works is also greater when temporary sewer is removed.  Plus Table 7.6 Alternative 4	Short term impacts due to construction west of Osler Bluff Rd on the south side of Hwy 26 including noise, vibration, dust and traffic  Short term impacts due to rock excavation including noise and vibration  Plus Table 7.6 Alternative 4
Technical Suitability	Construct 670m – 300 mm dia sewer west on Deviation Rd to existing 600 mm dia sewer trunk within Nipissing Ridge easement (plus removal of 670m temporary sewer at ultimate construction phase)  Plus Table 7.6 Alternative 4	Construct 130m – 300 mm dia sewer west of Osler Bluff Rd on the south side of Hwy 26 to the existing 300 mm dia sewer (plus removal of 130m temporary sewer at ultimate construction phase)  Plus Table 7.6 Alternative 4
Capital Cost	\$5,879,485	\$5,704,485
Preferred Alternative	No	Yes

**Recommended Alternative**

The Castle Glen Ultimate Preferred Sewage Servicing Option outlined in Table 8.7 is Alternative 4. It encompasses a full gravity sewer from Castle Glen easterly on County Road 19 then northerly on Osler Bluff Road including twin inverted siphon immediately north of County Road 19 to the new trunk sewer. Alternative 4 has the least natural environmental impacts, the least social impacts and similar to Alternative 3, and the second least capital cost within less than 1 % of Alternative 2 with the lowest cost. Therefore Alternative 4 was selected as the Preferred Alternative.

The Preferred Temporary Sewage Servicing Option for the Castle Glen Ultimate Preferred Alternate 4 as outlined in Table 8.8 is Alternative 4B. It involves constructing a temporary connection from the new trunk sewer on Osler Bluff Road in a westerly direction to the existing sewer on the south side of Highway 26. Alternative 4B proposes to construct 80% less temporary sewer than Alternative 4A resulting in less natural environmental impacts, less social impacts and lower total capital costs. Therefore Alternative 4B was selected as the Preferred Temporary Option.

### 8.2.3 Osler

#### Identification

The Osler service area comprises 249 existing residential and non-residential units, along with another 110 future residential and non-residential units. The estimated peak flow from these units is 20.3 L/s. A 200 mm dia. sewer with a minimum slope of 0.5% would be adequate to convey this flow, so all of the sewers in Osler could be 200 mm in diameter.

#### Osler – Town of Blue Mountains

The extension of a new sewer along Osler Bluff Road across the frontage of the ski club property would allow the lands west of Osler Bluff Road to be serviced by gravity. A sewer would also be extended west along the Poplar Sideroad. Internal sewers within the club property would connect to Osler Bluff Road and Poplar Sideroad to service the clubhouse and the surrounding residential lots. In some areas, it may be necessary to construct sewers off of the roadways, between existing chalets, in order to avoid the use of individual pumping stations. This would have to be addressed at the detailed design stage. There are basically two options to be considered for providing servicing to the western part of the Osler Servicing Area:

**Alternative No. 1:** Do Nothing (continue to use the existing septic systems)

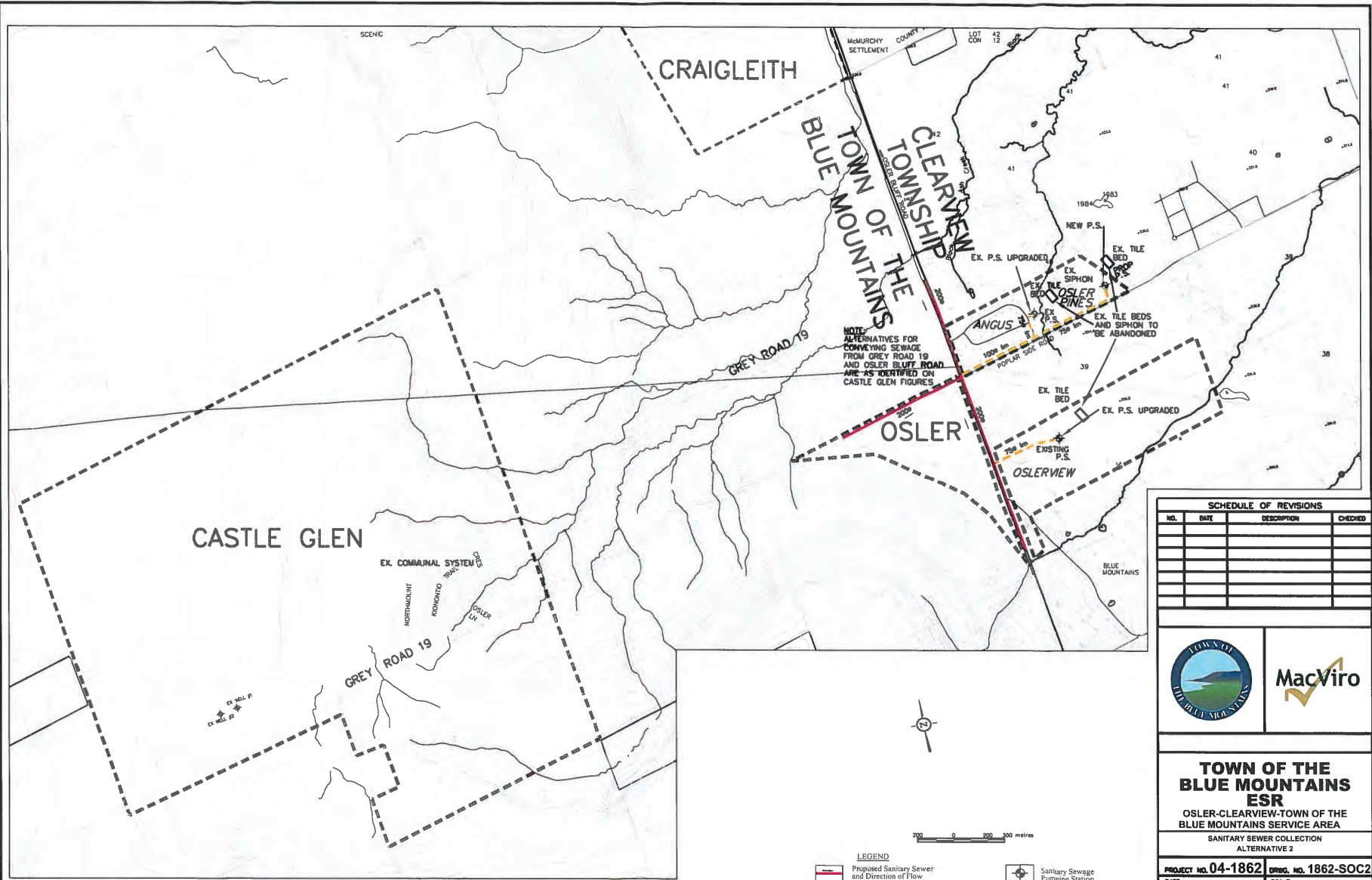
**Alternative No. 2:** Provide gravity servicing via Osler Bluff Road and the Poplar Sideroad (Drawing 1862-SOC2)

#### Assessment of Sewage Servicing Alternatives for Osler – Town of Blue Mountains

The Sewage Servicing Alternatives for the Osler area within the Town of Blue Mountains are to continue with individual on-site sewage systems or abandon the existing septic systems and provide municipal sewers. These alternatives were assessed using the above noted criteria. The assessment is summarized in the following table.

**Table 8-9: Assessment for Sewage Servicing Alternatives for Osler – Town of Blue Mountains**

Criteria	Alternative 1	Alternative 2
Natural Environmental Impacts	Potential contamination of groundwater (nitrate) and surface water (nitrate / un-ionized ammonia / phosphorus) from malfunctioning septic tank systems	Some vegetative removal required for construction of internal sewers within the club property to connect existing to new sewers
Social & Cultural Impacts	Long-term impacts due to potential tile field failures including breakout of raw sewage within the mantle at the surface resulting in public health concerns and odour problems	Short term impacts due to construction on Osler Bluff Rd and Poplar Sideroad including noise, vibration, dust and traffic
Technical Suitability	In situ clay soils are not conducive to existing individual on-site sewage treatment and disposal systems; and are prone to tile bed failures  Town of Blue Mountain Council's mandate to replace septic systems in designated areas with municipal sewers	Construct 1070m – 200 mm dia sewer on Osler Bluff Rd and 780m – 200 mm dia sewer on Poplar Sideroad
Capital Cost	N/A	\$ \$647,450
Preferred Alternative	No	Yes



NOTE:  
ALTERNATIVES FOR  
CONVEYING SEWAGE  
FROM GREY ROAD 19  
AND OSLER BLUFF ROAD  
ARE AS IDENTIFIED ON  
CASTLE GLEN FIGURES.

- LEGEND**
- Proposed Sanitary Sewer and Direction of Flow
  - Proposed Foremain and Direction of Flow
  - Study Area Boundary
  - Sanitary Sewage Pumping Station
  - Existing Sanitary Sewer and Direction of Flow
  - Existing Sanitary Foremain and Direction of Flow

Alternative 2 includes "Alternative 2 from Osler-Blue Mountains"

SCHEDULE OF REVISIONS			
NO.	DATE	DESCRIPTION	CHECKED



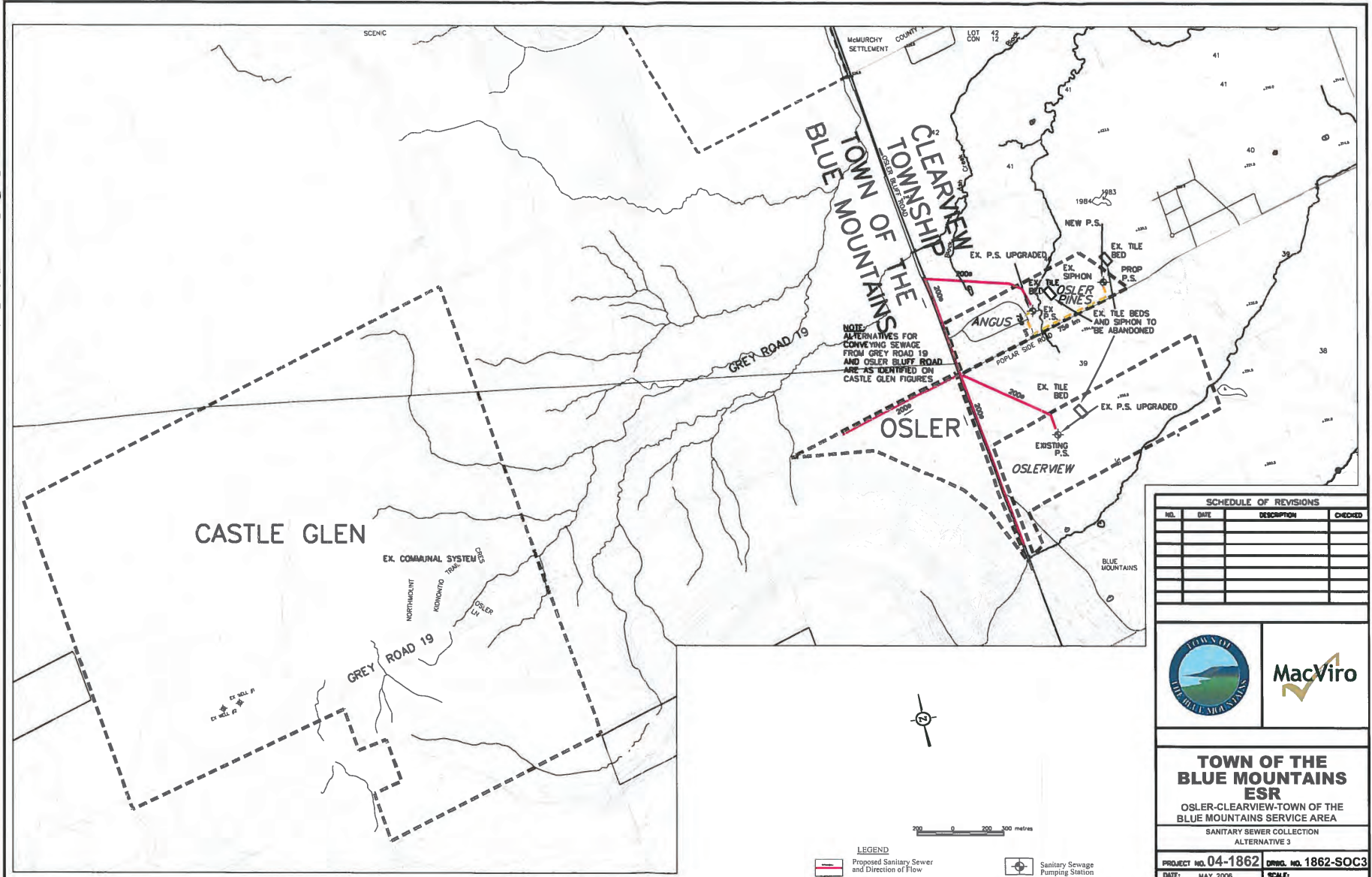
**TOWN OF THE BLUE MOUNTAINS ESR**  
OSLER-CLEARVIEW-TOWN OF THE BLUE MOUNTAINS SERVICE AREA  
SANITARY SEWER COLLECTION  
ALTERNATIVE 2

PROJECT NO. 04-1862 DRAWING NO. 1862-SOC2  
DATE: MAY 2006 SCALE:

DRAWN: BDD CHECKED: APPROVED:



CONSULTING ENGINEERS & PLANNERS  
25 BELL FARM ROAD, SUITE 107, BARRIE, ONTARIO, L4M 5G1  
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Alternative 3 includes \*alternative 2 from Osler-Blue Mountains\*

- LEGEND**
- Proposed Sanitary Sewer and Direction of Flow
  - Proposed Forcemain and Direction of Flow
  - Existing Sanitary Sewer and Direction of Flow
  - Existing Sanitary Forcemain and Direction of Flow
  - Study Area Boundary
  - Sanitary Sewage Pumping Station
  - Existing Sanitary Sewer and Direction of Flow
  - Existing Sanitary Forcemain and Direction of Flow

SCHEDULE OF REVISIONS			
NO.	DATE	DESCRIPTION	CHECKED



**TOWN OF THE BLUE MOUNTAINS ESR**  
 OSLER-CLEARVIEW-TOWN OF THE BLUE MOUNTAINS SERVICE AREA  
 SANITARY SEWER COLLECTION  
 ALTERNATIVE 3

PROJECT NO. 04-1862    DRWG. NO. 1862-SOC3  
 DATE: MAY 2008    SCALE:

DRAWN: BCD    CHECKED:    APPROVED:

**Skelton Brumwell**  
 CONSULTING ENGINEERS & PLANNERS

83 BELL FARM ROAD, SUITE 107    BARRIE, ONTARIO, L4M 5G1  
 TELEPHONE (705) 728-1141    FAX (705) 728-0331

### Recommended Alternative

The Osler Preferred Sewage Servicing for the Town of Blue Mountains outlined in Table 8.9 is Alternative 2. The Preferred Alternative encompasses constructing gravity sewers on Osler Bluff road and the Poplar Sideroad. Alternative 1 is not technically suitable, which leaves only Alternative 2. The Preferred Alternative 2 has minimal natural environmental and social impacts and a capital cost of \$925,000.

### Osler – Clearview Township

For the Osler lands in Clearview Township, provision of gravity servicing to a sewer on Osler Bluff Road is restrictive, as the lands are all at a lower elevation. The east end of the Oslerview Subdivision, for example, is about 10 metres below the elevation of Osler Bluff Road. This would require a sewer on Osler Bluff Road to be at least 13 metres deep to pick up Oslerview by gravity. A similar situation exists for Angus and Osler Pines.

Three alternatives for servicing the Oslerview, Angus and Osler Pines Subdivision as follows:

**Alternative 1:** Do Nothing (continue to use existing communal on-site sewage systems)

**Alternative 2:** Pump stations at Oslerview, Angus and Osler Pines with forcemains to a sewer on Osler Bluff Road, as shown on Drawing 1862-SOC2. For Angus and Oslerview, the existing pumping stations that are used to dose the tile beds can probably be used for this purpose. However the small effluent pumps would be replaced with larger grinder pumps as they would need to handle solids and would need to provide adequate capacity for the additional static head and longer forcemain. A new pumping station would be needed for Osler Pines, as one does not presently exist.

**Alternative 3:** Gravity sewer to Oslerview and Angus Subdivisions and pump station and forcemain from Osler Pines to a sewer on Osler Bluff Road, as shown on Drawing 1862- SOC3. For the Oslerview subdivision, it appears feasible to construct a gravity sewer north-west from the existing pumping station, towards the Poplar Sideroad. This would require an easement across the privately owned lands north of Oslerview. It also appears feasible to use the same approach for the Angus subdivision requiring an easement across private lands. A creek between Osler Pines and Osler Bluff Road prohibits gravity servicing, and a pumping station and forcemain would be required to service this subdivision. A sewer from Angus would run in a north-west direction towards the intersection of Osler Bluff Road and Grey Road 19.

The short-term options for discharging to the sewer system in Craigleith servicing Castle Glen could also provide servicing to Osler.

### Assessment of Sewage Servicing Alternatives for Osler – Clearview Township

The Sewage Servicing Alternatives for the Oslerview, Angus and Osler Pines Subdivisions located in Clearview Township are to continue with communal on-site sewage systems or abandon existing septic systems and provide three sanitary pump stations or a combination of two gravity sewers and one sanitary pump station. These three alternatives were assessed using the above noted criteria and are summarized in the following table:

**Table 8-10: Assessment for Sewage Servicing Alternatives for Osler – Clearview Township**

Criteria	Alternative 1	Alternative 2	Alternative 3
Natural Environmental Impacts	Potential contamination of groundwater (nitrate) and surface water (nitrate / ammonia / phosphorus) from malfunctioning individual septic tank systems	Angus SPS including forcemain removes need to cross headwaters of Black Ash Creek	Construction of sewer northwest of Angus crosses Black Ash Creek headwaters on privately owned lands  Construction of sewer northwest of Oslerview crosses privately owned undeveloped lands
Social & Cultural Impacts	Long-term impacts due to potential tile field failures including breakout of raw sewage within the mantle at the surface resulting in public health concerns and odour problems	Short term impacts due to construction of forcemains on Poplar Sideroad for Angus and Osler Pines and within Oslerview Subdivision including noise, vibration, dust and traffic  Long term impacts associated with maintaining the Oslerview, Angus, and Osler Pines SPSs including periodic maintenance, odours and noise from the emergency standby power	Short term impacts due to construction of Osler Pines forcemain on Poplar Sideroad including noise, vibration, dust and traffic  Long term impacts associated with maintaining the Osler Pines SPS including periodic maintenance, odours and noise from the emergency standby power
Technical Suitability	In situ clay soils are not conducive to existing on-site sewage treatment and disposal systems; and are prone to tile bed failures  Town of Blue Mountain Council's mandate to replace septic systems in designated areas with municipal sewers	Upgrade the Angus and Oslerview effluent pump stations including abandonment of septic tanks, forcemains and absorption trench beds; replacement of small effluent pumps with larger grinder pumps and installation of new forcemains  Construct new Osler Pines sewage pump station including abandonment of existing siphon and absorption trench bed	680m - 200 mm dia sewer from Oslerview and 700m – 200 mm dia sewer from Angus to Osler Bluff Rd sewer including abandonment of two on-site sewage systems  Construct new Osler Pines sewage pump station including abandonment of existing siphon and absorption trench bed  Easements across privately owned lands may not be possible
Capital Cost	N/A	\$ \$329,020	\$ \$416,020
Preferred Alternative	No	<b>Yes</b>	No

The costs noted in the above table are the amounts that would be paid for by Osler for works south of the Grey Road 19/Osler Bluff Road intersection. The Osler area would also have a share of the sewer works north of this location to the sewage treatment plant, which are detailed in Tables 8.7 and 8.8.

### Recommended Alternative

The Osler Preferred Sewage Servicing for the Township of Clearview outlined in Table 7.9 is Alternative 2. It incorporates sanitary pumping stations at Oslerview, Angus and Osler Pines Subdivisions with forcemains to a new sewer on Osler Bluff Road. Alternative 1 is not technically suitable and Alternative 3 may not be feasible unless easements across private lands are obtained. Alternative 2 has similar natural environmental and social impacts as Alternative 3, but a lower capital cost. Therefore Alternative 2 was selected as the Preferred Alternative

### 8.2.4 Collingwood

Similar to the Osler lands that are east of Osler Bluff Road, the Collingwood servicing area is generally down gradient from Osler Bluff road, which makes it very difficult to provide gravity

servicing to the areas. At the south end of the area, however, there are about 15 residential lots fronting the east side of Osler Bluff Road, which could be serviced directly from the new trunk sewer. It also appears feasible to provide a gravity service to Mountain View Court, a short cul-de-sac containing 15 lots located to the north; however, a detailed survey is required to determine confirm elevations.

Lands north of Mountain View Court encompassing residences on Trail's End, Slalom Gate Road, Laurel Boulevard, Juniper Court, Evergreen Road and Mountain Road would have to be serviced by a pumping station. This station could be located generally north-east of the present terminus of Evergreen Road, where it could also service lands that are presently designated Rural but could be developed in the future. Schedule E1 of the Town of Collingwood's Official Plan shows a proposed pumping station in this area, with a forcemain running eastward under Silver Creek.

Holly Court is north of Laurel Boulevard and comprises 10 lots. It is not feasible to drain this by gravity to Osler Bluff Road and because it is surrounded by two watercourses, it is unlikely that it will be possible to drain the street to the pumping station servicing the streets noted in the above paragraph. The recommended option for servicing this street is therefore to use individual pumping stations with a small diameter forcemain. North of Holly Court there are vacant lands designated Rural in the Official Plan. If these lands were developed, they would have to be serviced with a pumping station.

There are a number of streets between the Georgian Trail and Highway 26, including Forest Drive, Silvercreek Drive, Alpine Court, Craigleith Court and Georgian Court. It may be feasible to run a gravity sewer east from Osler Bluff Road along Silver Creek Drive to Forest Drive, then south on Forest Drive. This would likely result in a sewer depth of about 3.5 to 4 metres at Osler Bluff Road. The presence of a watercourse crossing on Silver Creek Drive could require the sewer to be deeper. In addition, Town of the Blue Mountains staff have advised that the bedrock is relatively shallow in the vicinity of Osler Bluff Road and Highway 26. Depending on the depth of the rock, it therefore may be preferable to service the Silver Creek Drive area with a pumping station and have a shallower sewer on Osler Bluff Road. It is apparent that the final decision on whether or not gravity servicing can be provided should only be made after a geotechnical investigation of Osler Bluff Road and a detailed topographical survey of Silver Creek Drive are completed.

The last area in the Collingwood service area that requires servicing is Madeline Drive, which is adjacent to Georgian Bay. There appear to be about 23 lots in this area requiring services, and the recommended method would be by individual pumping stations. A small diameter forcemain would carry the sewage to Long Point Road at Brophy's Lane



# C.C. Tatham & Associates Ltd.

Consulting Engineers

Collingwood      Bracebridge      Orillia      Barrie

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March 13, 2012

via e-mail & mail  
CCTA File 112008

## **Reg Russwurm**

Director of Engineering and Public Works  
Town of The Blue Mountains  
32 Mill Street  
P.O. Box 310  
Thornbury, ON N0H 2P0

## **Re: Grey County Road 21 Trunk Sanitary Sewer Outlet Capacity**

Dear Reg:

### **1.0 Introduction**

Further to the Project Initiation Meeting on February 24, 2012, we have prepared the following technical summary in support of the Grey County Road 21 (GR 21) Trunk Sanitary Sewer project.

The primary purpose of this summary is to provide background for the areas included on the sanitary sewer design sheet and to assess the capacity of the downstream sanitary sewer along Highway 26 in order to determine the approximate number of additional units from the Windfall and surrounding properties that can be accommodated before the trunk sanitary sewer north of Highway 26 and the lift station at the sewage treatment plant are required.

We have also provided an overview to address the Town's comments with respect to the depth of the trunk sewer and the ability to extend the sewer to service the future developments south of the Mountain Road.

### **2.0 Unit Allocation**

In order to estimate the sanitary sewage flows for the service areas contributing to the GR 21 trunk sewer, various municipal documents were reviewed. The following list summarizes the sources for the service areas shown on the overall Sanitary Contribution Area Plan (SAN-1):

Castle Glen: Development Plan and Combined EA Master Servicing Plan (June 2006)

Osler Lands: Combined EA Master Servicing Report

Deferred Development (1 & 2): Official Plan – DD designation – Assumed 75% of area would be developed (excluding EP & slope lands) at a rate of 5 units/ha.

Town of Collingwood: Town request to service only lands fronting on the Town line (GR's 19 & 21)

Medium Density adjacent to Price Subdivision: Official Plan

Price Subdivision: Actual lot count

Georgian Gate (Windfall): Initial Plan of Subdivision (Draft Plan and future medium density)

Le Scandinave Spa: Building Code

Nederend Property: Assumption similar to adjacent lands

Plateau East (Intrawest): Draft Plan

RR-50: Assumption based on comparison to Plateau East

Monterra Phase 2: Draft Plan

The total unit count of 4,622 shown on Drawing SAN-1 was used to develop the overall sanitary sewer design sheet for GC 21.

### **3.0 Temporary System Capacity**

The "short term sewage servicing alternative – 4 'B'" as described in Section 8.2.2 of the Combined EA Master Plan for Craigeleith, Castle Glen and Osler (June 2006), relies on the existing 300 mm diameter sanitary sewer between GR 21 and Timmins Road to provide the initial capacity until such time as the section of trunk sewer north of Highway 26 and the lift station at the plant are required.

We have reviewed the record drawings provided by the Town for the existing 300 mm diameter sanitary sewer between GR 21 and Timmins Road. The 300 mm dia. sewer east of Timmins Road between San MH 56 to San MH 66 has been installed at an average slope of 0.22% for the first 863 m. Although the drawings show some sewer sections at flatter slopes we believe it is reasonable to use the average slope in this section to calculate the available capacity. The sewer increases in slope east of San MH 66, to approximately 0.5%, to San MH 69 where the GR 21 sewer will connect. The capacity of a 300 mm diameter sewer at 0.22% is calculated to be 45.35 L/s for a pipe coefficient  $n=0.013$ . Although 0.013 is a generally accepted coefficient for sanitary sewers, the literature suggests that a coefficient of 0.011 to 0.009 is appropriate for PVC pipe. Applying these would produce a capacity for this pipe in the range of 54 L/s to 66 L/s.

There are currently approximately 38 parcels of land connected on the south side of Highway 26 and 7 on the north for a total of 45 parcels. Included in these 45 parcels is a motel converted to a condominium, plus 2 motels and two other commercial operations. Conservatively, we estimate a total of 75 equivalent units are currently or could be directly connected to the existing 300 mm diameter sanitary sewer between GR 21 and the Timmins Road sewer (750 dia. trunk).

### 3.1 Estimated Flow Per Unit

In order to estimate future overall sanitary sewage generation rates, MOE design guidelines as presented on page 12 of the Class Environmental Assessment for the Craigleith Sewage Treatment Plant Stage 3 Expansion (2009) were considered. The assessment uses an average flow rate of 1,125 L/unit/day (450 L/cap/day X 2.5 cap/unit) plus 225 L/unit/day for infiltration or a total of 1,350 L/unit/day. Considering the peak season average flows presented in Table 3 on page 7 of the assessment which shows the average daily flow of 890 L/unit/day, the above noted design criteria of 1,350 L/unit/day could be reduced by .34%.

In order to estimate the peak flow per unit we have considered the flows calculated using the Windfall Sanitary Sewer Design Sheets which was based on the Town of the Blue Mountains Engineering Standards. The Town standards apply an average flow rate of 1,035 L/unit/day (450 L/cap/day X 2.3 cap/unit) plus 0.23 L/s/ha for infiltration. The service area contributing to the 300 mm diameter sewer connecting Windfall to GR 21 at MH E29 includes a total of 1,071 equivalent units for a total population of 2,463 with a calculated peak flow of 57.95 L/s or 0.054 L/unit/s. A copy of the Windfall Sanitary Sewer Design Sheet is attached.

The overall trunk sewer design sheet uses similar per capita flows based on MOE design guidelines presented on page 12 of the Class Environmental Assessment for the Craigleith Sewage Treatment Plant Stage III Expansion (2009) (excluding the Windfall connection) of 1,125 L/unit/day (450 L/capita/day x 2.5 capita/unit) and peak infiltration of 227 L/capita/d. The resulting peak flow for 4,622 equivalent units was thus calculated to be 267.44 L/s or 0.058 L/unit/s. A copy of the GC 21 Trunk Sanitary Sewer Design Sheet is enclosed.

### 3.2 Available Capacity

By comparing the design flows to the historical flow data at the plant, it is reasonable to assume that the range of peak flows to use to establish the available capacity is in the range of 0.054 L/unit/s to 66% of design flow or 0.036 L/unit/s.

Assuming the overall capacity of the existing 300 mm dia. sewer on Highway 26 is 45.35 L/s, the capacity in terms of units would range from 840 to 1,260 units.

Considering the existing Highway 26 frontage already conveys sewage flows from approximately 75 equivalent units, the capacity in terms of units available for the GR 21 trunk sewer would be in the range of 765 to 1,185.

Assuming a growth rate of 60 units per year, the extension of the larger sewer will not be required for at least 12 years and likely over 20 years depending on the per capita flow being generated and the rate of development.

### 3.3 Monitoring

In light of all the variables involved in these calculations (occupancy rate, per capita flows, peaking factors, and sewer design coefficient) we recommend that a sewer flow monitoring program be established to check flows during the peak winter period starting in approximately 5 years and then repeating every 3 to 5 years depending on the results. By monitoring the actual flow to calculate the sewer capacity combined with knowing the actual number of connections, the Town can determine well in advance when the trunk sewer extension and lift station will be required.

### 4.0 **Future Developments South of Windfall Development**

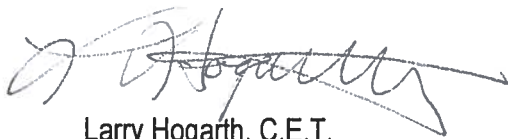
In addition to the plan-profile drawings included with the submission, we have included drawing PP-10 which shows a future trunk sanitary sewer adjacent to the Windfall development from San MH E29 to San MH 32 at the intersection of GR 21 to GR 19 (Mountain Road). The future sanitary sewer at San MH E32 has the potential to be over 6 m in depth.

The road continues to rise to the south at an average grade of approximately 0.66% to the 6<sup>th</sup> Street intersection after which the grade increases. We also considered the need to cross under a significant culvert located approximately 1,200 m south of Mountain Road and determined that the proposed pipe and grade are appropriate. A more detailed assessment can be made at the time the sewer is extended, but at this time the design is considered conservative. We have included copies of the plan and profile sheets that were prepared in 1989 which have been marked up to demonstrate the grades shown on the sewer design sheet.

We trust you will find the above satisfactory. Should you require more detailed calculations please let us know.

Yours truly,

**C.C. Tatham & Associates Ltd.**



Larry Hogarth, C.E.T.  
Senior Municipal Technologist



Kevin Sansom, B.A.Sc., P.Eng.  
Project Manager

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# MASTER SERVICING - SANITARY SEWER DESIGN SHEET

Approved:



**C.C. Tatham & Associates Ltd.**  
Consulting Engineers

Collingwood Bracebridge Orillia Barrie

**FLOW CRITERIA**  
Average Flow Rate: 450 l/cap/d  
Infiltration Rate: 0.23 l/cap/ha  
Population: 2.3 cap/unit  
Peaking Factor: Harmon

Project Name: Windfall - Master Servicing  
Project Number: 11179-2  
Municipality: Town of The Blue Mountains  
Designed By: JPA  
Date: September 8, 2011  
Checked By: PM  
Date: January 6, 2012  
Revision Number: ORIGINAL

LOCATION OF SECTION	AREA LABEL	UPSTREAM MAINTENANCE HOLE	DOWNSTREAM MAINTENANCE HOLE	POPULATION	ACCUMULATED POPULATION	PEAKING FACTOR	AREA	ACCUMULATED AREA	AVERAGE FLOW			PEAK FLOW			LENGTH OF PIPE	PIPE DIAMETER	GRADE	FULL FLOW CAPACITY	FULL FLOW VELOCITY	PEAK FLOW VELOCITY (ZERO INFILTRATION)
									cap.	cap.	ha	ha	l/s	l/s						
STREET 'D' and 'F'	100	SAN MH 508	SAN MH 408	232.3	232.3	4.12	6.22	6.22	1.21	1.43	2.64	4.99	1.43	6.42	478	200	1.40%	38.80	1.24	0.82
STREET 'D' and 'E'	101	SAN MH 415	SAN MH 408	286.7	286.7	4.08	6.16	6.16	1.55	1.42	2.96	6.31	1.42	7.72	484	200	1.10%	34.40	1.09	0.80
STREET 'G'	102	SAN MH 408	SAN MH 404	71.3	600.3	3.93	2.39	14.77	3.13	3.40	6.52	12.29	3.40	15.89	245	200	1.70%	42.76	1.36	1.12
STREET 'G'	103	SAN MH 404	SAN MH 112	80.5	680.8	3.90	1.72	16.49	3.55	3.79	7.34	13.83	3.79	17.63	229	200	0.50%	23.19	0.74	0.74
VARIOUS EX STREETS	104/105	SAN MH F13	SAN MH 206	363.4	363.4	4.04	13.36	13.36	1.89	3.07	4.97	7.65	3.07	10.72	638	200	0.70%	27.44	0.87	0.71
STREET 'C'	106	SAN MH 211	SAN MH 206	103.5	103.5	4.24	1.97	1.97	0.54	0.45	0.99	2.29	0.45	2.74	238	200	1.00%	32.80	1.04	0.58
STREET 'C'	107	SAN MH 206	SAN MH 122	117.3	584.2	3.94	2.48	17.81	3.04	4.10	7.14	11.98	4.10	16.08	299	200	1.00%	32.80	1.04	0.91
STREET 'C'	108	SAN MH 211	SAN MH 122	133.4	133.4	4.21	5.01	5.01	0.69	1.15	1.85	2.92	1.15	4.08	458	200	1.00%	32.80	1.04	0.62
STREET 'B'	109	SAN MH 122	SAN MH 120	6.9	724.5	3.89	0.46	23.28	3.77	5.35	9.13	14.86	5.35	20.02	141	200	2.80%	52.88	1.88	1.37
STREET 'B'	110	SAN MH 124	SAN MH 120	23.0	23.0	4.37	0.75	0.75	0.12	0.17	0.29	0.52	0.17	0.70	108	200	1.00%	32.80	1.04	0.39
STREET 'B'	111	SAN MH 120	SAN MH 118	18.4	785.9	3.87	0.60	24.63	3.99	5.66	9.65	15.44	5.66	21.11	72	200	2.00%	46.38	1.48	1.28
STREET 'B'	112	SAN MH 124	SAN MH 118	36.8	36.8	4.34	1.33	1.33	0.19	0.31	0.50	0.83	0.31	1.14	217	200	0.50%	23.19	0.74	0.35
Neighbourhood Park	113	SAN MH 118	SAN MH 115	0.0	802.7	3.86	0.13	26.09	4.18	6.00	10.18	16.14	6.00	22.14	141	200	0.50%	23.19	0.74	0.74
STREET 'I'	114	SAN MH 312	SAN MH 115	39.1	39.1	4.34	1.32	1.32	0.20	0.30	0.51	0.88	0.30	1.19	164	200	2.00%	46.38	1.48	0.58
STREET 'I'	115	SAN MH 115	SAN MH 114	0.0	841.8	3.85	0.00	27.41	4.38	6.30	10.69	16.87	6.30	23.17	5	200	0.80%	25.40	0.81	0.81
STREET 'H'	116	SAN MH 308	SAN MH 114	119.6	119.6	4.22	2.57	2.57	0.62	0.59	1.21	2.63	0.59	3.22	305	200	1.70%	42.76	1.36	0.74
STREET 'I'	117	SAN MH 114	SAN MH 112	20.7	982.1	3.81	0.63	30.61	5.12	7.04	12.16	19.46	7.04	26.50	88	250	0.80%	46.06	0.94	0.86
STREET 'G'	118	SAN MH 112	SAN MH 109	2.3	1865.2	3.65	0.38	47.48	8.67	10.92	19.59	31.62	10.92	42.54	99	300	0.50%	68.37	0.97	0.90
STREET 'G'	119	SAN MH 607	SAN MH 109	108.1	108.1	4.23	3.28	3.28	0.56	0.75	1.32	2.38	0.75	3.14	379	200	0.70%	27.44	0.87	0.52
BLOCK S	120	SAN MH 109	SAN MH 102	0.0	1773.3	3.63	0.24	51.00	9.24	11.73	20.97	33.49	11.73	45.22	264	300	0.80%	66.48	1.22	1.09
6.0 m BLOCK (Sanitary Sewer)	120	SAN MH 102	SAN MH 129	690.0	2463.3	3.51	4.96	55.98	12.83	12.87	25.70	45.08	12.87	57.95	168	300	0.50%	68.37	0.97	0.97

Notes:  
1. Refer to Master Servicing Sanitary Drainage Plan drawing SAN-1 prepared by C. C. Tatham and Associates for catchment areas.

# GREY COUNTY ROAD 21 - TRUNK SANITARY SEWER DESIGN SHEET

Approved:



**C.C. Tatham & Associates Ltd.**  
Consulting Engineers

Collingwood Branchbridge Orillia Barrie

**FLOW CRITERIA (See Note 1)**  
Average Flow Rate: 1125 L/unld  
Infiltration (Avg): 90 l/cap/d  
Infiltration (Peak): 227 l/cap/d  
Population: 2.5 cap/unld  
Peaking Factor: Harmon

**Project Name:** TRUNK SANITARY SEWER  
**Project Number:** August 31, 2206  
**Municipality:** Town of The Blue Mountains  
**Designed By:** JPA / PM  
**Date:** September 22, 2011  
**Checked By:** KRS  
**Date:** February 3, 2012  
**Revision Number:** 1

LOCATION OF SECTION	AREA LABEL	UPSTREAM MAINTENANCE HOLE	DOWNSTREAM MAINTENANCE HOLE	NUMBER OF LOTS/UNITS	ACCUMULATED NUMBER OF LOTS/UNITS	POPULATION	ACCUMULATED POPULATION	PEAKING FACTOR	AVERAGE FLOW			PEAK FLOW			LENGTH OF PIPE	PIPE DIAMETER	PROPOSED SEWER			
									RESIDENTIAL	INFILTRATION	TOTAL	RESIDENTIAL	INFILTRATION	TOTAL			GRADE	FULL FLOW CAPACITY	FULL FLOW VELOCITY	PEAK FLOW VELOCITY (ZERO INFILTRATION)
CASTLE GLEN		F18	F18	2119	2119	5297.5	5297.5	3.22	27.59	5.52	33.11	98.89	13.92	102.81	375	0.50%	123.97	1.12	1.12	
GREY ROAD 19		F18	F16	0	2119	0	5297.5	3.22	27.59	5.52	33.11	98.89	13.92	102.81	2970.0	375	4.30%	383.54	3.29	2.59
OSLER PROPERTIES		F17	F17	359	359	897.5	897.5	3.83	4.67	0.93	5.61	17.90	2.36	20.26	200	0.50%	23.19	0.74	0.74	
GREY ROAD 19		F17	F16	0	359	0	897.5	3.83	4.67	0.93	5.61	17.90	2.36	25.34	200	1.60%	41.48	1.32	1.21	
GREY ROAD 19		F16	F15	0	2478	0	6195.0	3.16	32.27	6.45	38.72	101.88	16.28	133.24	1260.0	375	1.60%	221.76	2.01	1.87
DD1 TOC		F15	F15	268	268	670.0	670.0	3.91	3.49	0.70	4.19	13.63	1.76	15.39	200	0.50%	23.19	0.74	0.74	
GREY ROAD 19		F15	F14	0	2746	0	6865.0	3.11	35.76	7.15	42.91	111.37	18.04	129.41	610.0	375	0.75%	151.83	1.37	1.37
DD2		F14	F14	476	476	1190.0	1190.0	3.75	6.20	1.24	7.44	23.24	3.13	26.37	250	0.50%	42.05	0.86	0.84	
GREY ROAD 19		F14	F14	0	3222	0	8055.0	3.05	41.95	8.39	50.34	127.85	21.16	149.01	1240.0	375	0.75%	151.83	1.37	1.37
GREY ROAD 21		E32	E32	0	3222	0	8055.0	3.05	41.95	8.39	50.34	127.85	21.16	149.01	300.0	375	1.20%	192.05	1.74	1.74
MDR 33, PRICE WINDFALL		E29	E29	1071	1071	2677.5	2677.5	2.92	(See Note 2)	25.70	25.70	57.95	(See Note 2)	57.95	300	0.50%	68.37	0.97	0.90	
GREY ROAD 21		E29	E28	0	4293	0	10732.5	2.92	55.90	11.18	92.78	163.45	28.20	249.60	94.2	450	0.80%	254.99	1.60	1.50
GREY ROAD 21		E28	E27	0	4293	0	10732.5	2.92	55.90	11.18	92.78	163.45	28.20	249.60	90.0	450	0.80%	254.99	1.60	1.80
GREY ROAD 21		E27	E26	0	4293	0	10732.5	2.92	55.90	11.18	92.78	163.45	28.20	249.60	85.0	450	1.10%	299.00	1.88	1.84
LE SCANDINAVE SPA		E26	E26	15	15	37.5	37.5	4.00	(See Note 3)	5.08	(See Note 3)	5.08	(See Note 3)	5.08	150	1.00%	15.23	0.86	0.80	
GREY ROAD 21		E26	E25	0	4308	0	10770.0	2.92	56.09	11.22	98.09	163.94	28.30	255.27	95.0	450	0.90%	270.46	1.70	1.70
GREY ROAD 21		E25	E24	0	4308	0	10770.0	2.92	56.09	11.22	98.09	163.94	28.30	255.27	100.0	450	0.90%	270.46	1.70	1.70
GREY ROAD 21		E24	E23	0	4308	0	10770.0	2.92	56.09	11.22	98.09	163.94	28.30	255.27	100.0	450	2.50%	450.76	2.83	2.48
NEDERAN		E23	E23	180	180	450.0	450.0	4.00	2.34	0.47	2.81	9.37	1.18	10.55	200	0.50%	23.19	0.74	0.66	
GREY ROAD 21		E23	E22	0	4488	0	11220.0	2.90	58.44	11.69	100.91	169.75	29.48	282.28	95.0	450	2.40%	441.65	2.78	2.47
PLATEAU EAST		E22	E22	38	38	95.0	95.0	4.25	0.49	0.10	0.59	2.10	0.25	2.35	200	0.50%	23.19	0.74	0.44	
GREY ROAD 21		E22	E21	0	4526	0	11315.0	2.90	58.93	11.79	101.50	170.97	29.73	263.73	95.0	450	2.80%	477.04	3.00	2.61
GREY ROAD 21		E21	E20	0	4526	0	11315.0	2.90	58.93	11.79	101.50	170.97	29.73	263.73	100.0	450	4.20%	584.25	3.67	3.03
GREY ROAD 21 * TOC		E20	E19	20	4546	50.0	11365.0	2.90	59.19	11.84	101.81	171.62	29.86	284.51	100.0	450	3.20%	508.98	3.21	2.75
GREY ROAD 21		E19	E18	0	4546	0	11365.0	2.90	59.19	11.84	101.81	171.62	29.86	284.51	100.0	450	1.00%	285.09	1.79	1.79
RR50 (AREA 1)		E18	E18	36	36	90.0	90.0	4.26	0.47	0.09	0.58	1.99	0.24	2.23	200	0.50%	23.19	0.74	0.44	

LOCATION OF SECTION	AREA LABEL	UPSTREAM MAINTENANCE HOLE	DOWNSTREAM MAINTENANCE HOLE	NUMBER OF LOTS/UNITS	ACCUMULATED NUMBER OF LOTS/UNITS	POPULATION	ACCUMULATED POPULATION	PEAKING FACTOR	AVERAGE FLOW			PEAK FLOW			PROPOSED SEWER					
									RESIDENTIAL	INFILTRATION	TOTAL	RESIDENTIAL	INFILTRATION	TOTAL	LENGTH OF PIPE	PIPE DIAMETER	GRADE	FULL FLOW CAPACITY	FULL FLOW VELOCITY	PEAK FLOW VELOCITY (ZERO INFILTRATION)
GREY ROAD 21		MH No. E18	MH No. E17	0	4822	0	11455.0	2.90	59.66	11.93	192.37	172.77	30.10	265.90	100.0	450	1.00%	285.09	1.79	1.79
GREY ROAD 21		E17	E16	0	4822	0	11455.0	2.89	59.66	11.93	192.37	172.77	30.10	265.90	85.2	450	1.00%	285.09	1.79	1.79
MONTERRA PHASE II			E13	40	40	1000.0	1000.0	4.24	0.52	0.10	0.63	2.21	0.26	2.47		200	0.50%	23.19	0.74	
GREY ROAD 21		E16	E15	0	4822	0	11555.0	2.89	60.18	12.04	103.00	174.05	30.36	267.44	99.8	525	0.40%	271.98	1.26	1.26
GREY ROAD 21		E15	E14	0	4822	0	11555.0	2.89	60.18	12.04	103.00	174.05	30.36	267.44	100.0	525	0.40%	271.98	1.26	1.26
GREY ROAD 21		E14	E13	0	4822	0	11555.0	2.89	60.18	12.04	103.00	174.05	30.36	267.44	92.3	525	0.40%	271.98	1.26	1.26
GREY ROAD 21		E13	E12	0	4822	0	11555.0	2.89	60.18	12.04	103.00	174.05	30.36	267.44	82.7	525	0.70%	359.79	1.66	1.57
GREY ROAD 21		E12	E11	0	4822	0	11555.0	2.89	60.18	12.04	103.00	174.05	30.36	267.44	80.0	525	0.70%	359.79	1.66	1.57
GREY ROAD 21		E11	E10	0	4822	0	11555.0	2.89	60.18	12.04	103.00	174.05	30.36	267.44	79.7	525	0.40%	271.98	1.26	1.26
GREY ROAD 21		E10	E9	0	4822	0	11555.0	2.89	60.18	12.04	103.00	174.05	30.36	267.44	80.3	525	0.40%	271.98	1.26	1.26
GREY ROAD 21		E9	E8	0	4822	0	11555.0	2.89	60.18	12.04	103.00	174.05	30.36	267.44	80.0	525	0.40%	271.98	1.26	1.26
GREY ROAD 21		E8	E7	0	4822	0	11555.0	2.89	60.18	12.04	103.00	174.05	30.36	267.44	100.0	525	0.40%	271.98	1.26	1.26
GREY ROAD 21		E7	E6	0	4822	0	11555.0	2.89	60.18	12.04	103.00	174.05	30.36	267.44	98.0	525	0.40%	271.98	1.26	1.26
GREY ROAD 21		E6	E5	0	4822	0	11555.0	2.89	60.18	12.04	103.00	174.05	30.36	267.44	97.5	525	0.40%	271.98	1.26	1.26
GREY ROAD 21		E5	E4	0	4822	0	11555.0	2.89	60.18	12.04	103.00	174.05	30.36	267.44	97.4	300	0.40%	61.15	0.87	0.87
GREY ROAD 21		E4	E3	0	4822	0	11555.0	2.89	60.18	12.04	103.00	174.05	30.36	267.44	97.4	300	0.40%	61.15	0.87	0.87
HIGHWAY 26		E3	E2	0	4822	0	11555.0	2.89	60.18	12.04	103.00	174.05	30.36	267.44	97.4	300	0.40%	61.15	0.87	0.87
HIGHWAY 26		E2	E1	0	4822	0	11555.0	2.89	60.18	12.04	103.00	174.05	30.36	267.44	97.4	300	0.22%	46.35	0.64	0.64
HIGHWAY 26		E1	EX SAN MH	0	4822	0	11555.0	2.89	60.18	12.04	103.00	174.05	30.36	267.44	97.4	300	0.22%	46.35	0.64	0.64

- Notes:
- Flow criteria based on the MOE Design Guidelines included in the Class EA for Craigleith Sewage Treatment Plant Expansion Environmental Study Report (Nov. 2009)
  - Flow calculated for MDR 13, Price and Windfall based on Windfall Master Servicing Sanitary Sewer Design Sheet and Town criteria for residential and extraneous flows.
  - Total peak flow generated by Le Scandilave Spa based on Part 7 of the Orlando Building Code. The calculated peak flow is used as an average flow to be conservative. See attached summary and design sheet for more information.

**FUNCTIONAL SERVICING &  
PRELIMINARY STORMWATER  
MANAGEMENT REPORT**

**LONG POINT ROAD  
SUBDIVISION**

**TOWN OF THE BLUE MOUNTAINS  
COUNTY OF GREY**

**PREPARED FOR:**

**TONY LESIAK & ISABELLA LEHMANN**

**PREPARED BY:**

**C.F. CROZIER & ASSOCIATES INC.  
40 HURON STREET, SUITE 301  
COLLINGWOOD, ONTARIO  
L9Y 4R3**

**JULY 2018**

**CFCA FILE NO. 1349-4556**

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<b>Revision Number</b>	<b>Date</b>	<b>Comments</b>
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## 1.0 Introduction

C.F. Crozier & Associates Inc. (Crozier) was retained by Tony Lesiak and Isabella Lehmann to prepare a Functional Servicing & Preliminary Stormwater Management Report support the development proposal for a proposed Draft Plan consisting of 22 single detached lots and Zoning By-Law Amendment. The proposed development is located on two properties and is legally described as Plan 529 PT Lot 85 RP;16R2186 Parts 4 & 8, and Plan 529 PT Lot 85 RP;16R2186 Parts 5 & 9 in the Town of The Blue Mountains, County of Grey. The location of the proposed development and the proposed Draft Plan are included as Figure 1 and Figure 2 respectively.

The proposed development, consisting of 22 lots, will be serviced with municipal sanitary, storm, and watermain infrastructure located within the municipal right of way (ROW). Preliminary servicing details have been reflected on the Preliminary Sanitary Routing and Water Distribution Plan included in this report as Figure 3. Grading details have been reflected on the Preliminary Site Drainage Plan included in this report as Figure 4.

This report has been prepared to document details associated with the functional servicing and stormwater management design for the proposed development. Contained in this report is a description of the existing site (Section 2.0); the water servicing strategy (Section 3.0); the sanitary servicing strategy (Section 4.0); the drainage & stormwater management strategy (Section 5.0); proposed utilities (Section 6.0); sediment and erosion control plan (Section 7.0) and a concluding discussion (Section 8.0).

## 2.0 Site Description

The Subject Property is approximately 2.2 ha and is located in a residential area in the Town of The Blue Mountains north of Highway 26 adjacent to Long Point road.

The property is bounded by:

- Residential properties to the north
- A residential property to the south
- A municipal drainage easement to the west
- Long Point Road to the east

Currently the site is undeveloped and fully treed. The site is relatively flat, with the grades generally descending from southeast to northwest. The site drains into a municipal drain west of the property which conveys flows approximately 1 km north of the site where it outlets to Georgian bay.

The site is currently zoned Residential/Recreational Area per the Town of The Blue Mountains official plan which specifies a maximum single detached density of 10 units/ha. Therefore, 22 units on 2.2 hectares is in conformance with this zoning requirement.

## 3.0 Water Servicing

The following subsections provide an analysis of the water servicing and fire protection strategy to be used for the Long Point Road development.

### 3.1 Existing Water Servicing

Per Town of Collingwood as-constructed drawing (DWG 112031-WM1, June 2012) an existing 150mm diameter Town of Collingwood Watermain is located in the Long Point Road right-of-way.

Connection to the Long Point Road watermain to service the development is proposed at the intersection of the development right-of-way and Long Point Road.

### 3.2 Design Water Demand

The Town of The Blue Mountains Design Criteria (The Blue Mountains Engineering Standards, April 2009) were referenced to calculate water demand flows for the proposed development. A per capita water demand of 450 L/C/day was used with an occupancy density of 2.3 persons/unit. The maximum peak day factor of 2.0 and peak hour factor of 4.50 were applied to the average daily demand flow of 0.26 L/sec to obtain max daily demand and peak hour demand flows. A summary of the results is presented in Table 1 and detailed calculations are provided in Appendix A.

**Table 1: Estimated Design Water Demand**

<b>Standard</b>	<b>Average Daily Demand (L/sec)</b>	<b>Maximum Daily Demand (L/sec)</b>	<b>Peak Hourly Demand (L/sec)</b>
Town of The Blue Mountains	0.26	0.53	1.19

### 3.3 Fire Flow Demand

The Fire Underwriters Survey (FUS) and Ontario Building Code (OBC) methods were used to estimate the fire flow requirements for the proposed development. All buildings are assumed to fall into building Class C with a gross floor area (GFA) of 480 sq. m. Table 2 summarizes the fire flow and duration requirements under both OBC and FUS approaches.

**Table 2: Estimated Fire Demand Flows**

<b>Method</b>	<b>Demand Flow (L/sec)</b>	<b>Duration (h)</b>
OBC	45	1.25
FUS	67	1.5

The FUS method resulted in a more conservative demand flow for the subdivision. The FUS method specifies a required demand fire flow 67 L/sec for a duration of 1.5 hours for the development. Appendix A contains the FUS and OFM calculations.

### 3.4 Proposed Water Servicing

A connection to the existing Long Point Road watermain will service the development. This watermain is owned and operated by the Town of Collingwood. Consultation with the Town of Collingwood was undertaken to confirm that there is capacity available to provide the required water pressures and flows to meet the calculated water demand. Sizing of this watermain will need to be confirmed by the Town of Collingwood in the detail design stage per their water model.

## 4.0 Sanitary Servicing

The following subsections provide an analysis of the servicing strategy for the proposed sanitary sewage system for the Long Point Road subdivision development.

### 4.1 Existing Sanitary Servicing

Per the Town of Collingwood as-constructed drawing (N<sup>2</sup>81042/43-SW5, July 1984) a sanitary manhole labeled #69 (MH#69) is located approximately 140m west of the Highway 26 and Osler Bluff Road intersection. This manhole connects to a gravity sanitary sewer that flows to the Craigeleith sewage pumping station, which pumps to the wastewater treatment plant north of the proposed development on Long Point Road.

Two parallel sanitary high pressure forcemains along Long Point Road pump sewage to the Sewage Treatment Plant, located north of the site.

### 4.2 Sanitary Design Flow

Sanitary design flow calculations were undertaken in accordance with the Town of The Blue Mountains Design Criteria. A per capita sewage flow of 450 L/C/day was used with an occupancy density of 2.3 persons/unit. Infiltration flow of 0.23 L/sec/ha and a peaking factor 4.3 were applied to the sewage flow rate to obtain the total estimated design sewage flow for the site. A summary of the design flows is presented in Table 3 and detailed calculations are provided in Appendix A.

**Table 3: Estimated Sanitary Design Flows (22 Units)**

Standard	Average Flow (L/sec)	Peaking Factor	Peak Flow (L/sec)	Infiltration Flow (L/sec)	Total Estimated Design Flow (L/sec)
Town of The Blue Mountains	0.26	4.3	1.12	0.51	1.64

The proposed sanitary sewers will be sized to convey a peak sanitary flow of 1.64 L/sec for the development.

### 4.3 Proposed Sanitary Servicing

A connection to the high-pressure force mains on Long Point Road for such a small development was ruled out due to the cost of a sewage pumping station required to make this connection. As a result, a servicing connection to the gravity sewer in Highway 26 was evaluated as a preferred route.

The Town indicated that there is available residual capacity in the Highway 26 sewer to service the site. Internal to the site, a low-pressure sewer system can be implemented to collect wastewater from the site and drain to the Highway 26 gravity system.

It has been assumed that partial roadway restoration will be required to install the sewage forcemain along Long Point Road. Consultation with the Town during detailed design would be required to determine a corridor for the forcemain within the right-of-way; the location of the forcemain will determine the necessary roadway restorations. An alternative alignment within the

municipal drain easement could also be reviewed at detailed design; this alignment would remove the required stream crossing of Watercourse 1 and reduce community transportation disruptions associated with the road restorations but would require agreements with adjacent landowners to allow the forcemain to pass through with the change of use of the easement.

## 5.0 Drainage & Stormwater Management

Management of stormwater and site drainage for the proposed development will proceed in conformance with the standards provided by the Town of The Blue Mountains, Grey Suable Conservation Authority (GSCA) and Ministry of the Environment and Climate Change (MOECC).

A stormwater management strategy and accompanying recommendations regarding the proposed development have been included below.

- Safe Stormwater Conveyance
  - Safe conveyance of post development peak flows for all storms up to and including the 100-year to Georgian Bay.
- Water Quality Control
  - "Enhanced Protection" per MOECC
- Development Standard
  - Urban cross section within 20-meter right-of-way
  - Lot grading at 2% optimum
  - Minor/major drainage system to convey frequent rainfall/runoff events

### 5.1 Existing Drainage

The soil type identified on the site is Granby well sorted sandy washout (Soil Map of Simcoe County, North Sheet, Soil Survey Report No. 29), which is classified as Hydrologic Soil Group B (Design Chart H2-6A, MTO Drainage Manual, 1985). This soil type has been generally confirmed in the Geotechnical Report by Wilson Associates, which identified onsite soils as predominantly glaciolacustrine sand overlying sandy silt till. Drainage from the subject site is predominately sheet flow from the southeast to the northwest and discharges into a municipal drain located at the west limits of the site.

The municipal drain conveys flows north to a culvert that crosses Brophy's Lane. North of Brophy's Lane, stormwater traverses the Town of The Blue Mountains waste water treatment facility lands where it discharges into a small pond northwest of the Treatment Facility's main entrance. Town staff have advised that this pond is an aesthetic feature with no stormwater quality or quantity features. The pond, discharges to a drainage channel flowing north down the Long Point Road west ditch to Georgian Bay.

Based on discussions with The Town of Blue Mountain staff, this municipal drain is currently under review for upgrades to increase the size and capacity of the drain. Increased flows from the proposed development could be accommodated during the drains redesign, if necessary.

### 5.2 Proposed Drainage

The proposed development consists of an urban cross section roadway complete with curb and gutter with an internal storm sewer system. Front yards will be graded to direct runoff towards the ROW where they will be collected by catchbasins and transported through the storm sewer network. During major storm events, excess flows will be safely conveyed via an overland flow route located between lots 11 and 12. Rear yards will slope to the back of the lots where swales will

transport flows west to the municipal drain. Drainage Figure 4 displays the proposed drainage configuration for the site.

Due to the site's proximity to Georgian Bay quantity control is not recommended for this site. Uncontrolled release of storm flows allows runoff from the site to travel safely to the bay prior to peak flow periods in the municipal drain. This will reduce flow requirements in the new drain and provide safe conveyance of flows to Georgian Bay.

### 5.3 Stormwater Quantity Conveyance

Given the small area of the proposed development property, the analysis of onsite quantity control requirements was performed using the Rational Method, per industry standard. A composite runoff coefficient for the existing and proposed site condition was calculated using values found in the Town of The Blue Mountains (The Blue Mountains Engineering Standards, April 2009) and MTO Standards (MTO Drainage Management Manual, 1997). Table 4 illustrates the determination of pre and post development runoff coefficients.

**Table 4: Pre and Post Development Conditions Composite Runoff Coefficient**

	Pre Development			Post Development		
Land Use	Area (ha)	Runoff Coefficient*	A x C	Area (ha)	Runoff Coefficient*	A x C
<b>Catchment</b>	PRE-1 (Front Yards and ROW)			POST-1 (Front Yards and ROW)		
Asphalt	0.00	0.90	0.0	0.25	0.90	0.23
Roof	0.00	0.90	0.0	0.18	0.90	0.16
Lawn	0.15	0.30	0.05	0.45	0.30	0.14
Woodland	0.73	0.25	0.18	0	0.25	0.0
<b>Composite</b>	<b>0.88</b>	<b>0.26</b>	<b>0.23</b>	<b>0.88</b>	<b>0.59</b>	<b>0.53</b>
<b>Catchment</b>	PRE-2 (Rear Yards)			POST-2 (Rear Yards)		
Asphalt	0.0	0.90	0.0	0.10	0.90	0.09
Roof	0.0	0.90	0.0	0.34	0.90	0.31
Lawn	0.0	0.30	0.0	0.88	0.30	0.26
Woodland	1.32	0.25	0.33	0	0.25	0
<b>Composite</b>	<b>1.32</b>	<b>0.25</b>	<b>0.33</b>	<b>1.32</b>	<b>0.54</b>	<b>0.66</b>

The calculated composite runoff coefficients were applied in the Rational Method. Rainfall events were modelled using Town of The Blue Mountains IDF data, and a 15-minute time of concentration. Refer to Appendix B for the peak flow results. Note that runoff coefficients for the 25 year and 100-year storms were adjusted per the MTO Standard methodology. The results of the analysis are shown in Table 5. Detailed calculations have been included in Appendix B of this report.

**Table 5: Rational Method Storage Volume Results**

Storm	Existing (m <sup>3</sup> /sec)			Proposed (m <sup>3</sup> /sec)			Difference (m <sup>3</sup> /sec)
	Front (Pre-1)	Back (Pre -2)	Total	Front (Post-1)	Back (Post -2)	Total	
<b><u>5-year</u></b>	0.04	0.07	0.11	0.12	0.16	0.28	0.17
<b><u>25-year</u></b>	0.07	0.11	0.18	0.18	0.24	0.42	0.24
<b><u>100-year</u></b>	0.09	0.22	0.31	0.25	0.33	0.58	0.27

As the site is within a short proximity to Georgian Bay, peak flows are to be released uncontrolled into the municipal drain. To summarize the data provide the calculated increase in flows generated from the site for the 5, 25 and 100-year storms were between 170 L/sec to 270 L/sec. Future upgrades to the municipal drain should account for these flows.

#### 5.4 Stormwater Quality Control

A preliminary screening of the most practical stormwater water quality measures to implement on-site was undertaken. Due to the small size of the site an oil/grit separator is the most practical quality control measure. The oil/grit separator will be located on-line with the site storm system, downstream of the last catchbasin as depicted in Figure 4.

To achieve an "enhanced" treatment level required by the MOECC a Stormceptor 2000 selected. Refer to Table 2 included below for a detailed breakdown of proposed oil/grit separator and required performance. Refer to Appendix B for the detailed sizing calculations of the proposed Stormceptor water quality treatment unit.

**Table 6: Stormceptor Oil/Grit Sizing Criteria**

Catchment	Contributing Drainage Area (ha)	Stormceptor Oil/Grit Separator Unit	Total Suspended Solids Removal (%)	Total Annual Runoff Volume Treated (%)
Internal Sewer	0.88	STC-2000	83	97

Once the oil/grit separator is installed, and operating accordingly to manufacturer's specifications, and assumed by the Town, the TOBM staff will be required to inspect and service the unit on a regular basis per the operations and maintenance manual included in Appendix C, to ensure long term efficiency.

#### 6.0 UTILITIES

The Subject Site is proposed to be serviced with natural gas, telephone, cable TV and hydro. We understand these utilities are available in the Long Point Road right-of-way adjacent the subject site. Coordination with the aforementioned utilities will be undertaken during the detailed design phases to confirm utility design capacity and connection locations.

#### 7.0 SEDIMENT AND EROSION CONTROLS DURING CONSTRUCTION

Sediment and erosion controls will be installed prior to the commencement of any construction activities and will be maintained until the site is stabilized or as directed by the Site Engineer and/or the Town of the Blue Mountains. A Grading & Sediment Erosion Control Plan will be prepared as part of the detailed design package to identify the location of the recommended control features. Controls will be inspected after each significant rainfall event and maintained in proper working condition. A summary of proposed controls to be implemented is included below.

- Silt Fencing

Silt fence will be installed where required to intercept sheet flow. Heavy duty silt fence will be located around the downstream side of the work zone limits. It should be noted that additional silt fencing may be added based on field decisions by the Site Engineer and Contractor prior to, during and following construction.

- Mud Mat

A mud mat will be installed at the entrance to the construction zone in order to prevent mud tracking from the site onto the surrounding lands and perimeter roadway network.

- Dust Suppression

During construction activities, the Contractor will ensure that measures for dust suppression are provided as required.

## 8.0 Conclusions and Recommendations

Based on the foregoing we conclude that the proposed Subject Property Residential Development can be adequately serviced.

1. Access to the site will be provided by way of roadway connections to Long Point Road.
2. A Preliminary site drainage plan has been completed to demonstrate that overland flow routes can be achieved to the municipal drain.
3. The development will be serviced via an internal low-pressure forcemain sanitary sewer system that will outlet to the Highway 26 gravity sanitary sewer.
4. Domestic water supply for the development will be provided via a connection to the Town of Collingwood Municipal watermain within the Long Point Road right-of-way. System pressures, flows and external improvements will be confirmed with the Town of Collingwood as development approvals proceed.
5. Utilities are available to service the site.

Therefore, we recommend approval of the Planning Applications for the subject lands from the perspective of engineering servicing requirements.

Respectfully submitted,

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# APPENDIX A

## Domestic Water and Sanitary Flow Calculations

**Water Supply for Public Fire Protection - 1999  
Fire Underwriters Survey**

**Part II - Guide for Determination of Required Fire Flow**

1. An estimate of fire flow required for a given area may be determined by the formula:

$$F = 220 * C * \text{sqrt } A$$

where

- F = the required fire flow in litres per minute
- C = coefficient related to the type of construction
  - = 1.5 for wood frame construction (structure essentially all combustible)
  - = 1.0 for ordinary construction (brick or other masonry walls, combustible floor and interior)
  - = 0.8 for non-combustible construction (unprotected metal structural components)
  - = 0.6 for fire-resistive construction (fully protected frame, floors, roof)
- A = The total floor area in square metres (including all storeys, but excluding basements at least 50 percent below grade) in the building considered.

Proposed Buildings 2 number of floors 240 sq.m. floor area 100% Floor 1 100% Floor 2 0% Floor 3 0% Floor 4 480 sq.m. total floor area	Wood Frame Construction 1.5 C 480 sq.m. total floor area
--	--

**Therefore F= 7,000 L/min (rounded to nearest 1000 L/min)**

- Fire flow determined above shall not exceed:
- 30,000 L/min for wood frame construction
  - 30,000 L/min for ordinary construction
  - 25,000 L/min for non-combustible construction
  - 25,000 L/min for fire-resistive construction

2. Values obtained in No. 1 may be reduced by as much as 25% for occupancies having low contents fire hazard or may be increased by up to 25% surcharge for occupancies having a high fire hazard.

Non-Combustible	-25%	Free Burning	15%
Limited Combustible	-15%	Rapid Buring	25%
Combustible	No Charge		

Low fire Hazard occupancy for dwellings                      0% reduction

**0 L/min reduction**

**Therefore UPDATED F= 7,000 L/min (rounded to nearest 1000 L/min)**

Note: Flow determined shall not be less than 2,000 L/min

3. Sprinklers - The value obtained in No. 2 above maybe reduce by up to 50% for complete automatic sprinkler protection.

**Sprinkler System                      Assume      0% reduction**  
**0 L/min reduction**

**Water Supply for Public Fire Protection - 1999  
Fire Underwriters Survey**

**Part II - Guide for Determination of Required Fire Flow**

4. Exposure - To the value obtained in No. 2, a percentage should be added for structures exposed within 45 metres by the fire area under consideration. The percentage shall depend upon the height, area, and construction of the building(s) being exposed, the separation, openings in the exposed building(s), the length and height of exposure, the provision of automatic sprinklers and/or outside sprinklers in the building(s) exposed, the occupancy of the exposed building(s) and the effect of hillside locations on the possible spread of fire.

Separation	Charge	Separation	Charge
0 to 3 m	25%	20.1 to 30 m	10%
3.1 to 10 m	20%	30.1 to 45 m	5%
10.1 to 20 m	15%		

**Exposed buildings**

Name	Distance		
Front	35	5%	350
Back	16.7	15%	1050
Left	3.7	20%	1400
Right	3.7	20%	1400
<b>4,200 L/min Surcharge</b>			

**Determine Required Fire Flow**

No. 1	7,000	
No. 2	0 reduction	
No. 3	0 reduction	
No. 4	4,200 surcharge	
<b>Required Flow:</b>	<b>4,000 L/min</b>	
<b>Rounded to nearest 1000l/min:</b>	<b>4,000 L/min</b>	or 66.7 L/s 1,057 USGPM

**Required Duration of Fire Flow**

Flow Required L/min	Duration (hours)
2,000 or less	1.0
3,000	1.25
4,000	1.5
5,000	1.75
6,000	2.0
8,000	2.0
10,000	2.0
12,000	2.5
14,000	3.0
16,000	3.5
18,000	4.0
20,000	4.5
22,000	5.0
24,000	5.5
26,000	6.0
28,000	6.5
30,000	7.0
32,000	7.5
34,000	8.0
36,000	8.5
38,000	9.0
40,000 and over	9.5

**Determine Required Fire Storage Volume**

Flow from above	4,000 L/min
Required duration	2.00 hours
Therefore:	480,000 Litres or 480 cu.m. is the required fire storage volume.

**Fire Protection Water Supply Guideline  
Part 3 of the Ontario Building Code (2006)**

$$Q = KVS_{TOT}$$

- Q = minimum supply of water in litres (L)  
K = water supply coefficient  
V = total building volume in cubic metres  
S<sub>TOT</sub> = total of spatial coefficient values from property line exposures on all sides

- K = 23.0 Group C/D building with combustible construction (Table 1)  
V = 1440 480sqm total floor area by 3m height  
S<sub>TOT</sub> = 2 S<sub>TOT</sub> Need Not Exceed 2.0

**Q = 66240 L**

Based on ranges listed in Table 2, the required minimum water supply flow rate is

2700	L/min
45	L/s



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By: j'l'a  
Check By:

**Long Point Road - Water Design Criteria**

Developed Site Area	2.20 ha
Number of Residential Units	22 units
Person Per Residential Unit (per Town of the Blue Mountains Development Standards)	2.3 persons/unit
Residential Population	51 persons
<b>Domestic Water Design Flows</b>	
Residential (per Town of the Blue Mountains Development Standards)	450 L/C-day
<b>Total Domestic Water Design Flows</b>	
Average Residential Daily Flow (per Town of the Blue Mountains Development Standards)	0.26 L/sec
Max Day Peak Factor (per Town of the Blue Mountains Development Standards)	2.00
<b>Max Day Demand Flow</b>	0.53 L/sec
Peak Hour Factor (per Town of the Blue Mountains Development Standards)	4.50
<b>Peak Hour Flow</b>	1.19 L/sec
<b>Fire Flow Demand (per FUS and OBC)</b>	67 L/sec
<b>Design Flow (per FUS and OBC)</b>	67.53 L/sec



File: 1349-4556  
Date: 16-May-18  
By: jl'a  
Check By:

### Longpoint - Sanitary Flows

Developed Site Area		2.20 ha
Number of Residential Units		22 units
Person Per Residential Unit	(Town of The Blue Mountains Development Standards)	2.30 persons/unit
Residential Population		51 persons
<b><u>Sanitary Design Flows</u></b>		
Residential	(Town of The Blue Mountains Development Standards)	450 L/C-day
Infiltration (typical)		0.23 L/s/ha
<b><u>Total Sanitary Design Flows</u></b>		
Average Daily Residential Flow		0.26 L/sec
Max Day Peak Factor	(Harmon Formula)	4.3
Infiltration		0.51 L/sec
<b>Design Flow</b>	(Town of The Blue Mountain Development Standards)	<b>1.64 L/sec</b>

# APPENDIX B

## Quality Control Measures & Stormwater Flow Calculations



**CROZIER**  
CONSULTING ENGINEERS

PROJECT: Long Point Road Development  
 PROJECT No.: 1349-4556  
 FILE: Rational Method - Peak Flow  
 DATE: 7/11/2018 0:00  
 DESIGN: JL'A

**Rational Method for Long Point Road**

Rational Method  $Q=0.0028 \cdot C \cdot i \cdot A$  (cms)  
 Intensity  $i=A / (Tc+b) \wedge c$  (mm/hr)

**Pre Development Peak Flows**

Storm Return	Area (ha)	Runoff Coef. - C	Time of Concentration - Tc	Intensity - i	Peak Flow - Q
2	0.88	0.23	15.0	60.00	0.03
5	0.88	0.23	15.0	79.39	0.04
10	0.88	0.23	15.0	92.31	0.05
25	0.88	0.25	15.0	108.72	0.07
50	0.88	0.28	15.0	120.67	0.08
100	0.88	0.29	15.0	132.69	0.09

**Post-Development Peak Flows**

Storm Return	Area (ha)	Runoff Coef. - C	Time of Concentration - Tc	Intensity - i	Peak Flow - Q
2	0.88	0.60	15.0	60.00	0.09
5	0.88	0.60	15.0	79.39	0.12
10	0.88	0.60	15.0	92.31	0.14
25	0.88	0.66	15.0	108.72	0.18
50	0.88	0.72	15.0	120.67	0.21
100	0.88	0.75	15.0	132.69	0.25

Storm Return	Coef. A	Coef. B
2	22.3	-0.714
5	29.1	-0.724
10	33.6	-0.729
25	39.3	-0.734
50	43.5	-0.736
100	47.7	-0.738



**CROZIER**  
CONSULTING ENGINEERS

PROJECT: Long Point Road Development

PROJECT No.: 1349-4556

FILE: Rational Method - Peak Flow

DATE: 7/11/2018 0:00

DESIGN: JL'A

### Rational Method for Long Point Road

Rational Method  $Q=0.0028 \cdot C \cdot I \cdot A$  (cms)

Intensity  $i=A / (Tc+b)^{1/c}$  (mm/hr)

#### Pre Development Peak Flows

Storm Return	Area (ha)	Runoff Coef. - C	Time of Concentration - Tc	Intensity - i	Peak Flow - Q
2	1.32	0.25	15.0	60.00	0.06
5	1.32	0.25	15.0	79.39	0.07
10	1.32	0.25	15.0	92.31	0.09
25	1.32	0.28	15.0	108.72	0.11
50	1.32	0.30	15.0	120.67	0.13
100	1.32	0.31	15.0	132.69	0.15

#### Post-Development Peak Flows

Storm Return	Area (ha)	Runoff Coef. - C	Time of Concentration - Tc	Intensity - i	Peak Flow - Q
2	1.32	0.54	15.0	60.00	0.12
5	1.32	0.54	15.0	79.39	0.16
10	1.32	0.54	15.0	92.31	0.18
25	1.32	0.59	15.0	108.72	0.24
50	1.32	0.65	15.0	120.67	0.29
100	1.32	0.68	15.0	132.69	0.33

Storm Return	Coef. A	Coef. B	Frequency - TOWN OF THE BLUE MOUNTAINS SPECIFIED IDF
2	22.3	-0.714	
5	29.1	-0.724	
10	33.6	-0.729	
25	39.3	-0.734	
50	43.5	-0.736	
100	47.7	-0.738	

## Detailed Stormceptor Sizing Report – Long Point Road

Project Information & Location			
Project Name	Long Point Road	Project Number	1349-4556
City	Town of The Blue Mountains	State/ Province	Ontario
Country	Canada	Date	7/11/2018
Designer Information		EOR Information (optional)	
Name	Rebecca Alexander	Name	
Company	C.F. Crozier & Associates	Company	
Phone #	905-875-0026	Phone #	
Email	ralexander@cfcrozier.ca	Email	

### Stormwater Treatment Recommendation

The recommended Stormceptor Model(s) which achieve or exceed the user defined water quality objective for each site within the project are listed in the below Sizing Summary table.

Site Name	Long Point Road
Recommended Stormceptor Model	STC 2000
Target TSS Removal (%)	80.0
TSS Removal (%) Provided	83
PSD	Fine Distribution
Rainfall Station	OWEN SOUND MOE

The recommended Stormceptor model achieves the water quality objectives based on the selected inputs, historical rainfall records and selected particle size distribution.

Stormceptor Sizing Summary		
Stormceptor Model	% TSS Removal Provided	% Runoff Volume Captured Provided
STC 300	68	83
STC 750	78	92
STC 1000	79	92
STC 1500	80	92
STC 2000	83	97
STC 3000	85	97
STC 4000	88	99
STC 5000	88	99
STC 6000	90	100
STC 9000	93	100
STC 10000	93	100
STC 14000	95	100
StormceptorMAX	Custom	Custom

### Stormceptor

The Stormceptor oil and sediment separator is sized to treat stormwater runoff by removing pollutants through gravity separation and flotation. Stormceptor's patented design generates positive TSS removal for each rainfall event, including large storms. Significant levels of pollutants such as heavy metals, free oils and nutrients are prevented from entering natural water resources and the re-suspension of previously captured sediment (scour) does not occur.

Stormceptor provides a high level of TSS removal for small frequent storm events that represent the majority of annual rainfall volume and pollutant load. Positive treatment continues for large infrequent events, however, such events have little impact on the average annual TSS removal as they represent a small percentage of the total runoff volume and pollutant load.

### Design Methodology

Stormceptor is sized using PCSWMM for Stormceptor, a continuous simulation model based on US EPA SWMM. The program calculates hydrology using local historical rainfall data and specified site parameters. With US EPA SWMM's precision, every Stormceptor unit is designed to achieve a defined water quality objective. The TSS removal data presented follows US EPA guidelines to reduce the average annual TSS load. The Stormceptor's unit process for TSS removal is settling. The settling model calculates TSS removal by analyzing:

- Site parameters
- Continuous historical rainfall data, including duration, distribution, peaks & inter-event dry periods
- Particle size distribution, and associated settling velocities (Stokes Law, corrected for drag)
- TSS load
- Detention time of the system

#### Hydrology Analysis

PCSWMM for Stormceptor calculates annual hydrology with the US EPA SWMM and local continuous historical rainfall data. Performance calculations of Stormceptor are based on the average annual removal of TSS for the selected site parameters. The Stormceptor is engineered to capture sediment particles by treating the required average annual runoff volume, ensuring positive removal efficiency is maintained during each rainfall event, and preventing negative removal efficiency (scour). Smaller recurring storms account for the majority of rainfall events and average annual runoff volume, as observed in the historical rainfall data analyses presented in this section.

#### Rainfall Station

<b>State/Province</b>	Ontario	<b>Total Number of Rainfall Events</b>	4492
<b>Rainfall Station Name</b>	OWEN SOUND MOE	<b>Total Rainfall (mm)</b>	18531.0
<b>Station ID #</b>	6132	<b>Average Annual Rainfall (mm)</b>	463.3
<b>Coordinates</b>	44°35'N, 80°56'W	<b>Total Evaporation (mm)</b>	1082.8
<b>Elevation (ft)</b>	580	<b>Total Infiltration (mm)</b>	7375.5
<b>Years of Rainfall Data</b>	40	<b>Total Rainfall that is Runoff (mm)</b>	10072.7

#### Notes

- Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor, which uses the EPA Rainfall and Runoff modules.
- Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal defined by the selected PSD, and based on stable site conditions only, after construction is completed.
- For submerged applications or sites specific to spill control, please contact your local Stormceptor representative for further design assistance.

Drainage Area		Up Stream Storage	
Total Area (ha)	0.88	Storage (ha-m)	Discharge (cms)
Imperviousness %	60.0	0.000	0.000
Water Quality Objective		Up Stream Flow Diversion	
TSS Removal (%)	80.0	Max. Flow to Stormceptor (cms)	
Runoff Volume Capture (%)	95.00	<b>Design Details</b>	
Oil Spill Capture Volume (L)		Stormceptor Inlet Invert Elev (m)	
Peak Conveyed Flow Rate (L/s)		Stormceptor Outlet Invert Elev (m)	
Water Quality Flow Rate (L/s)		Stormceptor Rim Elev (m)	
		Normal Water Level Elevation (m)	
		Pipe Diameter (mm)	
		Pipe Material	
		Multiple Inlets (Y/N)	No
		Grate Inlet (Y/N)	No

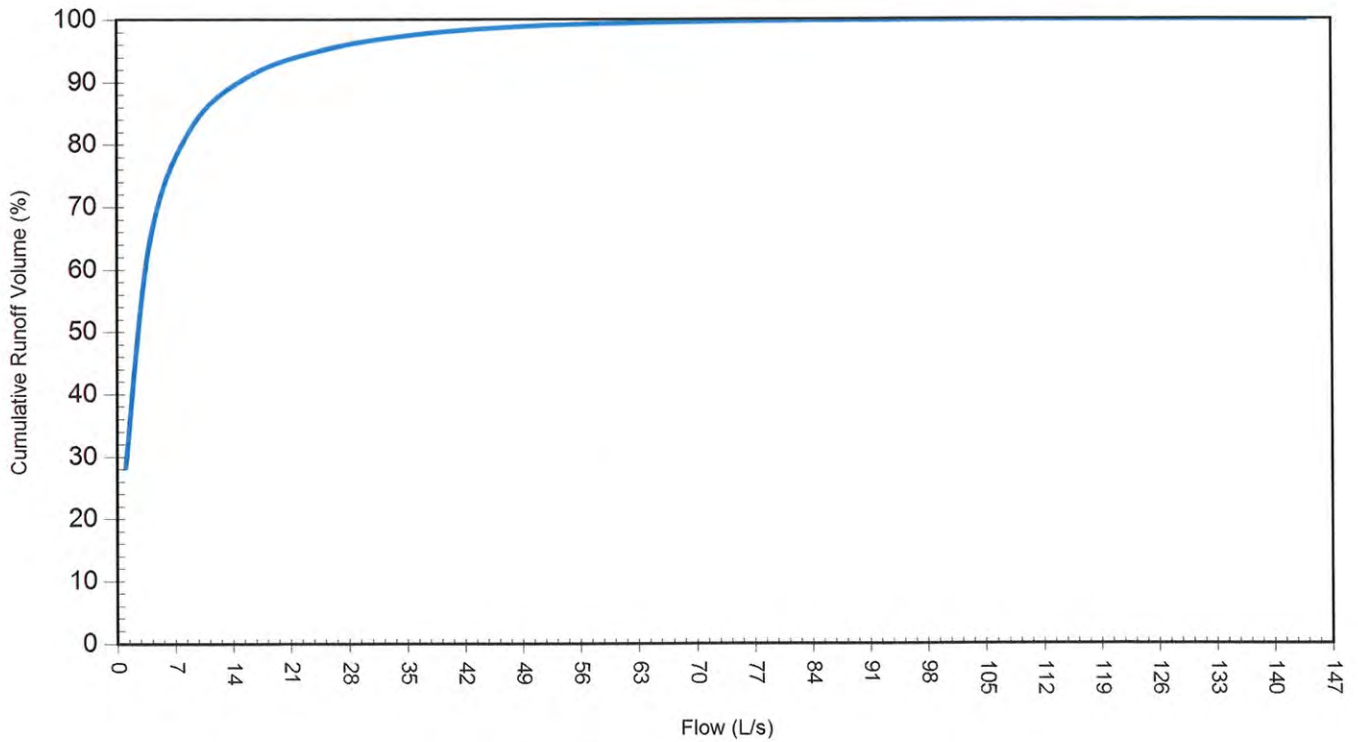
Particle Size Distribution (PSD)		
Removing the smallest fraction of particulates from runoff ensures the majority of pollutants, such as metals, hydrocarbons and nutrients are captured. The table below identifies the Particle Size Distribution (PSD) that was selected to define TSS removal for the Stormceptor design.		
Fine Distribution		
Particle Diameter (microns)	Distribution %	Specific Gravity
20.0	20.0	1.30
60.0	20.0	1.80
150.0	20.0	2.20
400.0	20.0	2.65
2000.0	20.0	2.65

Site Name		Long Point Road	
<b>Site Details</b>			
<b>Drainage Area</b>		<b>Infiltration Parameters</b>	
Total Area (ha)	0.88	Horton's equation is used to estimate infiltration	
Imperviousness %	60.0	Max. Infiltration Rate (mm/hr)	61.98
<b>Surface Characteristics</b>		Min. Infiltration Rate (mm/hr)	10.16
Width (m)	188.00	Decay Rate (1/sec)	0.00055
Slope %	2	Regeneration Rate (1/sec)	0.01
Impervious Depression Storage (mm)	0.508	<b>Evaporation</b>	
Pervious Depression Storage (mm)	5.08	Daily Evaporation Rate (mm/day)	2.54
Impervious Manning's n	0.015	<b>Dry Weather Flow</b>	
Pervious Manning's n	0.25	Dry Weather Flow (lps)	0
<b>Maintenance Frequency</b>		<b>Winter Months</b>	
Maintenance Frequency (months) >	12	Winter Infiltration	0
<b>TSS Loading Parameters</b>			
TSS Loading Function			
<b>Buildup/Wash-off Parameters</b>		<b>TSS Availability Parameters</b>	
Target Event Mean Conc. (EMC) mg/L		Availability Constant A	
Exponential Buildup Power		Availability Factor B	
Exponential Washoff Exponent		Availability Exponent C	
		Min. Particle Size Affected by Availability (micron)	

Cumulative Runoff Volume by Runoff Rate			
Runoff Rate (L/s)	Runoff Volume (m³)	Volume Over (m³)	Cumulative Runoff Volume (%)
1	25213	63977	28.3
4	57880	31308	64.9
9	73790	15396	82.7
16	81113	8069	91.0
25	84921	4261	95.2
36	87065	2115	97.6
49	88184	996	98.9
64	88704	475	99.5
81	88997	183	99.8
100	89108	72	99.9
121	89149	30	100.0
144	89175	4	100.0

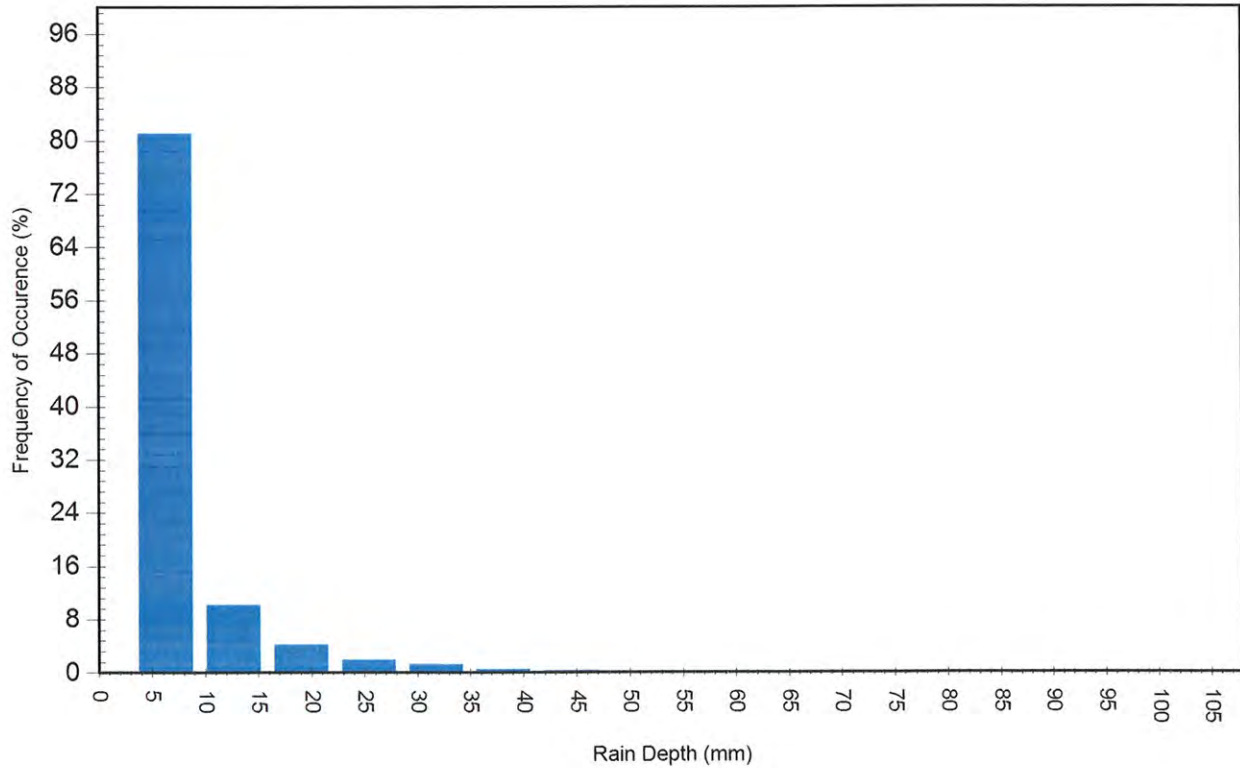
**Cumulative Runoff Volume by Runoff Rate**

For area: 0.88(ha), imperviousness: 60.0%, rainfall station: OWEN SOUND MOE



Rainfall Event Analysis				
Rainfall Depth (mm)	No. of Events	Percentage of Total Events (%)	Total Volume (mm)	Percentage of Annual Volume (%)
6.35	3645	81.1	5719	30.9
12.70	458	10.2	4102	22.1
19.05	191	4.3	2957	16.0
25.40	89	2.0	1936	10.5
31.75	57	1.3	1599	8.6
38.10	23	0.5	800	4.3
44.45	12	0.3	501	2.7
50.80	10	0.2	472	2.5
57.15	4	0.1	219	1.2
63.50	1	0.0	63	0.3
69.85	0	0.0	0	0.0
76.20	0	0.0	0	0.0
82.55	1	0.0	79	0.4
88.90	1	0.0	84	0.5
95.25	0	0.0	0	0.0
101.60	0	0.0	0	0.0

Frequency of Occurrence by Rainfall Depths



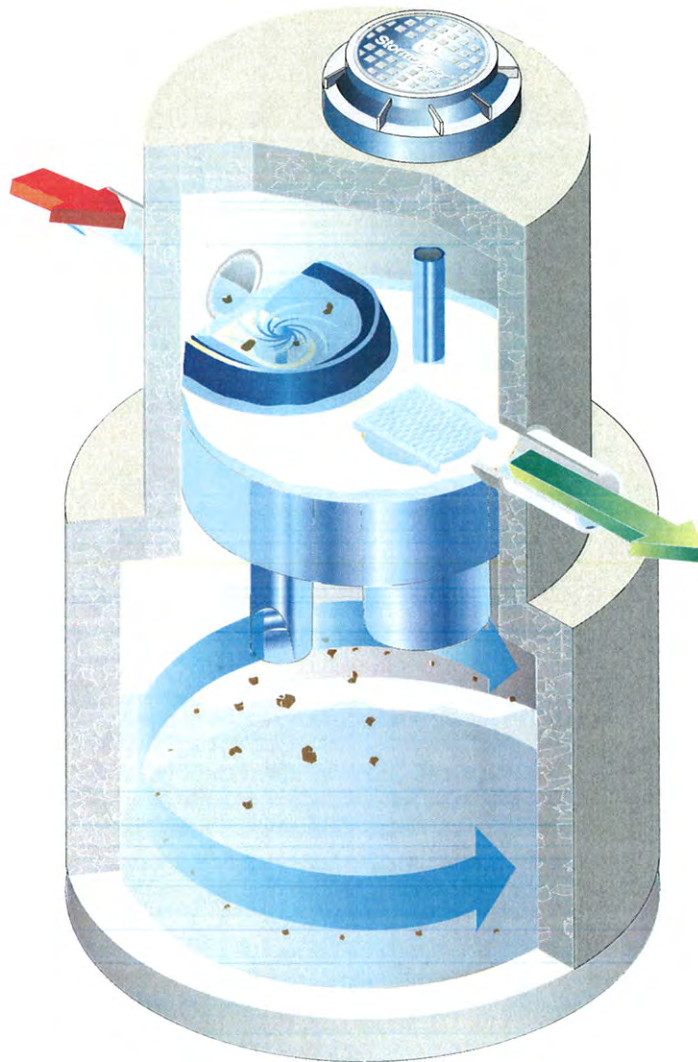
For Stormceptor Specifications and Drawings Please Visit:  
<http://www.imbriumsystems.com/technical-specifications>

# APPENDIX C

## Operations & Maintenance Manuals

# *Stormceptor*<sup>®</sup>

## Owner's Manual



Stormceptor is protected by one or more of the following patents:

Canadian Patent No. 2,137,942

Canadian Patent No. 2,175,277

Canadian Patent No. 2,180,305

Canadian Patent No. 2,180,338

Canadian Patent No. 2,206,338

Canadian Patent No. 2,327,768

U.S. Patent No. 5,753,115

U.S. Patent No. 5,849,181

U.S. Patent No. 6,068,765

U.S. Patent No. 6,371,690

U.S. Patent No. 7,582,216

U.S. Patent No. 7,666,303

Australia Patent No. 693,164

Australia Patent No. 707,133

Australia Patent No. 729,096

Australia Patent No. 779,401

Australia Patent No. 2008,279,378

Australia Patent No. 2008,288,900

Indonesia Patent No. 0007058

Japan Patent No. 3581233

Japan Patent No. 9-11476

Korean Patent No. 0519212

Malaysia Patent No. 118987

New Zealand Patent No. 314,646

New Zealand Patent No. 583,008

New Zealand Patent No. 583,583

South African Patent No. 2010/00682

South African Patent No. 2010/01796

Other Patents Pending

## **Table of Contents**

1 – Stormceptor Overview

2 – Stormceptor Operation & Components

3 – Stormceptor Identification

4 – Stormceptor Inspection & Maintenance

    Recommended Stormceptor Inspection Procedure

    Recommended Stormceptor Maintenance Procedure

5 – Contact Information (Stormceptor Licensees)

Congratulations!

Your selection of a Stormceptor® means that you have chosen the most recognized and efficient stormwater oil/sediment separator available for protecting the environment. Stormceptor is a pollution control device often referred to as a “Hydrodynamic Separator (HDS)” or an “Oil Grit Separator (OGS)”, engineered to remove and retain pollutants from stormwater runoff to protect our lakes, rivers and streams from the harmful effects of non-point source pollution.

## 1 – Stormceptor Overview

Stormceptor is a patented stormwater quality structure most often utilized as a treatment component of the underground storm drain network for stormwater pollution prevention. Stormceptor is designed to remove sediment, total suspended solids (TSS), other pollutants attached to sediment, hydrocarbons and free oil from stormwater runoff. Collectively the Stormceptor provides spill protection and prevents non-point source pollution from entering downstream waterways.

### Key benefits of Stormceptor include:

- Removes sediment, suspended solids, debris, nutrients, heavy metals, and hydrocarbons (oil and grease) from runoff and snowmelt.
- Will not scour or re-suspend trapped pollutants.
- Provides sediment and oil storage.
- Provides spill control for accidents, commercial and industrial developments.
- Easy to inspect and maintain (vacuum truck).
- “STORMCEPTOR” is *clearly* marked on the access cover (excluding inlet designs).
- Relatively small footprint.
- 3<sup>rd</sup> Party tested and independently verified.
- Dedicated team of experts available to provide support.

### Model Types:

- STC (Standard)
- STF (Fiberglass)
- EOS (Extended Oil Storage)
- OSR (Oil and Sand Removal)
- MAX (Custom designed unit, specific to site)

### Configuration Types:

- Inlet unit (accommodates inlet flow entry, and multi-pipe entry)
- In-Line (accommodates multi-pipe entry)
- Submerged Unit (accommodates the site's tailwater conditions)
- Series Unit (combines treatment in two systems)

## **Please Maintain Your Stormceptor**

To ensure long-term environmental protection through continued performance as originally designed for your site, **Stormceptor must be maintained**, as any stormwater treatment practice does. The need for maintenance is determined through inspection of the Stormceptor. Procedures for inspection are provided within this document. Maintenance of the Stormceptor is performed from the surface via vacuum truck.

If you require information about Stormceptor, or assistance in finding resources to facilitate inspections or maintenance of your Stormceptor please call your local Stormceptor Licensee or Imbrium® Systems.

## **2 – Stormceptor Operation & Components**

Stormceptor is a flexibly designed underground stormwater quality treatment device that is unparalleled in its effectiveness for pollutant capture and retention using patented flow separation technology.

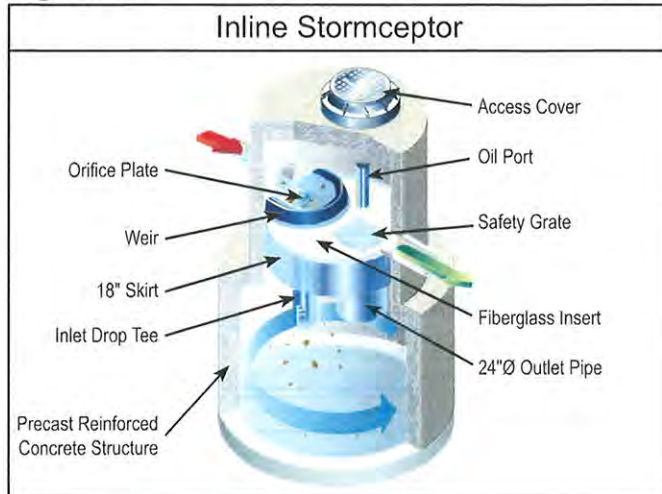
Stormceptor creates a non-turbulent treatment environment below the insert platform within the system. The insert diverts water into the lower chamber, allowing free oils and debris to rise, and sediment to settle under relatively low velocity conditions. These pollutants are trapped and stored below the insert and protected from large runoff events for later removal during the maintenance procedure.

With thousands of units operating worldwide, Stormceptor delivers reliable protection every day, in every storm. The patented Stormceptor design prohibits the scour and release of captured pollutants, ensuring superior water quality treatment and protection during even the most extreme storm events. Stormceptor's proven performance is backed by the longest record of lab and field verification in the industry.

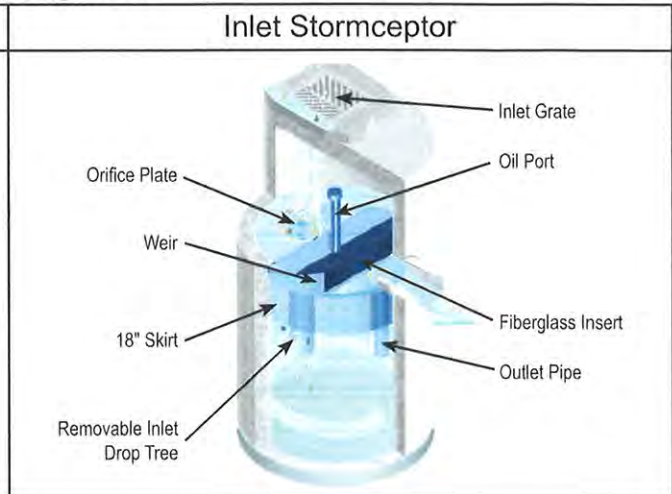
## Stormceptor Schematic and Component Functions

Below are schematics of two common Stormceptor configurations with key components identified and their functions briefly described.

**Figure 1.**



**Figure 2.**



- **Manhole access cover** – provides access to the subsurface components
- **Precast reinforced concrete structure** – provides the vessel's watertight structural support
- **Fiberglass insert** – separates vessel into upper and lower chambers
- **Weir** – directs incoming stormwater and oil spills into the lower chamber
- **Orifice plate** – prevents scour of accumulated pollutants
- **Inlet drop tee** – conveys stormwater into the lower chamber
- **Fiberglass skirt** – provides double-wall containment of hydrocarbons
- **Outlet riser pipe** – conveys treated water to the upper chamber; primary vacuum line access port for sediment removal
- **Oil inspection port** – primary access for measuring oil depth and oil removal
- **Safety grate** – safety measure to cover riser pipe in the event of manned entry into vessel

### 3 – Stormceptor Identification

Stormceptor is available in both precast concrete and fiberglass vessels, with precast concrete often being the dominant material of construction.

In the Stormceptor, a patented, engineered fiberglass insert separates the structure into an upper chamber and lower chamber. The lower chamber will remain full of water, as this is where the pollutants are sequestered for later removal. Multiple Stormceptor model (STC, OSR, EOS, MAX and STF) configurations exist, each to be inspected and maintained in a similar fashion.

Each unit is easily identifiable as a Stormceptor by the trade name "Stormceptor" embossed on each access cover at the surface. To determine the location of "inlet" Stormceptor units with horizontal catch basin inlet, look down into the grate as the Stormceptor insert will be visible. The name "Stormceptor" is not embossed on inlet models due to the variability of inlet grates used/ approved across North America.

Once the location of the Stormceptor is determined, the model number may be identified by comparing the measured depth from the fiberglass insert level at the outlet pipe's invert (water level) to the bottom of the tank using **Table 1**.

In addition, starting in 1996 a metal serial number tag containing the model number has been affixed to the inside of the unit, on the fiberglass insert. If the unit does not have a serial number, or if there is any uncertainty regarding the size of the unit using depth measurements, please contact your local Stormceptor Representative for assistance.

**Sizes/Models**

Typical general dimensions and capacities of the standard precast STC, EOS & OSR Stormceptor models in both USA and Canada/International (excluding South East Asia and Australia) are provided in **Tables 1 and 2**. Typical rim to invert measurements are provided later in this document. The total depth for cleaning will be the sum of the depth from outlet pipe invert (generally the water level) to rim (grade) and the depth from outlet pipe invert to the precast bottom of the unit. Note that depths and capacities may vary slightly between regions.

**Table 1A. (US) Stormceptor Dimensions – Insert to Base of Structure**

STC Model	Insert to Base (in.)	EOS Model	Insert to Base (in.)	OSR Model	Insert to Base (in.)	Typical STF m (in.)
450	60	4-175	60	65	60	1.5 (60)
900	55	9-365	55	140	55	1.5 (61)
1200	71	12-590	71			1.8 (73)
1800	105	18-1000	105			2.9 (115)
2400	94	24-1400	94	250	94	2.3 (89)
3600	134	36-1700	134			3.2 (127)
4800	128	48-2000	128	390	128	2.9 (113)
6000	150	60-2500	150			3.5 (138)
7200	134	72-3400	134	560	134	3.3 (128)
11000*	128	110-5000*	128	780*	128	
13000*	150	130-6000*	150			
16000*	134	160-7800*	134	1125*	134	

**Notes:**

1. Depth Below Pipe Inlet Invert to the Bottom of Base Slab can vary slightly by manufacturing facility, and can be modified to accommodate specific site designs, pollutant loads or site conditions. Contact your local representative for assistance.

\*Consist of two chamber structures in series.

**Table 1B. (CA & Int'l) Stormceptor Dimensions – Insert to Base of Structure**

STC Model	Insert to Base (m)	EOS Model	Insert to Base (m)	OSR Model	Insert to Base (m)	Typical STF m (in.)
300	1.5	300	1.5	300	1.7	1.5 (60)
750	1.5	750	1.5	750	1.6	1.5 (61)
1000	1.8	1000	1.8			1.8 (73)
1500	2.8					2.9 (115)
2000	2.8	2000	2.8	2000	2.6	2.3 (89)
3000	3.7	3000	3.7			3.2 (127)
4000	3.4	4000	3.4	4000	3.6	2.9 (113)
5000	4.0	5000	4.0			3.5 (138)
6000	3.7	6000	3.7	6000	3.7	3.3 (128)
9000*	3.4	9000*	3.4	9000*	3.6	
11000*	4.0	10000*	4.0			
14000*	3.7	14000*	3.7	14000*	3.7	

Notes:

1. Depth Below Pipe Inlet Invert to the Bottom of Base Slab can vary slightly by manufacturing facility, and can be modified to accommodate specific site designs, pollutant loads or site conditions. Contact your local representative for assistance.

\*Consist of two chamber structures in series.

**Table 2A. (US) Storage Capacities**

STC Model	Hydrocarbon Storage Capacity gal	Sediment Capacity ft <sup>3</sup>	EOS Model	Hydrocarbon Storage Capacity gal	OSR Model	Hydrocarbon Storage Capacity gal	Sediment Capacity ft <sup>3</sup>
450	86	46	4-175	175	065	115	46
900	251	89	9-365	365	140	233	58
1200	251	127	12-590	591			
1800	251	207	18-1000	1198			
2400	840	205	24-1400	1457	250	792	156
3600	840	373	36-1700	1773			
4800	909	543	48-2000	2005	390	1233	465
6000	909	687	60-2500	2514			
7200	1059	839	72-3400	3418	560	1384	690
11000*	2797	1089	110-5000*	5023	780*	2430	930
13000*	2797	1374	130-6000*	6041			
16000*	3055	1677	160-7800*	7850	1125*	2689	1378

Notes:

1. Hydrocarbon & Sediment capacities can be modified to accommodate specific site design requirements, contact your local representative for assistance.

\*Consist of two chamber structures in series.

**Table 2B. (CA & Int'l) Storage Capacities**

STC Model	Hydrocarbon Storage Capacity L	Sediment Capacity L	EOS Model	Hydrocarbon Storage Capacity L	OSR Model	Hydrocarbon Storage Capacity L	Sediment Capacity L
300	300	1450	300	662	300	300	1500
750	915	3000	750	1380	750	900	3000
1000	915	3800	1000	2235			
1500	915	6205					
2000	2890	7700	2000	5515	2000	2790	7700
3000	2890	11965	3000	6710			
4000	3360	16490	4000	7585	4000	4700	22200
5000	3360	20940	5000	9515			
6000	3930	26945	6000	12940	6000	5200	26900
9000*	10555	32980	9000*	19010	9000*	9300	33000
11000*	10555	37415	10000*	22865			
14000*	11700	53890	14000*	29715	14000*	10500	53900

*Notes:*

1. Hydrocarbon & Sediment capacities can be modified to accommodate specific site design requirements, contact your local representative for assistance.

*\*Consist of two chamber structures in series.*

#### 4 – Stormceptor Inspection & Maintenance

Regular inspection and maintenance is a proven, cost-effective way to maximize water resource protection for all stormwater pollution control practices, and is required to insure proper functioning of the Stormceptor. Both inspection and maintenance of the Stormceptor is easily performed from the surface. Stormceptor’s patented technology has no moving parts, simplifying the inspection and maintenance process.

Please refer to the following information and guidelines before conducting inspection and maintenance activities.

##### **When is inspection needed?**

- Post-construction inspection is required prior to putting the Stormceptor into service.
- Routine inspections are recommended during the first year of operation to accurately assess the sediment accumulation.
- Inspection frequency in subsequent years is based on the maintenance plan developed in the first year.
- Inspections should also be performed immediately after oil, fuel, or other chemical spills.

##### **When is maintenance cleaning needed?**

- For optimum performance, the unit should be cleaned out once the sediment depth reaches the recommended maintenance sediment depth, which is approximately 15% of the unit’s total storage capacity (see **Table 2**). The frequency should be adjusted based on historical inspection results due to variable site pollutant loading.

- Sediment removal is easier when removed on a regular basis at or prior to the recommended maintenance sediment depths, as sediment build-up can compact making removal more difficult.
- The unit should be cleaned out immediately after an oil, fuel or chemical spill.

***What conditions can compromise Stormceptor performance?***

- If construction sediment and debris is not removed prior to activating the Stormceptor unit, maintenance frequency may be reduced.
- If the system is not maintained regularly and fills with sediment and debris beyond the capacity as indicated in **Table 2**, pollutant removal efficiency may be reduced.
- If an oil spill(s) exceeds the oil capacity of the system, subsequent spills may not be captured.
- If debris clogs the inlet of the system, removal efficiency of sediment and hydrocarbons may be reduced.
- If a downstream blockage occurs, a backwater condition may occur for the Stormceptor and removal efficiency of sediment and hydrocarbons may be reduced.

***What training is required?***

The Stormceptor is to be inspected and maintained by professional vacuum cleaning service providers with experience in the maintenance of underground tanks, sewers and catch basins. For typical inspection and maintenance activities, no specific supplemental training is required for the Stormceptor. Information provided within this Manual (provided to the site owner) contains sufficient guidance to maintain the system properly.

In unusual circumstances, such as if a damaged component needs replacement or some other condition requires manned entry into the vessel, confined space entry procedures must be followed. Only professional maintenance service providers trained in these procedures should enter the vessel. Service provider companies typically have personnel who are trained and certified in confined space entry procedures according to local, state, and federal standards.

***What equipment is typically required for inspection?***

- Manhole access cover lifting tool
- Oil dipstick / Sediment probe with ball valve (typically 3/4-inch to 1-inch diameter)
- Flashlight
- Camera
- Data log / Inspection Report
- Safety cones and caution tape
- Hard hat, safety shoes, safety glasses, and chemical-resistant gloves

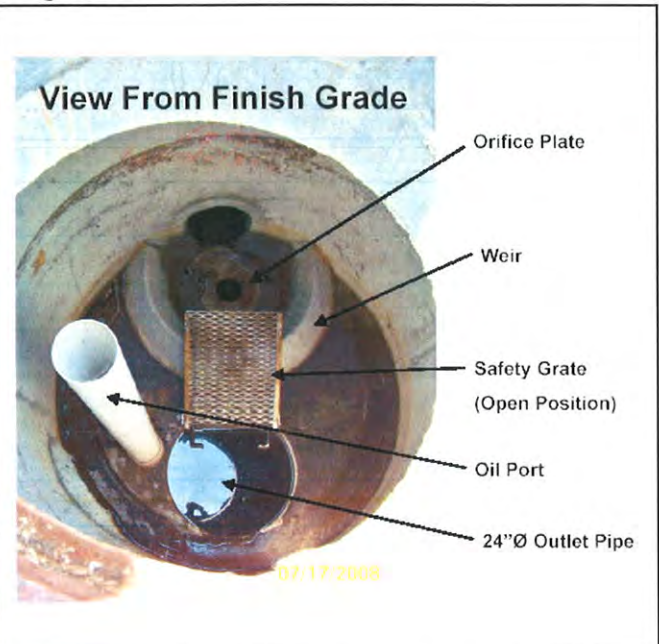
### Recommended Stormceptor Inspection Procedure:

- Stormceptor is to be inspected from grade through a standard surface manhole access cover.
- Sediment and oil depth inspections are performed with a sediment probe and oil dipstick.
- Oil depth is measured through the oil inspection port, either a 4-inch (100 mm) or 6-inch (150 mm) diameter port.
- Sediment depth can be measured through the oil inspection port or the 24-inch (610 mm) diameter outlet riser pipe.
- Inspections also involve a visual inspection of the internal components of the system.

Figure 3.



Figure 4.



### What equipment is typically required for maintenance?

- Vacuum truck equipped with water hose and jet nozzle
- Small pump and tubing for oil removal
- Manhole access cover lifting tool
- Oil dipstick / Sediment probe with ball valve (typically ¾-inch to 1-inch diameter)
- Flashlight
- Camera
- Data log / Inspection Report
- Safety cones
- Hard hats, safety shoes, safety glasses, chemical-resistant gloves, and hearing protection for service providers
- Gas analyzer, respiratory gear, and safety harness for specially trained personnel if confined space entry is required

## Recommended Stormceptor Maintenance Procedure

Maintenance of Stormceptor is performed using a vacuum truck.

No entry into the unit is required for maintenance. **DO NOT ENTER THE STORMCEPTOR CHAMBER** unless you have the proper personal safety equipment, have been trained and are qualified to enter a confined space, as identified by local Occupational Safety and Health Regulations (e.g. 29 CFR 1910.146 or Canada Occupational Safety and Health Regulations – SOR/86-304). Without the proper equipment, training and permit, entry into confined spaces can result in serious bodily harm and potentially death. Consult local, provincial, and/or state regulations to determine the requirements for confined space entry. Be aware, and take precaution that the Stormceptor fiberglass insert may be slippery. In addition, be aware that some units do not have a safety grate to cover the outlet riser pipe that leads to the submerged, lower chamber.

- Ideally maintenance should be conducted during dry weather conditions when no flow is entering the unit.
- Stormceptor is to be maintained through a standard surface manhole access cover.
- Insert the oil dipstick into the oil inspection port. If oil is present, pump off the oil layer into separate containment using a small pump and tubing.
- Maintenance cleaning of accumulated sediment is performed with a vacuum truck.
  - For 6-ft (1800 mm) diameter models and larger, the vacuum hose is inserted into the lower chamber via the 24-inch (610 mm) outlet riser pipe.
  - For 4-ft (1200 mm) diameter model, the removable drop tee is lifted out, and the vacuum hose is inserted into the lower chamber via the 12-inch (305 mm) drop tee hole.

Figure 5.



Figure 6.

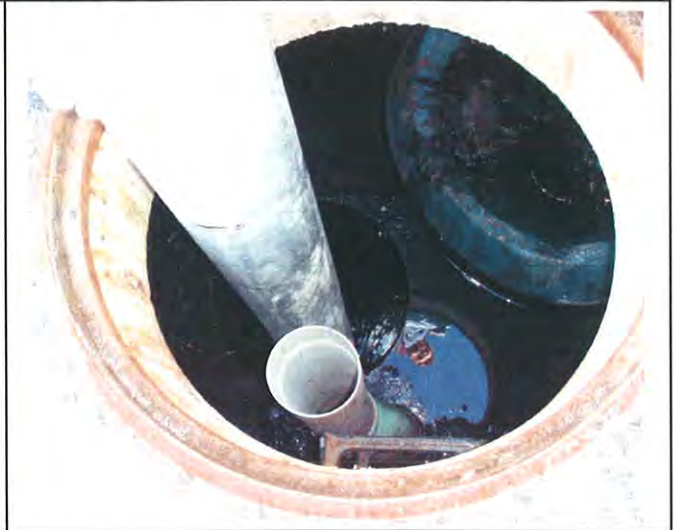


- Using the vacuum hose, decant the water from the lower chamber into a separate containment tank or to the sanitary sewer, if permitted by the local regulating authority.
- Remove the sediment sludge from the bottom of the unit using the vacuum hose. For large Stormceptor units, a flexible hose is often connected to the primary vacuum line for ease of movement in the lower chamber.
- Units that have not been maintained regularly, have surpassed the maximum recommended sediment capacity, or contain damaged components may require manned entry by trained personnel using safe and proper confined space entry procedures.

**Figure 7.**



**Figure 8.**



*A maintenance worker stationed at the above ground surface uses a vacuum hose to evacuate water, sediment, and debris from the system.*

***What is required for proper disposal?***

The requirements for the disposal of material removed from Stormceptor units are similar to that of any other stormwater treatment Best Management Practices (BMP). Local guidelines should be consulted prior to disposal of the separator contents. In most areas the sediment, once dewatered, can be disposed of in a sanitary landfill. It is not anticipated that the sediment would be classified as hazardous waste. This could be site and pollutant dependent. In some cases, approval from the disposal facility operator/agency may be required.

***What about oil spills?***

Stormceptor is often implemented in areas where there is high potential for oil, fuel or other hydrocarbon or chemical spills. Stormceptor units should be cleaned immediately after a spill occurs by a licensed liquid waste hauler. You should also notify the appropriate regulatory agencies as required in the event of a spill.

***What if I see an oil rainbow or sheen at the Stormceptor outlet?***

With a steady influx of water with high concentrations of oil, a sheen may be noticeable at the Stormceptor outlet. This may occur because a hydrocarbon rainbow or sheen can be seen at

very small oil concentrations (< 10 ppm). Stormceptor is effective at removing 95% of free oil, and the appearance of a sheen at the outlet with high influent oil concentrations does not mean that the unit is not working to this level of removal. In addition, if the influent oil is emulsified, the Stormceptor will not be able to remove it. The Stormceptor is designed for free oil removal and not emulsified or dissolved oil conditions.

**What factors affect the costs involved with inspection/maintenance?**

The Vacuum Service Industry for stormwater drainage and sewer systems is a well-established sector of the service industry that cleans underground tanks, sewers and catch basins. Costs to clean Stormceptor units will vary. Inspection and maintenance costs are most often based on unit size, the number of units on a site, sediment/oil/hazardous material loads, transportation distances, tipping fees, disposal requirements and other local regulations.

**What factors predict maintenance frequency?**

Maintenance frequency will vary with the amount of pollution on your site (number of hydrocarbon spills, amount of sediment, site activity and use, etc.). It is recommended that the frequency of maintenance be increased or reduced based on local conditions. If the sediment load is high from an unstable site or sediment loads transported from upstream catchments, maintenance may be required semi-annually. Conversely once a site has stabilized, maintenance may be required less frequently (for example: two to seven year, site and situation dependent). Maintenance should be performed immediately after an oil spill or once the sediment depth in Stormceptor reaches the value specified in **Table 3** based on the unit size.

**Table 3A. (US) Recommended Sediment Depths Indicating Maintenance**

STC Model	Maintenance Sediment depth (in)	EOS Model	Maintenance Sediment depth (in)	Oil Storage Depth (in)	OSR Model	Maintenance Sediment depth (in)
450	8	4-175	9	24	065	8
900	8	9-365	9	24	140	8
1200	10	12-590	11	39		
1800	15					
2400	12	24-1400	14	68	250	12
3600	17	36-1700	19	79		
4800	15	48-2000	16	68	390	17
6000	18	60-2500	20	79		
7200	15	72-3400	17	79	560	17
11000*	17	110-5000*	16	68	780*	17
13000*	20	130-6000*	20	79		
16000*	17	160-7800*	17	79	1125*	17

Note:

1. The values above are for typical standard units.

\*Per structure.

**Table 3B. (CA & Int'l) Recommended Sediment Depths Indicating Maintenance**

STC Model	Maintenance Sediment depth (mm)	EOS Model	Maintenance Sediment depth (mm)	Oil Storage Depth (mm)	OSR Model	Maintenance Sediment depth (mm)
300	225	300	225	610	300	200
750	230	750	230	610	750	200
1000	275	1000	275	990		
1500	400					
2000	350	2000	350	1727	2000	300
3000	475	3000	475	2006		
4000	400	4000	400	1727	4000	375
5000	500	5000	500	2006		
6000	425	6000	425	2006	6000	375
9000*	400	9000*	400	1727	9000*	425
11000*	500	10000*	500	2006		
14000*	425	14000*	425	2006	14000*	425

Note:

1. The values above are for typical standard units.

\*Per structure.

### **Replacement parts**

Since there are no moving parts during operation in a Stormceptor, broken, damaged, or worn parts are not typically encountered. Therefore, inspection and maintenance activities are generally focused on pollutant removal. However, if replacement parts are necessary, they may be purchased by contacting your local Stormceptor Representative, or Imbrium Systems.

**The benefits of regular inspection and maintenance are many – from ensuring maximum operation efficiency, to keeping maintenance costs low, to the continued protection of natural waterways – and provide the key to Stormceptor’s long and effective service life.**

### **Stormceptor Inspection and Maintenance Log**

Stormceptor Model No: \_\_\_\_\_

Allowable Sediment Depth: \_\_\_\_\_

Serial Number: \_\_\_\_\_

Installation Date: \_\_\_\_\_

Location Description of Unit: \_\_\_\_\_

Other Comments: \_\_\_\_\_

## **Contact Information**

Questions regarding the Stormceptor can be addressed by contacting your area Stormceptor Licensee, Imbrium Systems, or visit our website at [www.stormceptor.com](http://www.stormceptor.com).

### **Stormceptor Licensees:**

#### **CANADA**

Lafarge Canada Inc.  
[www.lafargepipe.com](http://www.lafargepipe.com)  
403-292-9502 / 1-888-422-4022  
780-468-5910  
204-958-6348

Calgary, AB  
Edmonton, AB  
Winnipeg, MB, NW, ON, SK

Langley Concrete Group  
[www.langleyconcretegroup.com](http://www.langleyconcretegroup.com)  
604-502-5236

BC

Hanson Pipe & Precast Inc.  
[www.hansonpipeandprecast.com](http://www.hansonpipeandprecast.com)  
519-622-7574 / 1-888-888-3222

ON

Lécuyer et Fils Ltée.  
[www.lecuyerbeton.com](http://www.lecuyerbeton.com)  
450-454-3928 / 1-800-561-0970

QC

Strescon Limited  
[www.strescon.com](http://www.strescon.com)  
902-494-7400  
506-633-8877

NS, NF  
NB, PE

#### **UNITED STATES**

Rinker Materials  
[www.rinkerstormceptor.com](http://www.rinkerstormceptor.com)  
1-800-909-7763

#### **AUSTRALIA & SOUTHEAST ASIA, including New Zealand & Japan**

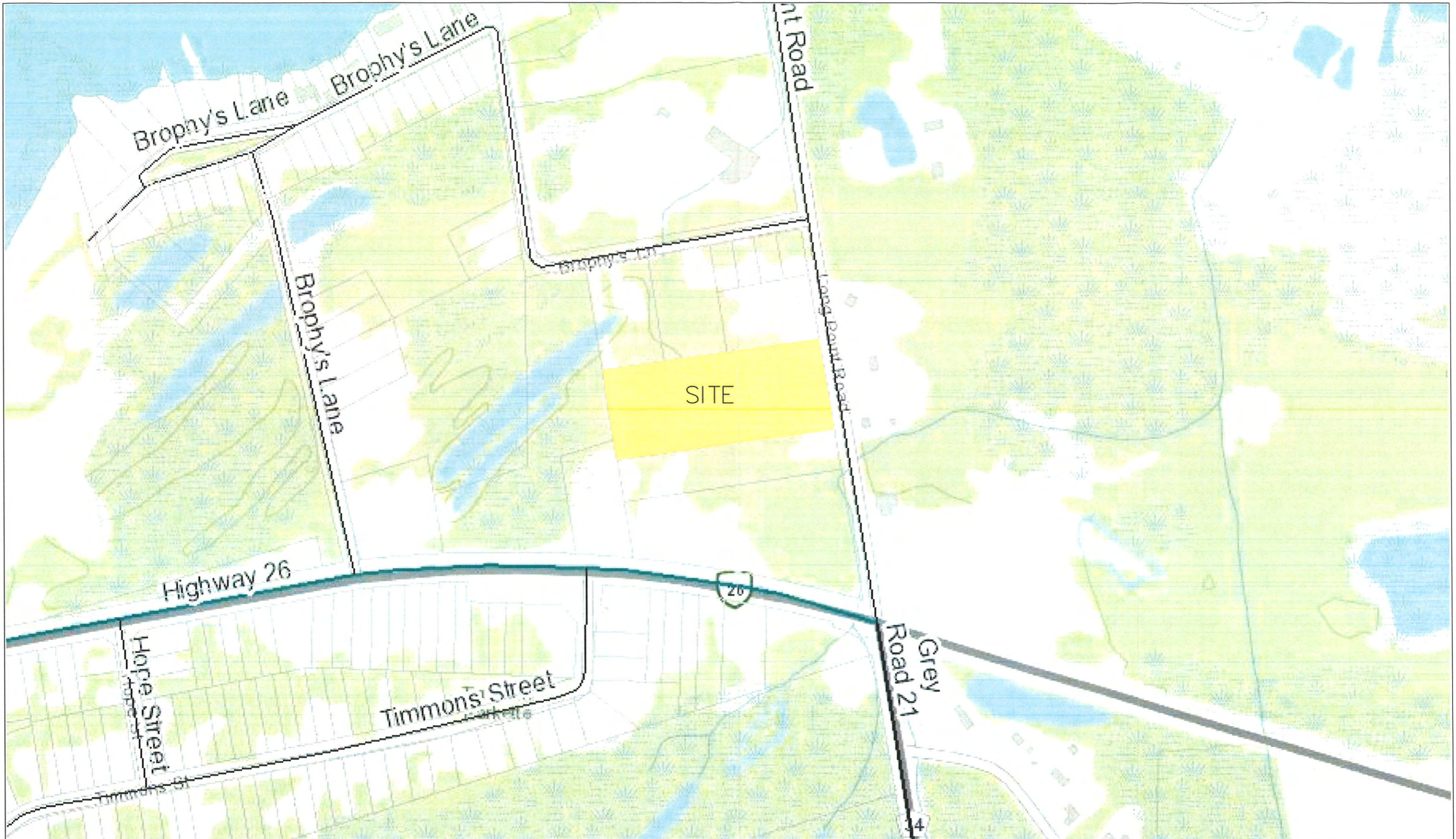
Humes Water Solutions  
[www.humes.com.au](http://www.humes.com.au)  
+61 7 3364 2894

#### **Imbrium Systems Inc. & Imbrium Systems LLC**

Canada 1-416-960-9900 / 1-800-565-4801  
United States 1-301-279-8827 / 1-888-279-8826  
International +1-416-960-9900 / +1-301-279-8827  
Email [info@imbriumsystems.com](mailto:info@imbriumsystems.com)


[www.imbriumsystems.com](http://www.imbriumsystems.com)  
[www.stormceptor.com](http://www.stormceptor.com)

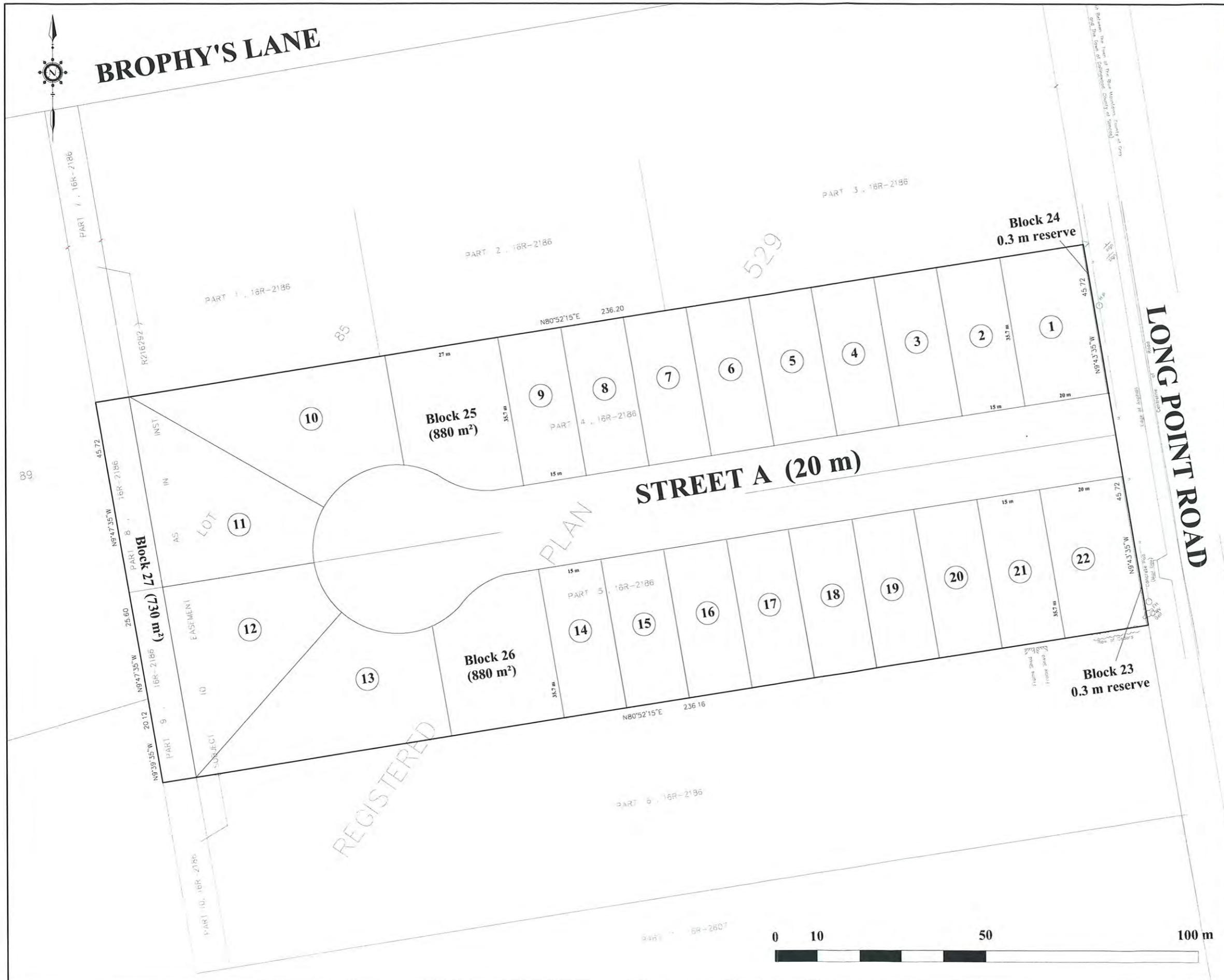
# FIGURES



Project  
LONGPOINT ROAD

Drawing  
SITE LOCATION

 <b>CROZIER &amp; ASSOCIATES</b> Consulting Engineers		<small>The HarbourEdge Building          40 Huron Street, Suite 301,          Collingwood, ON          L9Y 4R2</small>		<small>705-446-3510 T          705-446-3520 F          www.ccrozier.ca          info@crozier.ca</small>
		<small>Drawn By</small> <small>Date</small>	<small>Design By</small> <small>Check By</small>	<small>Project</small> 1349-4556
<small>Scale</small> N.T.S.				



## Draft Plan of Subdivision Long Point Road

Lot 85, Plan 529  
RP16R2186

TOWN OF THE BLUE MOUNTAINS  
(Formerly Township of Collingwood)  
COUNTY OF GREY

### SURVEYOR'S CERTIFICATE

I HEREBY CERTIFY THAT THE BOUNDARIES OF THE LANDS TO BE SUBDIVIDED ON THIS PLAN AND THEIR RELATIONSHIP TO THE ADJACENT LANDS ARE ACCURATELY AND CORRECTLY SHOWN.

JUNE, 2018

PAUL R. THOMSEN O.L.S.  
ZUBEK, EMO, PATTEN & THOMSEN LTD

### OWNER'S CERTIFICATE

PASCUZZO PLANNING INC. WAS AUTHORIZED BY TONY LESIAK AND ISABELLA LEHMANN TO SUBMIT THE PROPOSED PLAN OF SUBDIVISION TO THE COUNTY OF GREY FOR APPROVAL.

JUNE, 2018

ANDREW PASCUZZO MCIP RPP  
PASCUZZO PLANNING INC.

### ADDITIONAL INFORMATION REQUIRED UNDER SECTION 51 (17) OF THE PLANNING ACT

- |   |                                |
|---|--------------------------------|
| (a) AS SHOWN ON DRAFT PLAN.                                       | (g) AS SHOWN ON DRAFT PLAN.    |
| (b) AS SHOWN ON DRAFT PLAN.                                       | (h) MUNICIPAL WATER SUPPLY.    |
| (c) AS SHOWN ON DRAFT AND KEY PLAN.                               | (i) SAND.                      |
| (d) THE LAND IS TO BE USED ACCORDING TO THE SCHEDULE OF LAND USE. | (j) AS SHOWN ON DRAFT PLAN.    |
| (e) AS SHOWN ON DRAFT PLAN.                                       | (k) MUNICIPAL SANITARY SEWER.  |
| (f) AS SHOWN ON DRAFT PLAN.                                       | (l) EASEMENT - MUNICIPAL DRAIN |

### SCHEDULE OF LAND USE

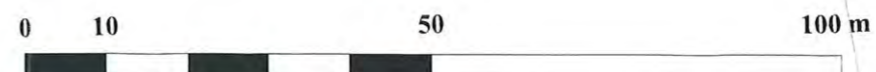
	UNITS	AREA
SINGLE-FAMILY RESIDENTIAL (LOTS 1-22)	22	1.48 ha.
1 FOOT RESERVES (BLOCK 23 and 24)		0.002 ha.
OPEN SPACE (BLOCK 25-27)		0.25 ha.
ROAD (STREET A)		0.43 ha.
<b>TOTAL</b>	<b>22</b>	<b>2.16 ha.</b>

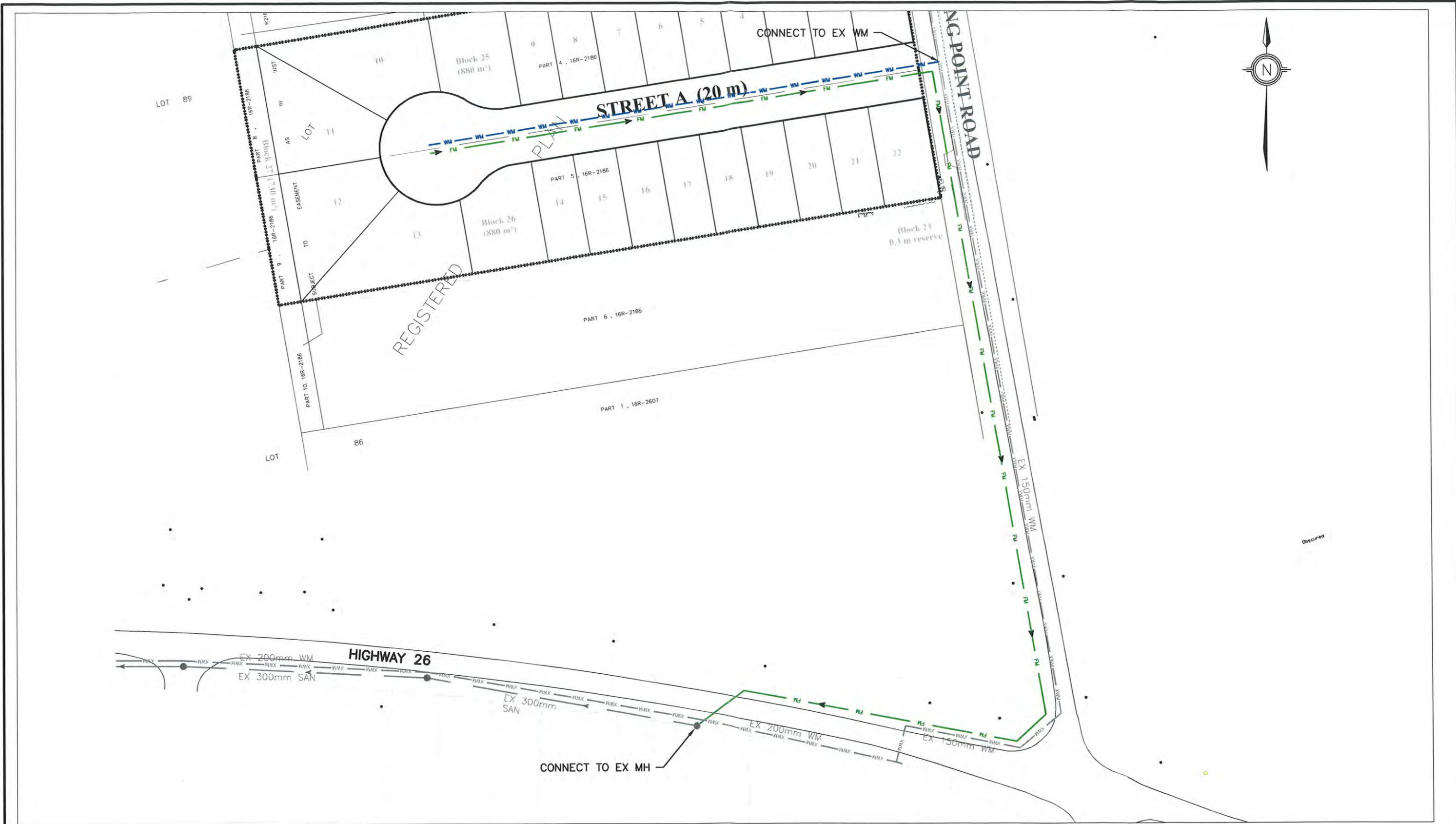
DISTANCES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

PROJECT: 892-17 DRAWN: AP DATE: JUNE 2018

DWG: 892-17-DP1


PASCUZZO PLANNING INC.





— WM — PROPOSED WATERMAIN  
— FM — PROPOSED SANITARY FORCEMAIN


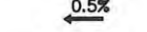

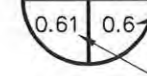




Project: **LONG POINT ROAD SUBDIVISION**  
 Drawing: **WATERMAIN AND FORCEMAIN**

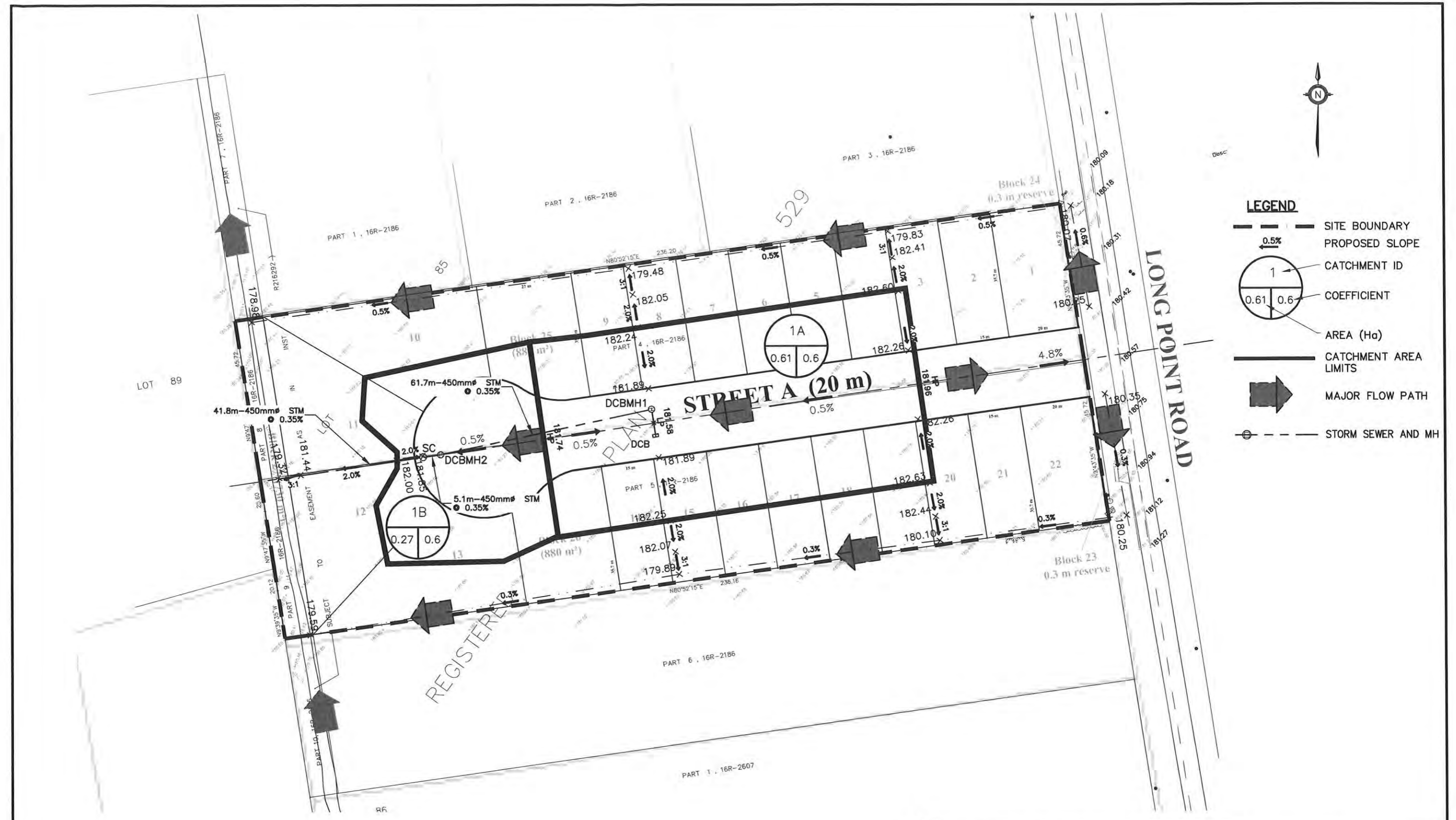

**CROZIER**  
 CONSULTING ENGINEERS  
 8 MARKET STREET  
 SUITE 600  
 TORONTO, ON M5E 1M6  
 416-477-3392 T  
 WWW.CROZIER.CA


Drawn By: M.V.R. Design By: M.V.R. Project: **1349-4556**  
 Scale: 1:1250 Date: 07/17/2018 Check By: JLL Drawing: **FIG 3**



**LEGEND**

-  SITE BOUNDARY
-  PROPOSED SLOPE
-  CATCHMENT ID
-  COEFFICIENT
-  AREA (Ha)
-  CATCHMENT AREA LIMITS
-  MAJOR FLOW PATH
-  STORM SEWER AND MH



<b>LONG POINT ROAD SUBDIVISION</b>		 <b>CROZIER</b> CONSULTING ENGINEERS <small>8 MARKET STREET SUITE 600 TORONTO, ON, M5E 1M6 416-477-3392 T WWW.CROZIER.CA</small>				
<b>GRADING AND STORM SEWER</b>						
Drawn By	M.V.R.	Design By	M.V.R.	Project	1349-4556	
Scale	1:1000	Date	07/17/2018	Check By	E.E.E./F.F.F.	
					Drawing	FIG 4

# CASTLE GLEN DEVELOPMENT, TOWN OF THE BLUE MOUNTAINS DRINKING WATER SUPPLY CLASS ENVIRONMENTAL ASSESSMENT

## NOTICE OF STUDY ADDENDUM COMMENCEMENT

A Class Environmental Assessment (Class EA) for the drinking water supply for the Castle Glen development was completed in December 2011. The owner of the development lands, Great Dale Manor Limited, is undertaking a review of the assessment of the water supply options and the conclusions of this previous Class EA. The review will consider changes in the conditions since the initial study to confirm the preferred drinking water supply approach for the development.

The previous Class EA had concluded that Phase 1 of the Castle Glen development should be serviced by a local groundwater supply system, a pump house with water treatment, and a ground-level treated water reservoir. For Phase 2 of the development, the Class EA concluded a connection to the municipal Georgian Bay-based water system should be established. It would include an expansion of the existing Mountain Road pumping station, a new booster pumping station at Osler Bluff Road and County Road 19, watermains to Castle Glen, and an expansion of the Castle Glen water reservoir. The local groundwater system would be maintained to supplement the Georgian Bay water system.

The Class EA Addendum will be prepared in accordance with the requirements of the MEA Municipal Class Environmental Assessment (October 2000, amended in 2007, 2011 & 2015). It will be documented in an Addendum Report.

To ensure that anyone interested in this study has the opportunity to get involved and provide input, public consultation will take place over the course of the study. A virtual Public Information Center will be held to present the updated assessment of alternative solutions and design concepts and to receive public input. At the completion of the Class EA update, the Addendum Report will be available for public review and comments.

If you have any questions or concerns, and/or would like to be added to the study's direct mailing list, please contact:

Suzanne Troxler  
Tatham Engineering Limited  
Manager, Water & Wastewater Engineering  
115 Sandford Fleming Drive, Suite 200  
Collingwood, Ontario, L9Y 5A6  
Tel: 705-444-2565  
Email: [stroxler@tathameng.com](mailto:stroxler@tathameng.com)

Comments and information received during this Class Environmental Assessment are collected in accordance with the *Municipal Freedom of Information and Protection of Privacy Act*. All comments will be part of the public record.



Enhancing our communities






# Windfall

## FUNCTIONAL SERVICING REPORT

Windfall GP Inc.

# Document Control

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Date:		
<b>June 19, 2020</b>		

<b>Authored by:</b>	<b>Reviewed by:</b>
	 
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Issue	Date	Description
2	June 19, 2020	Revised Draft Plan

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**Appendices**

Appendix A: Supporting Information



# 1 Introduction

Tatham Engineering Limited was retained by Windfall GP Inc. to complete this Functional Servicing Report in support of the proposed Windfall residential development in the Town of The Blue Mountains.

## 1.1 BACKGROUND

A Functional Servicing Report was originally prepared in support of approvals for the development at the time of first engineering submission for Phase 1 works in March of 2011. This revision has been prepared to support an application for a red-line revision to the draft plan of subdivision for the remaining Phases 5 and 6 (Phases 1, 2 and 3 are essentially complete and occupied, and Phase 4 is under construction). Under the application, the developer is applying to increase the unit count from 609 (as per the approved 2016 plan of subdivision) to 659, an increase of 50 units. The road and lot fabric generally remain as was previously approved in 2016 with only minor adjustments of the lot fabric in Phase 6 which include a walkway block on Street G between lots 179 and 181 (Block 180) and a small increase in the lands containing the stormwater management pond immediately adjacent to lot 156. The increased unit count is to be achieved through the provision of semi-detached units in place of single-detached units.

## 1.2 PURPOSE

The purpose of this study is to confirm that the proposed increase in density in Phases 5 and 6 can be accommodated by the existing and proposed infrastructure within the development. In this regard, the report addresses the servicing requirements for the proposed development, including potable water supply, sanitary sewage collections and conveyance, stormwater management, transportation and utility distribution.

## 1.3 GUIDELINES

This report has been prepared recognizing the pertinent Municipal and Provincial guidelines on water resources and the environment, including the following publications:

- *Design Guidelines for Drinking Water Systems*. Ministry of the Environment (2008);
- *Design Guidelines for Sewages Works*. Ministry of the Environment (2008); and
- *Engineering Standards*. Town of The Blue Mountains (April 2009).



## 2 Proposed Development

### 2.1 SITE LOCATION & DESCRIPTION

The subject property consists of approximately 65 ha of partially developed land located north and east of Grey Road 19, west of Grey Road 21 (Osler Bluff Road) in the Town of The Blue Mountains, as illustrated in Figure 1.

The legal description of the site is Part of Lot 16, Concession 1, Town of The Blue Mountains (formerly the Township of Collingwood), in the County of Grey. Residential and commercial developments are located opposite Grey Road 19 and Osler Bluff Road to the west, south and east of the subject property.

### 2.2 PROPOSED LAND USE & PHASING

#### 2.2.1 Residential Uses

It is proposed to develop approximately 60 ha of the site with a mix of residential dwelling types integrated with the natural features of the site. In total, the current proposal consists of 299 single-detached dwelling units and 360 semi-detached dwelling units (totaling 659 residential units). A breakdown of the proposed unit count by type and phase is provided in Table 1. Initially, the Windfall development was approved for 609 units; an increase in density in Phases 5 and 6 is proposed which will yield an additional 50 units (the increase in density is achieved through conversion of single units to semi-detached units. It is also noted that the phasing strategy has been revised as noted in Table 1. The development plan is illustrated on the drawings enclosed.

**Table 1: Proposed Land Use & Phasing**

PHASE	YEAR COMPLETE	PREVIOUS PLAN			CURRENT PLAN		
		SINGLE	SEMI	TOTAL	SINGLE	SEMI	TOTAL
1	2016	37	0	37	37	0	37
2	2018	67	100	167	67	100	167
3	2019	29	40	69	32	34	66
4	2021	103	20	123	42	82	124
5	2023	42	82	124	63	36	99
6	2025	73	16	89	58	108	166
<b>Total</b>		<b>351</b>	<b>258</b>	<b>609</b>	<b>299</b>	<b>360</b>	<b>656</b>
<b>Change</b>					<b>-52</b>	<b>+102</b>	<b>+50</b>



### 2.2.2 Internal Roads

A prominent feature of the development is a main centrally located road (Crosswinds Boulevard), which will provide two access points to the development:

- one from Grey Road 19 to the south; and
- one through the Second Nature development to the north.

A network of internal streets will provide access to Crosswinds Boulevard.

### 2.2.3 External Road Dedication

A 5.2 m road widening dedication to the County of Grey has been provided along the north and east side of Grey Road 19 (i.e. along the south and west limits of the development).

### 2.2.4 Stormwater Management & Parkland

A 2.2 ha block has been allocated for stormwater management within the development proposal. An existing excavated channel and surrounding area as identified in the Azimuth EIS report will remain undisturbed as an Environmental Protection Block. A 3.0 ha area in the vicinity of the north property boundary has been designated as a Community Forest Park. The location of the parkland corresponds with parkland within the Second Nature development to the north, creating a combined community park approximately 5 ha in size. In addition to the community park, a 3.1 ha buffer will be provided along the north side of Grey Road 19 near the main access to the development, and approximately 4.9 ha of additional parkland will be provided within the site plan along with a 7.7 ha combined wetland and protective buffer.

### 2.2.5 Mountain House

Approximately 4.5 ha of land located in the southeast corner of the site, also owned by the applicant and referred to as Mountain House, is not included in the current application and is being developed under separate planning and approvals.

## 2.3 COMPLETED TO DATE

Phases 1, 2 and 3 of the Windfall development have been constructed and are currently fully occupied (or very close). Residential dwelling units within Phase 4 are under construction with the site services and road works completed in 2020. Phase 5 and 6 have yet to be commenced.

Phases 1 through 4 are currently serviced by a municipal water distribution network, and municipal storm and sanitary sewer systems. The site is also currently serviced by Telephone, Cable TV, Natural Gas and Hydro. Details on how Phases 5 and 6 will be serviced are included in the following sections.



## 3 Water Supply

### 3.1 EXISTING CONDITIONS

#### 3.1.1 Grey Road 19 & 21 Watermains

An existing 300 mm diameter trunk watermain located along Grey Road 21 supplies water from the Collingwood water distribution system to a booster pumping station (BPS) at the intersection of Grey Road 19 and Grey Road 21. The BPS is at an elevation of 215.0 metres and currently pumps at a rate of 4,000 m<sup>3</sup>/day with an agreement in place between the Town of Collingwood and the Town of The Blue Mountains to potentially increase the rate to 8,000 m<sup>3</sup>/day as demand warrants.

A 350 mm diameter trunk watermain on the south and west side of Grey Road 19 delivers water from the BPS to a reservoir on Happy Valley Road while servicing the Blue Mountain Resort and adjacent commercial and residential areas. The reservoir located on Happy Valley Road is approximately 2.5 km from the BPS and is at an elevation of 280.0 metres.

#### 3.1.2 Windfall Water Service

A 300 mm diameter watermain has been fully constructed along Crosswinds Boulevard from a connection to the 350 mm diameter trunk watermain on Grey Road 19 and a connection to the 300 mm diameter watermain at the Second Nature development located immediately north of Windfall. This watermain currently supplies Phases 1 to 4 with future connections provided to service Phases 5 and 6.

An additional 200 mm diameter connection from the trunk watermain on Grey Road 19 near the existing roundabout was completed as part of Phase 2 works and connects through Block 43 and Block 54 to both Phase 2 and 4. This connection provides further looping of the Windfall water distribution system.

#### 3.1.3 Second Nature Water Service

The Second Nature development is currently being developed/constructed by others. This development has been fully serviced and all roads have been constructed including the extension of Crosswinds Boulevard to the north limit of Windfall.

As part of Windfall Phase 4 servicing work in 2019, a connection of the Windfall and Second Nature water distribution systems was completed, thereby providing a looped system with a 300 mm diameter watermain along the entire length of Crosswinds Boulevard from Grey Road 19 to Jozo Weider Boulevard.



## 3.2 PROPOSED SERVICING

### 3.2.1 Equivalent Population

The original development concept consisted of 357 single-residential units and 252 semi-detached units for a total of 609 units with an equivalent population of 1,400 people. Under the current proposed increase in density, there will be 299 single-residential units and 360 semi-detached units totaling 659 units with an equivalent population of 1,516.

The Medium Density Block located at the east side of the development has been considered separate in terms of water distribution and is excluded from this analysis (while it was part of the initial overall Windfall development, it is now considered a separate development and referred to as Mountain House).

### 3.2.2 Water Supply Demands

The proposed water supply demands for the Windfall development have been calculated based on the MOE guidelines and Town design standards. The proposed water demands using the proposed population densities are calculated as follows:

Design Population	1,516 persons
Average daily demand per person	450 L/day
Maximum day peak factor	2.0
Peak hour peak factor	4.5
Minimum fire flow	66.67 L/s (4000 L/min)
Average day demand (ADD)	= design population x Average daily demand per person = 1,516 persons x 450 L/day = 682,200 L/day = 682 m <sup>3</sup> /day (7.9 L/s)
Maximum day demand (MDD)	= Average day demand (ADD) x Maximum day peak factor = 682 m <sup>3</sup> /day x 2.0 = 1,364 m <sup>3</sup> /day (15.8 L/s)
Peak Hour demand (PHD)	= Average day demand (ADD) x Peak hour peak factor = 682 m <sup>3</sup> /day x 4.5 = 3,069 m <sup>3</sup> /day (35.5 L/s)
Maximum day plus fire flow	= Maximum day demand (MDD) + Minimum fire flow = 15.8 L/s + 66.67 L/s = 82.47 L/s (for 2 hours)



### 3.2.3 Water Distribution System

A water distribution layout has been prepared to demonstrate the feasibility of providing water service to the development based on the densities within Phase 5 and 6. The layout shown on Figure 2 includes a 300 mm diameter watermain on Crosswinds Boulevard with connections to the existing 350 mm diameter trunk main on Grey Road 19 at the south limit of Windfall and at Jojo Weider Boulevard through the Second Nature Subdivision. A third connection to the existing 350 mm diameter trunk main has been made via a 200 mm diameter connection at the west limit of Phase 2C near the existing roundabout opposite Mountain Drive. The remaining internal residential streets throughout the development will consist of looped 150 mm diameter watermains. The revised densities do not require any watermain upgrades from the original concept plan.

Due to the existing and potential pumping rates from the BPS and the difference in elevation between the Happy Valley Reservoir and the BPS, higher than permissible Town water distribution pressures may result within and surrounding the Windfall development. At the time of detailed design of Phase 1 works, it was determined by Town staff that rather than installing pressure reducing valves on the watermain itself, that each residential unit within the Windfall development shall be constructed with an individual pressure reducing valve on the service lateral internal to each dwelling unit in order to maintain pressures within the plumbing system to below the maximum permissible in accordance with the requirements of the Ontario Building Code; however, to date no individual pressure reducing valves have been installed within any completed dwelling unit within the development (Phases 1 through 4).

The developer has recently consulted with staff from the Town's engineering department and it has been agreed in principle the developer will construct mainline pressure reducing valves on Crosswinds Boulevard near Grey Road 19, on Crosswinds Boulevard near Second Nature and at Block 54. The proposed mainline pressure reducing valves shall be located prior to any service lateral that connect to a dwelling unit and shall reduce pressures within the entire Windfall development to below the maximum permissible in accordance with Town standards and the Ontario Building Code. The valves shall be within a concrete underground chamber (maintenance hole) designed and constructed to the satisfaction of the Town. The proposed locations for each mainline pressure reducing valve/chamber (3 locations) is shown on Figure 2.



## 4 Sanitary Servicing

### 4.1 EXISTING CONDITIONS

#### 4.1.1 Grey Road 21 Sanitary Sewer

In 2012, a trunk sanitary sewer was designed along Grey Road 21 (Osler Bluff Road) to collect and convey wastewater from existing and proposed development lands located within the Town of The Blue Mountains adjacent to and upstream of Grey Road 21 (Osler Bluff Road). The sewer was designed to be extended from Highway 26 south for approximately 6.5 km to the Osler Bluff Ski Club then west approximately 3.0 kms to the proposed Castle Glen development on Grey Road 19, and accommodate a total of 4,622 residential units having a contributing drainage area of approximately 1,094 hectares.

Construction of approximately 2.5 km of the 450 mm trunk sewer was completed in 2012 extending from Highway 26 to provide service to the Mountain House and Windfall developments. At its downstream end, the sewer was connected to an existing 300 mm diameter sanitary sewer located on the south side of Highway 26 (as an interim measure). In the future, the trunk sewer will be extended across Highway 26 and run north directly to a new lift station at the Craigleith Sewage Treatment Plant. Refer to Appendix A for additional information.

#### 4.1.2 Highway 26 Sanitary Sewer

As previously noted, there is an existing 300 mm diameter sanitary sewer located on the south side of Highway 26. This sewer directs flows west for a distance of approximately 1.3 km, at which point it is increased in size to 750 mm diameter and continues west for another 240 m where it outlets to an existing sanitary sewage pumping station located at Lakeshore Road East. Until the future extension of the trunk sewer across Highway 26 to the new lift station at the Craigleith Sewage Treatment Plant is constructed, the “short term sewage servicing alternative – 4B” as described in Section 8.2.2 of the *Combined EA Master Plan for Craigleith, Castle Glen and Osler*<sup>1</sup> relies on the existing 300 mm diameter sewer on Highway 26 to convey flows to the sewage pumping station at Lakeshore Road East and ultimately to the Craigleith Sewage Treatment Plant.

An assessment of the capacity of the existing 300 mm diameter sewer between Grey Road 21 (Osler Bluff Road) and the sewage pumping station was completed in March 2012 and is included in Appendix A for information. The assessment concluded the existing sewer has capacity to

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<sup>1</sup> *Combined EA Master Plan for Craigleith, Castle Glen and Osler*. MacViro Consultants Inc., June 2006.



convey peak flows from a total of 840 to 1,260 residential units (the lower capacity is based on a theoretical peak flow of 0.054L/unit/s, whereas the higher capacity is based on historical flow data at the plant of 0.036 L/unit/s).

#### 4.1.3 Lakeshore Road East Pumping Station & Highway 26 Forcemain

The sewage pumping station at Lakeshore Road East pumps wastewater to the Craigleith Sewage Treatment Plant via 2 - 300 mm diameter forcemains via a crossing to the north side of Highway 26 then east approximately 1.5 km to Long Point Road then north approximately 450 m to the STP. Information regarding the capacity of the pumping station and the existing forcemains was not readily available at the time of this report. The Town should provide confirmation that there is available capacity to receive and convey wastewater flows generated by the connected sewers including existing and proposed residences and developments.

#### 4.1.4 Craigleith Sewage Treatment Plant

The *2017 Annual Performance Report for the Craigleith Wastewater Treatment Plant and Associated Collection System*<sup>2</sup> for the reporting period January 1 to December 31, 2017 was reviewed to confirm available capacity of the treatment plant to handle additional wastewater flows. The report demonstrated the treatment plant has an average design capacity of 8,133 m<sup>3</sup>/d and a peak design capacity of 19,640 m<sup>3</sup>/d. In 2017 the average day flow was 3,383 m<sup>3</sup>/d and the peak day flow was 8,956 m<sup>3</sup>/d. The plant operated at approximately 39% of the capacity based on a 5-year rolling average of daily flows.

#### 4.1.5 Windfall Sanitary Service

A 300 mm diameter sanitary sewer was connected to the trunk sanitary sewer on Grey Road 21 then extended along the north limit of the Mountain House site (servicing this development), under the existing watercourse west of Mountain House and through the stormwater management block to future residential phases. The sanitary sewer then reduced in size to 250 mm diameter and 200 mm diameter with stubs provided at road intersections for connections to service future development phases.

A 200 mm diameter sanitary sewer was constructed through the neighbourhood park block to service Phases 1 and 2. A connection was provided through Phase 2 to Grey Road 19 to allow for future extension of the sanitary sewer (by others) into the Price's subdivision located to the south-west of Windfall.

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<sup>2</sup> *2017 Annual Performance Report for the Craigleith Wastewater Treatment Plant and Associated Collection System*. Town of The Blue Mountains.



A 200 mm diameter sanitary sewer was constructed to service Phase 3 lands and a 200 mm diameter sewer was constructed through Phase 6 lands along Sugar Maple Street to service Phase 4 and 5 lands. The sewer on Sugar Maple Street was constructed without individual service laterals recognizing the potential redline revisions to increase the densities within the Phases 5 and 6 lands. Accordingly, individual sanitary service laterals along this stretch of existing sanitary sewer will be installed at the time of Phase 6.

## **4.2 PROPOSED SERVICING**

The internal sanitary sewer collection system has been designed to convey all sewage flows generated from the development to the trunk sewer on Grey Road 21. The sanitary sewer design sheet (refer to Appendix A) has been updated to support the revised densities in Phase 5 and 6. The sanitary flows resulting from the increase in units does not require any resizing of existing or proposed sanitary sewers and conforms with the original servicing concept. The sanitary sewer servicing plan is denoted in Figure 3, illustrating the existing service to Phases 1 to 4, and the proposed service to Phases 5 and 6.

## **4.3 ASSESSMENT**

### **4.3.1 Sewage Demands**

Since construction of the trunk sanitary sewer on Grey Road 21 was completed, several surrounding developments have connected to it and now contribute flows to this sewer. These developments are at various stages with some being completed while others are still under construction. Table 2 summarizes known completed or active surrounding developments (including existing development and that of Windfall) and associated timelines for sewer connections. As noted, a total of 1238 units are anticipated.

### **4.3.2 Capacity Assessment**

The sanitary sewer on Grey Road 21 (Osler Bluff Road) has been designed to convey flow from 4,622 units and therefore has capacity to convey the anticipated flows generated by the existing and proposed connections noted in Table 2, including those of Windfall Phase 5 and 6.

The existing 300 mm diameter sanitary sewer on Highway 26 was estimated to have capacity to convey flow from approximately 840 units (based on theoretical peak flow demands) to 1260 units (based on historic peak flow demands) In considering the application of actual observed data within the existing sanitary infrastructure, as opposed to theoretical data, the system has capacity to accommodate all of the noted development, including Windfall. If, however, the theoretical demands are adopted (which are 50% greater than the actual demands), capacity will be reached in 2021 based on the development timelines presented in Table 2.



**Table 2: Area Development Sewer Demands**

DEVELOPMENT	ANTICIPATED NUMBER OF RESIDENTIAL CONNECTIONS WITHIN SANITARY DRAINAGE AREA							
	2018	2019	2020	2021	2022	2023	2024	2025
Existing on Highway 26	75							
Blue Vista				60	60	60		
Monterra Phase 2						40		
Plateau East	39							
Le Scandinave Spa	15							
Mountain House Ph 1	70							
Mountain House Ph 2		75						
Mountain House Ph 3			85					
Windfall Phase 1	37							
Windfall Phase 2	167							
Windfall Phase 3	66							
Windfall Phase 4A		63						
Windfall Phase 4B			61					
Windfall Phase 5A				50				
Windfall Phase 5B					49			
Windfall Phase 6A						75		
Windfall Phase 6B							91	
<b>Annual Total</b>	<b>469</b>	<b>138</b>	<b>146</b>	<b>110</b>	<b>109</b>	<b>175</b>	<b>91</b>	<b>0</b>
<b>Cumulative Total</b>	<b>469</b>	<b>607</b>	<b>753</b>	<b>863</b>	<b>972</b>	<b>1147</b>	<b>1238</b>	<b>1238</b>

#### 4.3.3 Flow Monitoring

Given the range of remaining capacity identified within the system and recognizing the number of variables that impact peak flow demands (occupancy rate, per capita flows, peaking factors, and sewer design coefficients), it is recommended that a sewer flow monitoring program be initiated by the Town as soon as possible to measure and record actual flows within the system during the peak spring period to fully assess the available capacity of the system. Measures should be taken at the treatment plant (to capture all demand and infiltration) and just



downstream of the Windfall development (from which actual demands can be derived with little infiltration given the age of the infrastructure).

#### **4.3.4 Infrastructure Improvements**

Depending on the realization of actual flow demands through flow monitoring, infrastructure improvements including the extension of the Grey Road 19 (Osler Bluff Road) trunk sanitary sewer across Highway 26 to the Craigleith Sewage Treatment Plant and construction of a lifting station may be required as early as the next several years, or not at all. It is recommended the Town initiate the engineering studies, design and approvals for this work (as may be required) such that construction could proceed when deemed necessary to service the existing developments under construction and/or proposed within the sanitary drainage area. It is understood the cost for the required infrastructure improvements would be addressed through development charges.

#### **4.4 SUMMARY**

- There is a trunk sanitary sewer on Grey Road 21 (Osler Bluff Road) with excess available capacity to collect and convey flows from existing and proposed residential units including those within Windfall and other surrounding developments within the sanitary drainage area.
- There is a 300 mm diameter sewer on Highway 26 that is being utilized as a “short term sewage servicing alternative” until such time as the proposed extension of the trunk sewer and lifting station at the sewage treatment plant are constructed.
- There is a potential for the 300 mm diameter sewer on Highway 26 to reach capacity in 2021 based on the projected number and timing of new connections from existing/proposed developments under construction, and considering conservative, theoretical peak flow demands (based on actual demands, capacity will be reached after all noted developments are complete).
- It is recommended a flow monitoring program be implemented to confirm the actual flow within and upstream of the 300 mm diameter sewer on Highway 26 to fully assess the capacity of the system and to determine timing for infrastructure improvements.
- It is recommended the Town initiate the engineering studies, design and approvals such that construction of required infrastructure improvements can be completed to meet future demands (without hindering development).



# 5 Stormwater Management

A separate Stormwater Management Report has been completed by Tatham Engineering to review the existing and proposed stormwater conditions for the proposed Windfall subdivision as well as the surrounding site area. The Stormwater Management Report should be read in conjunction with this report; the study findings and conclusions are summarized below.

## 5.1 STORMWATER MANAGEMENT PLAN

The proposed stormwater management plan maintains existing drainage conditions at the existing site outlets by restricting post development peak flow rates to pre-development levels. The stormwater management plan provides the required Level 1 “Enhanced” water quality control for the site effluent at all site outlets. Safe conveyance of the Regulatory storm event peak flows through the site to the downstream drainage system is provided and the drainage from all external lands is accommodated within the proposed drainage design. The storm sewer servicing plan is illustrated in Figure 4.

## 5.2 STORMWATER MANAGEMENT POND

The original report concluded that one extended detention wet pond would be sufficient to provide both stormwater quality and quantity controls. The pond would provide Level 1 or “enhanced” protection and will discharge to the unnamed Silver Creek tributaries and the Grey Road 21 roadside ditch. The pond was designed to be constructed in two stages with the first stage being constructed in conjunction with Phase 1 site servicing works and the second stage being constructed in conjunction with Phase 3 site servicing works. The pond has now been constructed to the ultimate design. A minor vertical adjustment of the emergency overflow weir (0.050 m) will be required should the increased densities within Phases 5 and 6 be approved.

## 5.3 PERIMETER CHANNEL

In conjunction with Phase 1, a perimeter channel was constructed along Grey Road 19 to convey external flows to the existing water course traversing through the site and ultimately discharging to the Silver Creek in order to eliminate overflow spill into the Windfall development property.

## 5.4 SILTATION & EROSION CONTROL

Construction and maintenance of siltation and erosion control facilities and adherence to strict housekeeping measures during site servicing and building construction will reduce the transportation of sediment from the site, improving stormwater quality and mitigating environmental impacts during construction.



## 6 Traffic

A separate Traffic Impact Study has been completed by Tatham Engineering to address the traffic and transportation issues related to the Windfall development from the perspectives of the external and internal road systems. The traffic study should be read in conjunction with this report; the study findings and conclusions are summarized below.

### 6.1 TRAFFIC DEMAND

In considering the total Windfall unit count of 659 units (including the 262 units that were constructed and occupied at the time of the traffic counts), the site will generate 261 and 348 trips during the Friday PM and Saturday peak hours respectively. The remaining 397 units to be constructed are expected to generate 212 trips during each peak hour. Given the ski activities during the winter in the area, winter Friday PM and Saturday peak hours have been used as the study periods. The additional 50 residential units will generate 27 additional trips during each peak hour, which translates to slightly less than 1 additional trip every 2 minutes. In context of the ensuing reviews and traffic operations, these additional trips can be readily accommodated on the future road system without further infrastructure.

### 6.2 SITE ACCESS

Windfall traffic will access Grey Road 19 via Crosswinds Boulevard, which provides 1 point of access within Windfall and another within Second Nature (intersection Grey Road 19 opposite Jozo Weider Boulevard).

### 6.3 HORIZON YEARS & KEY INTERSECTIONS

To address the potential impacts of the proposed site, peak hour operations were reviewed for the 2025 (build out of Windfall), 2030 (5 years beyond build-out) and 2035 (10 years beyond build-out) horizons at the intersections of Grey Road 19 with Grey Road 21, Grey Road 119/Gord Canning Drive (roundabout) and Jozo Weider Boulevard, in addition to the Crosswinds Boulevard intersection.

### 6.4 PLANNED ROAD IMPROVEMENTS

The following road system improvements have been identified and were considered in the traffic review:

- interim signal control at the intersection of Crosswinds Boulevard with Grey Road 19 in late 2020;



- extension of Crosswinds Boulevard through Windfall to Second Nature by end of 2020 (with opening to public traffic expected by 2022);
- provision of a roundabout at the intersection of Grey Road 19 and Grey Road 21 by 2022; and
- provision of a roundabout at the intersection of Crosswinds Boulevard with Grey Road 19 by 2022.

## **6.5 TRANSPORTATION OPERATIONS**

With the existing and/or planned intersection improvements, acceptable operations will be provided at each study area intersection in each of the 2025, 2030 and 2035 horizon years. All of the roundabouts (1 existing and 2 proposed) will provide excellent levels of service with minimal delays. Likewise, the signalized intersection of Grey Road 19 with Jozo Weider Boulevard/Crosswinds Boulevard will also provide acceptable operations.

Recognizing that the 2 new roundabouts on Grey Road 19 will not be implemented until 2022, operations under this horizon were also considered, with signal control at both subject intersections (Grey Road 19/21 is currently signalized whereas interim signal control will be implemented at Grey Road 19/Crosswinds Boulevard in 2020). At Grey Road 19/Grey Road 21, the existing intersection can accommodate the interim traffic volumes - no improvements are necessary. Similarly, at the Crosswinds Boulevard intersection, the provision of traffic signals will ensure appropriate operations prior to the implementation of the roundabout.

## **6.6 INTERNAL ROAD SYSTEM**

The internal road system was reviewed with respect to the rights-of-way and number of lanes proposed. Based on the projected volumes, all are considered appropriate. While single points of access are provided to a number of the internal phases, such are not considered problematic given the short road lengths considered, the limited number of units in Phase 1 (37) and the provision of an emergency access to serve Phase 2.



## 7 Utilities

Hydro One, Union Gas, Bell Canada and Rogers currently service Phases 1 to 4 of the Windfall development. Sufficient capacity exists to provide hydro and utility services to the remaining phases of the development as each phase is completed.



## 8 Summary

Based on the preceding analysis, the development has adequate services available to support the proposed increased densities within Phases 5 and 6 development lands (50 additional dwelling units) as illustrated on the proposed red-lined draft plan of subdivision.

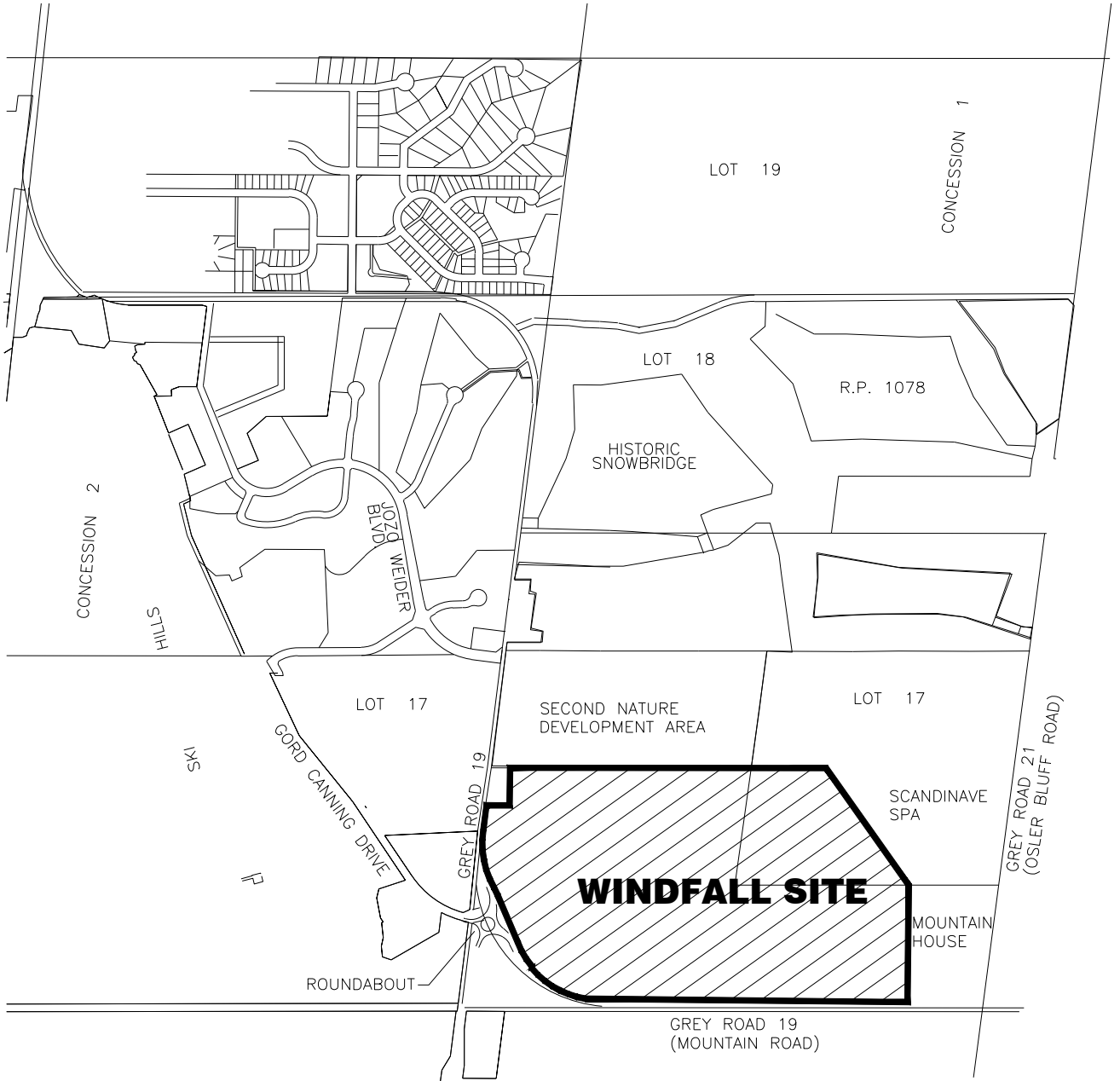
Specifically, the proposed servicing includes:

- an internal water distribution system to supply the needs of the development without the need for external improvements;
- an internal sanitary sewer collection system to convey sewage to the existing trunk sewer on Grey Road 21, and ultimately to the Craigleith Sewage Treatment Plant;
- an internal storm sewer collection system to convey surface runoff to an existing stormwater management facility that provides the necessary SWM controls for the development; and
- electrical, telephone, cable and gas utilities to service the future Windfall phases.

As previously noted, the existing 300 mm diameter watermain on Crosswinds Boulevard and 150 mm diameter watermains that loop through the rest of the development remain adequate and the existing and proposed sanitary sewers within the development will not require resizing to support the revised densities. Similarly, the future stormwater management system (with minor modifications) and transportation system can accommodate the Windfall development and the future phases.

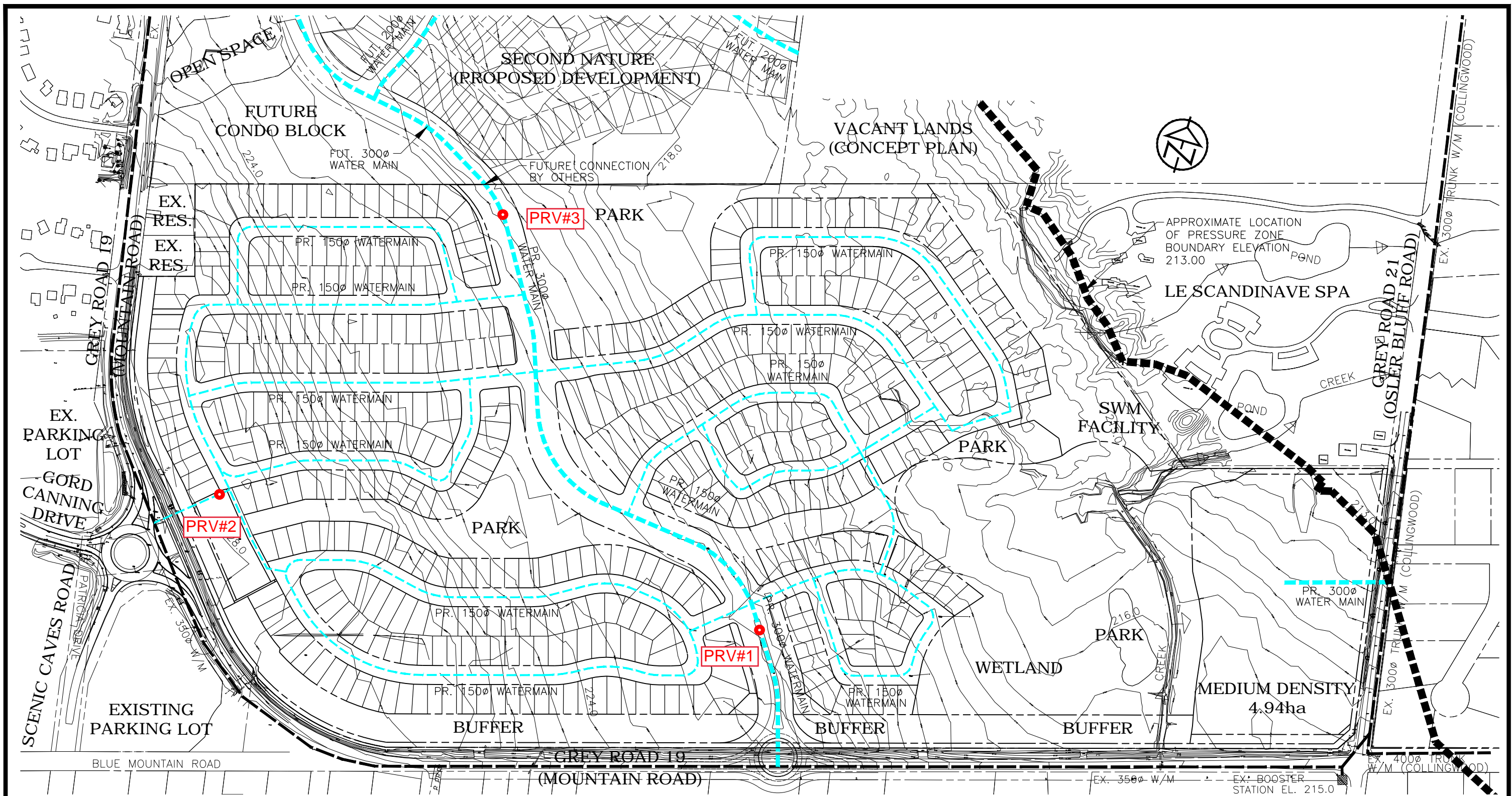


TOWN OF THE BLUE MOUNTAINS



WINDFALL DEVELOPMENT  
SITE LOCATION PLAN


SCALE: NTS      DATE: JUN/20      DWG NO. FIG. 1



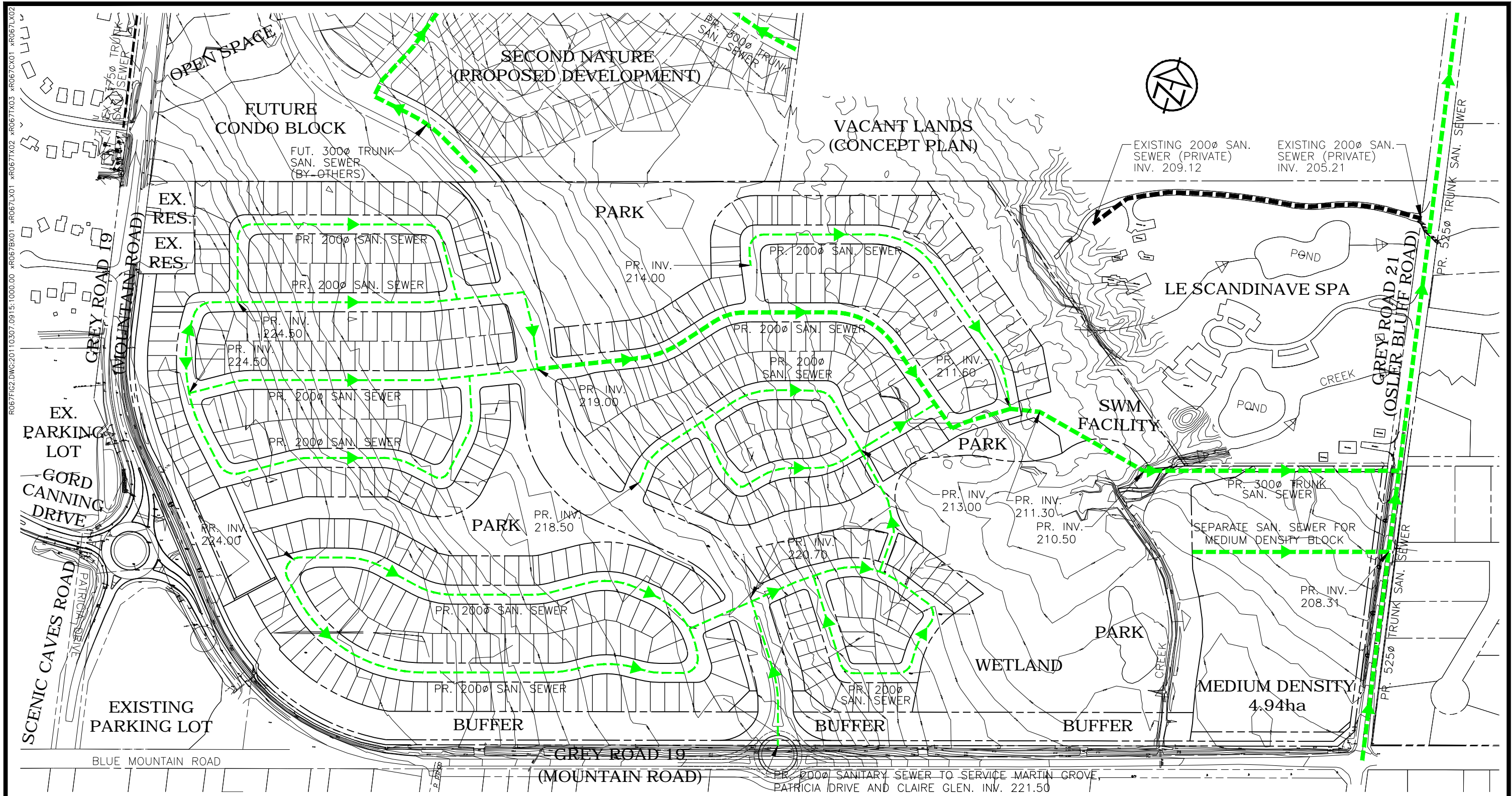
No.	REVISION DESCRIPTION	DATE
1.	REVISED DRAFT PLAN	FEB/11
2.	REVISED DRAFT PLAN	SEP/18
3.	2020 REVISED DRAFT PLAN	JUN 12/20

**WINDFALL DEVELOPMENT  
TOWN OF THE BLUE MOUNTAINS**

**WATER SERVICING**



DESIGN: JPA/DFM	FILE: 111179	<b>FIG-2</b>
DRAWN: JPA/DFM	DATE: JUN 2020	
CHECK: LH/JPA	SCALE: 1:4000	



R067FC2.DWG:20110307.09:15:1000.00 \*R067BX01 \*R067LX01 \*R067TX03 \*R067CX01 \*R067LX02

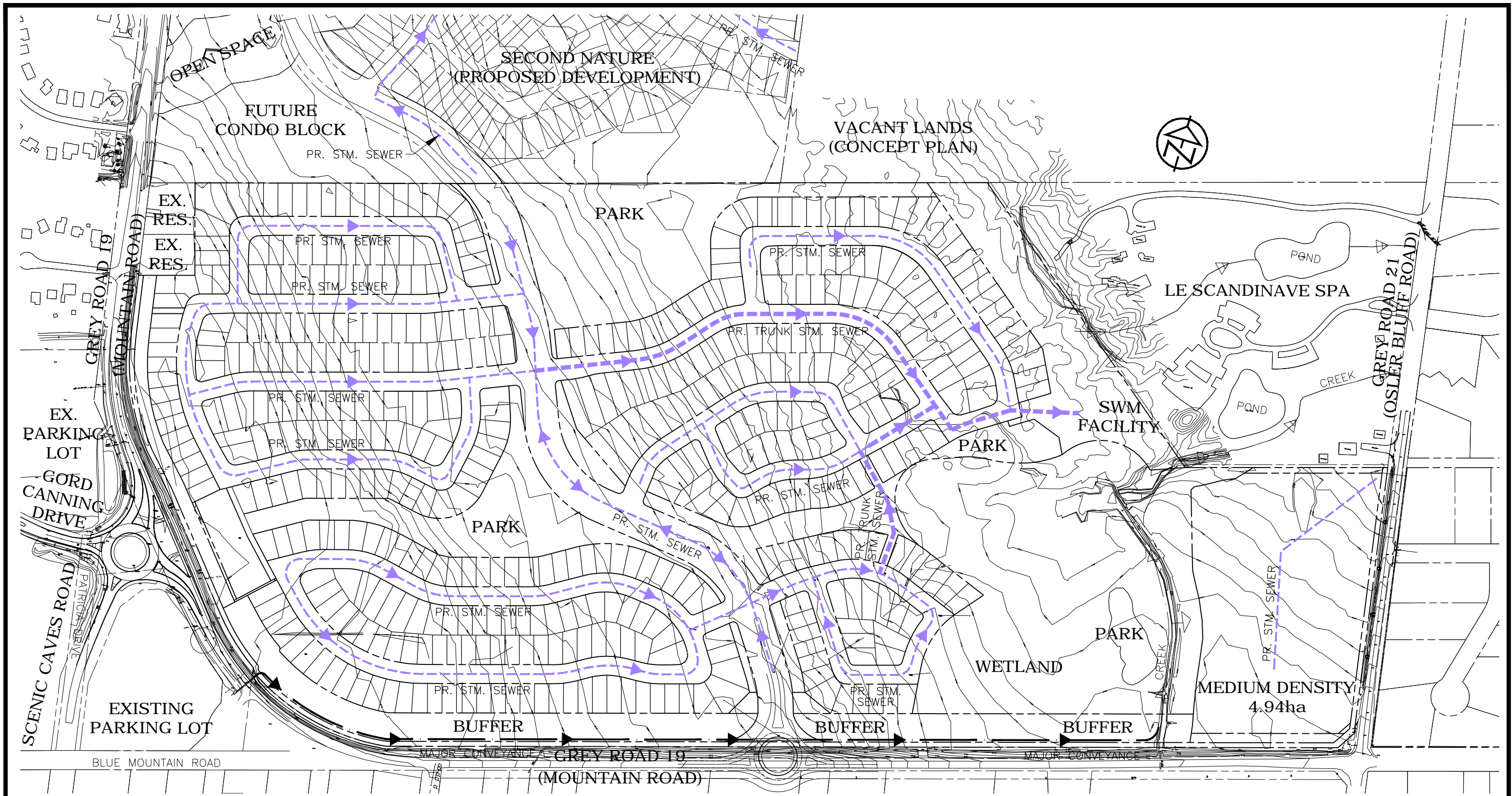
No.	REVISION DESCRIPTION	DATE
1.	REVISED DRAFT PLAN	FEB/11
2.	REVISED DRAFT PLAN	SEP/18
3.	2020 REVISED DRAFT PLAN	JUN 12/20

**WINDFALL DEVELOPMENT  
TOWN OF THE BLUE MOUNTAINS**

**SANITARY SEWER SERVICING**




DESIGN: JPA/DFM	FILE: 111179	<b>FIG-3</b>
DRAWN: JPA/DFM	DATE: JUN 2020	
CHECK: LH/JPA	SCALE: 1:4000	



No.	REVISION DESCRIPTION	DATE
1.	REVISED DRAFT PLAN	FEB/11
2.	REVISED DRAFT PLAN	SEP/18
3.	2020 REVISED DRAFT PLAN	JUN 12/20

**WINDFALL DEVELOPMENT  
TOWN OF THE BLUE MOUNTAINS**

**STORM SEWER SERVICING**



DESIGN: JPA/DFM	FILE: 111179	DWG:
DRAWN: JPA/DFM	DATE: JUN 2020	<b>FIG-4</b>
CHECK: LH/JPA	SCALE: 1:4000	

# Appendix A: Supporting Information

# GREY COUNTY ROAD 21 - TRUNK SANITARY SEWER DESIGN SHEET

**FLOW CRITERIA (See Note 1)**  
 Average Flow Rate: 1125 l/min/d  
 Infiltration (Avg): 90 l/cap/d  
 Infiltration (Peak): 227 l/cap/d  
 Population: 2.5 cap/unit  
 Peaking Factor: Harmon

**Project Name:** TRUNK SANITARY SEWER  
**Project Number:** August 31, 2006  
**Municipality:** Town of The Blue Mountains  
**Designed By:** JPA / PM  
**Date:** September 22, 2011  
**Checked By:** KRS  
**Date:** February 3, 2012  
**Revision Number:** 1

**C.C. Tatham & Associates Ltd.**  
 Consulting Engineers

Collingwood Brexbridge Orillia Barrie

Approved:

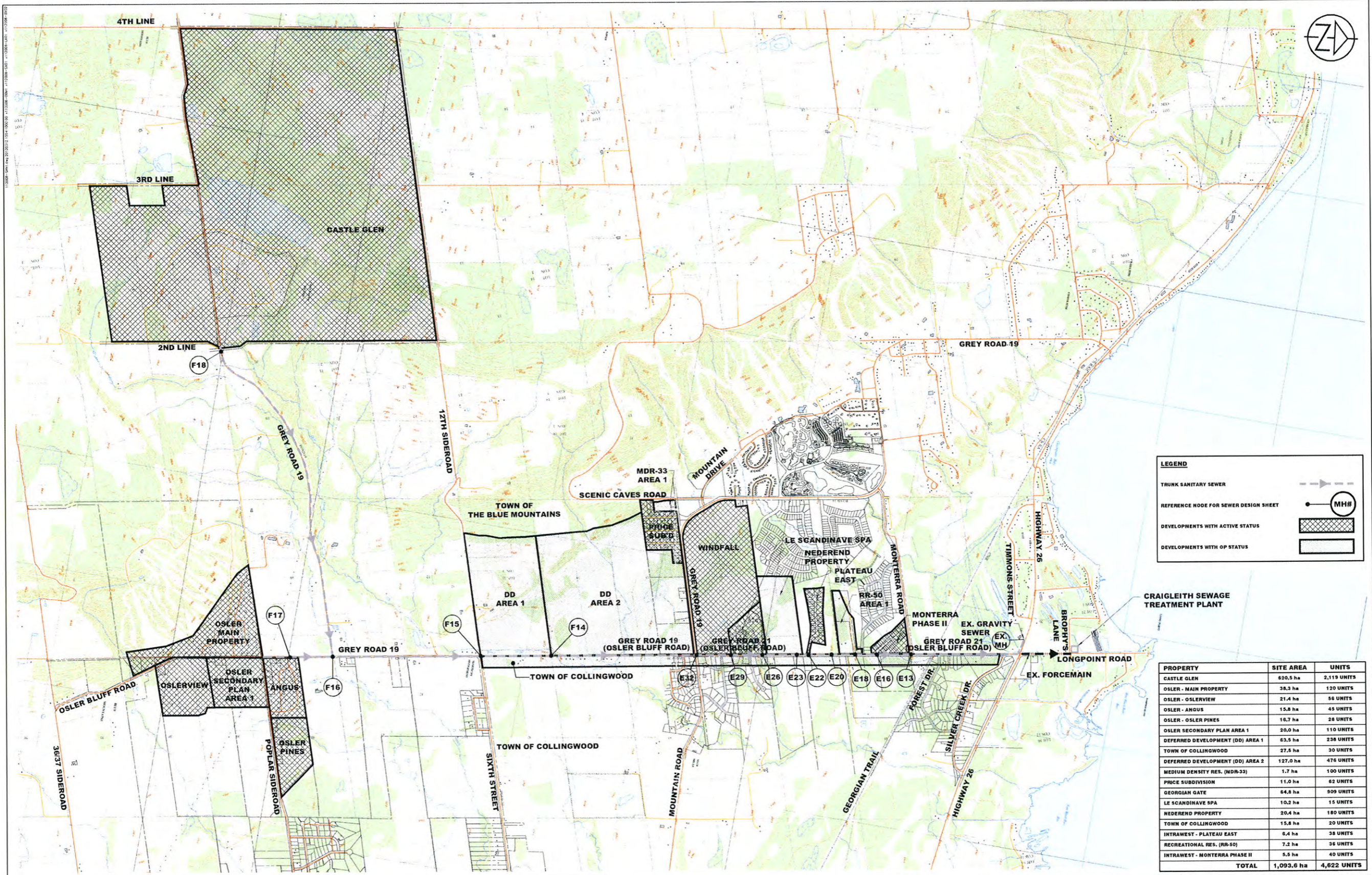


LOCATION OF SECTION	AREA LABEL	UPSTREAM MAINTENANCE HOLE	DOWNSTREAM MAINTENANCE HOLE	NUMBER OF LOTS/UNITS	ACCUMULATED NUMBER OF LOTS/UNITS	POPULATION	ACCUMULATED POPULATION	PEAKING FACTOR	AVERAGE FLOW		PEAK FLOW		PROPOSED SEWER						
									RESIDENTIAL	INFILTRATION	TOTAL	RESIDENTIAL	INFILTRATION	TOTAL	LENGTH OF PIPE	PIPE DIAMETER	GRADE	FULL FLOW CAPACITY	FULL FLOW VELOCITY
		MH No.	MH No.	units	units	cap.			l/s	l/s	l/s	mm	%	l/s	m/s	m/s			
CASTLE GLEN		F18	F18	2119	2119	5297.5	5297.5	3.22	27.59	5.52	33.11	88.89	13.92	102.81	375	0.50%	123.97	1.12	1.12
GREY ROAD 19		F16	F16	0	2119	0	5297.5	3.22	27.59	5.52	33.11	88.89	13.92	102.81	375	4.30%	363.54	3.29	2.59
OSLER PROPERTIES		F17	F17	359	359	897.5	897.5	3.83	4.67	0.83	5.61	17.90	2.36	20.26	200	0.50%	23.19	0.74	0.74
GREY ROAD 19		F16	F16	0	359	0	897.5	3.83	4.67	0.83	5.61	17.90	2.36	20.26	200	1.50%	41.48	1.32	1.21
GREY ROAD 19		F15	F15	0	2478	0	6195.0	3.16	32.27	6.45	38.72	101.88	16.28	123.24	375	1.60%	221.76	2.01	1.87
DD1, TOC		F15	F15	268	268	670.0	670.0	3.91	3.49	0.70	4.19	13.63	1.76	15.39	200	0.50%	23.19	0.74	0.74
GREY ROAD 19		F14	F14	0	2746	0	6965.0	3.11	35.76	7.15	42.91	111.37	18.04	129.41	375	0.75%	151.83	1.37	1.37
DD2		F14	F14	476	476	1190.0	1190.0	3.75	6.20	1.24	7.44	23.24	3.13	26.37	250	0.50%	42.05	0.86	0.84
GREY ROAD 19		E29	E29	0	3222	0	8055.0	3.05	41.95	8.39	50.34	127.85	21.16	149.01	375	0.75%	151.83	1.37	1.37
GREY ROAD 21		E32	E32	0	3222	0	8055.0	3.05	41.95	8.39	50.34	127.85	21.16	149.01	375	1.20%	192.05	1.74	1.74
MDR 33, PRICE, WINDFALL		E29	E29	1071	1071	2677.5	2677.5		(See Note 2)		25.70				300	0.50%	68.37	0.97	0.00
GREY ROAD 21		E28	E28	0	4293	0	10732.5	2.92	55.90	11.18	92.78	163.45	28.20	249.60	450	0.80%	254.99	1.60	1.60
GREY ROAD 21		E27	E27	0	4293	0	10732.5	2.92	55.90	11.18	92.78	163.45	28.20	249.60	450	0.80%	254.99	1.60	1.60
GREY ROAD 21		E26	E26	0	4293	0	10732.5	2.92	55.90	11.18	92.78	163.45	28.20	249.60	450	1.10%	299.00	1.88	1.84
LE SCANDINAVIA SPA		E26	E26	15	15	37.50	37.50		(See Note 3)		5.08				150	1.00%	15.23	0.86	0.00
GREY ROAD 21		E25	E25	0	4308	0	10770.0	2.92	56.09	11.22	98.09	163.94	28.30	255.27	450	0.90%	270.46	1.70	1.70
GREY ROAD 21		E24	E24	0	4308	0	10770.0	2.92	56.09	11.22	98.09	163.94	28.30	255.27	450	0.90%	270.46	1.70	1.70
GREY ROAD 21		E23	E23	0	4308	0	10770.0	2.92	56.09	11.22	98.09	163.94	28.30	255.27	450	2.50%	450.76	2.83	2.48
NEDERAN		E23	E23	180	180	450.0	450.0	4.00	2.34	0.47	2.81	9.37	1.18	10.55	200	0.50%	23.19	0.74	0.66
GREY ROAD 21		E22	E22	0	4488	0	11220.0	2.90	58.44	11.69	100.31	169.75	29.48	262.26	450	2.40%	441.65	2.78	2.47
PLATEAU EAST		E22	E22	38	38	95.0	95.0	4.25	0.49	0.10	0.59	2.10	0.25	2.35	200	0.50%	23.19	0.74	0.44
GREY ROAD 21		E21	E21	0	4526	0	11315.0	2.90	58.93	11.79	101.50	170.97	29.73	263.73	450	2.80%	477.04	3.00	2.61
GREY ROAD 21		E20	E20	0	4526	0	11315.0	2.90	58.93	11.79	101.50	170.97	29.73	263.73	450	4.20%	584.25	3.67	3.03
GREY ROAD 21 + TOC		E19	E19	20	4546	50.0	11365.0	2.90	59.19	11.84	101.81	171.62	29.86	264.51	450	3.20%	508.98	3.21	2.75
GREY ROAD 21		E18	E18	0	4546	0	11365.0	2.90	59.19	11.84	101.81	171.62	29.86	264.51	450	1.00%	285.09	1.79	1.79
RR50 (AREA 1)		E18	E18	36	36	90.0	90.0	4.26	0.47	0.09	0.56	1.99	0.24	2.23	200	0.50%	23.19	0.74	0.44

LOCATION OF SECTION	AREA LABEL	UPSTREAM MAINTENANCE HOLE	DOWNSTREAM MAINTENANCE HOLE	NUMBER OF LOTS/UNITS	ACCUMULATED NUMBER OF LOTS/UNITS	POPULATION	ACCUMULATED POPULATION	PEAKING FACTOR	AVERAGE FLOW			PEAK FLOW			PROPOSED SEWER			
									RESIDENTIAL	INFILTRATION	TOTAL	RESIDENTIAL	INFILTRATION	TOTAL	LENGTH OF PIPE	PIPE DIAMETER	GRADE	FULL FLOW CAPACITY
		MH No.	MH No.	units	units	cap.			l/s	l/s	l/s	l/s	l/s	mm	%	l/s	m/s	m/s
GREY ROAD 21		E18	E17	0	4582	0	11455.0	2.90	59.66	11.93	102.37	172.77	30.10	100.0	1.00%	285.09	1.79	1.79
GREY ROAD 21		E17	E16	0	4582	0	11455.0	2.90	59.66	11.93	102.37	172.77	30.10	85.2	1.00%	285.09	1.79	1.79
MONTERA PHASE II			E13	40	40	100.0	100.0	4.24	0.52	0.10	0.83	2.21	0.26		0.50%	23.19	0.74	
GREY ROAD 21		E16	E15	0	4622	0	11555.0	2.89	60.18	12.04	103.00	174.05	30.35	99.8	0.40%	271.98	1.26	1.26
GREY ROAD 21		E15	E14	0	4622	0	11555.0	2.89	60.18	12.04	103.00	174.05	30.35	100.0	0.40%	271.98	1.26	1.26
GREY ROAD 21		E14	E13	0	4622	0	11555.0	2.89	60.18	12.04	103.00	174.05	30.35	92.3	0.40%	271.98	1.26	1.26
GREY ROAD 21		E13	E12	0	4622	0	11555.0	2.89	60.18	12.04	103.00	174.05	30.35	82.7	0.70%	359.79	1.65	1.57
GREY ROAD 21		E12	E11	0	4622	0	11555.0	2.89	60.18	12.04	103.00	174.05	30.35	80.0	0.70%	359.79	1.65	1.57
GREY ROAD 21		E11	E10	0	4622	0	11555.0	2.89	60.18	12.04	103.00	174.05	30.35	79.7	0.70%	359.79	1.65	1.57
GREY ROAD 21		E10	E9	0	4622	0	11555.0	2.89	60.18	12.04	103.00	174.05	30.35	80.3	0.40%	271.98	1.26	1.26
GREY ROAD 21		E9	E8	0	4622	0	11555.0	2.89	60.18	12.04	103.00	174.05	30.35	80.0	0.40%	271.98	1.26	1.26
GREY ROAD 21		E8	E7	0	4622	0	11555.0	2.89	60.18	12.04	103.00	174.05	30.35	100.0	0.40%	271.98	1.26	1.26
GREY ROAD 21		E7	E6	0	4622	0	11555.0	2.89	60.18	12.04	103.00	174.05	30.35	100.0	0.40%	271.98	1.26	1.26
GREY ROAD 21		E6	E5	0	4622	0	11555.0	2.89	60.18	12.04	103.00	174.05	30.35	100.0	0.40%	271.98	1.26	1.26
GREY ROAD 21		E5	E4	0	4622	0	11555.0	2.89	60.18	12.04	103.00	174.05	30.35	98.0	0.40%	271.98	1.26	1.26
GREY ROAD 21		E4	E3	0	4622	0	11555.0	2.89	60.18	12.04	103.00	174.05	30.35	97.5	0.40%	271.98	1.26	1.26
GREY ROAD 21		E3	E2	0	4622	0	11555.0	2.89	60.18	12.04	103.00	174.05	30.35	37.4	0.40%	51.15	0.87	0.87
HIGHWAY 26		E2	E1	0	4622	0	11555.0	2.89	60.18	12.04	103.00	174.05	30.35	42.7	0.40%	51.15	0.87	0.87
HIGHWAY 26		E1	EX SAN MH	0	4622	0	11555.0	2.89	60.18	12.04	103.00	174.05	30.35	72.4	0.22%	45.35	0.64	0.64

Notes:

- Flow criteria based on the MOE Design Guidelines included in the Class EA for Cragville Sewage Treatment Plant Expansion Environmental Study Report (Nov, 2009)
- Flow calculated for MDR 33, Price and Windfall based on Windfall Master Servicing Sanitary Sewer Design Sheet and Town criteria for residential and extraneous flows.
- Total peak flow generated by La Scandoliva Spa based on Part 7 of the Ontario Building Code. The calculated peak flow is used as an average flow to be conservative. See attached summary and design sheet for more information.



**CONTRACT DRAWINGS**  
 CONTRACTOR MUST VERIFY ALL DIMENSIONS AND BE RESPONSIBLE FOR SAME. ANY DISCREPANCIES MUST BE REPORTED TO THE ENGINEER BEFORE COMMENCING WORK. DRAWINGS ARE NOT TO BE SCALED.  
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NO.	REVISIONS	DATE	INITIAL
1.	ISSUED FOR MOE ECA APPROVAL	KRS	MAR 12/12

APPROVED

**GREY COUNTY ROAD 21 TRUNK SANITARY SEWER TOWN OF THE BLUE MOUNTAINS**  
**SANITARY CONTRIBUTION AREA PLAN**

**C.C. Tatham & Associates Ltd.**  
 Consulting Engineers  
 Collingwood Bracebridge Orillia Barrie

SCALE: 1 : 15000      JOB NO.: 112008-1  
 DESIGN: JPA/PM      CHECKED: KRS  
 DRAWN: JPA      DATE: SEPT. 2011      DWG. **SAN-1**

# PHASE 5 - SANITARY SEWER DESIGN SHEET - FINAL DESIGN

Approved:


**FLOW CRITERIA**

 Average Flow Rate: 450 l/cap/d  
 Infiltration Rate: 0.23 l/s/ha  
 Population: 2.3 cap/unit  
 Peaking Factor: Harmon

 Project Name: Windfall - Phase 5  
 Project Number: 111179-16  
 Municipality: Town of The Blue Mountains  
 Designed By: VP  
 Date: June 18, 2020  
 Checked By: AS  
 Date:

LOCATION OF SECTION	AREA LABEL	UPSTREAM MAINTENANCE HOLE	DOWNSTREAM MAINTENANCE HOLE	POPULATION	ACCUMULATED POPULATION	PEAKING FACTOR	AREA	ACCUMULATED AREA	AVERAGE FLOW			PEAK FLOW			PROPOSED SEWER					
									RESIDENTIAL	INFILTRATION	TOTAL	RESIDENTIAL	INFILTRATION	TOTAL	LENGTH OF PIPE	PIPE DIAMETER	GRADE	FULL FLOW CAPACITY	FULL FLOW VELOCITY	PEAK FLOW VELOCITY (ZERO INFILTRATION)
									l/s	l/s	l/s	l/s	l/s	l/s	m	mm	%	l/s	m/s	m/s
Black Willow Street	100M	SAN MH 606	SAN MH 613	6.9	6.9	4.43	0.33	0.33	0.04	0.08	0.11	0.16	0.08	0.24	75.3	200	1.60%	41.48	1.32	0.34
Black Willow Street	100L	SAN MH 613	SAN MH 612	4.6	11.5	4.41	0.23	0.56	0.06	0.13	0.19	0.26	0.13	0.39	14.1	200	1.60%	41.48	1.32	0.39
Black Willow Street	100K	SAN MH 612	SAN MH 611	34.5	46.0	4.32	0.88	1.44	0.24	0.33	0.57	1.04	0.33	1.37	100.0	200	1.60%	41.48	1.32	0.56
Black Willow Street	100J	SAN MH 611	SAN MH 610	43.7	89.7	4.26	0.91	2.35	0.47	0.54	1.01	1.99	0.54	2.53	100.0	200	1.10%	34.40	1.09	0.58
Black Willow Street	100I	SAN MH 610	SAN MH 603	11.5	101.2	4.24	0.41	2.76	0.53	0.64	1.16	2.24	0.64	2.87	80.2	200	0.50%	23.19	0.74	0.45
Courtland Street	100H	SAN MH 506	SAN MH 607	13.8	13.8	4.40	0.46	0.46	0.07	0.11	0.18	0.32	0.11	0.42	42.2	200	2.00%	46.38	1.48	0.44
Courtland Street	100G	SAN MH 607	SAN MH 606	4.6	18.4	4.39	0.18	0.64	0.10	0.15	0.24	0.42	0.15	0.57	42.8	200	3.40%	60.47	1.92	0.58
Courtland Street	100F	SAN MH 606	SAN MH 605	29.9	48.3	4.32	0.84	1.48	0.25	0.34	0.59	1.09	0.34	1.43	100.0	200	3.30%	59.58	1.90	0.74
Courtland Street	100E	SAN MH 605	SAN MH 604	29.9	78.2	4.27	0.82	2.30	0.41	0.53	0.94	1.74	0.53	2.27	99.3	200	1.00%	32.80	1.04	0.54
Courtland Street	100D	SAN MH 604	SAN MH 603	6.9	85.1	4.26	0.22	2.52	0.44	0.58	1.02	1.89	0.58	2.47	33.6	200	1.00%	32.80	1.04	0.56
Courtland Street	100C	SAN MH 603	SAN MH 412	6.9	193.2	4.15	0.29	5.57	1.01	1.28	2.29	4.18	1.28	5.46	69.3	200	0.50%	23.19	0.74	0.53
Crosswinds Boulevard	100B	SAN MH 412	SAN MH 411	0.0	193.2	4.15	0.17	5.74	1.01	1.32	2.33	4.18	1.32	5.50	45.7	200	0.50%	23.19	0.74	0.53
Crosswinds Boulevard	100A	SAN MH 411	SAN MH 410	0.0	193.2	4.15	0.13	5.87	1.01	1.35	2.36	4.18	1.35	5.53	40.2	200	0.50%	23.19	0.74	0.53
Courtland Street	101Q	SAN MH 518	SAN MH 517	27.6	27.6	4.36	0.52	0.52	0.14	0.12	0.26	0.63	0.12	0.75	72.5	200	1.00%	32.80	1.04	0.41
Courtland Street	101P	SAN MH 517	SAN MH 516	20.7	48.3	4.32	0.60	1.12	0.25	0.26	0.51	1.09	0.26	1.34	89.3	200	1.70%	42.76	1.36	0.58
Courtland Street	101O	SAN MH 516	SAN MH 515	23.0	71.3	4.28	0.70	1.82	0.37	0.42	0.79	1.59	0.42	2.01	81.6	200	2.20%	48.64	1.55	0.71
Courtland Street	101N	SAN MH 515	SAN MH 514	6.9	78.2	4.27	0.21	2.03	0.41	0.47	0.87	1.74	0.47	2.21	31.5	200	2.20%	48.64	1.55	0.72
Courtland Street	101M	SAN MH 514	SAN MH 513	9.2	87.4	4.26	0.26	2.29	0.46	0.53	0.98	1.94	0.53	2.47	25.4	200	2.20%	48.64	1.55	0.75
Courtland Street	101L	SAN MH 513	SAN MH 512	4.6	92.0	4.25	0.16	2.45	0.48	0.56	1.04	2.04	0.56	2.60	13.7	200	2.60%	29.33	0.93	0.52
Courtland Street	101K	SAN MH 512	SAN MH 511	6.9	98.9	4.24	0.22	2.67	0.52	0.61	1.13	2.19	0.61	2.80	40.2	200	0.80%	29.33	0.93	0.53
Courtland Street	101J	SAN MH 511	SAN MH 510	6.9	105.8	4.24	0.22	2.89	0.55	0.66	1.22	2.33	0.66	3.00	24.4	200	0.50%	23.19	0.74	0.46
Courtland Street	101I	SAN MH 510	SAN MH 500	4.6	110.4	4.23	0.18	3.07	0.58	0.71	1.28	2.43	0.71	3.14	40.5	200	0.50%	23.19	0.74	0.46
Courtland Street	101H	SAN MH 518	SAN MH 504	9.2	9.2	4.42	0.14	0.14	0.05	0.03	0.08	0.21	0.03	0.24	23.9	200	2.00%	46.38	1.48	0.40
Courtland Street	101G	SAN MH 506	SAN MH 505	9.2	9.2	4.42	0.27	0.27	0.05	0.06	0.11	0.21	0.06	0.27	34.9	200	1.00%	32.80	1.04	0.31
Courtland Street	101F	SAN MH 505	SAN MH 504	6.9	16.1	4.39	0.14	0.41	0.08	0.09	0.18	0.37	0.09	0.46	20.9	200	1.00%	32.80	1.04	0.36
Sycamore Street	101E	SAN MH 504	SAN MH 503	13.8	39.1	4.34	0.26	0.8	0.20	0.19	0.39	0.88	0.19	1.07	57.1	200	2.20%	48.64	1.55	0.60
Sycamore Street	101D	SAN MH 503	SAN MH 502	55.2	94.3	4.25	0.81	1.64	0.49	0.38	0.87	2.09	0.38	2.46	97.1	200	2.20%	48.64	1.55	0.76
Sycamore Street	101C	SAN MH 502	SAN MH 501	64.4	158.7	4.18	0.88	2.52	0.83	0.58	1.41	3.46	0.58	4.04	97.9	200	1.60%	41.48	1.32	0.78
Sycamore Street	101B	SAN MH 501	SAN MH 500	20.7	179.4	4.16	0.31	2.83	0.93	0.65	1.59	3.69	0.65	4.54	45.1	200	1.60%	41.48	1.32	0.80
Sycamore street	101A	SAN MH 500	SAN MH 410	6.9	296.7	4.08	0.27	6.2	1.55	1.42	2.96	6.31	1.42	7.72	74.1	200	1.70%	42.76	1.36	0.93
Sugar Maple Street	102G	SAN MH 410	SAN MH 409	23.0	512.9	3.97	0.84	12.9	2.67	2.96	5.63	10.60	2.96	13.56	100.0	200	1.00%	32.80	1.04	0.88
Sugar Maple Street	102F	SAN MH 409	SAN MH 408	11.5	524.4	3.96	0.34	13.22	2.73	3.04	5.77	10.83	3.04	13.87	37.8	200	1.70%	42.76	1.36	1.08
Sugar Maple Street	102E	SAN MH 408	SAN MH 407	18.4	542.8	3.96	0.52	13.74	2.83	3.16	5.99	11.18	3.16	14.34	64.5	200	1.70%	42.76	1.36	1.09
Sugar Maple Street	102D	SAN MH 407	SAN MH 406	6.9	549.7	3.95	0.22	13.96	2.86	3.21	6.07	11.32	3.21	14.53	20.0	200	1.70%	42.76	1.36	1.09
Sugar Maple Street	102C	SAN MH 406	SAN MH 405	2.3	552.0	3.95	0.08	14.04	2.88	3.23	6.10	11.36	3.23	14.59	18.7	200	1.70%	42.76	1.36	1.09
Chestnut Street	102B	SAN MH 430	SAN MH 431	4.6	4.6	4.44	0.15	0.15	0.02	0.03	0.06	0.11	0.03	0.14	24.3	200	1.30%	37.39	1.19	0.28
Chestnut Street	102A	SAN MH 431	SAN MH 405	2.3	6.9	4.43	0.15	0.3	0.04	0.07	0.10	0.16	0.07	0.23	56.8	200	1.34%	37.96	1.21	0.32
Sugar Maple Street	103E	SAN MH 405	SAN MH 404	25.3	584.2	3.94	0.65	14.99	3.04	3.45	6.49	11.98	3.45	15.43	80.9	200	0.50%	23.19	0.74	0.71
Sugar Maple Street	103D	SAN MH 404	SAN MH 403	9.2	593.4	3.93	0.16	15.15	3.09	3.49	6.58	12.16	3.49	15.65	20.5	200	0.50%	23.19	0.74	0.71
Sugar Maple Street	103C	SAN MH 403	SAN MH 402	9.2	602.6	3.93	0.14	15.29	3.14	3.52	6.66	12.34	3.52	15.86	17.2	200	0.50%	23.19	0.74	0.72
Sugar Maple Street	103B	SAN MH 402	SAN MH 401	9.2	611.8	3.93	0.15	15.44	3.19	3.55	6.74	12.51	3.55	16.07	20.2	200	0.50%	23.19	0.74	0.72
Sugar Maple Street	103A	SAN MH 401	SAN MH 212	27.6	639.4	3.92	0.62	16.06	3.33	3.69	7.02	13.04	3.69	16.74	92.7	200	0.50%	23.19	0.74	0.73
Yellow Birch Crescent	108L	SAN MH211	SAN MH 211	9.2	9.2	4.42	0.28	0.28	0.05	0.06	0.11	0.21	0.06	0.28	37.2	200	1.10%	34.40	1.09	0.32
Yellow Birch Crescent	108K	SAN MH 221	SAN MH 220	4.6	13.8	4.40	0.15	0.43	0.07	0.10	0.17	0.32	0.10	0.42	32.0	200	1.10%	34.40	1.09	0.35
Yellow Birch Crescent	108J	SAN MH 220	SAN MH 219	6.9	20.7	4.38	0.23	0.66	0.11	0.15	0.26	0.47	0.15	0.62	27.1	200	1.10%	34.40	1.09	0.40
Yellow Birch Crescent	108I	SAN MH 219	SAN MH 218	20.7	41.4	4.33	0.58	1.24	0.22	0.29	0.50	0.93	0.29	1.22	63.4	200	1.10%	34.40	1.09	0.48
Yellow Birch Crescent	108H	SAN MH 218	SAN MH 217	11.5	52.9	4.31	0.22	1.46	0.28	0.34	0.61	1.19	0.34	1.52	22.2	200	1.10%	34.40	1.09	0.51
Yellow Birch Crescent	108G	SAN MH 217	SAN MH 216	36.8	89.7	4.26	0.76	2.22	0.47	0.51	0.98	1.99	0.51	2.50	96.4	200	2.70%	53.89	1.72	0.81
Yellow Birch Crescent	108F	SAN MH222	SAN MH 216	9.2	9.2	4.42	1.30	1.30	0.05	0.30	0.35	0.21	0.30	0.51	54.5	200	0.50%	23.19	0.74	0.24
Yellow Birch Crescent	108E	SAN MH 216	SAN MH 215	2.3	101.2	4.24	0.07	3.59	0.53	0.83	1.35	2.24	0.83	3.06	9.1	200	0.70%	27.44	0.87	0.51
Yellow Birch Crescent	108D	SAN MH 215	SAN MH 214	25.3	126.5	4.21	0.51	4.10	0.66	0.94	1.60	2.78	0.94	3.72	54.1	200	0.70%	27.44	0.87	0.54
Yellow Birch Crescent	108C	SAN MH 214	SAN MH 213	9.2	135.7	4.20	0.21	4.31	0.71	0.99	1.70	2.97	0.99	3.96	30.9	200	0.70%	27.44	0.87	0.55
Yellow Birch Crescent	108B	SAN MH 213	SAN MH 212	16.1	151.8	4.19	0.39	4.70	0.79	1.08	1.87</									

LOCATION OF SECTION	AREA LABEL	UPSTREAM MAINTENANCE HOLE	DOWNSTREAM MAINTENANCE HOLE	POPULATION	ACCUMULATED POPULATION	PEAKING FACTOR	AREA	ACCUMULATED AREA	AVERAGE FLOW			PEAK FLOW			LENGTH OF PIPE	PIPE DIAMETER	PROPOSED SEWER			
									RESIDENTIAL	INFILTRATION	TOTAL	RESIDENTIAL	INFILTRATION	TOTAL			GRADE	FULL FLOW CAPACITY	FULL FLOW VELOCITY	PEAK FLOW VELOCITY (ZERO INFILTRATION)
		MH No.	MH No.	cap.	cap.		ha	ha	l/s	l/s	l/s	l/s	l/s	l/s	m	mm	%	l/s	m/s	m/s
BLOCK 48	---	SAN MH 115	SAN MH 114	0.0	834.9	3.85	0.00	26.11	4.35	6.01	10.35	16.74	6.01	22.74	7.7	200	0.60%	25.40	0.81	0.81
White Oak Street	114E	SAN MH 313	SAN MH 312	4.6	4.6	4.44	0.20	0.20	0.02	0.05	0.07	0.11	0.05	0.15	19.9	200	1.25%	36.67	1.17	0.28
White Oak Street	114D	SAN MH 312	SAN MH 311	6.9	11.5	4.41	0.21	0.41	0.06	0.09	0.15	0.26	0.09	0.36	14.4	200	2.09%	47.41	1.51	0.43
White Oak Street	114C	SAN MH 311	SAN MH 310	6.9	18.4	4.39	0.23	0.64	0.10	0.15	0.24	0.42	0.15	0.57	26.9	200	2.53%	52.16	1.66	0.52
White Oak Street	114B	SAN MH 310	SAN MH 309	16.1	34.5	4.34	0.49	1.13	0.18	0.26	0.44	0.78	0.26	1.04	61.0	200	2.05%	46.96	1.49	0.57
White Oak Street	114A	SAN MH 309	SAN MH 114	4.6	39.1	4.34	0.19	1.31	0.20	0.30	0.50	0.88	0.30	1.19	42.1	200	3.52%	61.53	1.96	0.72
Red Pine Street	115H	SAN MH 308	SAN MH 307	9.2	9.2	4.42	0.38	0.38	0.05	0.09	0.14	0.21	0.09	0.30	30.9	200	2.04%	46.84	1.49	0.40
Red Pine Street	115G	SAN MH 307	SAN MH 306	6.9	16.1	4.39	0.24	0.62	0.08	0.14	0.23	0.37	0.14	0.51	19.8	200	2.94%	56.23	1.79	0.53
Red Pine Street	115F	SAN MH 306	SAN MH 305	20.7	36.8	4.34	0.61	1.23	0.19	0.28	0.47	0.83	0.28	1.11	76.1	200	2.50%	51.85	1.65	0.62
Red Pine Street	115E	SAN MH 305	SAN MH 304	18.4	55.2	4.31	0.26	1.49	0.29	0.34	0.63	1.24	0.34	1.58	26.8	200	1.45%	39.49	1.26	0.57
Red Pine Street	115D	SAN MH 304	SAN MH 303	13.8	69.0	4.28	0.21	1.70	0.36	0.39	0.75	1.54	0.39	1.93	25.2	200	0.63%	26.03	0.83	0.44
Red Pine Street	115C	SAN MH 303	SAN MH 302	27.6	96.6	4.25	0.42	2.12	0.50	0.49	0.99	2.14	0.49	2.62	59.2	200	0.84%	30.06	0.96	0.54
Red Pine Street	115B	SAN MH 302	SAN MH 301	13.8	110.4	4.23	0.26	2.38	0.58	0.55	1.12	2.43	0.55	2.98	29.2	200	0.64%	26.24	0.84	0.51
Red Pine Street	115A	SAN MH 301	SAN MH 114	4.6	115.0	4.23	0.19	2.57	0.60	0.59	1.19	2.53	0.59	3.12	40.6	200	2.88%	55.66	1.77	0.88
White Oak Street	116B	SAN MH 114	SAN MH 113	11.5	1000.5	3.80	0.34	30.33	5.21	6.98	12.19	19.80	6.98	26.78	45.6	250	0.66%	48.31	0.98	0.89
White Oak Street	116A	SAN MH 113	SAN MH 112	9.2	1009.7	3.80	0.29	30.62	5.26	7.04	12.30	19.97	7.04	27.01	41.9	250	0.60%	46.06	0.94	0.86
Sugar Maple Street	117C	SAN MH 112	SAN MH 111	2.3	1651.4	3.65	0.12	46.80	8.60	10.76	19.37	31.38	10.76	42.15	21.6	300	0.50%	68.37	0.97	0.90
Sugar Maple Street	117B	SAN MH 111	SAN MH 110	0.0	1651.4	3.65	0.04	46.84	8.60	10.77	19.37	31.38	10.77	42.16	15.3	300	0.50%	68.37	0.97	0.90
Sugar Maple Street	117A	SAN MH 110	SAN MH 109	2.3	1653.7	3.65	0.10	46.94	8.61	10.80	19.41	31.42	10.80	42.22	54.3	300	0.50%	68.37	0.97	0.90
Chestnut Street	118I	SAN MH 430	SAN MH 429	9.2	9.2	4.42	0.29	0.29	0.05	0.07	0.11	0.21	0.07	0.28	20.5	200	1.00%	32.80	1.04	0.31
Chestnut Street	118H	SAN MH 429	SAN MH 428	27.6	36.8	4.34	0.77	1.06	0.19	0.24	0.44	0.83	0.24	1.08	100.0	200	0.70%	27.44	0.87	0.39
Chestnut Street	118G	SAN MH 428	SAN MH 427	9.2	46.0	4.32	0.20	1.26	0.24	0.29	0.53	1.04	0.29	1.33	20.8	200	0.70%	27.44	0.87	0.41
Chestnut Street	118F	SAN MH 427	SAN MH 426	6.9	52.9	4.31	0.25	1.51	0.28	0.35	0.62	1.19	0.35	1.53	24.9	200	0.70%	27.44	0.87	0.43
Chestnut Street	118E	SAN MH 426	SAN MH 425	4.6	57.5	4.30	0.17	1.68	0.30	0.39	0.69	1.29	0.39	1.67	17.1	200	0.70%	27.44	0.87	0.44
Chestnut Street	118D	SAN MH 425	SAN MH 424	9.2	66.7	4.29	0.36	2.04	0.35	0.47	0.82	1.49	0.47	1.96	39.1	200	0.70%	27.44	0.87	0.46
Chestnut Street	118C	SAN MH 424	SAN MH 423	27.6	94.3	4.25	0.79	2.83	0.49	0.65	1.14	2.09	0.65	2.74	89.6	200	0.70%	27.44	0.87	0.50
Chestnut Street	118B	SAN MH 423	SAN MH 422	6.9	101.2	4.24	0.23	3.06	0.53	0.70	1.23	2.24	0.70	2.94	25.7	200	0.70%	27.44	0.87	0.51
Chestnut Street	118A	SAN MH 422	SAN MH 109	9.2	110.4	4.23	0.24	3.30	0.58	0.76	1.33	2.43	0.76	3.19	38.6	200	0.70%	27.44	0.87	0.52
6.0 m EASEMENT	119E	SAN MH 109	SAN MH 108	0.0	1764.1	3.63	0.03	50.27	9.19	11.56	20.75	33.33	11.56	44.89	38.3	300	0.50%	68.37	0.97	0.92
BLOCK 41	119D	SAN MH 108	SAN MH 105	0.0	1764.1	3.63	0.04	50.31	9.19	11.57	20.76	33.33	11.57	44.90	35.9	300	0.50%	68.37	0.97	0.92
BLOCK 57	119C	SAN MH 105	SAN MH 104	0.0	1764.1	3.63	0.07	50.38	9.19	11.59	20.78	33.33	11.59	44.92	71.4	300	0.50%	68.37	0.97	0.92
BLOCK 57	119B	SAN MH 104	SAN MH 103	0.0	1764.1	3.63	0.05	50.43	9.19	11.60	20.79	33.33	11.60	44.93	51.3	300	0.50%	68.37	0.97	0.92
BLOCK 57	119A	SAN MH 103	SAN MH 102	0.0	1764.1	3.63	0.06	50.49	9.19	11.61	20.80	33.33	11.61	44.94	57.5	300	0.50%	68.37	0.97	0.92
BLOCK 64	120B	SAN MH 102	SAN MH 101	529.0	2293.1	3.54	4.88	55.37	11.94	12.74	24.68	42.27	12.74	55.00	84.2	300	0.50%	68.37	0.97	0.97
BLOCK 64	120A	SAN MH 101	SAN MH E29	0.0	2293.1	3.54	0.08	55.45	11.94	12.75	24.70	42.27	12.75	55.02	83.9	300	0.50%	68.37	0.97	0.97

- Notes:
1. Refer to Phase 4 Sanitary Drainage Plan drawing SAN-1 prepared by Tatham for catchment areas and pipe details. Excludes increased density for redline revision.
  2. Refer to Master Servicing Sanitary Drainage Plan (111179-2, sheet SAN-1) for additional information.
  3. An allowance of 4 equivalent residential units has been provided for the Amenity Building located in Block B (Neighborhood Park)
  4. Existing sanitary pipe cells are in grey, proposed sanitary pipe cells are yellow and future sanitary pipe cells are white.



**C.C. Tatham & Associates Ltd.**  
Consulting Engineers

Collingwood      Bracebridge      Orillia      Barrie

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March 13, 2012

COPY

via e-mail & mail  
CCTA File 112008

**Reg Russwurm**

Director of Engineering and Public Works  
Town of The Blue Mountains  
32 Mill Street  
P.O. Box 310  
Thornbury, ON N0H 2P0

**Re: Grey County Road 21 Trunk Sanitary Sewer  
Outlet Capacity**

Dear Reg:

**1.0 Introduction**

Further to the Project Initiation Meeting on February 24, 2012, we have prepared the following technical summary in support of the Grey County Road 21 (GR 21) Trunk Sanitary Sewer project.

The primary purpose of this summary is to provide background for the areas included on the sanitary sewer design sheet and to assess the capacity of the downstream sanitary sewer along Highway 26 in order to determine the approximate number of additional units from the Windfall and surrounding properties that can be accommodated before the trunk sanitary sewer north of Highway 26 and the lift station at the sewage treatment plant are required.

We have also provided an overview to address the Town's comments with respect to the depth of the trunk sewer and the ability to extend the sewer to service the future developments south of the Mountain Road.

**2.0 Unit Allocation**

In order to estimate the sanitary sewage flows for the service areas contributing to the GR 21 trunk sewer, various municipal documents were reviewed. The following list summarizes the sources for the service areas shown on the overall Sanitary Contribution Area Plan (SAN-1):

Castle Glen: Development Plan and Combined EA Master Servicing Plan (June 2006)

Osler Lands: Combined EA Master Servicing Report

Deferred Development (1 & 2): Official Plan – DD designation – Assumed 75% of area would be developed (excluding EP & slope lands) at a rate of 5 units/ha.

Town of Collingwood: Town request to service only lands fronting on the Town line (GR's 19 & 21)

Medium Density adjacent to Price Subdivision: Official Plan

Price Subdivision: Actual lot count

Georgian Gate (Windfall): Initial Plan of Subdivision (Draft Plan and future medium density)

Le Scandinave Spa: Building Code

Nederend Property: Assumption similar to adjacent lands

Plateau East (Intrawest): Draft Plan

RR-50: Assumption based on comparison to Plateau East

Monterra Phase 2: Draft Plan

The total unit count of 4,622 shown on Drawing SAN-1 was used to develop the overall sanitary sewer design sheet for GC 21.

### **3.0 Temporary System Capacity**

The "short term sewage servicing alternative – 4 'B'" as described in Section 8.2.2 of the Combined EA Master Plan for Craighleith, Castle Glen and Osler (June 2006), relies on the existing 300 mm diameter sanitary sewer between GR 21 and Timmins Road to provide the initial capacity until such time as the section of trunk sewer north of Highway 26 and the lift station at the plant are required.

We have reviewed the record drawings provided by the Town for the existing 300 mm diameter sanitary sewer between GR 21 and Timmins Road. The 300 mm dia. sewer east of Timmins Road between San MH 56 to San MH 66 has been installed at an average slope of 0.22% for the first 863 m. Although the drawings show some sewer sections at flatter slopes we believe it is reasonable to use the average slope in this section to calculate the available capacity. The sewer increases in slope east of San MH 66, to approximately 0.5%, to San MH 69 where the GR 21 sewer will connect. The capacity of a 300 mm diameter sewer at 0.22% is calculated to be 45.35 L/s for a pipe coefficient  $n=0.013$ . Although 0.013 is a generally accepted coefficient for sanitary sewers, the literature suggests that a coefficient of 0.011 to 0.009 is appropriate for PVC pipe. Applying these would produce a capacity for this pipe in the range of 54 L/s to 66 L/s.

There are currently approximately 38 parcels of land connected on the south side of Highway 26 and 7 on the north for a total of 45 parcels. Included in these 45 parcels is a motel converted to a condominium, plus 2 motels and two other commercial operations. Conservatively, we estimate a total of 75 equivalent units are currently or could be directly connected to the existing 300 mm diameter sanitary sewer between GR 21 and the Timmins Road sewer (750 dia. trunk).

### 3.1 Estimated Flow Per Unit

In order to estimate future overall sanitary sewage generation rates, MOE design guidelines as presented on page 12 of the Class Environmental Assessment for the Craigleith Sewage Treatment Plant Stage 3 Expansion (2009) were considered. The assessment uses an average flow rate of 1,125 L/unit/day (450 L/cap/day X 2.5 cap/unit) plus 225 L/unit/day for infiltration or a total of 1,350 L/unit/day. Considering the peak season average flows presented in Table 3 on page 7 of the assessment which shows the average daily flow of 890 L/unit/day, the above noted design criteria of 1,350 L/unit/day could be reduced by .34%.

In order to estimate the peak flow per unit we have considered the flows calculated using the Windfall Sanitary Sewer Design Sheets which was based on the Town of the Blue Mountains Engineering Standards. The Town standards apply an average flow rate of 1,035 L/unit/day (450 L/cap/day X 2.3 cap/unit) plus 0.23 L/s/ha for infiltration. The service area contributing to the 300 mm diameter sewer connecting Windfall to GR 21 at MH E29 includes a total of 1,071 equivalent units for a total population of 2,463 with a calculated peak flow of 57.95 L/s or 0.054 L/unit/s. A copy of the Windfall Sanitary Sewer Design Sheet is attached.

The overall trunk sewer design sheet uses similar per capita flows based on MOE design guidelines presented on page 12 of the Class Environmental Assessment for the Craigleith Sewage Treatment Plant Stage III Expansion (2009) (excluding the Windfall connection) of 1,125 L/unit/day (450 L/capita/day x 2.5 capita/unit) and peak infiltration of 227 L/capita/d. The resulting peak flow for 4,622 equivalent units was thus calculated to be 267.44 L/s or 0.058 L/unit/s. A copy of the GC 21 Trunk Sanitary Sewer Design Sheet is enclosed.

### 3.2 Available Capacity

By comparing the design flows to the historical flow data at the plant, it is reasonable to assume that the range of peak flows to use to establish the available capacity is in the range of 0.054 L/unit/s to 66% of design flow or 0.036 L/unit/s.

Assuming the overall capacity of the existing 300 mm dia. sewer on Highway 26 is 45.35 L/s, the capacity in terms of units would range from 840 to 1,260 units.

Considering the existing Highway 26 frontage already conveys sewage flows from approximately 75 equivalent units, the capacity in terms of units available for the GR 21 trunk sewer would be in the range of 765 to 1,185.

Assuming a growth rate of 60 units per year, the extension of the larger sewer will not be required for at least 12 years and likely over 20 years depending on the per capita flow being generated and the rate of development.

### 3.3 Monitoring

In light of all the variables involved in these calculations (occupancy rate, per capita flows, peaking factors, and sewer design coefficient) we recommend that a sewer flow monitoring program be established to check flows during the peak winter period starting in approximately 5 years and then repeating every 3 to 5 years depending on the results. By monitoring the actual flow to calculate the sewer capacity combined with knowing the actual number of connections, the Town can determine well in advance when the trunk sewer extension and lift station will be required.

### 4.0 **Future Developments South of Windfall Development**

In addition to the plan-profile drawings included with the submission, we have included drawing PP-10 which shows a future trunk sanitary sewer adjacent to the Windfall development from San MH E29 to San MH 32 at the intersection of GR 21 to GR 19 (Mountain Road). The future sanitary sewer at San MH E32 has the potential to be over 6 m in depth.

The road continues to rise to the south at an average grade of approximately 0.66% to the 6<sup>th</sup> Street intersection after which the grade increases. We also considered the need to cross under a significant culvert located approximately 1,200 m south of Mountain Road and determined that the proposed pipe and grade are appropriate. A more detailed assessment can be made at the time the sewer is extended, but at this time the design is considered conservative. We have included copies of the plan and profile sheets that were prepared in 1989 which have been marked up to demonstrate the grades shown on the sewer design sheet.

We trust you will find the above satisfactory. Should you require more detailed calculations please let us know.

Yours truly,

C.C. Tatham & Associates Ltd.

**Original Signed by**

Larry Hogarth, C.E.T.  
Senior Municipal Technologist

**Original Signed by**

Kevin Sansom, B.A.Sc., P.Eng.  
Project Manager

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# GREY COUNTY ROAD 21 - TRUNK SANITARY SEWER DESIGN SHEET

**FLOW CRITERIA (See Note 1)**  
 Average Flow Rate: 1125 l/unit/d  
 Infiltration (Avg): 90 l/cap/d  
 Infiltration (Peak): 227 l/cap/d  
 Population: 2.5 cap/unit  
 Peaking Factor: Hamon

**Project Name:** TRUNK SANITARY SEWER  
**Project Number:** August 31, 2006  
**Municipality:** Town of The Blue Mountains  
**Designed By:** JPA / PM  
**Date:** September 22, 2011  
**Checked By:** KRS  
**Date:** February 3, 2012  
**Revision Number:** 1

**C.C. Tatham & Associates Ltd.**  
 Consulting Engineers  
 Collingwood Bracebridge Orillia Barrie



Approved:



LOCATION OF SECTION	AREA LABEL	UPSTREAM MAINTENANCE HOLE	DOWNSTREAM MAINTENANCE HOLE	NUMBER OF LOTS/UNITS	ACCUMULATED NUMBER OF LOTS/UNITS	POPULATION	ACCUMULATED POPULATION	PEAKING FACTOR	AVERAGE FLOW			PEAK FLOW			PROPOSED SEWER		
									RESIDENTIAL	INFILTRATION	TOTAL	RESIDENTIAL	INFILTRATION	TOTAL	LENGTH OF PIPE	PIPE DIAMETER	GRADE
		MH No.	MH No.	units	units	cap.			l/s	l/s	l/s	m	mm	%	l/s	m/s	m/s
CASTLE GLEN									27.59	5.52	33.11		375	0.50%	123.97	1.12	1.12
GREY ROAD 19		F18	F18	2119	2119	5297.5	5297.5	3.22	27.59	5.52	33.11	2970.0	375	4.30%	363.54	3.29	2.59
OSLER PROPERTIES									4.67	0.93	5.61		200	0.50%	23.19	0.74	0.74
GREY ROAD 19		F17	F17	359	359	897.5	897.5	3.83	4.67	0.93	5.61		200	0.50%	23.19	0.74	0.74
GREY ROAD 19		F16	F16	0	359	0	897.5	3.83	4.67	0.93	5.61	360.0	200	1.60%	41.48	1.32	1.21
GREY ROAD 19		F15	F15	0	2478	0	6195.0	3.16	32.27	6.45	38.72	1260.0	375	1.60%	221.76	2.01	1.87
DD1, TOC									3.49	0.70	4.19		200	0.50%	23.19	0.74	0.74
GREY ROAD 19		F15	F15	0	2746	0	6885.0	3.11	35.76	7.15	42.91	610.0	375	0.75%	151.83	1.37	1.37
DD2									6.20	1.24	7.44		250	0.50%	42.05	0.86	0.84
GREY ROAD 19		F14	F14	0	3222	0	8055.0	3.05	41.95	8.39	50.34	1240.0	375	0.75%	151.83	1.37	1.37
GREY ROAD 21		E32	E29	0	3222	0	8055.0	3.05	41.95	8.39	50.34	300.0	375	1.20%	192.05	1.74	1.74
MDR 33, PRICE, WINDFALL									(See Note 2)		25.70		300	0.50%	68.37	0.97	0.90
GREY ROAD 21		E29	E28	1071	1071	2677.5	2677.5	2.82	55.90	11.18	67.08		450	0.80%	254.99	1.60	1.60
GREY ROAD 21		E28	E27	0	4283	0	10732.5	2.92	55.90	11.18	67.08	94.2	450	0.80%	254.99	1.60	1.60
GREY ROAD 21		E27	E26	0	4283	0	10732.5	2.92	55.90	11.18	67.08	90.0	450	0.80%	254.99	1.60	1.60
GREY ROAD 21		E26	E25	0	4283	0	10732.5	2.92	55.90	11.18	67.08	85.0	450	1.10%	299.00	1.88	1.84
LE SCANDINAVE SPA									(See Note 3)		5.08		150	1.00%	15.23	0.65	0.60
GREY ROAD 21		E26	E25	15	15	37.5	37.5	4.00	2.34	0.47	2.81	470.0	150	1.00%	15.23	0.65	0.60
GREY ROAD 21		E25	E24	0	4308	0	10770.0	2.92	56.09	11.22	68.09	95.0	450	0.90%	270.46	1.70	1.70
GREY ROAD 21		E24	E23	0	4308	0	10770.0	2.92	56.09	11.22	68.09	100.0	450	0.90%	270.46	1.70	1.70
GREY ROAD 21		E23	E22	0	4308	0	10770.0	2.92	56.09	11.22	68.09	100.0	450	2.50%	450.76	2.83	2.48
NEDERAN									2.34	0.47	2.81		200	0.50%	23.19	0.74	0.66
GREY ROAD 21		E23	E22	0	4488	0	11220.0	2.90	58.44	11.69	70.13	95.0	450	2.40%	441.65	2.78	2.47
PLATEAU EAST									0.49	0.10	0.59		200	0.50%	23.19	0.74	0.44
GREY ROAD 21		E22	E21	38	38	95.0	95.0	4.25	0.49	0.10	0.59	2.35	200	0.50%	23.19	0.74	0.44
GREY ROAD 21		E21	E20	0	4526	0	11315.0	2.90	58.53	11.79	70.32	95.0	450	2.80%	477.04	3.00	2.61
GREY ROAD 21		E20	E19	0	4526	0	11315.0	2.90	58.53	11.79	70.32	100.0	450	4.20%	584.25	3.67	3.03
GREY ROAD 21 * TOC		E19	E18	20	4546	50.0	11365.0	2.90	59.19	11.84	71.93	100.0	450	3.20%	509.98	3.21	2.75
GREY ROAD 21		E18	E17	0	4546	0	11365.0	2.90	59.19	11.84	71.93	100.0	450	1.00%	265.09	1.79	1.79
RR50 (AREA 1)									0.47	0.09	0.56		200	0.50%	23.19	0.74	0.44

LOCATION OF SECTION	AREA LABEL	UPSTREAM MAINTENANCE HOLE	DOWNSTREAM MAINTENANCE HOLE	NUMBER OF LOTS/UNITS	ACCUMULATED NUMBER OF LOTS/UNITS	POPULATION	ACCUMULATED POPULATION	PEAKING FACTOR	AVERAGE FLOW			PEAK FLOW			PROPOSED SEWER				
									RESIDENTIAL	INFILTRATION	TOTAL	RESIDENTIAL	INFILTRATION	TOTAL	LENGTH OF PIPE	PIPE DIAMETER	GRADE	FULL FLOW CAPACITY	FULL FLOW VELOCITY
		MH No.	MH No.	units	units	cap.			l/s	l/s	l/s	l/s	l/s	l/s	mm	%	l/s	m/s	m/s
GREY ROAD 21		E18	E17	0	0	0	11455.0	2.90	59.86	11.93	102.37	172.77	30.10	265.90	450	1.00%	285.09	1.78	1.78
GREY ROAD 21		E17	E16	0	0	0	11455.0	2.90	59.86	11.93	102.37	172.77	30.10	265.90	450	1.00%	285.09	1.79	1.79
MONTEIRA PHASE II			E13	40	40	100.0	100.0	4.24	0.52	0.10	0.63	2.21	0.26	2.47	200	0.50%	23.19	0.74	
GREY ROAD 21		E16	E15	0	0	0	11555.0	2.89	60.18	12.04	103.00	174.05	30.36	267.44	525	0.40%	271.98	1.26	1.26
GREY ROAD 21		E15	E14	0	0	0	11555.0	2.89	60.18	12.04	103.00	174.05	30.36	267.44	525	0.40%	271.98	1.26	1.26
GREY ROAD 21		E14	E13	0	0	0	11555.0	2.89	60.18	12.04	103.00	174.05	30.36	267.44	525	0.40%	271.98	1.26	1.26
GREY ROAD 21		E13	E12	0	0	0	11555.0	2.89	60.18	12.04	103.00	174.05	30.36	267.44	525	0.40%	271.98	1.26	1.26
GREY ROAD 21		E12	E11	0	0	0	11555.0	2.89	60.18	12.04	103.00	174.05	30.36	267.44	525	0.40%	271.98	1.26	1.26
GREY ROAD 21		E11	E10	0	0	0	11555.0	2.89	60.18	12.04	103.00	174.05	30.36	267.44	525	0.40%	271.98	1.26	1.26
GREY ROAD 21		E10	E9	0	0	0	11555.0	2.89	60.18	12.04	103.00	174.05	30.36	267.44	525	0.40%	271.98	1.26	1.26
GREY ROAD 21		E9	E8	0	0	0	11555.0	2.89	60.18	12.04	103.00	174.05	30.36	267.44	525	0.40%	271.98	1.26	1.26
GREY ROAD 21		E8	E7	0	0	0	11555.0	2.89	60.18	12.04	103.00	174.05	30.36	267.44	525	0.40%	271.98	1.26	1.26
GREY ROAD 21		E7	E6	0	0	0	11555.0	2.89	60.18	12.04	103.00	174.05	30.36	267.44	525	0.40%	271.98	1.26	1.26
GREY ROAD 21		E6	E5	0	0	0	11555.0	2.89	60.18	12.04	103.00	174.05	30.36	267.44	525	0.40%	271.98	1.26	1.26
GREY ROAD 21		E5	E4	0	0	0	11555.0	2.89	60.18	12.04	103.00	174.05	30.36	267.44	525	0.40%	271.98	1.26	1.26
GREY ROAD 21		E4	E3	0	0	0	11555.0	2.89	60.18	12.04	103.00	174.05	30.36	267.44	525	0.40%	271.98	1.26	1.26
HIGHWAY 26		E3	E2	0	0	0	11555.0	2.89	60.18	12.04	103.00	174.05	30.36	267.44	300	0.40%	61.15	0.87	0.87
HIGHWAY 26		E2	E1	0	0	0	11555.0	2.89	60.18	12.04	103.00	174.05	30.36	267.44	300	0.40%	61.15	0.87	0.87
HIGHWAY 26		E1	EX SAN MH	0	0	0	11555.0	2.89	60.18	12.04	103.00	174.05	30.36	267.44	300	0.22%	45.35	0.64	0.64

**NOTES:**

- Flow criteria based on the MOE Design Guidelines included in the Class EA for Craigleith Sewerage Treatment Plant Expansion Environmental Study Report (Nov. 2009)
- Flow calculated for MDR 35, Price and Windfall based on Windfall Master Servicing Sanitary Sewer Design Sheet and Town criteria for residential and exurban flows.
- Total peak flow generated by Le Scandinavia Spa based on Part 7 of the Ontario Building Code. The calculated peak flow is used as an average flow to be conservative. See attached summary and design sheet for more information.

# MASTER SERVICING - SANITARY SEWER DESIGN SHEET

Approved:



**C.C. Tatham & Associates Ltd.**  
Consulting Engineers

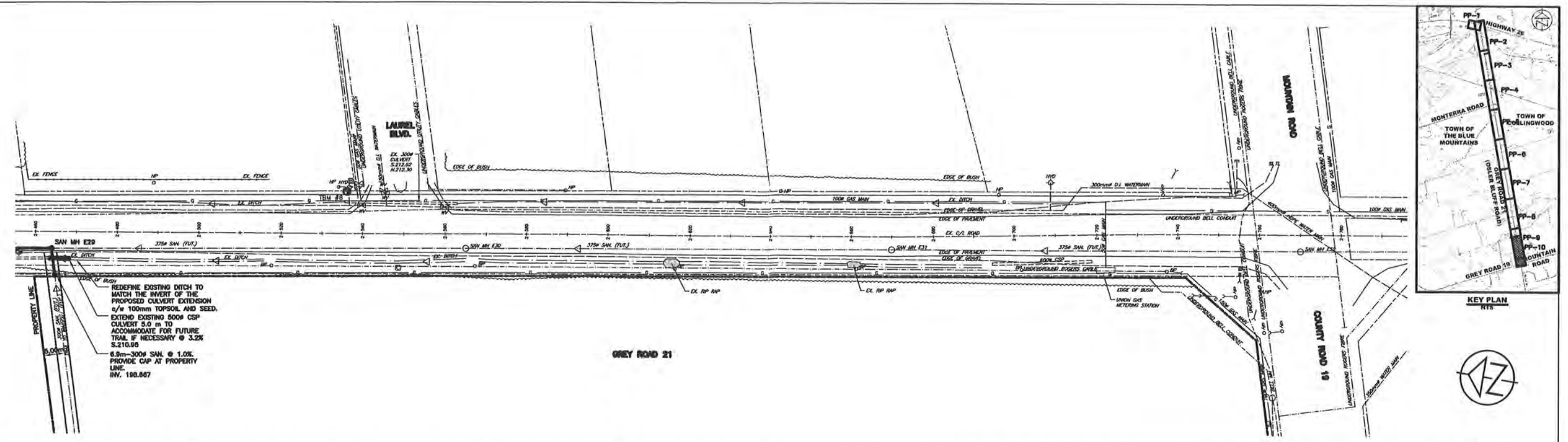
Collingwood      Bracebridge      Orillia      Barrie

**FLOW CRITERIA**  
Average Flow Rate: 450 l/cap/d  
Infiltration Rate: 0.23 l/s/ha  
Population: 2.3 cap/unit  
Peaking Factor: Harmon

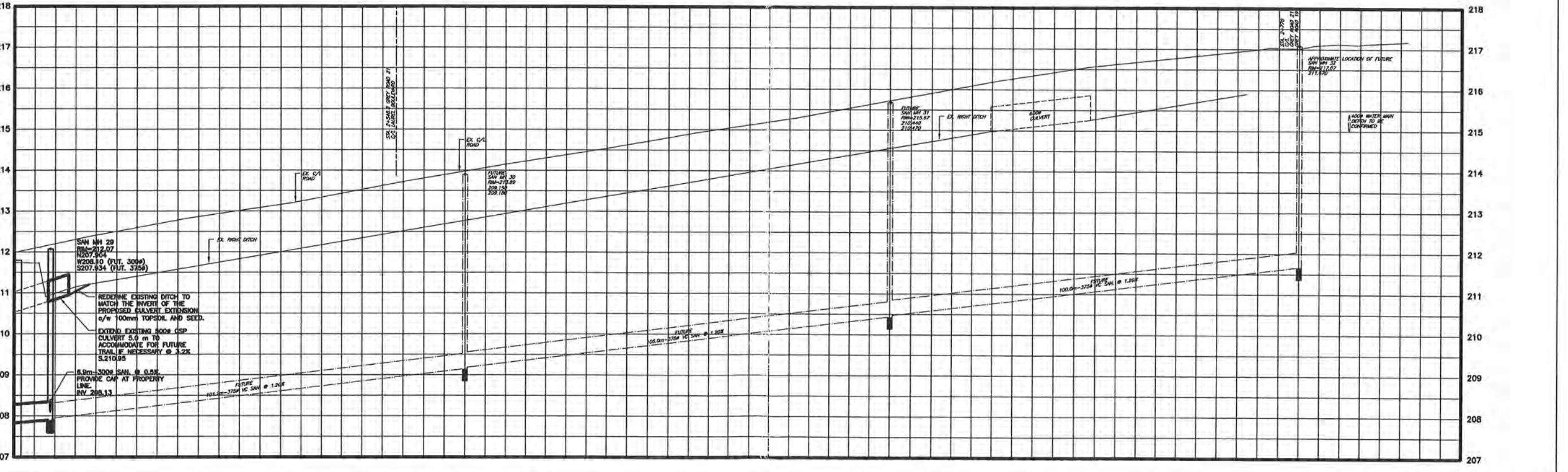
Project Name: Windfall - Master Servicing  
Project Number: 111179-2  
Municipality: Town of The Blue Mountains  
Designed By: JPA  
Date: September 8, 2011  
Checked By: PM  
Date: January 6, 2012  
Revision Number: ORIGINAL

LOCATION OF SECTION	AREA LABEL	UPSTREAM MAINTENANCE HOLE	DOWNSTREAM MAINTENANCE HOLE	POPULATION	ACCUMULATED POPULATION	PEAKING FACTOR	AREA	ACCUMULATED AREA	AVERAGE FLOW		PEAK FLOW		PROPOSED SEWER					
									RESIDENTIAL	INFILTRATION	TOTAL	RESIDENTIAL	INFILTRATION	TOTAL	LENGTH OF PIPE	PIPE DIAMETER	GRADE	FULL FLOW CAPACITY
		MH No.	MH No.	cap.	cap.		ha	ha	l/s	l/s	l/s	l/s	m	mm	%	l/s	m/s	m/s
STREET 'D' and 'F'	100	SAN MH 508	SAN MH 408	232.3	232.3	4.12	6.22	6.22	1.43	1.43	2.64	4.99	478	200	1.40%	38.80	1.24	0.82
STREET 'D' and 'E'	101	SAN MH 415	SAN MH 408	296.7	296.7	4.08	6.16	6.16	1.42	1.42	2.96	6.31	484	200	1.10%	34.40	1.09	0.80
STREET 'G'	102	SAN MH 408	SAN MH 404	71.3	600.3	3.93	2.39	14.77	3.40	3.40	6.52	12.28	245	200	1.70%	42.76	1.36	1.12
STREET 'G'	103	SAN MH 404	SAN MH 112	80.5	690.8	3.90	1.72	16.49	3.79	7.34	13.83	3.79	229	200	0.50%	23.19	0.74	0.74
VARIOUS EX STREETS	104/105	SAN MH F13	SAN MH 208	363.4	363.4	4.04	13.36	13.36	3.07	3.07	4.97	7.65	658	200	0.70%	27.44	0.87	0.71
STREET 'C'	106	SAN MH 211	SAN MH 206	103.5	103.5	4.24	1.97	1.97	0.54	0.45	0.99	2.29	238	200	1.00%	32.80	1.04	0.68
STREET 'C'	107	SAN MH 206	SAN MH 122	117.3	584.2	3.94	2.48	17.81	4.10	7.14	11.98	4.10	299	200	1.00%	32.80	1.04	0.91
STREET 'C'	108	SAN MH 211	SAN MH 122	133.4	133.4	4.21	5.01	5.01	0.89	1.85	2.92	2.92	458	200	1.00%	32.80	1.04	0.62
STREET 'B'	109	SAN MH 122	SAN MH 120	6.9	724.5	3.89	0.46	23.28	3.77	5.35	9.13	14.66	141	200	2.60%	52.88	1.68	1.37
STREET 'B'	110	SAN MH 124	SAN MH 120	23.0	23.0	4.37	0.75	0.75	0.12	0.17	0.29	0.52	108	200	1.00%	32.80	1.04	0.39
STREET 'B'	111	SAN MH 120	SAN MH 118	18.4	765.9	3.87	0.60	24.63	3.99	5.66	9.65	15.44	72	200	2.00%	46.38	1.48	1.26
STREET 'B'	112	SAN MH 124	SAN MH 118	36.8	36.8	4.34	1.33	1.33	0.19	0.31	0.50	0.83	217	200	0.50%	23.19	0.74	0.35
Neighbourhood Park	113	SAN MH 118	SAN MH 115	0.0	802.7	3.86	0.13	26.09	4.18	6.00	10.18	16.14	141	200	0.50%	23.19	0.74	0.74
STREET 'I'	114	SAN MH 312	SAN MH 115	39.1	39.1	4.34	1.32	1.32	0.20	0.30	0.51	0.88	194	200	2.00%	46.38	1.48	0.58
		SAN MH 115	SAN MH 114	0.0	841.8	3.85	0.00	27.41	4.38	6.30	10.69	16.87	5	200	0.60%	25.40	0.81	0.81
STREET 'H'	115	SAN MH 308	SAN MH 114	119.6	119.6	4.22	2.57	2.57	0.62	0.59	1.21	2.63	305	200	1.70%	42.76	1.36	0.74
STREET 'I'	116	SAN MH 114	SAN MH 112	20.7	982.1	3.81	0.63	30.61	5.12	7.04	12.16	19.46	88	250	0.80%	46.06	0.94	0.66
STREET 'G'	117	SAN MH 112	SAN MH 109	2.3	1665.2	3.65	0.38	47.48	8.67	10.92	19.59	31.62	99	300	0.50%	66.37	0.97	0.90
STREET 'G'	118	SAN MH 607	SAN MH 109	108.1	108.1	4.23	3.28	3.28	0.56	0.75	1.32	2.38	379	200	0.70%	27.44	0.87	0.52
BLOCK S	119	SAN MH 108	SAN MH 102	0.0	1773.3	3.63	0.24	51.00	9.24	11.73	20.97	33.49	264	300	0.80%	86.48	1.22	1.09
6.0 m BLOCK (Sanitary Sewer)	120	SAN MH 102	SAN MH E29	690.0	2463.3	3.51	4.96	55.96	12.87	12.87	25.70	45.08	168	300	0.50%	66.37	0.97	0.97

Notes:  
1. Refer to Master Servicing Sanitary Drainage Plan drawing SAN-1 prepared by C.C. Tatham and Associates for catchment areas.



REDEFINE EXISTING DITCH TO MATCH THE INVERT OF THE PROPOSED CULVERT EXTENSION c/w 100mm TOPSOIL AND SEED.  
 EXTEND EXISTING 500# CSP CULVERT 5.0 m TO ACCOMMODATE FOR FUTURE TRAIL IF NECESSARY @ 3.2% S.210.95  
 0.5m-300# SAN @ 1.0% PROVIDE CAP AT PROPERTY LINE. INV. 190.667



REDEFINE EXISTING DITCH TO MATCH THE INVERT OF THE PROPOSED CULVERT EXTENSION c/w 100mm TOPSOIL AND SEED.  
 EXTEND EXISTING 300# CSP CULVERT 5.0 m TO ACCOMMODATE FOR FUTURE TRAIL IF NECESSARY @ 3.2% S.210.95  
 0.5m-300# SAN @ 0.5% PROVIDE CAP AT PROPERTY LINE. INV. 208.13

CHANGE	EXISTING C/L ELEV	PROPOSED C/L ELEV
2+460	212.09	212.09
2+480	212.50	212.50
2+500	212.86	212.86
2+520	213.16	213.16
2+540	213.53	213.53
2+560	213.89	213.89
2+580	214.22	214.22
2+600	214.53	214.53
2+620	214.89	214.89
2+640	215.19	215.19
2+660	215.54	215.54
2+680	215.90	215.90
2+700	216.26	216.26
2+720	216.57	216.57
2+740	216.78	216.78
2+760	216.99	216.99
2+780	217.12	217.12
2+787	217.17	217.17

**CONTRACT DRAWINGS**  
 CONTRACTOR MUST VERIFY ALL DIMENSIONS AND BE RESPONSIBLE FOR SAME. ANY DISCREPANCIES MUST BE REPORTED TO THE ENGINEER BEFORE COMMENCING WORK. DRAWINGS ARE NOT TO BE SCALED.  
 C.C. TATHAM & ASSOCIATES LTD. CLAIMS COPYRIGHT TO THIS DOCUMENT WHICH MAY NOT BE USED FOR ANY PURPOSE OTHER THAN THAT PROVIDED IN THE CONTRACT BETWEEN THE OWNER/CLIENT AND THE ENGINEER WITHOUT THE EXPRESS CONSENT OF C.C. TATHAM & ASSOCIATES LTD.

NO.	REVISIONS	DATE	INITIALS
1.	ISSUED FOR MOE ECA APPROVAL	KRS	MAR 12/12

APPROVED  
**INFORMATION ONLY**

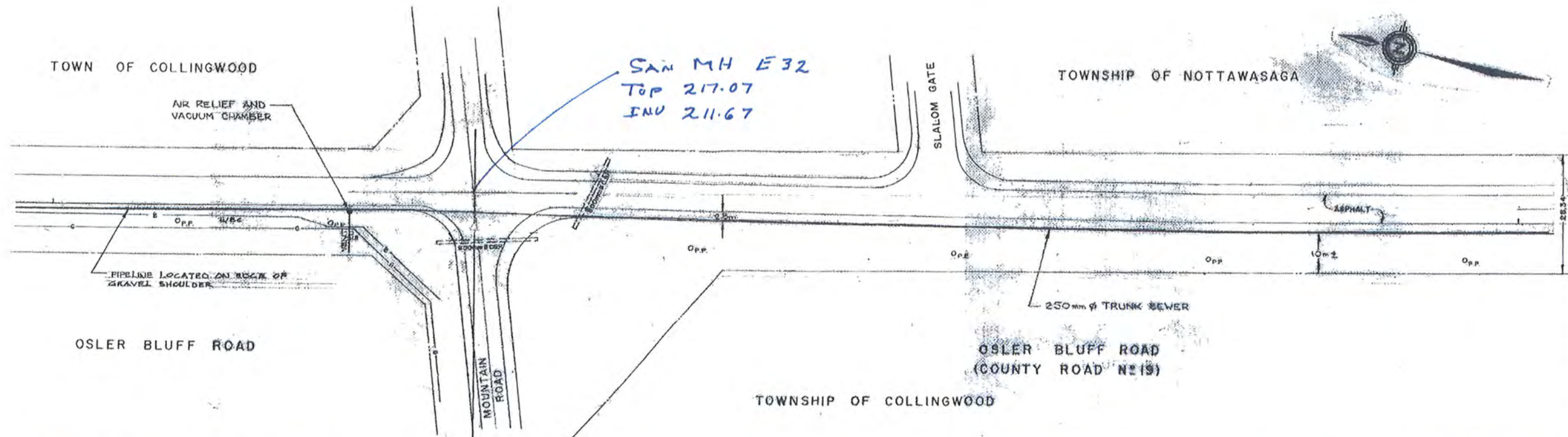
**GREY COUNTY ROAD 21  
 TRUNK SANITARY SEWER  
 TOWN OF THE BLUE MOUNTAINS  
 PLAN AND PROFILE  
 OSLER BLUFF ROAD  
 STA. 2+700 TO 2+800**

**C.C. Tatham & Associates Ltd.**  
 Consulting Engineers  
 Collingwood Braemar Orillia Barrie

SCALE: 1 : 500 HORIZ., 1 : 50 VERT. JOB NO. 112008-1  
 DESIGN: PM CHECKED: KRS DWG. PP-10  
 DRAWN: PM DATE: FEB 2012

TOWN OF COLLINGWOOD

TOWNSHIP OF NOTTAWASAGA

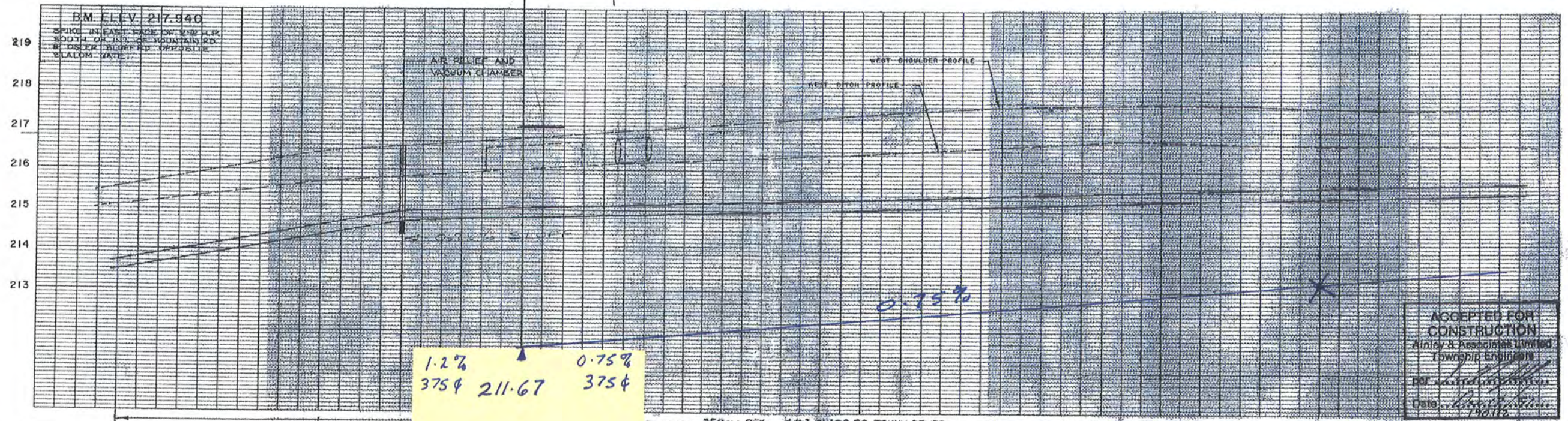


SAN MH E32  
TOP 217.07  
INV 211.67

OSLER BLUFF ROAD

OSLER BLUFF ROAD  
(COUNTY ROAD NO. 19)

TOWNSHIP OF COLLINGWOOD



ACCEPTED FOR  
CONSTRUCTION  
Ainley & Associates Limited  
Township Engineer  
Date: 14/11/20

CHANGING ELEVAT. W. SHEL	PROPTS INVERT	STATIONING	ELEVATION
50	215.55	213.50	
3+200	216.45	214.36	
3+220		214.70	
3+25			
3+300	217.17	214.92	
50	217.51	215.06	
3+400	217.73	215.20	
50	217.61	215.34	
3+500	217.58	215.48	

1.2%  
375¢ 211.67

0.75%  
375¢

E32

Notes:

NO.	REVISIONS	DATE	INITIAL
1	RESUBMIT ROAD SURFACE	22/7/21	J.M.



CASTLE BLUFF DEVELOPMENTS  
TOWNSHIP OF COLLINGWOOD

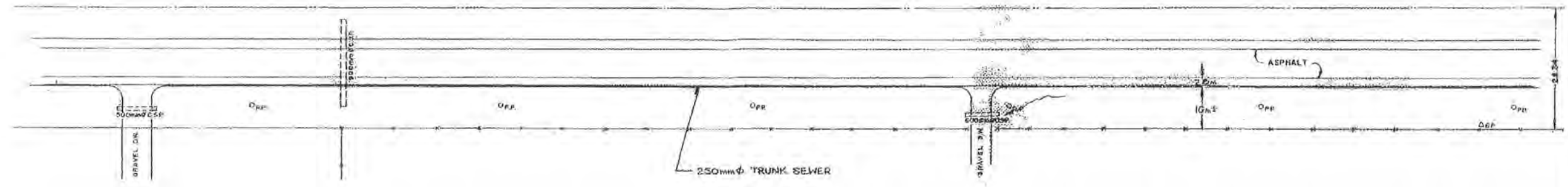
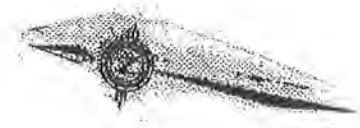
TRUNK SEWER  
OSLER BLUFF ROAD  
STN. 3+150 TO 3+500

C.C. TATUM & ASSOCIATES LTD.  
Consulting Engineers

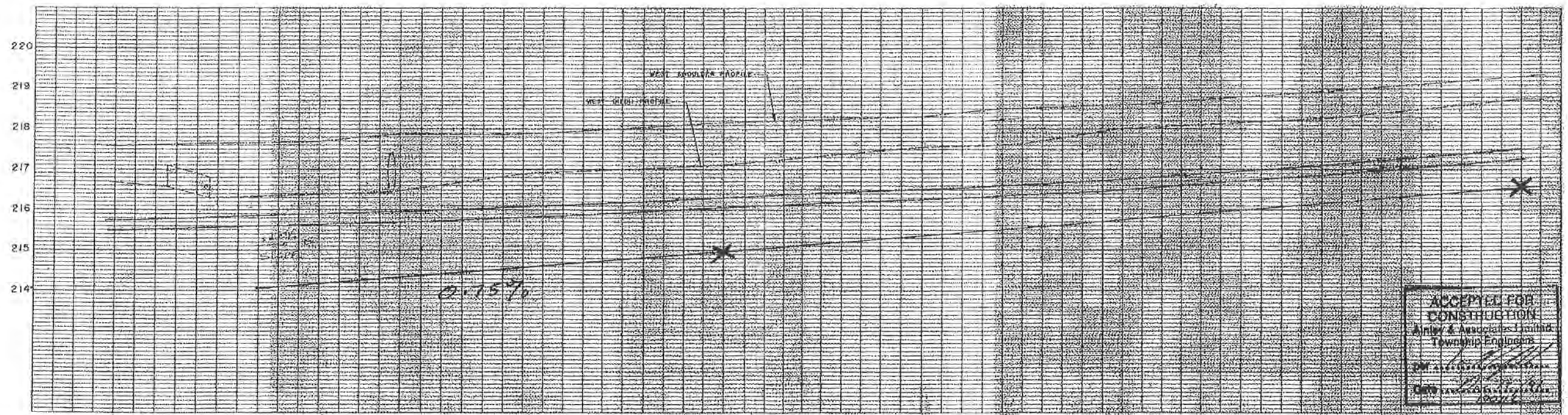
SCALE: HORIZ. 1"=50'  
VERT. 1"=10'

DESIGN: J.M. CHECKED: J.M.  
DRAWN: J.M. DATE: OCT. 23

OWG. NO. 88010-781



OSLER BLUFF ROAD  
(COUNTY ROAD N° 19)



ACCEPTED FOR  
CONSTRUCTION  
Ainslie & Associates Limited  
Township Engineers  
DWG. No. 88810-1750  
DATE 02/11/2011

CHAMBER ELEV. AT PROPOSED INVERT	215.48	215.52	215.50	215.05	215.25	215.47	215.00	215.24
W. SHOULDER	217.59	217.68	217.85	218.13	218.30	218.52	218.80	219.28
	3+500	50	3+600	50	3+700	50	3+800	50

Notes:

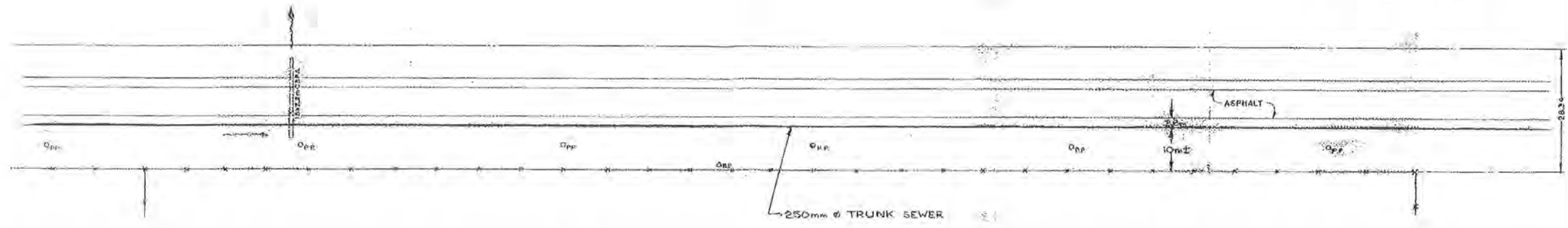
NO.	REVISIONS	DATE	INITIAL



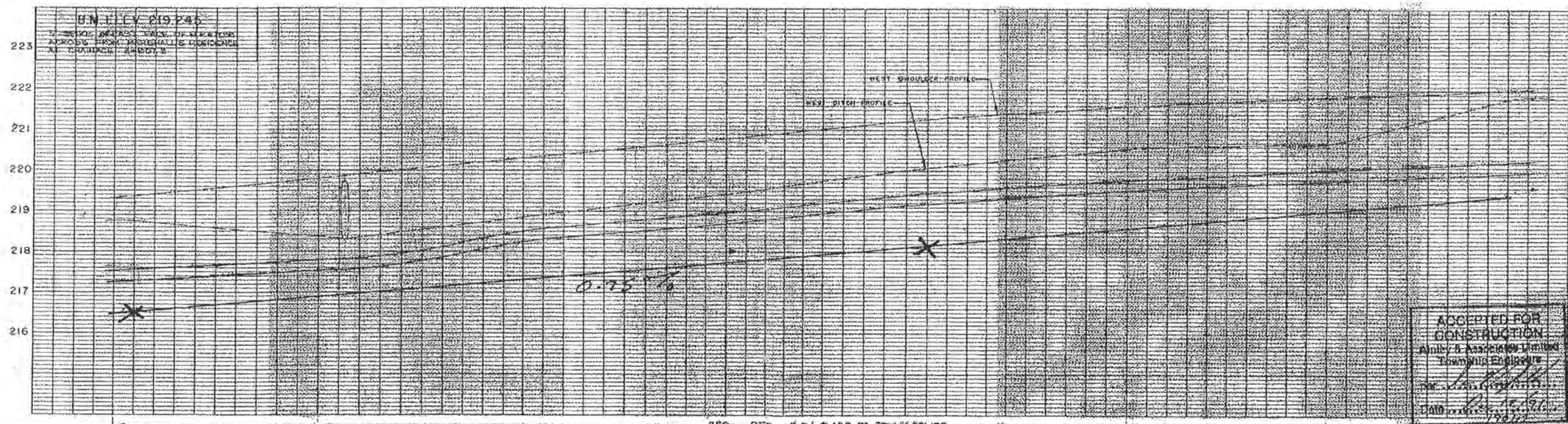
CASTLE CREEK DEVELOPMENTS  
TOWNSHIP OF BOGANSWOOD  
TRUNK SEWER  
OSLER BLUFF ROAD  
STN 3+500 TO 3+850



C.C. TATHAM & ASSOCIATES LTD.  
Consulting Engineers  
DWG. No. 88810-1750  
DATE 02/11/2011

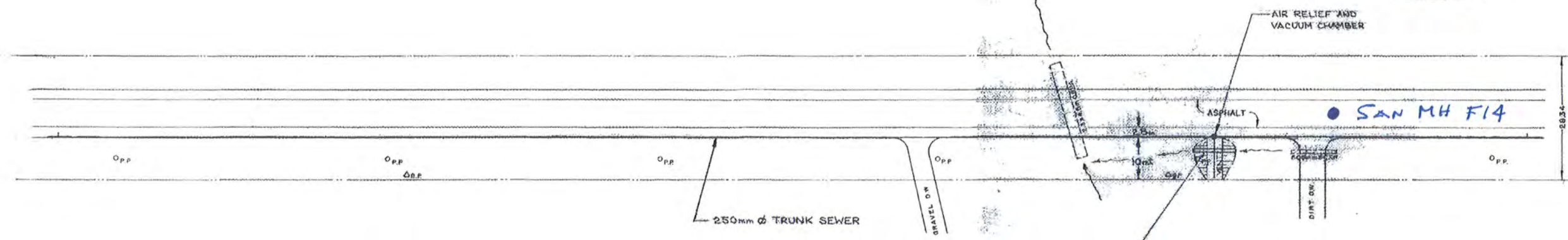


OSLER BLUFF ROAD  
(COUNTY ROAD N°19)

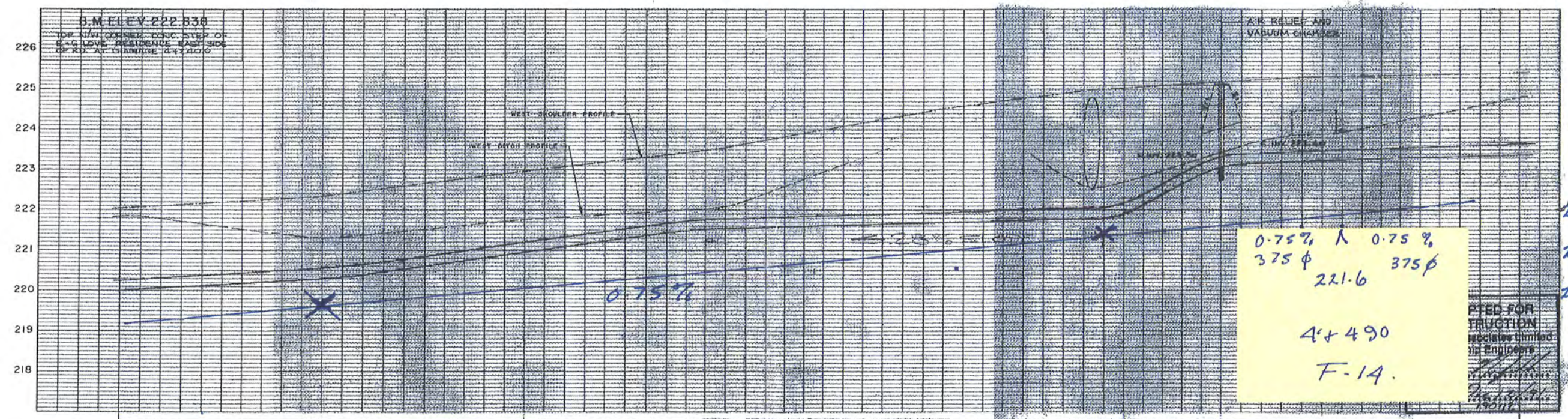


CHAINAGE	3+850	3+900	3+950	4+000	4+050	4+100	4+150	4+200
ELEVAT. PROFILE	217.54	217.52	218.23	218.70	219.16	219.5	219.7	219.87
W.S.H.D. INVERT	216.29	216.82	220.26	220.76	221.21	221.6	221.65	222.02
	50	50	50	50	50	50	50	4+200

NO. 1011	Approved				<b>OSLER BLUFF DEVELOPMENTS</b> Townships of Colborne & Fenwick <b>TRUNK SEWER</b> OSLER BLUFF ROAD STN. 3+850 TO 4+200	<b>T.J. TAYLOR &amp; ASSOCIATES LTD.</b> Consulting Engineers 40 Home West P.O. Box 200 Collingwood, Ontario L9Y 3Y1 (519) 444-2250	DWG. NO. 88010-TS01 DATE: 15/12/2011 SCALE: AS SHOWN
	NO.	REVISIONS	DATE				



OSLER BLUFF ROAD  
(COUNTY ROAD N° 19)



222  
221  
220

CHANGE ELEVAT FRONT'S W. SHLD. INVERT	4+200 - 223.02 - 218.97	50 - 223.31 - 220.06	4+300 - 225.95 - 220.90	221.52	221.66	221.80	223.25
			4+345	50	225.01	224.48	225.31
					4+400	50	225.42
					4+445	50	225.47
					4+475	50	225.37
					4+500	50	

Notes:

NO.	REVISIONS	DATE	INITIAL
1	REVISED C.S.P. LENGTH	22/11/15	S.V.



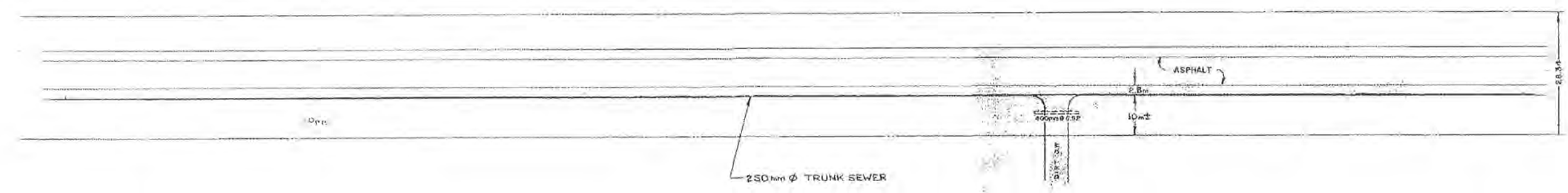
COASTSIDE ROSEN DEVELOPMENTS  
TOWNSHIP OF COSSAHOOD  
TRUNK SEWER  
OSLER BLUFF ROAD  
STN 4+200 TO 4+550

**D.C. JARVAN & ASSOCIATES LTD.**  
Consulting Engineers  
40 Tynes Street, Suite 202, Coltonbrook, Ontario L9T 1Y4 (781) 466-8899

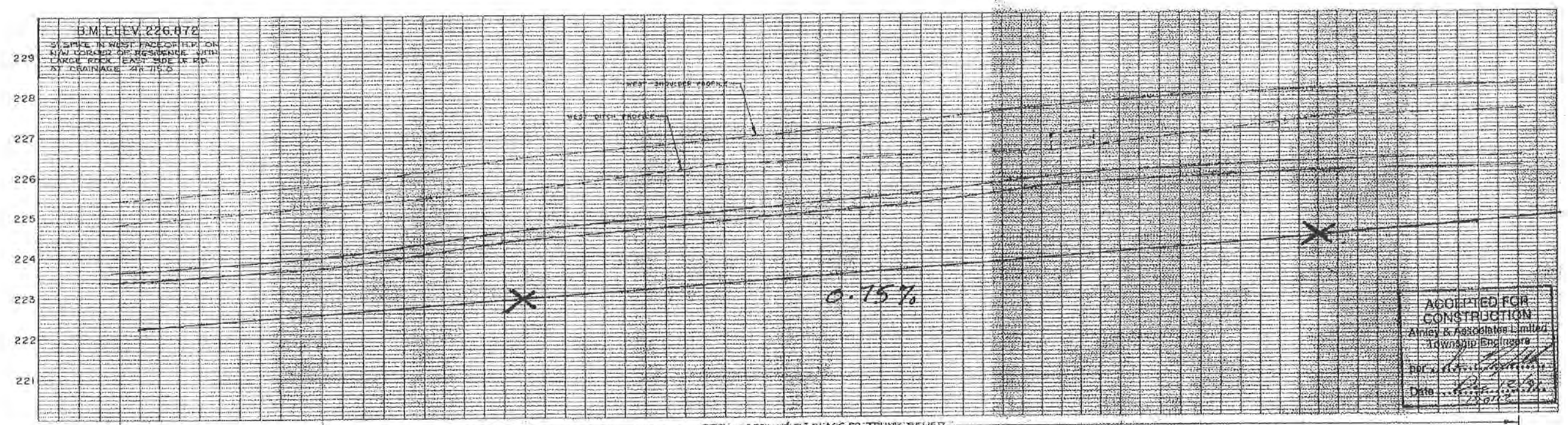
SCALE: HORIZ. 1" = 50.00'  
VERT. 1" = 10.00'

DESIGN: P.J.W. / CHECKED: P.J.W.  
DRAWN: K.S. / DATE: OCT 1988

DWG. N° 88010-1914



OSLER BLUFF ROAD  
(COUNTY ROAD N°19)



CHARGE ELEVAT. PROPTS. W. S.M.C. INVERT	50	225.42	223.37	4+600	226.76	223.73	50	226.42	224.37	4+700	226.89	224.84	50	227.37	225.32	4+800	227.74	225.60	50	228.10	226.05	4+900	228.20	226.15
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Notes:

NO.	REVISIONS	DATE	INITIAL



Approved  
**CARRIE GLEN DEVELOPMENTS**  
 TOWNSHIP OF COLLINGWOOD  
 TRUNK SEWER  
 OSLER BLUFF ROAD  
 STN. 4+550 TO 4+900

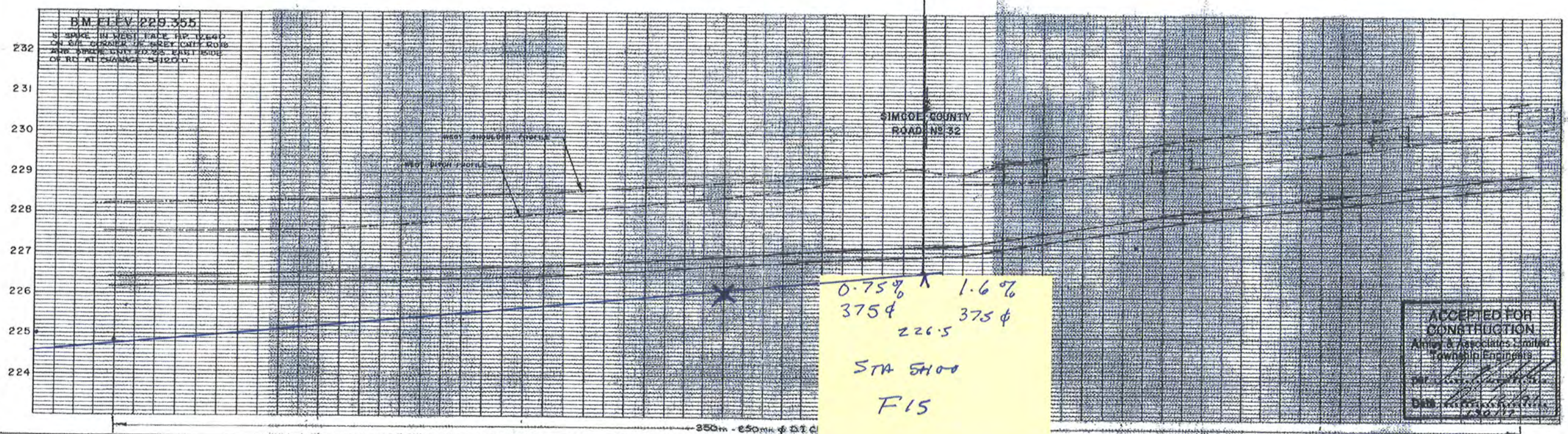
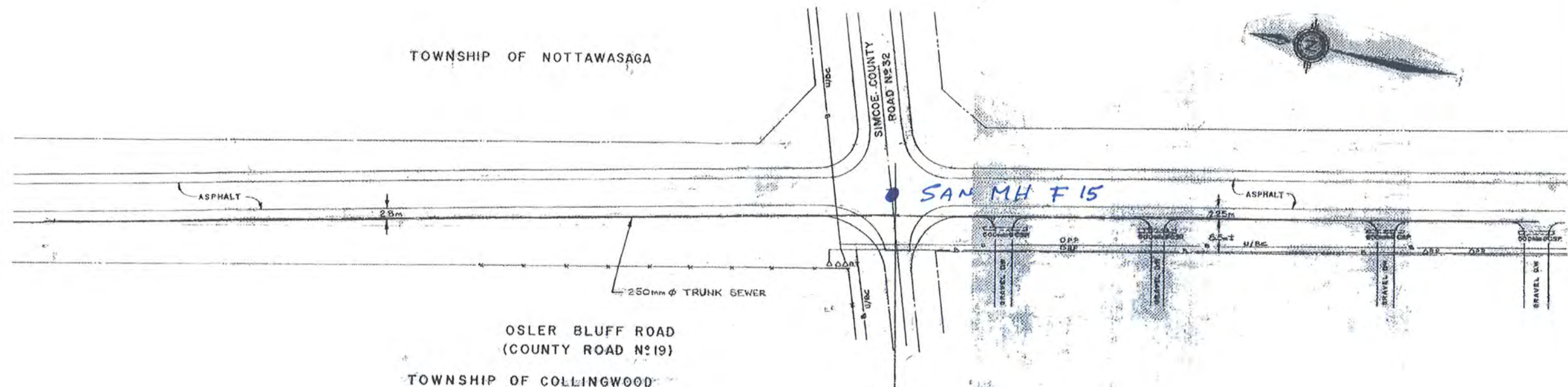
**C.C. TATHAM & ASSOCIATES LTD.**  
 Consulting Engineers  
 89 Home Street, Suite 200, Collingwood, Ontario L9Y 1W4 (705) 444-6255

SCALE: HORIZ. 1" = 500' VERT. 1" = 5'

DESIGN: E.J.M. CHECKED: R.J.M.  
 DRAWN: P.D. DATE: OCT. '00

OWG, N° 88010-TS10

TOWNSHIP OF NOTTAWASAGA



ACCEPTED FOR CONSTRUCTION  
 Anley & Associates Limited  
 Township Engineers  
 C.E. YATMAN & ASSOCIATES LTD.  
 1907/12

CHAINAGE	4+900	50	5+000	50	5+100	50	5+200
ELEV. AT INVERT	226.15	226.27	226.35	226.85	226.1	226.24	226.79
ELEV. AT W. SHLD	228.20	228.32	228.44	228.74	229.00	229.37	230.37

Notes:

NO.	REVISIONS	DATE	INITIAL



GASTRE-GLEN DEVELOPMENTS  
 TOWNSHIP OF COLLINGWOOD  
 TRUNK SEWER  
 OSLER BLUFF ROAD  
 STN. 4+950 TO 5+250

C.E. YATMAN & ASSOCIATES LTD.  
 Consulting Engineers  
 SCALE: HORIZ. 1" = 50'  
 VERT. 1" = 5'  
 DRAWN: C.Y.  
 CHECKED: R.J.M.  
 DATE: OCT. 1989  
 DWG. NO. 88010-TS15

File 120121

January 27, 2020

Allison Kershaw  
Manager of Water and Wastewater Services  
Town of The Blue Mountains  
32 Mill Street  
Thornbury, Ontario N0H 2P0  
akershaw@thebluemountains.ca

Re: Highway 26 Flow Monitoring (Grey Road 21 to Timmons Street), Town of The Blue Mountains  
Data Review & Assessment

Dear Allison:

We are pleased to present the findings of the flow monitoring study and an assessment of the remaining capacity for the above noted sanitary sewer on Highway 26 in the Town of The Blue Mountains.

## **BACKGROUND**

The Town circulated RFP 2020-15-Q-OPS on June 23, 2020 requesting a consultant complete flow monitoring and provide an assessment of the associated data to confirm the existing volume of flow and remaining capacity within the 300 mm diameter sanitary sewer on the south side of Highway 26 between Grey Road 21 and the west leg of Timmons Street (the limits of which are indicated in Figure 1). It is understood that once flows within this sewer reach 80% capacity, the existing sanitary sewer on Grey Road 21 (which ranges in size from 450 mm at its south limit at Grey Road 19 to 525 mm at its north limit at Highway 26) is to be extended across Highway 26 to provide an ultimate connection to the Craighleith Wastewater Treatment Plant.

## **DATA COLLECTION**

### **Monitoring Locations**

Tatham Engineering engaged AMG Environmental Inc. to complete the requisite flow monitoring at the following 2 locations:

- Location 1: Maintenance Hole 41 (MH 41) on the Highway 26 300 mm sanitary sewer at the west leg of Timmons Street. This location is the downstream limit of the 300 mm sewer and thus reflects the most critical location from a flow and capacity perspective (west of MH 41, the pipe size increases to 750 mm which extends to the pump station).
- Location 2: Maintenance Hole E29 (MH E29) on Grey Road 21 on a 300 mm sewer at the north limit of the Mountain House development. The upstream sewers contributing to MH E29 are isolated and

limited to the Mountain House and Windfall developments, and therefore this location serves as a means to establish actual sanitary flow demands per residential unit.

In addition, a rain gauge was installed at the Craigleith WWTP to record rainfall duration and intensity.

The locations of the monitoring devices and rain gauge are illustrated on Figure 1.

### Monitoring Period

The flow monitors and rain gauge recorded information over the period August 13, 2020 to October 10, 2020 (a 2-month period as required under the RFP). Both flow and rainfall data were collected in 5-minute increments for the entire duration. AMG monitored the data and performed maintenance on the flow monitors and rain gauge as required to maintain the quality of data. No issues were noted with the data collection. AMG subsequently undertook a quality review of the 2-month period data.

It is noted that the measuring devices remained in place under November 5, 2020 and data for the period October 11, 2020 to November 4, 2020 was also provided. However, as this data was not quality reviewed, it has only been provided for information purposes only and has not been included in the assessment.

### Summary of Data

The following is a selection of peak data at MH 41, which is the focus of this study:

- peak daily volume
  - 197.5 m<sup>3</sup> on October 10
  - 175.1 m<sup>3</sup> on August 29
- peak flow rate
  - 7.9 L/s on August 13
  - 6.9 L/s on August 29
- peak velocity
  - 0.58 m/s on September 24

As per the Town's RFP, wet weather events are defined as having a rainfall intensity greater than 10 mm over 24 hours. Such occurred on the following dates (6 in total):

- August 2, 27 and 28;
- September 30; and
- October 4 and 7.

Graphical representations of the collected data for both monitoring stations are provided in Figure 2 through Figure 4, addressing both daily flow rates and rainfall accumulation (the data for the period



October 11, 2020 to November 4, 2020 is included for illustration purposes only). In most cases, there are pronounced peaks with the Saturday and Sunday data, suggesting that weekend data reflects the greatest demands.

Little correlation exists between the peak volumes, flows and velocities and measured rainfall. The only day with any identifiable correlation is August 29 which followed an extended period of rainfall and exhibited a high daily flow volume and peak flow rate. However, neither of these were the maximum for the monitoring period nor do they appear to be solely related to the preceding rainfall. Based on the monitoring data, the Saturday conditions are likely to have contributed to the peak as well.

## **CAPACITY ANALYSIS METHODOLOGY**

Multiple approaches for analysis are available to determine the remaining capacity of a sanitary sewer.

### **Theoretical Flow Rates**

The most common approach used in the design and analysis of capacity is a theoretical comparison to the Ministry of the Environment *Design Guidelines for Sewage Works* flow rate (ranging from 225 to 450 L/cap/day) and an assumed population per unit (2.3 persons) to determine the total flow distributed over the day with peaking factors to determine peak expected flow. This approach is quite conservative and typically results in sewers designed with significant additional capacity, suitable for future intensification.

### **Actual Flow Rates**

An alternative approach to sanitary sewer design and analysis is to complete flow monitoring to establish actual flow rates and determine the amount of infiltration and inflow within the subject section of sanitary sewer. The results of flow monitoring can aid the development of more accurate parameters to determine the remaining actual capacity and average flow rate per unit.

## **DATA ANALYSIS**

### **Consideration for Dry Weather Conditions**

A number of dry weather flow (DWF) periods were observed during the monitoring period. The extended period of September 14 to 21 had no recorded precipitation, so the flow rates during the following week are considered suitable for DWF (considering the following week allows a one-week period for rainfall to accumulate, migrate and infiltrate into the sanitary sewer system). Based on the data collected, the DWF rate recorded at MH 41 varies between 95.5 and 148.2 m<sup>3</sup>/day. Similarly, at MH E29 the data during the same period varies between 98.9 and 128.8 m<sup>3</sup>/day. This high variance in flow rate suggests the base flow rate is directly dependant on other contributing factors, primarily occupancy rates within the upstream contributing residences.



It is also evident that the weekend flow rates are typically higher than those rates realized through the week, regardless of the contributing rainfall events. Again, this is likely attributed to increased residential occupancies and hence utilization on the weekends.

### **Consideration for Occupancy**

As this area is heavily influenced by seasonal residents, the development of a dry weather flow (DWF) rate is less critical for this project. Rather, flow rates based on actual occupancy levels have been explored and further considered.

At MH 41, the contributing areas include a number of residential and non-residential uses such as Squire Johns and Le Scandinave. Occupancy information and/or flow data specific to these uses was not collected or determined as part of this assignment. In this regard, data from MH 41 was not considered in establishing a baseline residential flow demand.

At MH E29, the contributing area is limited to that of the Mountain House and Windfall residential developments. Furthermore, it is noted that the corresponding sewers were installed within the last 10 years and accordingly reflect modern construction materials and practices, and thus these sewers are expected to have minimal infiltration (as per the data in Figure 3, there is no obvious correlation between rainfall and sewer flows). To establish the occupancy rates within the Windfall and Mountain House developments, a Tatham Engineering staff member visited the developments on each Sunday morning (around 09:00) during the 2 month monitoring period and established the number of occupied units. For Mountain House, the number of occupied units was estimated based on the number of cars in parking lots assuming 1 car per unit (in that units are only assigned 1 spaces). For Windfall, the number of occupied units was estimated based on either vehicles present in the driveway or obvious signs of resident activity. It is assumed that the occupancy data as collected on Sunday mornings is reflective of occupancy over the course of the weekend (ie. applicable to both Saturday and Sunday). It is noted that at the time of the surveys, 288 units were completed and delivered to purchasers in Windfall and 70 units in Mountain House (total 358 units).

Table 1 provides a summary of the occupied units, the daily flows as measured at MH E29 for each Saturday and Sunday during the collection period and the resulting daily flows per occupied unit (as per Figures 4 and 5, the weekend flows were typically greater than flows during the preceding weekdays and thus reflect the maximum conditions); Figure 5 illustrates the unit flows graphically.

As noted, the average flows are in the order of 518 to 531 L/unit/day, whereas the maximum flows (recorded over the period August 29-30) are in the order of 597 to 660 L/unit/day. While the Thanksgiving weekend, October 10-11, had the highest unit occupancy, the resulting flows/unit were slightly less than average. The maximum flow of 660 L/unit/day equates to 287 L/cap/day based on 2.3 persons per unit. As previously noted, MOE design guidelines suggest 225 to 450 L/cap/day.



**Table 1: Weekend Flow Rate Per Unit Calculations**

WEEKEND PERIOD	OCCUPIED UNITS (of 358)	SATURDAY		SUNDAY	
		Total Flow (m <sup>3</sup> /day)	Flow Per Unit (L/day)	Total Flow (m <sup>3</sup> /day)	Flow Per Unit (L/day)
August 22-23, 2020	233	137.3	589	128.2	550
August 29-30, 2020	245	<b>161.6</b>	<b>660</b>	<b>146.3</b>	<b>597</b>
September 5-6, 2020	259	137.2	530	132.2	511
September 12-13, 2020	255	131.2	514	136.4	535
September 19-20, 2020	255	118.4	464	116.6	457
September 26-27, 2020	254	120.5	474	128.8	507
October 3-4, 2020	254	134.5	530	129.7	511
October 10-11, 2020	283	137.4	486	134.1	474
<b>Average</b>	<b>255</b>	<b>134.8</b>	<b>531</b>	<b>131.5</b>	<b>518</b>
<b>Minimum</b>	<b>233</b>	<b>118.4</b>	<b>464</b>	<b>116.6</b>	<b>457</b>
<b>Maximum</b>	<b>283</b>	<b>161.6</b>	<b>660</b>	<b>146.3</b>	<b>597</b>

## CAPACITY ANALYSIS & ASSESSMENT

### Peak Measures

At MH 41, the following measures are noted:

- the peak measured velocity is 0.58 m/s at a flow depth of only 50 mm (indicating the theoretical roughness is likely conservative);
- the peak depth of flow is 88.3 mm with a flow rate of 6.9 L/s (approximately 30% of the cross sectional area and 15% of total capacity); and
- the peak flow rate is 7.9 L/s (18% of the total capacity).

AT MH E29, the following area are noted:

- the peak flow rate is 9.44 L/s (13.5% of the total capacity); and
- compared to MH 41, this flow rate is higher despite being upstream, but is indicative of measurements closer to the source (addressed by peaking factors in large catchments).



### Peak Factors

The peaking factor of the sewer is established by dividing the peak flow rate by the average flow rate. For both sewers, the peaking factors are as follows:

- MH 41      7.92 L/s (maximum) ÷ 1.47 L/s (average) = 5.39 Peaking Factor
- MH E29    9.44 L/s (maximum) ÷ 1.43 L/s (average) = 6.60 Peaking Factor

It is noted that the peaking factors reflect data for the overall monitoring period, inclusive of weekend and weekday day. As evident in the charts of Figures 2 and Figure 4, the weekday demands are typically less than the weekend demands, which is reflective of the recreational and seasonal nature of some of the area residents. The lower weekday demands result in lower average values and hence higher peak factors (which is premised on the peak values that occur during the weekend). When considering only the weekend data (which effectively assumes that usage during the remainder of the week will be comparable and consistent, reflective of full-time residency and utilization), the following peak factors are realized:

- MH 41      4.41 Peaking Factor (which is more reflective of typical conditions)
- MH E29    5.56 Peaking Factor

### Pipe Capacity

The full flow capacity of a sewer is directly dependant on the slope and roughness coefficient. As per the as-built drawings for Highway 26, the slope of the 300 mm diameter PVC sanitary sewer discharging to MH 41 is 0.21%. For PVC sewers, typical roughness coefficients vary between 0.009 and 0.011. However, to ensure a conservative approach, and to be consistent with standard design practice, including that of the Town, a coefficient of 0.013 has been employed (representative of a concrete pipe).

Available Capacity (L/s)      = 44.3 L/s with a peak velocity of 0.63 m/s

It is noted that the peak velocity as observed at MH 41 is 0.58 m/s and thus the actual roughness coefficient will be somewhat less than 0.013 (which has a corresponding peak velocity of 0.63 m/s).

### Remaining Capacity (L/s)

The remaining capacity within the Highway 26 sanitary sewer has been determined based on its available capacity and the peak flows observed (which include consideration for inflow and infiltration). Consideration for an 80% capacity threshold is also noted.

Remaining Capacity (L/s)      = Available Capacity - Peak Flow  
    = 44.3 L/s - 7.9 L/s  
    = 36.4 L/s

Remaining Capacity (80%)      = 80% × 44.3 L/s - 7.9 L/s  
    = 27.5 L/s



### Remaining Capacity (units)

The remaining capacity as it relates to residential units is determined below, considering the actual unit demand of 287 L/cap/day or 660 L/unit/day (based on 2.3 persons per unit) as determined at MH E29 and the actual peak factor of 5.4, as determined at MH 41. Again, an 80% capacity threshold is also noted

$$\begin{aligned} \text{Remaining Capacity (units)} &= \text{Remaining Capacity (L/s)} \div \text{Unit Rate} \div \text{Peak Factor} \\ &= 36.4 \text{ L/s} \div 660 \text{ L/unit/day} \div 5.39 \\ &= 884 \text{ units} \end{aligned}$$

$$\begin{aligned} \text{Remaining Capacity (80\%)} &= 27.5 \text{ L/s} \div 660 \text{ L/unit/day} \div 5.39 \\ &= 668 \text{ units} \end{aligned}$$

Based on the above, the existing system has capacity for an additional 668 units prior to it reaching 80% capacity, at which time the crossing of Highway 26 is desired. An additional 884 units can be accommodated prior to the system reaching full capacity.

Should the “weekend peak factor” of 4.41 be used, the remaining capacity unit count increases to 816 units under 80% capacity and 1080 units under 100% capacity.

### CONCLUSION

Based on the actual flow data (including existing inflow and infiltration) and unit demands realized from the Mountain House and Windfall developments (as determined from the peak weekend data), the 300 mm diameter sanitary sewer on Highway 26 can accommodate:

- 668 additional occupied residential units prior to reaching 80% capacity; and
- 884 additional occupied residential units prior to reaching 100% capacity.

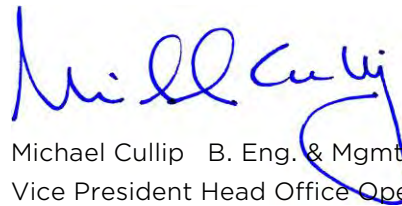
Due to the seasonal and recreational nature of the area, the weekday demands are lower than the weekend demands, resulting in an exaggerated peaking factor (maximum demand ÷ average demand). If data for only the weekends is considered (and assumed to be reflective of demands throughout the week), the peaking factor is reduced to 4.41 and the remaining unit counts increase to 816 for 80% capacity and 1080 for 100% capacity.

Yours truly,

**Tatham Engineering Limited**

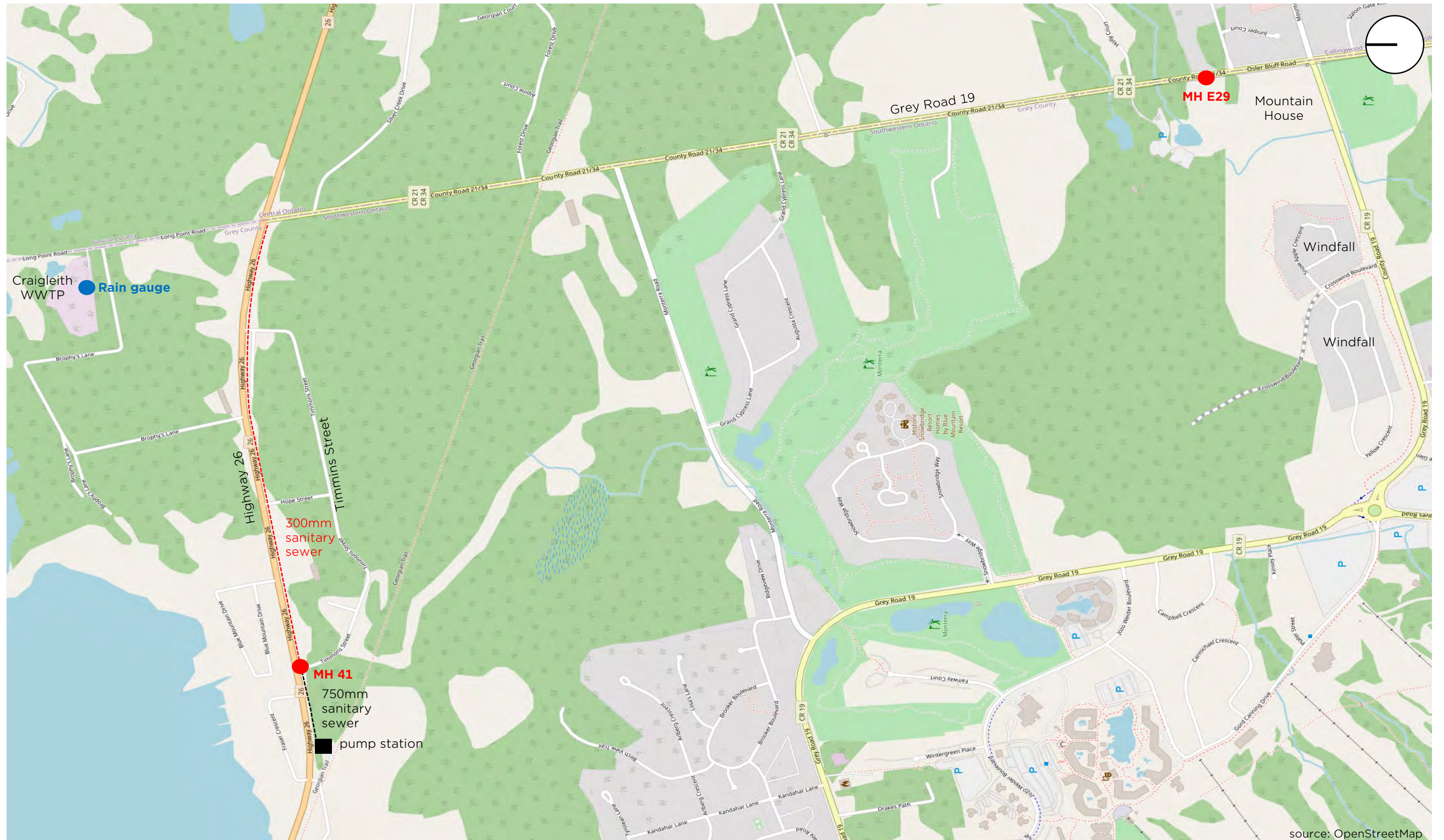


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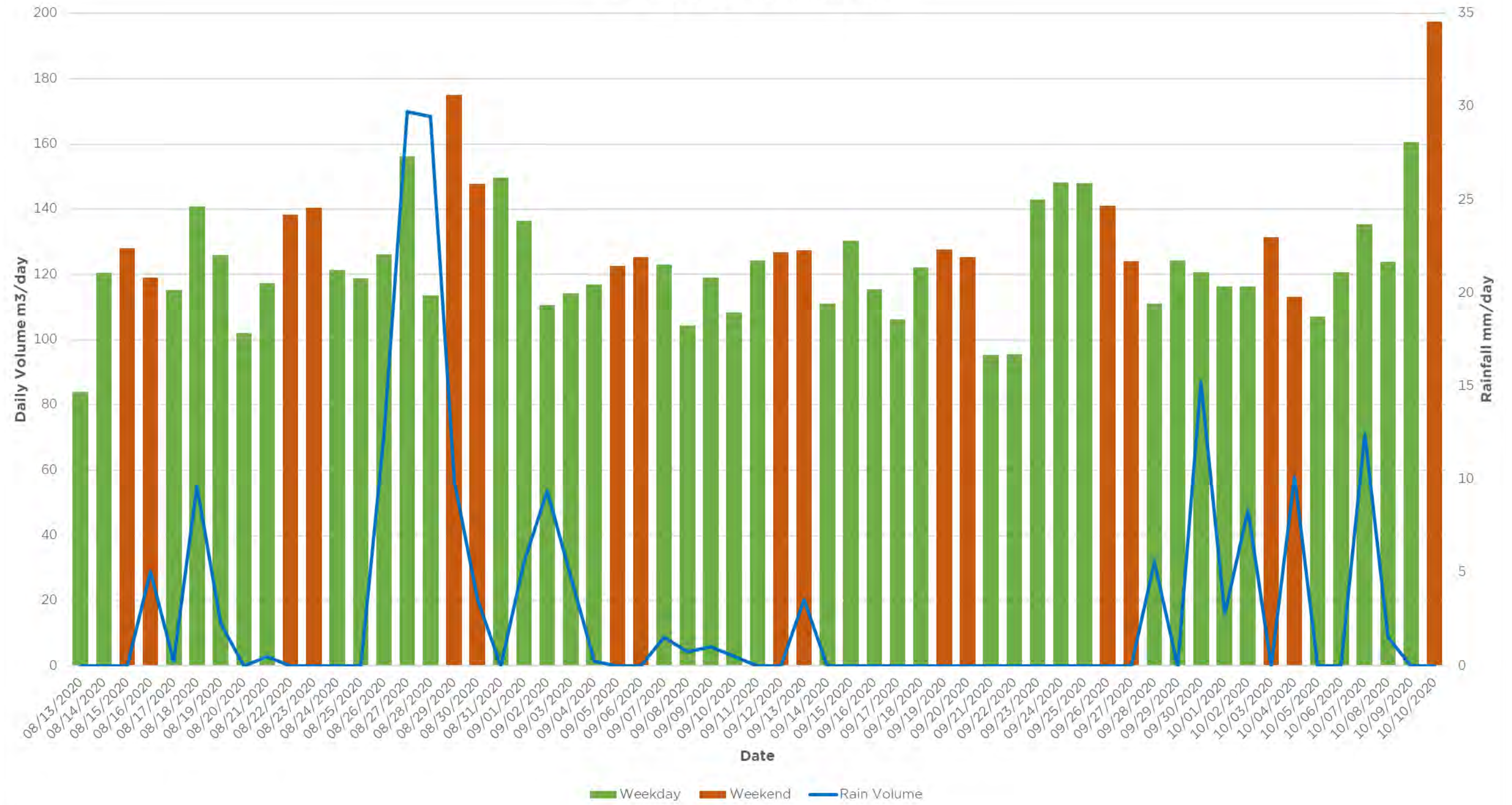


**TOBM FLOW MONITORING**

Figure 1: Study Limits & Monitoring Locations



### MH 41 Daily Volume of Flow

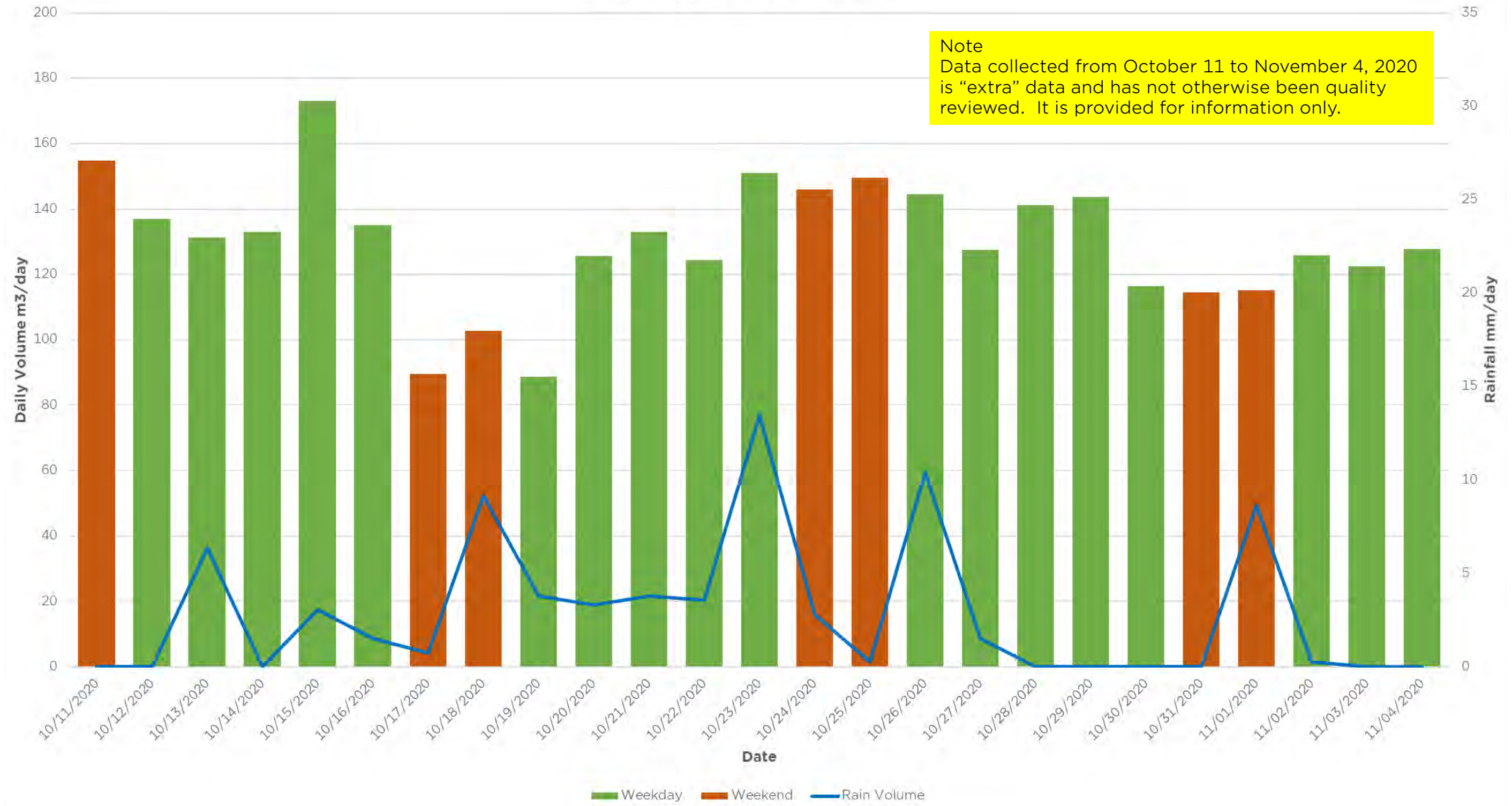


**TOBM FLOW MONITORING**

Figure 2: Daily Measures MH 41 + Rainfall (Aug 13, 2020 to Oct 10, 2020)



### MH 41 Daily Volume of Flow

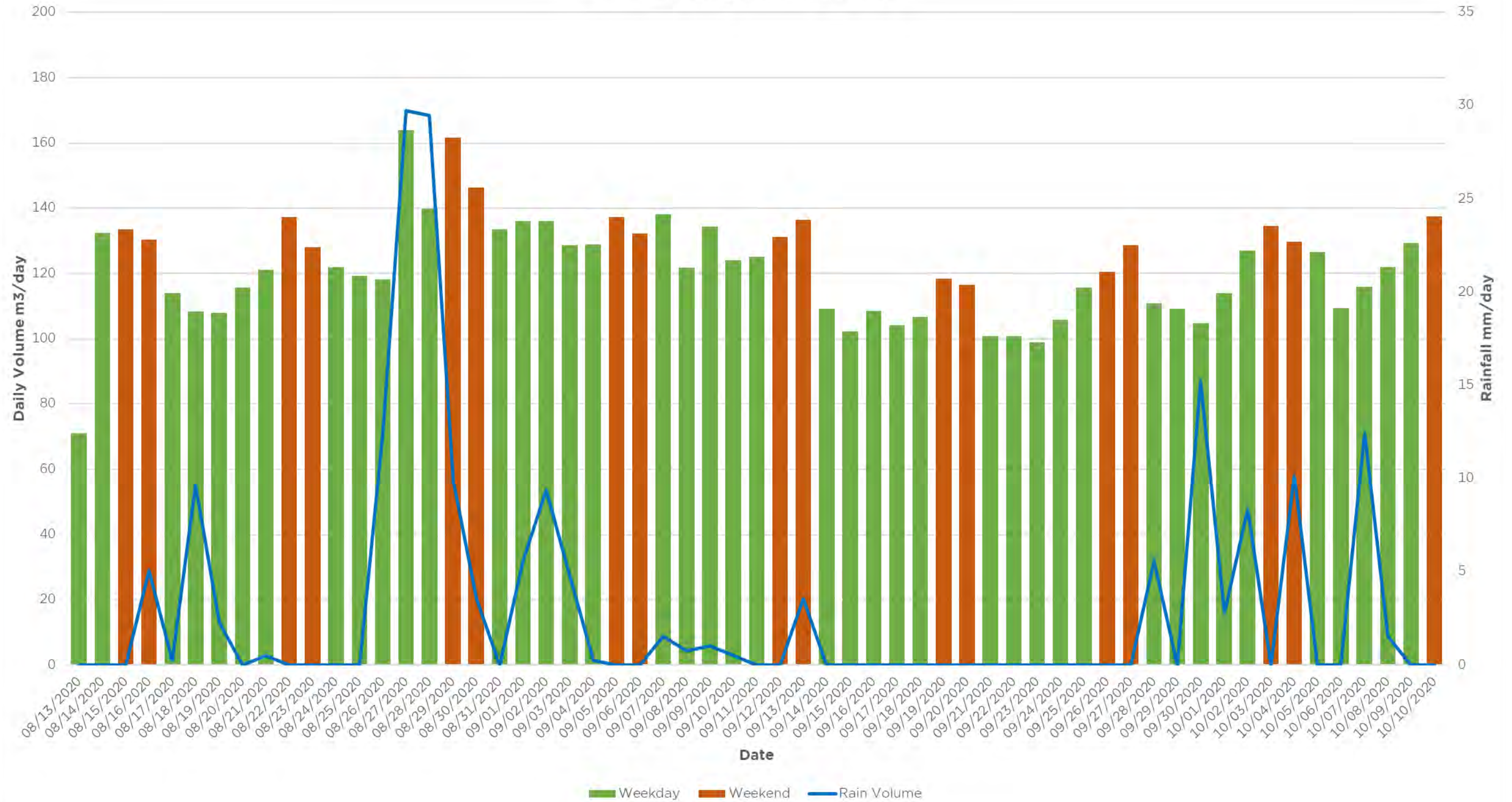


**TOBM FLOW MONITORING**

Figure 3: Daily Measures MH 41 + Rainfall (Oct 11, 2020 to Nov 4, 2020)



### MH E29 Daily Volume of Flow



**TOBM FLOW MONITORING**

Figure 4: Daily Measures MH E29 + Rainfall (Aug 13, 2020 to Oct 10, 2020)



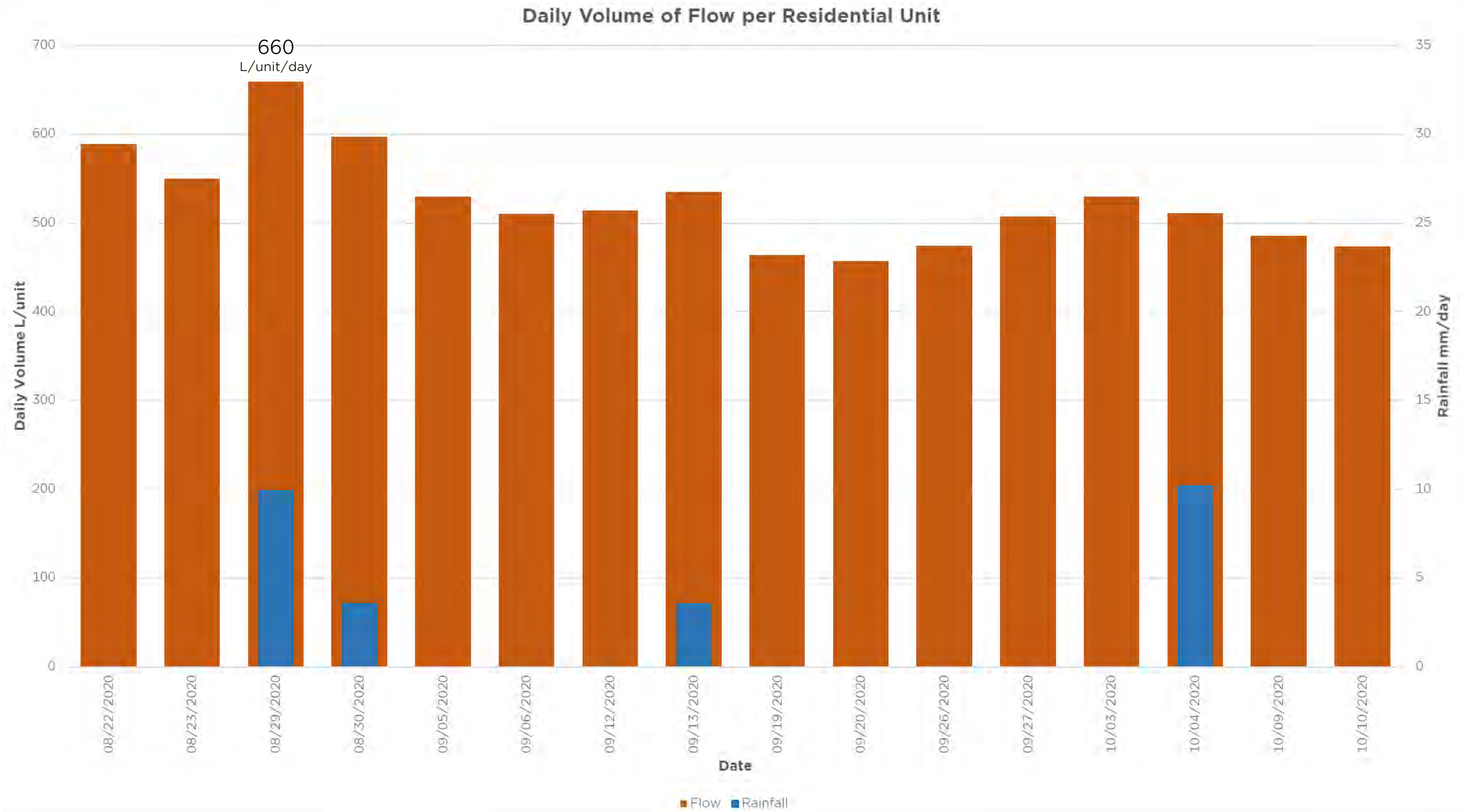
### MH E29 Daily Volume of Flow



**TOBM FLOW MONITORING**

Figure 5: Daily Measures MH E29 + Rainfall (Oct 11, 2020 to Nov 4, 2020)





**TOBM FLOW MONITORING**  
 Figure 5: Flow per Residential Unit





# **The Blue Mountains Engineering Standards**

**Revised April 2009  
AODA Update July 2018**

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# The Blue Mountains Engineering Standards

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# 1 General Requirements

## 1.1 Introduction

The Blue Mountains Engineering Standards presented here are intended as the Town's requirements to aid in the uniform design and installation of infrastructure throughout the Municipality. Innovative technological changes that improve or maintain the quality of the Works on a life cycle cost basis may be considered at the discretion of the Town.

These standards are to be read in conjunction with the Ontario Provincial Standard Specifications (OPSS) and the Ontario Provincial Standard Drawings (OPSD).

It is the Designer's responsibility to obtain and check with The Blue Mountains for the latest version. Copies are available on the Town's website at [www.thebluemountains.ca](http://www.thebluemountains.ca)

The Town reserves the right to make project specific requests deemed reasonable by the Town Engineer.

## 1.2 Definitions

In this specification the following definitions shall apply:

"AFC" shall mean Accepted For Construction

"AWWA" shall mean the American Water Works Association.

"CHBDC" shall mean the Canadian Highway Bridge Design Code.

"Consultant Engineer" shall mean professional engineers licensed to practice in Ontario and shall be responsible for the preparation of drawings and specifications to the satisfaction of the Town's Engineer. "Engineer" and "Designer" shall mean the same as Consultant.

"Contractor(s)" shall mean the firm of Contractors, the company or individual acting as the Contractor and having entered into a contract with the Developer/Owner to install the services.

"Developer(s)/Owner(s)" shall mean the person(s) causing the Works to be undertaken.

"DFO" shall mean the Department of Fisheries and Oceans, Canada.

"GSCA" shall mean the Grey Sauble Conservation Authority.

"MNR" shall mean the Ontario Ministry of Natural Resources.

"MOE" shall mean the Ontario Ministry of the Environment.

"MTO" shall mean the Ontario Ministry of Transportation. "NEC" shall mean the Niagara Escarpment Commission.

"NVCA" shall mean the Nottawasaga Valley Conservation Authority. "OBC" shall mean the Ontario Building Code.

"OPSD" shall mean the Ontario Provincial Standard Drawings. "OPSS" shall mean the Ontario Provincial Standard Specification. "Town" shall mean The Blue Mountains.

"Town Engineer" shall mean the Director of Engineering and Public Works of the Town of The Blue Mountains or designate.

"Town Representative" shall mean any person assigned to a project by the Town to carry out work on their behalf.

## 2 Development Design Submissions

### 2.1 Introduction

This section outlines the required submissions to be made to the Town in regards to development projects.

The submission of all reports and drawings are to be coordinated by the owner's Consultant. The submission requirements for Town initiated projects shall be coordinated between the Town and the Consultant.

Prints of drawings for all submissions shall be in accordance with Town standards and each print shall be stamped with the submission number (1, 2, or 3) and date of submission.

### 2.2 Pre-Consultation

Prior to the initiation of design, the Consultant shall confer with Town staff to review the proposed works and in particular discuss and agree upon any deviation from the Town Standards.

### 2.3 Submissions to Government Agencies

The Consultant shall deal directly with the Ministry of the Environment (MOE), Ministry of Natural Resources (MNR), Ministry of Transportation (MTO), Niagara Escarpment Commission (NEC), Nottawasaga Valley Conservation Authority (NVCA) or Grey Sauble Conservation Authority (GSCA), as applicable, Department of Fisheries and Oceans (DFO), Grey County and any other government agencies for works that fall within their jurisdiction. It is the responsibility of the Consultant to ensure that all correspondence, comments and approvals are provided to the Town.

## 2.4 First Submission to the Town

The following submissions shall be compiled and submitted in their entirety by the owner's Consultant in one complete package to the Town. Any incomplete submissions or submission quality deemed to be unacceptable for review by the Town Engineer, shall be returned un-reviewed.

### 2.4.1 Engineering Submission

- A Letter of Retainer from the Consulting Engineer stating that they have been engaged for the design and general construction inspection of all works, and coordination of sub-consultants.
- One copy of proposed Registered Plan or Site Plan
- Five complete bound sets and 2 bond sets on 11x17 of the following drawings are to be submitted in the following order:
  - Cover Sheet
  - General Servicing Plan
  - Grading Plan(s)
  - Storm Drainage Plan(s)
  - Sanitary Drainage Plan(s)
  - Water Distribution Plan(s)
  - Plan and Profile Drawing(s)
  - Stormwater Management Facilities Drawing(s)
  - Miscellaneous and special detail drawings
- One bound set of drawings containing the following:
  - General Servicing Plan
  - Sanitary Drainage Plan(s)
  - Plan and Profile Drawing(s)
- One bound set of drawings containing the following:
  - General Servicing Plan
  - Water Distribution Plan(s)
  - Plan and Profile Drawing(s)
- Four additional copies of the General Servicing Plan
- Three copies of water supply and distribution report providing calculations to support the design of the distribution works including main sizes, fire flows and anticipated flows and pressures for domestic and other users.

- Three copies of the Storm Water Management Report and O&M manuals as requested.
- Three copies of the storm sewer calculations on standard design sheets.
- Three copies of sanitary design calculations on standard design sheets.
- Three copies of the Traffic Impact Study (if required)
- Four copies of the Geotechnical Report
- A letter from the Consultant, summarizing the contents of the submission and certifying that the design has been reviewed by a senior engineer and conforms with the Town's Engineering Standards.

#### 2.4.2 Municipal Structures Submission

By definition, a municipal structure is any structure with a clear or adjacent span totaling more than 3.0 metres.

When a new municipal structure is proposed, a specific submission related to the structure is required, which includes the following information.

- Three copies of the General Arrangement drawing(s), prepared in general accordance with the MTO Structural Manual. It includes the roadway structure plan, profile, elevation and cross sections.
- Three copies of the Design Report which includes but is not limited to the description of the works, how the detail was arrived at, different options and cost analysis/least expensive alternate.
- Three copies of the Design Criteria Sheet which includes, but is not limited to, the type/class of roadway, volume of traffic, geometric information and cost estimate.
- Three copies of the Hydrology Report.
- A letter from the Engineer responsible for the design which certifies that:
  - the bridge type, length and width are appropriate;
  - CHBDC requirements are met;
  - Ministry standards have been followed;
  - the most economical life cycle cost solution has been selected for the site,
- The structural design drawings and details included as part of the Subdivision Agreement shall be stamped and signed by the Engineer who designed the roadway structure and by the professional engineer who checked the structural design drawings.

## 2.5 Second Submission to the Town

The following plans and documents shall be compiled and submitted in their entirety by the Consultant in one complete package. Any incomplete submissions, delivered to the Town, shall be returned.

- Five complete sets of the following drawings are to be submitted and are to be presented in the following order:
  - Revised set of all drawings listed in “First Submission” plus
    - Regulatory Signage Plan(s)
    - Composite Utility Plan(s)
    - Erosion and Sediment Control Plan(s)
    - Detail drawings for outlets and watercourse improvements
    - Landscaping Plan(s)
  - Three revised copies of water supply and distribution report if any changes were required.
  - Three revised copies of the Storm Water Management Report if any changes were required.
  - Three revised copies of the storm sewer calculations if any changes were required.
  - Three revised copies of sanitary design calculations if any changes were required.
  - Three copies of the Traffic Impact Study if any changes were required.
  - Three copies of photometric design calculations.
  - Three copies of the Acoustical Report (if required).
  - Three copies of the Arborist Report (if required).
  - One set of Landscape Drawings additional to bound set above.
  - A Letter of Retainer from the Consulting Landscape Architect stating that they have been engaged for the design and complete general construction inspection of all landscape works, plus an outline of the items contained within the submission.
  - A covering letter from the Consulting Engineer stating that the landscape work is in conformity with the proposed grading and municipal services for the development, plus an outline of the items contained within the submission.
  - A letter from the Consultant, summarizing the contents of the submission and certifying that the design has been reviewed by a senior engineer and conforms with the Town’s Engineering Standards.

## 2.6 Third Submission to the Town (if required)

Same as second submission

## 2.7 Final Submission to the Town

After final approval by the Town of the aforementioned submissions, the following is required:

- One copy of the Proposed Registered Plan or Site Plan.
- Five complete 'full size' sets and two complete 'reduced' (11x17) sets of all drawings to be approved.
- All drawings must be stamped and signed by the Consulting Engineer or Landscape Architect as appropriate.
- A digital copy in "dwg" format of the complete set of engineering drawings in accordance with the Town drawing requirements.
- Three reduced copies (11x17) of the final storm drainage plan and the storm sewer design sheet labelled final design.
- Three reduced copies (11x17) of the final sanitary drainage plan and the sanitary sewer design sheet labelled final design.
- Copies of all required agency approvals - i.e. GSCA, MOE, NEC, NVCA, etc.
- Detail cost breakdown of all proposed works in MS Excel format.
- Evidence in writing that agreements are in place with Bell Canada, Cable TV, and Hydro for the installation of these utilities in a common trench in the prescribed locations on road allowances within the plan of subdivision.
- Evidence in writing that an agreement is in place with Union Gas for the installation of their utility in the prescribed location on road allowances within the plan of subdivision.
- Evidence in writing that satisfactory arrangements are in place with Canada Post for the location of mailboxes.

Two sets of drawings stamped "Accepted For Construction" (AFC) will be returned to the Consultant. Only drawings stamped "Accepted For Construction" in red ink, shall be considered originals for the purpose of interpretation of the required Works. Any field changes or post AFC modifications to the drawing originals by the Consultant must be approved and stamped "AFC" by the Town prior to construction.

## 2.8 Expiration of “AFC” drawings

The “AFC” drawings will be valid for 6 months after Town approval unless a Development Agreement is executed.

If a Development Agreement has not been entered into within the 6 month period, the “AFC” designation must be re-issued. It will be at the Towns discretion to review the drawings prior to re-issuing “AFC”.

## 2.9 Pre-Servicing Policy for Subdivision Development

Subsequent to Draft Plan Approval and prior to execution of a Subdivision Agreement, the Town may consider Pre-Servicing of a development at the owner's risk when the following conditions have been met:

- The Developer must execute a Pre-Servicing agreement and deposit required securities with the Town or execute and deposit the requisite agreement fees and securities with the Town.
- Engineering drawings have been “Accepted for Construction Pre-Servicing Only” for the Works under consideration. The drawings shall be prepared in a manner to clearly distinguish the Pre-Servicing Works. Only drawings stamped “Accepted for Construction Pre-Servicing Only” in red ink, shall be considered originals for the purpose of interpretation of the required Works.
- Written approval of various agencies, e.g., GSCA, MOE, NEC, NVCA, MNR, MTO, Ministry of Citizenship, Culture and Recreation, where they relate to the installation of services permitted by the Pre-Servicing Agreement.
- Written confirmation from utility companies that satisfactory agreements have been reached for provision of respective services.
- Permission will not be given to construct external services prior to execution of the Subdivision Agreement. Connections to existing municipal services will not be permitted until the plan is registered. Only one gravelled access to the public road system will be granted.
- All other documents considered necessary to the Works under the Pre-servicing Agreement including, 300 mm reserves, easements, etc., must be approved as to form and description as described in the Pre-servicing Agreement.
- Above ground works will not be permitted to commence unless approved in writing by the Town.
- If applicable, a servicing permit pursuant to the Building Code Act has been obtained.

## 3. Drawings

### 3.1 Specifications for Engineering Drawings:

#### 3.1.1 Size

Drawings to be Metric Standard A1 (566mm X 801 mm) or Imp. Equivalent (24" X 36") Reduced drawings on Metric Standard A3 (280mm X 240mm) or Imp. Equivalent (11" X 17")

#### 3.1.2 Materials for all Submission and "Record" drawings

- Bond (Paper)
- Translucent Mylar for "Record" drawings (0.04mm matte)
- Black Ink (permanent)
- Digital copies on CD in AutoCad version 2004 or later

### 3.2 General Drawing Requirements

All drafting work on the drawings to be done neatly and legibly. The following basic information and criteria shall apply in preparation of the drawings:

- all plans shall include a north arrow and Key Plan in the upper right hand quadrant
- all text to be horizontal, vertical read from right side of page, or aligned to feature described (eg. pipe)
- all text shall be presented neatly in an orderly manner and not over lapping
- text size for general notes and descriptions shall be 2.0mm plotted size (Leroy 80)
- text size shall not be less than 1.5mm plotted size (Leroy 60)
- text size for headings and titles to be appropriate for use
- drawings shall be signed and sealed by the Professional responsible for the design
- elevations are to be geodetic and related to the Geodetic Survey of Canada datum
- a local benchmark note shall appear in each drawing
- rubber stamps shall not be used except for the Professional's seal
- nothing shall be affixed to the drawing with tape or adhesive
- the drawings shall indicate the submission phase to which they apply
- existing information shall be shown light or background line weight
- proposed information shall be shown bold or foreground line weight
- in general, east-west streets shall have zero chainage at their westerly limit and north-south streets shall have their zero chainage at their southerly limits.
- chainage on a plan-profile shall increase from left to right.
- Key Plan drawn at 1:10,000 scale shall be shown in all plan and profile drawings and any other plans that encompass more than one drawing sheet, with the area covered by the drawing clearly identified.
- legend is to be provided on each drawing or a comprehensive legend on second sheet.
- Cross reference number scheme for each section or detail.

### 3.3 Computer Aided Drawings (CAD)

All drawings shall be prepared using AutoCAD, version 2004 or later.

### 3.4 General Plans

#### 3.4.1 Cover Sheet

The Cover Sheet shall contain a Key Plan which clearly identifies the location of the proposed project. Provide the name of the project, the municipality, consultant and a drawing index (optional on page 2).

#### 3.4.2 General Servicing Plans

General plans showing aboveground services and appurtenances are to be drawn to a scale of 1:1000. When more than one "General Servicing Plan" is required, a supplementary "General Servicing Plan" at a smaller scale shall be prepared to show the entire plan of development on one drawing.

The General Servicing Plan shall show but not be limited to:

- road allowances, lots, blocks, easements, daylighting and reserves in the same manner as shown on the registered plan;
- watermains and appurtenances, with notes showing sizes;
- maintenance hole numbers;
- sewers with notes showing flow type, size, and direction of flow;
- lot numbers per registered plan with provision to add street addresses when available;
- future land use identified;
- retaining walls;
- rear lot/block catchbasins;
- community mail boxes;
- hydro vaults, street lights, sidewalks:
- existing watercourse across lands or adjacent to lands:
- existing land use bordering lands extended far enough to clearly identify adjoining roads, buildings, driveways, utilities poles, hydrants, sewers and ditches:
- fill and flood line restrictions as specified by the local Conservation Authority
- clearly identify phasing and/or staging of the works
- clearly identify lands to be conveyed to the Town

#### 3.4.3 Grading Plans

Grading plans are to be drawn to a scale of 1 to 500 and shall clearly provide sufficient information to fully understand the movement of stormwater.

The grading plans shall indicate, but not be limited to, the following:

- existing 1.0 metre contours extended outside the subject lands far enough to determine the existing drainage pattern. If land is relatively flat, reduce to 0.5m contour intervals;
- on steeper grades, label only even numbered contours;
- driveway locations and building envelopes if known;
- elevations at existing trees, structures, watercourses, etc.;
- existing and proposed roads with elevations at 20m intervals;
- proposed sidewalks and trails with surface treatment labelled;
- proposed catch-basin's and ditch inlets;
- proposed elevations at front and rear building envelope as per zoning by-law;
- proposed elevations at the corners of each lot and block;
- proposed elevations at side-yard highpoints if applicable;
- proposed elevation at changes in slope
- proposed 0.5m contours for grading within large blocks and parks (> 1.0 ha);
- proposed grades for major and minor overland flow routes;
- lot fabric of subject lands including lot, block and easement description;
- physical structures such as fencing, retaining walls, etc.;
- proposed top of foundation elevation or finished floor (FF) elevation;
- proposed grades for storm system to intercept block and external drainage;
- swale and ditch cross section(s) identifying width, depth, side slope easement or property limits and maximum depth of water;
- proposed grading direction arrows;
- proposed culverts for road crossings;
- proposed overland flow route for major storm events and if it is marginal that major storm events will be contained within road allowance, or requested by the Town, provide high water level for major storm events

#### 3.4.4 Storm Drainage Plans

Storm drainage plans are to be drawn to a scale of 1 to 1000 (a scale not exceeding 1 to 5000 will be accepted for large external drainage areas) and are to indicate the total area to be drained by the proposed storm sewers and drainage system.

The storm drainage plan shall indicate but not be limited to, the following:

- existing 1.0 metre contours with even numbered contours labelled;
- drainage patterns of adjacent lands;
- runoff coefficients and areas (ha) of tributary areas outside the development and for each section of the storm sewers within the development;
- direction of runoff;
- street, blocks, lots and easements;
- street names;
- storm maintenance holes, numbered consecutively from the outlet;
- storm sewer sizes, slope and directions of flow;
- any catchbasins or swales, on the lots or blocks, required to collect the runoff;
- temporary or permanent quantity and quality storm water management facilities;
- major and minor overland flow routes;
- show storm discharge from site to nearest significant watercourse;

- culverts and other drainage appurtenances;
- legend

#### 3.4.5 Sanitary Drainage Plans

Sanitary drainage plans are to be drawn to a scale of 1 to 1000 and are to indicate the total area to be collected by the proposed sanitary sewers.

The sanitary drainage plan shall indicate but, not be limited to, the following:

- sanitary catchment areas (ha) and population per unit for each section of the sanitary sewers within the development;
- overall sanitary catchment area (ha) and population based on population per unit for each upstream section of the sanitary sewer entering the development;
- street, blocks, lots and easements;
- street names;
- sanitary maintenance hole numbers;
- sanitary sewer sizes, slope and directions of flow;
- forcemains
- pump stations
- lot services
- legend

#### 3.4.6 Water Distribution Plan

Water Distribution plans are to be drawn to a scale of 1 to 1000.

The water distribution plan shall indicate but, not be limited to, the following:

- street, blocks, lots and easements;
- street names;
- watermain size and material
- valves
- hydrants
- pump stations
- flushing points
- sample stations
- lot services
- legend

#### 3.4.7 Plan-Profile Drawings

Plan-profile drawings are to be drawn to a horizontal scale of 1 to 500 and a vertical scale of 1 to 50 and are to conform to the following:

- where multiple drawings are required for one street, match lines must be used and there shall be no overlap or duplication of information;
- where intersecting streets or easements are shown on a plan-profile, only the diameter of the pipe and direction of flow of the intersecting sewers shall be shown;

- on profile portion of drawings the type of sewer, material, diameter, length, grade and class of pipe shall be shown;
- on profile portion of drawings the watermain diameter, length, material and class of pipe shall be shown;
- only the type and diameter of pipe shall be shown in the plan portion;
- where possibility of conflict with other services exist, connections are to be plotted on the profile or a crossings chart included;
- provide centre line road elevations at 20.0 m intervals;
- pavement/road base grades for the particular roadway are to be indicated on all plan-profile drawings;
- top of bedrock from all borehole logs is to be plotted on the profile drawings;
- ground water elevation from geotechnical report to be plotted on profile drawings;
- gutter elevation details (% grade) for turning radii, cul-de-sacs and intersections to be shown on the plan;
- provide curb radii at all intersections, cul-de-sac's and horizontal curves
- All existing or future services, utilities and abutting properties shall be shown in dashed or screened line work;
- provide elevation and stationing for BVC, Apex (low point) and EVC on all vertical curves;
- pipe invert and related information shall be shown on the feature described and not to be presented in table form;

#### 3.4.8 Regulatory Signage Plan

*Left blank for now.*

#### 3.4.9 Composite Utility Plan

The Composite Utility Plan shall show all the above ground requirements of the General Servicing Plans as well as the proposed location of Bell, Hydro, Gas and Cable TV. All running line and road crossing locations must be established and resolved by the Consulting Engineer in conjunction with the Utility companies and in accordance with the locations shown on the typical cross-section.

#### 3.4.10 Erosion and Sediment Control Plans

Erosion and sediment control plans are to be prepared in accordance with the appropriate Provincial and Conservation Authority Standards.

#### 3.4.11 Details

Provide sufficient details to all works necessary to ensure that there are clear instructions on what is to be built with no ambiguity.

#### 3.4.12 Details for Stormwater outlets and watercourse improvements (if required)

*Left blank for now.*

### 3.4.13 Landscaping Plans

#### 3.4.13.1 General

All landscape plans shall be drawn and stamped by a Full Member of the Ontario Association of Landscape Architects. All landscape plans shall be drawn at a minimum scale of 1:500.

The landscape drawings may include the following:

- Existing Natural Features Assessment;
- Tree Survey/Vegetation Analysis;
- Tree Preservation Plan and Details;
- Streetscape and Buffer Planting Plans and Details;
- Detailed Park Development Plans and Details;
- Trails Master Plans and Details;
- Landscape Restoration Plans and Details;
- Stormwater Management Pond Planting Plan.

Construction details will be required for all landscape elements to be implemented as part of the development.

Any required landscape Restoration Plans and Stormwater Management Facility Planting Plans will require both the Town and the appropriate Conservation Authority's approval prior to implementation of the plans.

#### 3.4.13.2 Streetscape Plan

The Streetscape Plan shall show the following:

- all existing trees and natural features to remain with protection details;
- all building envelopes, driveways and sidewalks;
- all walkways, trails and easements;
- all required fencing including privacy, acoustic and chain link;
- all proposed plantings;
- all entry features;
- location of street lighting, public utility boxes, hydrants and other street furniture;
- location of easements

#### 3.4.13.3 Park Development

Detailed Park Development Plans are to be submitted by the Landscape Architect. A complete set of detailed design plans and working drawings are required. Park plans are to be submitted at a scale of 1:500 and shall indicate, but not be limited to, the following:

- existing contours;
- drainage structures and direction of overland drainage;

- species and size of existing plant material to remain and be protected;
- species and size of plant material to be removed;
- layout of all proposed recreation facilities;
- layout of parking lot and spaces (including handicapped parking);
- layout of all trails;
- proposed site amenities including benches, bike racks, trash receptacles, signs;
- perimeter fencing;
- park lighting;
- all surface treatments;
- all proposed plant materials

#### 3.4.13.4 Trails

The Developer may be required to design and construct a trail system, pathways and linkages to existing trail systems which will be identified through the planning process. Pathways adjacent to parkland and walkway easements adjoining parallel roads or acting as service access shall be fenced, gated, and planted according to the Town's Trail Design and Management Planning Handbook, available from the Town's Recreational Department. The provision of new trails shall be consistent with, and support the existing Town-wide trails network. The trail system in the Town consists of a comprehensive trails network that includes the regional Georgian Trail and a series of multi-use community wide trails.

The Town's trails network is generally comprised of:

- Multi-use urban hard surface trails, 3.0m width (hard surface, multi-use trails)
  - These are used for high-use trails, which can accommodate the widest variety and volume of non-motorized vehicles and users. These trails serve as part of an alternate transportation system for the Town and should be designed for both recreation and transportation. Usage can be year round or seasonal.
- Multi-use urban soft surface trails, 3.0m width (crusher fines, multi-use trails)
  - These are suited for trails with moderate use in urban, suburban, and easily accessed undeveloped areas but where multiple use is not a priority. Soft surface trails are typically not maintained during winter months, but does not preclude winter usage
- Multi-use rural soft surface trails, 2.0m width (crusher fines, multi-use trails).
  - These are suited for trails with moderate use in rural areas but where multiple use is not a priority. Soft surface trails are typically not maintained during winter months, but does not preclude winter usage.
- Natural surface trails, 2.0m width (natural surface, multi-use trails)
  - These are suitable for low to moderate use country and backcountry hiking trails where a natural and undeveloped feel is desired. Trail width can vary to handle the expected volume and types of use.
- Road based cycle routes, 1.0m width and safety buffer

- These trails are designed, constructed, and maintained on a case-by-case basis. On-road cycling lanes are separated from other travel lanes by a painted line reflective tape or rumble strip. Lines should be painted or taped the same white colour as other roadway lane lines. Paint should be to Ontario Provincial Standards and Specifications (OPSS).
- Snowmobile trails
  - These trails can be designed, constructed, and maintained on a case-by-case basis as arranged by the Community Trails Committee in conjunction with the Ontario Federation of Snowmobiles, the Town and the Developer.

Proposed trails should link together local points of interest, all open space amenities, and civic institutions and connect to the regional trails network. To the extent possible the route should be off-road, utilizing public open spaces, right-of-ways and easements.

Trails connecting through urban areas located within the road right-of-way should be paved multi-purpose cycle ways. Trails through sensitive natural features should be designed as soft surface paths and located to avoid fragile areas. Entrance points to the trail system should be marked with signage as required by the Town. All trails and walkways shall be approved by Council. Any proposed development affecting an existing trail, must have an interim/temporary trail in place during construction. Any works adjacent to or affecting the Georgian Trail shall be done in consultation with the Georgian Trail Board of Management.

## 3.5 Record Drawings

### 3.5.1 General

Upon completion of the construction of the Works or as requested by the Town, the Consultant shall obtain as-constructed field information and revise the original drawings accordingly and submit the same, as "Record Drawings".

All drawings shall be revised to reflect the "Record Drawing" condition for Works to be accepted by the Town. Lots and Blocks are to be numbered according to the Registered Plan and a separate distinct number for the municipal street address will be provided by the Town for incorporation into the "Record Drawings". Specific requirements for Storm System, Sanitary Sewers, Watermains and Roadways are noted in the following sections.

The drawings shall be sealed and signed by a Registered Professional Engineer and stamped "Record" and dated or provide appropriate wording that the undersigning Consulting Engineer is verifying and certifying that the works have been installed as described in the Record Drawings.

Drawings shall conform to the most recent requirements and AutoCAD standards of the Town.

### 3.5.2 Storm System

Actual storm system invert elevations shall be indicated on the "Record" drawings. If the difference is greater than 150 mm from the design vertical alignment, affected portions of the sewer or overland drainage route shall be redrawn in profile. Any maintenance hole which differs from the proposed horizontal location by more than 1.0m shall be redrawn in both plan and profile.

In addition, the following shall be indicated on the "Record" drawings:

- pipe/culvert size, grade, type, class/gauge, bedding;
- chainage from MH along main to service tees.

If the final grade of sewer differs by more than 5% of the design grade, the Consultant shall submit hydraulic calculations.

### 3.5.3 Sanitary Collection System

All actual sanitary sewer invert elevations shall be indicated on the "Record" drawings. If difference is greater than 150 mm from the design vertical alignment, affected portions of the sewer shall be redrawn in profile. Any maintenance hole which differs from proposed horizontal location by more than 1.0m shall be redrawn in both plan and profile.

In addition the following shall be indicated on the "Record" drawings:

- pipe size, grade, type, class, bedding;
- chainage from MH along main to service tees;
- dimensions from lot corners and elevations for service laterals.

If the final grade of sewer differs by more than 5% of the design grade, the Consultant shall submit hydraulic calculations.

#### 3.5.4 Water Distribution System

All actual watermain obvert elevations at 40m intervals and vertical bends shall be indicated on the "Record Drawings". If the difference is greater than 150mm from design vertical alignment, affected portions of the watermain shall be redrawn in profile. If horizontal alignment changes exceed 0.5m the affected portions of the watermain shall be redrawn in plan.

In addition, the following shall be indicated on the "Record" drawings:

- pipe size, type, class, bedding;
- swing-ties to all main appurtenances (valves, bends, tees, etc);
- chainage from appurtenance along main to main stops;
- dimensions from lot corners and elevations for service laterals;
- tracer wire gauge

Separate from the "Record" drawings, the Consultant shall supply a list of all appurtenances, valves, curb stops, fire hydrants, etc. installed as part of the project. In addition, the consultant shall fill in Service Locate Sheets, provide by the Town, for each service installed for new development or reconstruction.

#### 3.5.5 Roadways

All actual roadway centre line elevations to a tolerance of 0.025 metres, at a maximum 20m interval, shall be indicated on the "Record" drawings. Gutter elevations shall be indicated for cul-de-sacs and intersections to show drainage into storm system. If horizontal road alignment changes more than 0.5m or vertical geometry changes greater than 150mm the plan and/or profile shall be redrawn as appropriate.

In addition, the following shall be indicated on the "Record" drawings:

- driveways, lay-byes, curb depressions;
- road signage;
- laneway marking and stop bar locations.

## 4. DESIGN AND CONSTRUCTION REQUIREMENTS

### 4.1 Introduction

The purpose of this section is to outline the minimum design requirements for the construction of municipal services in the Town. These requirements are general in nature and do not relieve the Consultant of the responsibility for submitting a completed project demonstrating competent engineering design in full compliance with all applicable legislation.

Any deviation from the minimum Town standards shall be specifically referred to by the Consultant with a copy of prior written approval of the Town attached.

### 4.2 Storm Water Management System

#### 4.2.1 General

Stormwater quantity and quality must be satisfactorily addressed on all projects. The requirements of the Town, Ministry of the Environment, Grey Sauble Conservation Authority and Nottawasaga Valley Conservation Authority will apply. Stormwater management should conform to any applicable sub-watershed study.

Design and system selection must make reference to the Ministry of the Environment Storm Water Management Practice, Planning and Design Manual (2003) and its subsequent revisions.

Where curb and gutters are required, stormwater run-off shall be accommodated by a system of catch basins, manholes and storm sewers. The storm drainage system is to be designed to limit flood damage and hazards for non-frequent storm conditions, to provide a reasonable level of convenience and safety for pedestrian and traffic use by removal of lot and street surface run-off during frequent storm conditions and to prevent the impairment of water quality and disturbance to natural streams.

In all cases the designer must have regard for impacts on overland flow routes and receiving water courses. In all instances there shall be an adequate overland emergency flow route to the satisfaction of the Town.

#### 4.2.2 Drainage Areas

Allowances shall be made for inflows from adjacent lands that naturally drain into or through the subject Works and the system shall be designed to service all areas within the project to their maximum future development in accordance with the Official Plan. The Stormwater Management design must account for the safe conveyance of the greater of the runoff rate generated during the 100 year storm or Regional event from the development area and external catchments draining through the property. In addition, the design must be completed to ensure that there are no negative impacts to owners of upstream or downstream lands occurring as a result of the Works. The exact location for connecting sewers or channels to adjacent sewers or areas shall be approved by the Town's Engineer.

#### 4.2.3 Easements

If the required drainage works from municipal lands or lands to be dedicated to the municipality result in drainage through other lands, all such work shall be carried out by means of a storm drain and appurtenances of sufficient size for the drainage requirements of the area. The design shall be based on the run-off to be expected from the area when completely developed with buildings, pavements, sidewalks and parking areas.

The width of any drainage easement shall be sufficient for the facility and maintenance thereof. The minimum easement widths are as follows:

- One sewer and/or swale – 6 metres
- Two sewers, same trench – 8 metres
- 2x depth of sewer invert
- As dictated by the Town

#### 4.2.4 Drainage and/or Stormwater Management Report

The Drainage and/or Stormwater Management Report setting out the existing and proposed drainage system shall be submitted for approval to the Town's Engineer. The report may also have to be approved by the Ministry of the Environment, the Ministry of Natural Resources, the Grey Sauble Conservation Authority and Nottawasaga Valley Conservation Authority as appropriate. This report, among other things, shall pay particular attention to the following:

- a) Possible areas within the development lands not having suitable drainage outlets.
- b) The possible obstruction of natural drainage patterns by development and buildings.
- c) Details of a suitable drainage outlet(s) from the development lands including all overland flow routes.
- d) Natural watercourses entering the development lands and adjacent lands draining to the development lands.
- e) Accumulated flows at all proposed drainage structures.

The report shall include a plan showing the major overland system design. When the Rational Method is used, the relevant figures are to be entered on Storm Sewer Design Sheets. When computer modeling is used, the report shall indicate model parameters and assumptions used to give outflow hydrographs and hydraulic grade line levels where applicable.

This report shall provide recommendations for dealing with all drainage which affects the design of drainage works for the development and such recommendations, when approved, shall be incorporated into the Engineering Drawings.

#### 4.2.5 Design Criteria

The storm water system is to be designed to provide convenience drainage for frequent storms (minor system) and flood protection from rare events (major system).

#### 4.2.5.1 Minor System

Storm sewers and culverts are to be designed for at least a 5-year return frequency storm without surcharge where adequate overland drainage capacity exists to satisfy the major system requirements.

Exceptions to this may be considered when the major system is inadequate either because there is no outlet for overland flows or there is insufficient surface detention potential, the sewer system shall be designed to carry as much flow as necessary to achieve the minimum 100 year level of protection for the major system as specified below.

#### 4.2.5.2 Major System

Run-off rates in excess of the design capacity of the minor system shall be conveyed via streets and swales to an appropriate outlet. The combination of overland flow system and minor system shall be designed for the greater of the 100 year return frequency storm or Regional event, to prevent flooding of private property with maximum level of road flooding and surface detention. The extent and the elevation of the 100 year storm ponding are to be shown on the grading plan(s). Maximum ponding depth is not to exceed 0.30 m. The allowable ponding shall be as defined below.

LOCATION	STORM RETURN FREQUENCY (YEARS)		
	5	25	100
Walkways and Open Spaces	Minor Surface Flow up to 25mm Deep On Walkways	As Approved for Overland Flow Outlets	As Approved for Overland Flow Outlets
Local Roads	Within the roadside ditch or 1.0 metres wide in gutter or 0.10 metres deep at low point catchbasin	Up to Crown	0.15 over Crown
Collector and Industrial Roads	Within the Roadside Ditch or 1.0m Wide in Gutter or 0.10m Deep at Low Point Catch Basins	Up to Crown	0.10m Above Crown for flows parallel to road. Water course are not to cross over top road
Arterial Roads	Within the Roadside Ditch or 1.0m Wide in Gutter or 0.10m Deep at Low Point Catch Basins	One Lane Clear	Up to Crown for flows parallel to the road Water course are not to cross over top road
Private Property	Minor Ponding In Swales	No Structural Damage, Minor ponding In Yard Areas	No Structural Damage, Ponding in Yard Areas Below Building Openings - No Basement Flooding No designed flooding of private lands without approvals.
Public Property	Minor Ponding in Swales or Ditches	No Structural Damage Ponding in Flat Areas No Erosion	No Structural Damage Ponding in Flat Areas Some Erosion permitted

Street grading must provide a continuous gradient to direct street flows to an adequate outlet at low points. Outlets can be walkways or open sections of roadways leading to parks, open spaces or river valleys.

#### 4.2.6 Detention & Retention Facilities

Where deemed necessary by the Town to reduce run-off increases and to meet identified downstream flow and quality constraints, detention and/or retention facilities shall be provided for both the major and minor systems.

Land area set aside expressly for stormwater management facilities where it is not part of a privately owned facility (ie. roof top storage or otherwise incorporated into industrial/commercial lands) shall be designated as a "stormwater detention/retention site" and dedicated to the Town. It shall not be considered as part of the park system.

Stormwater management areas subject to site plan approval, will be on lands retained by the owner.

#### 4.2.6.1 Overflow Spillway

All stormwater management facilities shall be provided with an outlet (overflow spillway) designed to accommodate a 100-year return frequency storm flow without failure. Suitable erosion protection shall be provided downstream of the outlet for all flow conditions. Operation during spring snow melt or freezing conditions shall be investigated and any required changes shall be incorporated.

#### 4.2.6.2 Dry Ponds

Stormwater management Dry Ponds shall be designed to limit the maximum depth of water to 1.8m above the lowest point of the stormwater basin. An additional 0.3 m freeboard is required above the maximum peak flow flood level. The maximum depth of the extended detention zone shall not exceed 1.0 m above the lowest part of the pond. A maximum 5:1 slope shall extend from the bottom of the pond to the limit of maximum extended detention, with a minimum horizontal length of 3.0 m. The minimum allowable gradient on the bottom of the basin shall be 1.0% and the maximum gradient shall be 5.0%.

#### 4.2.6.3 Wetlands

Stormwater management Wetlands shall be designed to limit the maximum depth of water to 2.1 m above the lowest point of the stormwater basin excluding micro pools. An additional 0.3 m freeboard is required above the maximum peak flow flood level. The maximum depth of the extended detention zone shall not exceed 1.0 m above the permanent pool elevation. Maximum peak flow attenuation zone shall not exceed 1.8 m above the permanent pool elevation. The permanent pool depth shall range between a minimum depth of 0.15 m to a maximum depth of 0.3 m. A maximum 5:1 slope below the permanent pool level shall be permitted around the entire stormwater management pond. A maximum 5:1 slope above the permanent pool level shall be permitted around the entire stormwater management pond. The slope shall extend from the permanent pool level, to the limit of the maximum extended detention. The horizontal distance of this slope must be a minimum of 3.0 m. Micropools shall not exceed an additional maximum depth of 0.3 m below the permanent pool level. Micropools shall not exceed 5% of the total wetland permanent pool surface area.

#### 4.2.6.4 Wet Ponds

Stormwater management Wet Ponds shall be designed to limit the maximum depth of water to 3.3m above the lowest point of the stormwater basin. An additional 0.3 m freeboard is required

above the maximum peak flow flood level. The maximum depth of the extended detention zone shall not exceed 1.0 m above the permanent pool elevation. Maximum peak flow attenuation zone shall not exceed 1.8 m above the permanent pool elevation. The permanent pool depth shall range between a minimum depth of 1.0 m to a maximum depth of 1.5 m.

A maximum 5:1 slope below the permanent pool level shall be permitted around the entire stormwater management pond. The horizontal distance of this slope must be a minimum of 3.0 m. A slope commencing from this point to the lowest point of the stormwater basin shall be a maximum of 3:1. A maximum 5:1 slope above the permanent pool level shall be permitted around the entire stormwater management pond. The slope shall extend from the permanent pool level, to the limit of the maximum extended detention. The horizontal distance of this slope must be a minimum of 3.0 m.

#### 4.2.6.5 Forebays

Forebays are required for all stormwater management facilities. The permanent pool depth shall range between a minimum depth of 1.0 m to a maximum depth of 1.5m in which a maximum depth of 0.5 m shall be used for sediment accumulation. Forebays shall not exceed 33% of the total Wet Pond surface area and 20% of the Wet Land permanent pool surface area. All other aspects regarding the design of forebays shall conform to the above Wet Pond standards. Excluding maintenance access routes, all access to forebays shall be discouraged through shrub plantings.

From the point of maximum extended detention, to the lower limits of the "Safety Separation" area or property line where it abuts private property, slopes shall vary between 2:1 to 6:1 and have a maximum average slope of 4:1; not including the maximum 10:1 maintenance access slope.

#### 4.2.6.6 Landscaping

Native and non-invasive trees, shrubs, ground covers and aquatic plants are required in a low maintenance landscape design which has regard for the ecology of the site and the eco-region.

For Wet Ponds and Wetlands, all slopes 5:1 and steeper ranging from a minimum horizontal distance of 3.0 m from the permanent pool level to the property line (not including walkways and trails) shall be planted. For Dry Ponds, all slopes 5:1 and steeper ranging from a minimum horizontal distance of 3.0 m from the pool bottom level to the property line (not including walkways and trails) shall also be planted. Incorporating a wide range of slopes and ponding depths into facility design that conforms to the design criteria is strongly encouraged and desirable in order to facilitate a wide range of flora and fauna habitat conditions.

Where trees are to be planted, they must be planted at a minimum rate of 1 tree (40 mm cal) per 50 square metres. The density of shrub plantings, for safety purposes, shall vary depending on the degree of slope. Shrub planting shall prevent public access on all 2:1 slopes and discourage access on all 3:1 slopes.

#### 4.2.6.7 Operating and Maintenance Manuals

Upon the request of the Town the designer shall provide an operating and maintenance for the proposed Storm Water Maintenance Facility(ies).

#### 4.2.7 Ditches and Culverts

Ditches and driveway culverts shall be sized to convey a 5 year storm. Road crossing culverts to be designed to convey a 25 year storm on Local and Collector roads and 100 year storm on Arterial roads. Where curb and gutter are not required, ditches shall be constructed as follows:

- a) Culverts shall be constructed with low point of entrance or road over culvert.
- b) Ditches shall be constructed to contain the 5 year storm event without flooding the road surface.
- c) Depth below finished centreline grade shall be:  
Maximum 1.5 m  
Minimum 200 mm below bottom of granular to drain roadbed
- d) Ditch grade shall be:  
Maximum 6 percent  
Minimum 0.5 percent, 1.0 percent in areas of high ground water
- e) In exceptional cases and where ditches are on easements off the road allowance, ditches with grades greater than 6 percent may be allowed by the Town's Engineer but these shall be suitably protected against erosion by such means as rip-rap or gabions.
- f) Ditches through easements exceeding 1.8 m in depth shall be fenced off with standard 1.8m high chain link fence or shall be constructed with 4:1 side slopes.
- g) Where considered necessary by the Town's Engineer, ditches shall be piped.

The minimum ditch protection on all ditches shall be 100 mm of topsoil and staked sod on the side slopes and bottom of the ditch. The Town may consider the use of seed and mulch in place of nursery sod.

Ditch to ditch road cross culverts shall be installed where required as follows:

- Minimum Length - as required from centre of ditch to centre of ditch
- Minimum Size - 600 mm diameter
- Material - galvanized corrugated steel pipe
- Wall Thickness - as recommended by manufacturer for deep pipes, minimum wall thickness 2.0 mm (14 gauge)
- Cover - 300 mm minimum
- Bedding - Culverts shall be bedded and backfilled with granular material in accordance with Ontario Provincial Standards

Where it is necessary to construct culverts under roadways or driveways larger than the minimum size, the cross-sectional end area shall be calculated by an approved method as noted previously. The culverts shall be of reinforced concrete or corrugated steel and detail drawings and calculations shall be submitted for the approval of the Town's Engineer.

Driveway entrance culverts shall have a minimum diameter of 500 mm, a minimum wall thickness of 2.0 mm (14 gauge) and a minimum length of 7 m. Culverts for fire hydrant ramps, if required, shall have a minimum diameter of 500 mm and a minimum wall thickness of 2.0 mm (14 gauge). Larger diameter culverts may be required based on storm water management analysis.

#### 4.2.8 Water Quality

Quality controls for runoff from proposed developments within the Town are to be provided to achieve treatment to an Enhanced level of protection as per the "Stormwater Management Planning and Design Manual" MOE, March 2003.

The selection of Best Management Practices (BMP) for water quality control shall be investigated as directed by the Town's Engineer. When selecting and designing BMP's, reference should be made to the Ministry of the Environment Storm Water Management Practices Planning and Design Manual (2003) and its subsequent revisions.

The BMP selection process shall review all environment constraints and provide rationale for the selection of alternatives for a specific site as outlined in detail in the above noted MOE document.

In all cases, infiltration of stormwater from rooftops and grassed areas by using dry wells, infiltration trenches, buffer zones, grass swales, etc. shall be the primary consideration for stormwater quality control. Infiltration areas would be subject to the recommendations of a hydrogeological and soils investigation report. Runoff from roadways and parking lots must be treated prior to infiltration or discharge to a watercourse. For developments where infiltration is not possible, or is limited, infiltration ponds for extended detention facilities shall be considered.

Wet facilities shall be considered only if all other BMP's have been proven not feasible or ineffective.

Designers are encouraged to incorporate quantity and quality control within a single structure with multiple chambers.

The Town does not have a specific method or combination of methods specified with regard to stormwater quality. Each design shall be evaluated on its merits.

##### 4.2.8.1 Point Of Entry Control

In cases where the area of the development is not capable of facilitating the required quality control measures, point of entry traps shall be employed.

##### 4.2.8.2 Oil/Grit Separators (OGS)

Oil/Grit Separators (OGS) can be used as a stand alone unit without the requirement of supporting quality management devices on a site specific basis. The OGS design shall be signed and sealed by a Professional Engineer (Registered in Ontario). The information required for review is as follows:

Design calculations verifying the claimed performance  
Details and  
Maintenance requirements

The replacement of the approved OGS with an “equivalent” shall not be permitted without having the “equivalent” submitted for review and approval under the same site requirements.

#### 4.2.9 Connections to Ditch and Storm Sewers

##### 4.2.9.1 General

Rain water leaders, house perimeter tile drains, trench drains or sump pump pipes, shall not be discharged directly to the roadside ditches.

##### 4.2.9.2 Outfalls

Outfall structures to existing channels or water courses shall be designed to prevent erosion or damage in the vicinity of the outfall from maximum design flows. Headwalls shall be provided for all outfalls 400 mm and larger.

##### 4.2.9.3 Roof Leaders

Leaders are to be discharged to the ground surface to splash blocks and flows to be directed away from the building in such a way as to prevent ponding or seepage into weeping tile. Where flat roofs are used, as in commercial or industrial sites, detention roof hoppers requiring smaller or fewer roof leaders may be used as part of the stormwater management design. No connections are to be installed directly to storm or sanitary sewers or outletted to roadside ditches.

##### 4.2.9.4 Foundation Drains

It is the Town policy that foundation drains shall not be connected directly to the Town sewer systems. A sump pump system shall discharge to a 100 mm residential storm sewer connection. Where storm sewer connections are not available, the sump pump system shall discharge to a concrete splash pad in a landscaped area and with the water directed to side yard swales. The geotechnical report shall consider the ground water table elevation and recommend minimum basement elevations. Foundation drain discharge water that becomes a nuisance shall be corrected.

Basement floor slabs must be a minimum of 0.3 m above seasonal high ground water table.

##### 4.2.9.5 Storm Connections

All newly proposed residential developments with storm sewers will be required to provide a storm sewer connection to all residential dwellings. The residential storm sewer will be oversized to accommodate these additional flows.

Residential storm connections shall be PVC 100 mm SDR28 colour white.

Residential storm connections shall terminate at 1.0 m right of sanitary connection (when facing lot) with a gasketed cap/plug and an 89 mm x 38 mm marker painted white.

#### 4.2.9.6 Municipal Drains

Where development proposals include any sort of alterations to a municipal drain, the laws, regulations and specifications of the Ontario Municipal Drainage Act shall be strictly adhered to and the design specified by the Engineer's report for the Municipal Drain shall be met.

#### 4.2.9.7 Temporary Erosion and Sediment Control

Temporary erosion and sediment control measures during construction must be addressed on all projects.

All silt fences must be constructed as per OPSD 219.130, heavy duty silt fence.

The requirements of the Town, Ministry of Environment, Nottawasaga Valley Conservation Authority and Grey Sauble Conservation Authority will apply and any other applicable authority.

The Designer shall consider the sensitivity of the downstream environment and the availability of on-site retention facilities when determining erosion and sediment control measures.

The Stormwater Management and Erosion Control Plan(s) shall include the control measures required to prevent erosion and sediment control resulting from mud tracking onto municipal streets, windblown dust, and waterborne sediments entering the municipal sewer system.

The control measures shall be monitored and properly maintained during construction and until such time as the control measures are no longer required. Maintenance shall include the removal of sediment accumulated by the control measures.

Should the proposed control measures prove to be ineffective, then other methods and controls shall be added subject to the approval of the Town's Engineer.

#### 4.2.10 Storm Water Management System

##### 4.2.10.1 Design Flows

Potential increases in run-off rates of any storm event, resulting from new development on the project shall be controlled to pre-development run-off rates. Where downstream constraints exist such as those established by the Town or the Conservation Authority, the drainage report shall demonstrate how run-off rates will be controlled to satisfy those constraints. In the absence of

such constraints, the post-development flows generally shall not exceed the flows for pre-development conditions for the same storm event at the outlet unless it is demonstrated to the satisfaction of the Town's Engineer that uncontrolled flows will have no adverse effects.

#### 4.2.10.2 Methods of Computation

Pre-development peak flows shall be computed by a method such as the Rational Method or by an approved computer model. Watershed definition and pre-development flows must be approved by the Town's Engineer.

Preliminary estimates of post-development flow rates may be computed using a method such as the Rational Method.

Where:  $Q = 2.78ACI/1000$   
Q = flow (m<sup>3</sup>/s)  
A = area (ha)  
C = run-off Coefficient  
I = intensity (mm/hr)

For all systems and for the design of surcharged sewers and detention facilities, the latest version of the computer model OTTHYMO is recommended. Other hydrograph methods may be considered if it is demonstrated that the results are comparable to those from OTTHYMO. Post-development design flows may be determined using the Rational Method only where the design area is less than 40 hectares and run-off control facilities are not considered.

Rainfall intensity-duration-frequency equations or their curves and design storm hydrographs shall be based on the Owen Sound Rainfall Intensity chart.

#### 4.2.10.3 Time of Concentration

Where the first leg of a residential storm sewer system is sized using the Rational Method, the initial inlet time shall be 15 minutes for the 5-year storm. This shall apply where the upstream drainage area does not include large open space areas. Where peak flows from external areas enter a subdivision sewer system, the more critical case based on either the time of concentration including the external area or the time of concentration excluding the external area shall be used. Actual velocities of computed peak flows shall be used to estimate time of concentration. Calculations for time of concentration should be based on the Airport or Bransby-Williams formula as per recommendations of the MTO Drainage Management Manual. For areas where the slope exceeds 10 percent, the values established in the preceding calculations are to be used directly rather than rounded up.

A design evaluation of inlet times must be submitted to justify inlet times different from those specified above, especially in the cases where the sewer is designed for certain surcharge peaks for larger storms and where the sizing is optimized for both situations. Such an evaluation shall be approved by the Town's Engineer prior to submission of design drawings.

#### 4.2.10.4 Surface Run-off Coefficient

Surface run-off coefficient for the Rational Method are given by component of surface treatment and by Land Use. The Land Use values provided are intended as a guide only. The Designer is encouraged to develop an appropriate co-efficient using a composite calculation, which is subject to the approval of the Town's Engineer.

Description	C5
Sodded area under 7% slope	0.30
Sodded area over 7% slope	0.40
Paved Area with Storm Sewer	0.90
Paved Area with Sodded Swales (Dependent on Relative Area of Swale to Paved Area and on Type of Swale)	0.45 - 0.85
Gravel Area	0.75
Roof Area	0.90
Flat Roof Area with Detention Hoppers	0.10 - 0.50
Residential Lots	0.45 - 0.55
Commercial Lots	0.40 - 0.85
With Any Roof Leaders or Pavement to Sodded Areas	
Unimproved Open Space Under 7% Slope	0.25
Unimproved Open Space Over 7% Slope	0.35

For estimating flows from storms larger than the 5-year return storm, the run-off coefficients should be increased to account for the increase in run-off due to saturation of the soil, with the estimate becoming less accurate for larger storms. Coefficient for the larger storms can be derived as follows:

$$\begin{aligned}C10 &= (0.8 \times C5) + 0.2 \\C25 &= (0.7 \times C5) + 0.3 \\C50 &= (0.6 \times C5) + 0.4 \\C100 &= (0.5 \times C5) + 0.5\end{aligned}$$

In general, a storm sewer system shall be designed to convey not less than the 5-year return frequency storm without surcharge. Surcharged design may be considered for higher design levels where suitable methods are used. Foundation drains are not to be connected to the storm sewer.

#### 4.2.10.5 Rainfall Intensity

##### 4.2.10.5.1 Owen Sound IDF

Intensity Duration Frequency (IDF) Curves for the Owen Sound area are attached as Appendix 'C' to this document. The curves are derived using the following variables and formula:

$$I=A \times T^B$$

Where:

A = coefficient from chart (unitless)

T = time (hr)

B = coefficient from chart (unitless)

I = rainfall intensity (mm/hr)

Design Storm	A	B
2 yr	22.3	-0.714
5 yr	29.1	-0.724
10 yr	33.6	-0.729
25 yr	39.3	-0.734
50 yr	43.5	-0.736
100 yr	47.7	-0.738

#### 4.2.10.5.2 Chicago Storm Parameters

Most computer modeling programs use the “Chicago Storm” as the default method of simulating rainfall events. For the Owen Sound area, the parameters for modeling using the Chicago storm are as follows:

CHICAGO DESIGN STORM	2 yr	5 yr	25 yr	100 yr
Max. storm duration (min.)	180	180	210	210
Max. hydrograph length (min.)	360	360	360	360
Time step (min.)	5	5	5	5
Coefficient (a)	854.100	1234.576	1750.276	2171.754
Constant (b)	7.781	8.297	8.303	8.303
Exponent (c)	0.830	0.851	0.862	0.867
Fraction (r)	0.375	0.375	0.375	0.375
Duration $t_d$ (min.)	180	180	210	210
Maximum Intensity (mm/hr)	101.673	134.692	165.718	202.862
Total Depth (mm)	33.228	42.929	59.007	71.271

Rainfall intensity formula for this application:

$$I=a/(t+b)^c$$

Where:

a = Coefficient in Chicago Design Storm chart (unitless)

b = Constant in Chicago Design Storm chart (unitless)

c = Exponent in Chicago Design Storm chart (unitless)

t = time (minutes)

I = Rainfall intensity (mm/hr)

#### 4.2.10.6 Storm Sewer

##### 4.2.10.6.1 Pipe Capacities

Manning's Formula shall be used in determining the capacity of all storm sewers. The capacity of the pipe shall be determined under the condition that the pipe is running full.

The value of the roughness coefficient (n) used in the Manning's Formula shall be as follows:

Concrete pipe, all sizes	0.013
Concrete box culverts	0.013
Corrugated metal pipe	0.024
PVC pipe	0.009

##### 4.2.10.6.2 Flow Velocities

Minimum allowable velocity = 0.75 m/s

Maximum allowable velocity = 4.50 m/s

##### 4.2.10.6.3 Minimum Pipe Size

The minimum allowable pipe size for mainline storm sewer shall be 300mm.

##### 4.2.10.6.4 Minimum Grades

Regardless of the designed flow velocities achieved, the minimum design grades for storm sewer pipe shall be as follows:

Pipe Diameter	Minimum Grade
300mm to 375mm	0.50%
450mm to 525mm	0.30%
600mm to 1200mm	0.20%
1200mm and Greater	0.15%

##### 4.2.10.6.5 Changes in Pipe Size

In no case shall the downstream pipe size be smaller in diameter than that of the upstream pipe regardless of increase in grade.

##### 4.2.10.6.6 Radial (Curvilinear) Pipe

Manufactured radial pipe shall be allowed for all storm pipes sized 900 mm in diameter or larger. A maintenance hole shall be located at the beginning and the end of the radial pipe section.

#### 4.2.10.6.7 Location

The storm sewer location shall be as shown on the Town's Engineering Standards road cross section drawings. In the case of crescents or looped streets the storm sewer location can be varied to avoid crossing interference with the sanitary sewer.

#### 4.2.10.6.8 Minimum Cover

The depth of storm sewers shall be sufficient to allow for the drainage of adjacent properties having internal stormwater management systems outletting to the mainline system. The minimum cover to the top of the outside barrel shall be no less than 1.5 m from the centerline of the roadway. In cases where the road centerline is no longer relevant, minimum cover to the top of the outside barrel shall be no less than 1.3 m. Provisions are not required for downspout or foundation drain collection as it is not a permitted connection to the storm sewer.

#### 4.2.10.6.9 Pipe Crossings

A minimum crossing clearance of 300 mm shall be provided between the outside barrels at all points of crossing. In the case where the sewer is to cross over a previously disturbed trench the sewer is to be adequately supported to prevent settlement of the sewer. Where the proposed sewer is to be installed beneath a previously disturbed trench that trench will be adequately supported to prevent settlement of the trench.

#### 4.2.10.6.10 Limits

All sewers shall be terminated at the project limits using maintenance holes when external drainage is considered in the overall design of the sewer system. Maintenance holes at the limit of the development shall be designed for the future extension of the sewer.

#### 4.2.11 Materials

Storm sewer pipe shall be constructed of concrete or PVC. The type and class of the sewer pipe along with the bedding classification shall be shown for each length in the profile of the plan and profile drawings.

All pipes to be joined with a gasketed bell and spigot system.

PVC pipe shall be used in accordance to OPSD 806.040 excluding the use of DR 41.

Non-reinforced concrete pipe may be used for sizes of mainline sewer up to and including 375 mm.

Reinforced concrete pipe may be used for all sizes of mainline sewer.

#### 4.2.12 Pipe Bedding

The appropriate bedding class shall be selected from the OPSD with regard to the type of pipe being specified. (OPSD 806.040 as pipe strength may be surpassed due to exceeding the specified trench width.) If the specified trench width were to be exceeded during construction, a stronger pipe or an increase in bedding material shall be required.

#### 4.2.13 Maintenance Holes

Concrete maintenance holes shall be provided at all changes in direction or junctions of the sewer and at all street intersections.

##### 4.2.13.1 Maximum Spacing

The maximum spacing between maintenance holes shall be as follows:

Pipe Size	Max. Maintenance hole Spacing
300 mm	95 m
375 mm to 750 mm	100 m
825 mm to 1200 mm	125 m
1200 mm and Greater	150 m

##### 4.2.13.2 Materials

Storm Maintenance holes shall be constructed of precast or poured concrete and shall be a minimum of 1200 mm inside diameter. The Ontario Provincial Standard 700 series Drawings shall be used for maintenance hole design where applicable. The Designer is to analyze each maintenance hole applying the OPSD related to soil conditions, ground water, loading, and other pertinent aspects to determine structural suitability. In the cases where the OPSD are not adequate, the maintenance hole(s) shall be individually designed and detailed.

Reference shall be made on the plan and profile drawings regarding the type and size of all maintenance holes. In the case of a standard 1200 mm precast maintenance hole, referring to OPSD 701.010 will suffice.

##### 4.2.13.3 Maintenance Hole Design

- All maintenance hole chamber openings shall be located such that the ladder rungs are over the raised portions of the benched bottoms. In no case shall a ladder rung be placed in front of any portion of the inlet or outlet barrels.
- The direction of the flow in any maintenance hole shall not be permitted at acute interior angles.
- Safety grates shall be provided in all maintenance holes exceeding a depth of 5 m. The maximum spacing between safety grates is not to exceed 4.5 m.
- The obvert of the outlet pipe shall not be higher than the obvert of the inlet pipe(s) at any maintenance hole location.
- In the case of sewers 900 mm and greater the change in direction of flow in any maintenance hole shall be no more than 45°.
- Where the difference in elevation between the inlet invert and outlet invert exceeds 900 mm, a drop structure shall be placed on the inlet side of the maintenance hole.
- All storm maintenance holes shall be benched as per OPSD 701.021. In the case where OPSD 701.021 does not apply a detailed drawing will be shown on the plan and profile drawing that the maintenance hole is subject to.
- The minimum width of benching in all maintenance holes shall be 230 mm
- Minimum size of any maintenance hole stack shall be 685 mm x 685 mm.
- Maximum height of maintenance hole entry rings (Mod-u-loc) is 450 mm before another precast concrete maintenance hole structure ring is necessary.
- The maximum offset from vertical in maintenance hole entry rings is 50 mm.

#### 4.2.13.4 Head Losses

Appropriate drops shall be afforded across all maintenance holes to compensate for the loss of energy inherent to changes in flow velocity and changes in flow depths in sewers.

In general changes in velocity between the inlet and outlet pipes shall be no greater than 0.6 m/s.

Hydraulic calculations shall be provided when maintenance holes with outlet pipes of 900 mm in diameter and larger are required. Upon the request of the Town, hydraulic calculations may be required for maintenance holes with outlets smaller than 900 mm.

Regardless of the drop across a maintenance hole required by design calculations, the obvert of the outlet pipe shall not be higher than the obvert of the inlet pipe(s) at any maintenance hole location.

The minimum drops across maintenance holes shall be as follows:

Change in Horizontal Direction	Minimum Drop
0° (no change)	20 mm
1° to 45°	50 mm
46° to 90°	80 mm

The change in direction of the inlet(s) and outlet pipes shall always be 90° or less. In the case of sewers 900 mm and greater, the change in direction of flow in any maintenance hole shall be not more than 45°.

#### 4.2.13.5 Grates for Maintenance Hole Frames and Covers

All maintenance holes located within the travelled portion of the roadway shall have the rim elevation set flush with the surface of the base course of asphalt. The setting of the frame and cover shall be constructed in accordance with OPSD 704.010.

The maintenance hole frames and covers are to be raised using concrete maintenance hole entry rings (mud-u-loc) prior to the placement of the top course of asphalt.

#### 4.2.14 Catchbasins

Catchbasin leads shall be connected to the main sewer through a maintenance hole except where the main sewer size is 900 mm or greater in diameter, in which case the lead can be connected directly to the main sewer in the top half of the pipe using saddles and straps.

##### 4.2.14.1 Location and Spacing

Catchbasin type shall be selected, located and spaced as per the requirements of the design. The catchbasin type and location shall take into consideration roadway area, roadway grade, lot area and lot grades, driveway locations and intersection locations. Catchbasins shall be provided on both sides of the street and double catchbasins shall be provided at all sags. The maximum catchbasin spacings are as follow:

Asphalt Width	Road Grade	Max. Spacing
> 11 m	≤ 4.5%	75 m
> 11 m	> 4.5%	60 m
≤ 11 m	≤ 4.5%	90 m
≤ 11 m	> 4.5%	75 m

Catchbasins shall be located upstream of pedestrian crossings and upstream of sidewalk crossings at intersections. Catchbasins shall not be located in driveway curb depressions, whenever possible.

Double catchbasins shall be used when flow is encountered from more than one direction where the total distances from each highpoint is greater than that allocated in the Max. spacing chart above. Double catchbasins will not be used to increase catchbasin spacing.

Rear yard catchbasins and connections shall be located as detailed in the Lot Grading Criteria.

#### 4.2.14.2 Catchbasin Types

Catchbasins shall be constructed of precast or poured concrete.

Single, double, and catchbasin maintenance holes shall be specified as per OPSD. Rear yard catchbasins are to be specified as such, but detailed as the design appropriate OPSD.

The maximum catch basin height measured from the top of grate to pipe invert shall not exceed 2.4 m. Otherwise maintenance hole catch basins with 300 mm sumps shall be used.

All street line catchbasins shall have a 600 mm sump. All rear yard catchbasins shall be benched.

All special catchbasin or inlets shall be designed and detailed by the Designer.

#### 4.2.14.3 Catchbasin Connections

The minimum catchbasin lateral sizes shall be 300mm dia.

In general, catchbasins located in close proximity to a maintenance hole shall have the lead connected to the maintenance hole and benched accordingly. Long catchbasin leads in excess of 90 meters shall be connected to a maintenance hole or alternatively the 600 mm x 600 mm catchbasin shall be replaced with a 1200 mm catchbasin maintenance hole. Catchbasins are not to be used in series and local stormwater systems are only to connect to a maintenance hole structure (minimum 1200 mm diameter) or mainline tee.

#### 4.2.14.4 Grates

The frame and cover for catchbasins shall be as per OPSD. In general, OPSD 400.020 shall be installed for all catchbasins located within the roadway, rear yard applications, pedestrian pathways or parkland. OPSD 403.010 shall be installed for all ditch inlet catchbasins. "Birdcage" style grates as per OPSD 400.120 shall be used in rear yard catchbasins or as indicated by the Town. Inlet structures with grates shall be designed to allow entry of design flow at 50%

blocked. Where the catchbasin receives open channel flow that may be subject to debris, the Town may specify a custom grate and a larger lead size.

#### 4.2.14.5 Catchbasins at Intersections

All catchbasins at intersections shall be located on the tangent section of the curb, a minimum of 1.0 m distance from the beginning or end of the curb radius on upstream side of sidewalk crossing.

#### 4.2.14.6 Catchbasin Riser Rings

The maximum offset from vertical in catchbasin entry rings is 50 mm.

#### 4.2.15 Inlets, Outfalls and Special Structures

For most design solutions, the Town requires the use of OPSD inlet and outlet structures, frames and grates. In cases where the Designer's solution requires a special inlet or outlet structure the Designer shall fully design the structure.

Inlet conveyance systems and outlet conveyance systems are to be fully designed to protect against channel morphology. The extent of the protection shall be specified on the engineering drawings and shall depend on velocity at the inlet/outlet and their ability to provide a laminar transition, soil conditions, the existing base flows and site characteristics.

#### 4.2.16 Open Channels

Generally, open channels shall not be considered by the Town unless the flow exceeds 10 m<sup>3</sup>/s. All open channels shall be designed to convey the 100 year return storm flow with a free board 0.20 times the depth.

Scouring velocity of the cover materials and vegetation shall be considered. The velocities of stormwater in swales or open channels shall be calculated and submitted as a component of the Stormwater Management Report.

The proposed rationale for an open channel shall be submitted to the Town's Engineer for approval prior to the detailed design. The Consulting Engineer shall also be responsible for obtaining approval from the authorizing Conservation Authority, the Ministry of Natural Resources, and the Ministry of the Environment.

## 4.3 Sanitary Sewer System

### 4.3.1 Design

#### 4.3.1.1 Design Flows Residential:

Flows to be designed in accordance with the M.O.E. Guidelines for the Design of Sanitary Sewage Works (latest edition) and the requirements below

Average Flow = 450 L / capita / day *exclusive of extraneous flows*

Peak Extraneous Flow = 0.23 L/s/ha

Peak Flow =  $\frac{MQP}{86.4} + I \times A$  (L/s)

Where:  $M = \text{Peak factor} = 1 + \frac{14}{4 + P^{0.5}}$  "Harmon Formula"

Q = Average daily per capita domestic flow (L/ capita / day)

P = Design Population / 1000

I = Unit of peak extraneous flow (L/s/ha)

A = Tributary area (ha)

#### Commercial / Institutional:

Commercial / Institutional	= 100 persons / ha
Hospitals	= 900-1800 L / bed / day
Schools	= 70-140 L / student / day
Church	= 100 persons / ha
Motels	= 150-200 L / bed / day
Hotels	= 225 L / bed / day

Note: All Commercial / Institutional flow information is exclusive of extraneous flows.

#### Industrial:

Light Industrial	= 20000 L / ha / day
Heavy Industrial	= 55000 L / ha / day

Note: All Industrial flow information is exclusive of extraneous flows.

#### 4.3.1.2 Population Density

Population density to be determined from maximum unit density permitted under the Official Plan or actual unit count, whichever is the largest, multiplied by the average unit population. The average number of persons per unit regardless of density is 2.3.

#### 4.3.1.3 Future Sanitary Sewer Requirements

Future land use and population shall be based on The Blue Mountain Official Plan. The system shall be designed to service all areas within the project to their maximum future development in accordance with the Town's Official Plan. Allowance shall be made for inflows from the appropriate adjacent contributing area. Discharges of the system are to be into appropriate sewers and are to be approved by the Town. The exact location for connecting to sewers in adjacent subdivisions or areas shall be as approved by the Town.

#### 4.3.2 Sewer Pipe

##### 4.3.2.1 Minimum Pipe Size

The minimum allowable pipe size for mainline sanitary sewer shall be 200 mm.

##### 4.3.2.2 Minimum Grades

Regardless of the flow velocities achieved, the minimum design grades for sanitary sewer pipe shall be as follows:

Sewer Size	Minimum Grade
200 mm – 300 mm	0.50%
375 mm – 675 mm	0.40%
750 mm – 825 mm	0.30%

The first leg of any sewer regardless of size shall be 1.00%

##### 4.3.2.3 Pipe Capacities

Manning's Formula shall be used in determining the capacity of all sanitary sewers. The capacity of the pipe shall be determined under the condition that the pipe is running full.

The value of the roughness coefficient (n) used in the Manning's Formula shall be 0.013.

#### 4.3.2.4 Flow Velocities

For circular pipes (flowing full) the minimum acceptable velocity is 0.75 m/s and the maximum acceptable velocity is 3.0 m/s. The minimum velocity for sewers operating partially full shall result in self-cleansing equivalent to that produced by flow in sewer operating full at a velocity of 0.6 m/s.

#### 4.3.2.5 Changes In Pipe Size

In no case shall the downstream pipe size be smaller in diameter than that of the upstream pipe regardless of increase in grade.

#### 4.3.2.6 Head Losses

Appropriate drops shall be afforded across all maintenance holes to compensate for the loss of energy inherent to changes in flow velocity and changes in flow depths in sewers.

In general changes in velocity between the inlet and outlet pipes shall be no greater than 0.6 m/s.

Regardless of the drop across a maintenance hole required by calculations, the obvert of the outlet pipe shall not be higher than that of the obvert of the inlet pipes at any maintenance hole location.

The minimum drops across maintenance holes shall be as follows:

Change in Horizontal Direction	Minimum Drop
0° (no change)	30 mm
1° to 45°	50 mm
46° to 90°	80 mm

The change in direction of the inlet(s) and outlet pipes shall always be 90° or less. In the case of sewers 900 mm and greater the change in direction of flow in any maintenance hole shall be not more than 45°.

#### 4.3.2.7 Location

The sanitary sewer location shall be as shown on the Engineering Standard Design road cross section drawings. Generally the location is in the centerline of the roadway.

#### 4.3.2.8 Minimum Cover

Sanitary sewers shall be buried a minimum of 1.0 m below basement floor elevations where possible to allow for the installation of sewer laterals. In areas of no sanitary sewer connection the sewers shall have a minimum frost cover of 1.6 m.

#### 4.3.2.9 Pipe Crossings

A minimum crossing clearance of 300 mm shall be provided between the outside barrels at all points of crossing. In the case where the sewer is to cross over a previously disturbed trench the sewer is to be adequately supported to prevent settlement of the sewer. Where the proposed sewer is to be installed beneath a previously disturbed trench that trench will be adequately supported to prevent settlement of the trench. The sanitary sewer connections are required to go under the storm sewer.

#### 4.3.2.10 Limits

All sewers shall be terminated at the project limit using maintenance holes when external drainage is considered in the overall design of the sewer system. Maintenance holes at the limit of the project shall be designed for the future extension of the sewer.

#### 4.3.3 Materials

Sanitary sewer pipe shall be constructed of PVC. Concrete or HDPE may be considered in some applications. All sanitary sewer pipes shall conform to the requirements of CSA and OPSS.

For sewer applications requiring pressure pipe, pipe design should reference MOE guidelines.

The type and class of the sewer pipe along with the bedding classification shall be shown for each length on the plan and profile drawings.

PVC pipe shall be used in accordance to OPSD 806.040 excluding the use of DR 41.

#### 4.3.4 Pipe Bedding

The appropriate bedding class shall be selected from the OPSD with regard to the type of pipe being specified. If the specified trench width were to be exceeded during construction, a stronger pipe or an increase in bedding material shall be required.

In areas where it is difficult to control the infiltration of ground water into the sewer trenches, a clear stone may be used provided it is wrapped in a suitable geotextile, selected and installed in accordance with the manufacturer's requirement.

#### 4.3.5 Sanitary Maintenance Holes

Maintenance holes shall be located at each change in alignment, grade or pipe material, at all pipe junctions, and at regular intervals along the pipe to permit entry for maintenance to the sewer.

##### 4.3.5.1 Maximum Spacing

The maximum spacing between sanitary maintenance holes shall be as follows:

Pipe Size	Max. Maintenance hole Spacing
200mm to 750mm	100m
750mm to 1200mm	125m
1200mm and Greater	150m

##### 4.3.5.2 Maintenance Hole Types

Maintenance holes shall be constructed of precast or poured concrete. The Ontario Provincial Standard 700 series Drawings shall be used for maintenance hole design where applicable. The Consulting Engineer is to analyze each maintenance hole applying the OPSDs related to soil conditions, ground water, loading, and other pertinent aspects to determine structural suitability. In the cases where the OPSDs are not adequate, the maintenance hole(s) shall be individually designed and detailed and stamped by an engineer.

Reference shall be made on the plan and profile drawings regarding the type and size of all maintenance holes. In the case of a standard 1200 mm precast maintenance hole, referring to OPSD 701.010 will suffice.

##### 4.3.5.3 Maintenance Hole Design

- All maintenance hole chamber openings shall be located such that the ladder rungs are over the raised portions of the benched bottoms. In no case shall a ladder rung be placed in front of any portion of the inlet or outlet barrels.
- The direction of the flow in any maintenance hole shall not be permitted at acute interior angles.
- Safety grates shall be provided in all maintenance holes exceeding a depth of 5 m. The maximum spacing between safety grates is not to exceed 4.5 m.
- The obvert of the outlet pipe shall not be higher than that of the obvert of the inlet pipes at any maintenance hole location.
- In the case of sewers 900 mm and greater the change in direction of flow in any maintenance hole shall be no more than 45°.
- Where the difference in elevation between the inlet invert and outlet invert exceeds 900 mm, a drop structure shall be placed on the inlet side of the maintenance hole.
- All storm maintenance holes shall be benched as per OPSD 701.021. In the case where OPSD 701.021 does not apply a detailed drawing will be shown on the plan and profile drawing that the maintenance hole is subject.
- The minimum width of benching in all maintenance holes shall be 230 mm
- Minimum size of any maintenance hole stack shall be 685 mm x 685 mm.
- The maximum height of maintenance hole entry rings (i.e. Mod-u-loc) is 450 mm before an additional precast concrete maintenance hole riser section is necessary.
- The total maximum offset in maintenance hole entry rings is 50 mm.

#### 4.3.5.4 Grates for Maintenance Hole Frames and Covers

All maintenance holes located within the travelled portion of the roadway shall have the rim elevation set flush with the surface of the base course of asphalt. The setting of the frame and cover shall be constructed in accordance with OPSD 704.010.

In cases where sanitary maintenance holes are located in areas where storm water surface ponding is designed to take place a water tight maintenance hole cover shall be used as per OPSD 401.050.

The maintenance hole frames and covers are to be raised using concrete rings prior to the placement of the top course of asphalt.

#### 4.3.6 Sanitary Service Connections

Sanitary service connections are to have a minimum of 2.0% slope at all sections of the service connection.

Sanitary connections are to be sized in accordance with the following sizes:

Single family residential:

single 125 mm diameter (min.) PVC SDR 28 Current requirement

Multiple family residential block, institutional, commercial and industrial blocks:  
designed to convey expected peak flow;  
Min. size 200 mm diameter.

Sanitary connections shall be in accordance with the following Standards:  
OPSD 1006.010 Sewer Service Connection for Rigid Pipe;  
OPSD 1006.020 Sewer Service Connection for Flexible Pipe.

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.

#### 4.3.7 Testing and Acceptance

The complete sewer system including service connections to the property line and maintenance holes shall be tested in accordance with OPSS. Deformation gauge (Pig) test as per OPSS is required on all pipe works prior to Town acceptance. All pipe works shall have a CCTV inspection as per OPSS 409 completed as part of the preliminary and final acceptance inspections.

## 4.4 Water Supply System

### 4.4.1 Watermain Design

#### 4.4.1.1 General

The proposed design must consider and be able to convey all water needs for the project under consideration and adjacent lands. The phasing of any construction or implementation must be in a manner to provide orderly and reliable water distribution systems within the development, looping of these systems shall be provided to the satisfaction of the Town.

Watermains shall be designed to carry the maximum day demand plus fire suppression flows or peak hour flow whichever is greater.

A hydraulic network analysis of the water distribution system shall be carried out and shall include allowances for demands to adjacent areas anticipated.

#### 4.4.2.1 Demand Criteria

The average daily demand is to be 450 litres/capita/day. The estimated populations and areas for the different neighbourhoods shall be in accordance with The Blue Mountains' Official Plan or the actual unit count multiplied by 2.3 persons/unit.

The maximum day and peak hour factors shall be determined from the current MOE design guidelines although the following are considered minimums:

Maximum daily demand factor: 2.0

Peak hourly demand factor: 4.5

Flows and peaking factors for industrial, commercial and institutional land uses shall be determined on an individual basis.

#### 4.4.2.2 Fire Suppression

Water demand for fire suppression shall be determined from the Fire Underwriters Survey (FUS), latest edition dependent on the actual land uses. If the actual land use is not known, the water demand for fire suppression shall be determined from the maximum possible depending on the current zoning or as directed by the Town. Where there is evidence acceptable to the Town that FUS level of fire protection will be available within 5 years, the interim level of available fire flow can be reduced to that required under the Ontario Building Code (OBC).

#### 4.4.2.3 Frictional Losses

The Hazen-Williams formula shall be used for computing friction losses and subsequently sizing the watermains. For new mains the values of "C" coefficient shall be 110 for 150 mm diameter pipe, 120 for 200 mm diameter pipe and 130 for larger.

#### 4.4.2.4 Minimum Size

The minimum size of mains shall be 150 mm in diameter in residential subdivisions and 200 mm diameter in industrial developments.

#### 4.4.2.5 Maximum Velocity

The maximum velocity in the watermain under all flow conditions shall not exceed 5.0 m/s.

#### 4.4.2.6 Permissible Pressure Ranges

The permissible pressure range for varying demand events are as followed and are measured at the centreline road elevation.

Average and Maximum Day: 350 – 550 kPa (50 – 80 psi)

Minimum and Peak Hour: 275 – 700 kPa (40 – 100 psi)

Maximum Day plus Fire Suppression: 140 – 700 kPa (20 – 100 psi)

Where the topography is such that the pressure at the centreline road elevation will be greater than 550 kPa (80psi), an individual pressure reducing device will be required on each water service.

In instances where all services are protected by an individual pressure reducing device, the maximum pressure in the watermain system shall not exceed 825 kPa (120 psi). The use of individual reducing valves shall be pre-approved by the Town.

#### 4.4.3 Depth of Watermains

The minimum ground cover on watermains service laterals and hydrant leads shall be 1.7 m at all points or 1.2 m with a pre-approved insulation procedure. The maximum ground cover shall be 2.5m unless approved by the Town.

#### 4.4.4 Separation of Watermains and Sanitary Sewers

Minimum separation between watermains and sanitary sewers shall be provided in accordance with MOE guidelines.

#### 4.4.5 Location

The watermain shall be located as shown on The Blue Mountains standard road cross section drawings.

4.4.6 Pipe Classification and Bedding Watermains shall be PVC DR18.

#### 4.4.7 Bedding

Pipe embedment and backfill shall be as per OPSS and OPSD.

#### 4.4.8 Thrust Blocks and Joint Restraints

Thrust blocks or joint restraints shall be required at all changes in pipe direction, terminations and any location where thrust pressures may occur. Where soil conditions are suspect, such as in disturbed soils or soils with bearing strength of less than 200 kPa, pipe restrainers shall be used.

The use of threaded rod in joint restraint is not permissible.

Serrated (machined) ring type joint restraints for PVC shall meet the requirements of Uni-Bell B-13 or ASTM F1674, and AWWA C-111 where appropriate, and be listed by ULc or FM. Accepted products include Clow (Series 300, 350, 360), Ebaa (Series 1600, 2500, 2800), Sigma (PV Lok PVP, PVM, PVPF) and UniFlange (Series 1300, 1350, 1360). Wedge action type joint restraints for PVC pipe shall meet the requirements of Uni-Bell B-13 or ASTM F1674, and AWWA C-111 where appropriate, and be listed by ULc or FM. Accepted products include Ebaa (series 2000PV), Sigma (One lok SLC), and UniFlange (Series 1500)

The length of watermain protected with mechanical joint restraint shall be clearly indicated on design and record drawings.

#### 4.4.9 Cathodic Protection

Unless otherwise approved, anodes shall be installed at all valves, tees, caps, elbows, reducers, sleeves, hydrants, curbstops, service saddles and each length of ductile main. The anode shall be connected using the "cadweld" method and shall be installed in accordance with the manufacturer's recommendations and specifications. All "cadwelds" are to be covered with

mastik material. The anode shall be connected to curbstops in conjunction with an electrical brass grounding clamp.

In addition, all fitting bolts are to be fitted with 19mm sacrificial zinc caps. Cap shall be “Protecto-Caps” Cat. No. 175P190 or approved equal.

Anode Sizing Chart for Zinc Anodes

Wtm / Fitting	Anode Size (kg)	Spacing
100mm	2.3	Per length over 3.0m or fitting of similar size
150mm	2.3	Per length over 3.0m or fitting of similar size
200mm	5.5	Per length over 3.0m or fitting of similar size
250mm	5.5	Per length over 3.0m or fitting of similar size
300mm	11	Per length over 3.0m or fitting of similar size
Copper Service	2.3	At each curbstop
Hydrant	5.5	At hydrant base
Valve	5.5	At each valve
Service Saddle	2.3	At each service saddle
Tees, elbows etc.	2.3	On each fitting for 100mm – 150mm pipe
Tees, elbows etc.	5.5	On each fitting for 200mm to 300mm pipe

NOTE: Under certain circumstances, the anode may be connected to the mainstop or a coupling in conjunction with an electrical grounding tailpiece.

4.4.9.1 Anodes

All anodes shall be packaged zinc anodes. The zinc anode coating shall have a 316 stainless steel core wire. The zinc anode casting is to be packaged in cardboard or a cloth bag having a minimum diameter of 100 mm. The backfill material within the package shall be a Gypsum/Sodium Sulphate/Bentonite mixture having an electrical resistivity less than 50 ohm cm wet. An insulated copper (AWG 10-12) wire 3 metres in length shall be brazed to the end of the core wire.

Duratron Systems Limited, Cathodic Technology Ltd., Maple Agencies and Corrosion Service Company Limited presently manufacture anodes to the specified requirements.

4.4.10 Underground Chambers

Underground chambers will be reviewed on a site specific basis. Underground chambers will not be constructed with maintenance-hole frame and grates for access.

4.4.11 Fire Hydrants

Fire hydrants shall be Canada Valve, open left.

Hydrants shall be spaced at a maximum distance of 100 m in residential and 90 m in commercial or industrial areas.

Hydrants shall be located on the projection of side lot lines. A hydrant shall be placed at the end of every cul-de-sac and dead end street as well as at the high points in roads.

All hydrants shall be painted chrome yellow. All hydrants shall have a Flexstake Hydrant Marker Model FHV804, 1.2 m long, colour yellow with a reflective hydrant graphic on both sides at the top of the marker. The required hydrant marker is positioned on the right port as viewed from the street.

A fire hydrant marker shall be installed 0.3m behind each hydrant. The sign shall be reflective with a red hydrant on a white background and measure 0.3 m x 0.3m. The sign shall be mounted 1.5m above grade.

Fire Hydrants require Stortz connections on all steamer ports. Access paths (3.0 m wide) shall be provided to all hydrants where side ditches are required. Provide culverts as required.

Hydrant sets shall be installed at not less than 0.9 m from the centre of the valve to the centre of the hydrant. Tracer wire shall be attached to the outside of the valve box and wire brought into valve box under cap. The tracer wire does not need to be taken to the hydrant.

All owners of private fire hydrants must participate in the Town's "Privately Owned Fire Hydrant Maintenance Program" (Form #D001). A yearly fee will be charged for this service

#### 4.4.12 Valves

Isolation valves shall be resilient seat gate valves with mechanical joints, open left, Clow or Mueller. Valve boxes shall be 5-SL-48 sliding or Mueller MVB composite complete with guide plate and ductile adjustable top and lid or approved equal with cap painted blue.

Generally, isolation valves shall be located on the projection of side lot lines at or near intersections as required for spacing. Generally 3 valves shall be placed at cross intersections and 2 valves at tee intersections. An isolation valve shall be installed between each fire hydrant such that no two adjacent fire hydrants are out of service.

Where watermains are terminated pending future extension, a valve and 2 additional lengths of watermain with plug, blow-off and thrust block shall be installed.

Valves shall have a maximum spacing of 100 m for distribution watermains and 400 m for trunk supply mains.

Any valves placed in gravel shoulders or roundings shall be protected with asphalt or concrete apron.

#### 4.4.13 Air Release and Drain Chambers

Air release valves shall be utilized at high points of all watermains where there is no servicing or fire hydrants to provide air release or as requested by the Town Engineer.

Drains shall be provided at low points of all watermains 350 mm and larger.

#### 4.4.14 Service Connections

Service connections shall be 19mm type K copper pipe, Rehau's Municplex (blue) or Series 160 PE and shall terminate at 2.5 m left of sanitary connection (when facing lot) and supplied with a 89 mm x 38 mm marker from the invert of the service to 600 mm above grade painted blue.

Service connections shall be left with a tail up to grade and capped or crimped.

Service connections for industrial, commercial, institutional or multiple dwelling use will be considered on an individual basis. Fire connections may be required for industrial, commercial, institutional or multiple dwelling lots.

Water service fittings shall be as follows:

Main stop B Mueller H25008  
Curb stop B Mueller H25209  
Service Saddle B Robar 2706 double strap  
Tapping Saddle B Robar 6906  
Service Boxes B Mueller A-726  
Stainless Steel Rod

#### 4.4.16 Metering

All services shall be metered including irrigation and other exterior uses. Meters to be Neptune T-10, complete with radio read.

For larger installations it is necessary to install a meter in accordance with the "Canadian Standards Association, B64.10-01 – Manual for the Selection and Installation of Backflow Prevention Devices/Manual for the Maintenance and Field Testing of Backflow Prevention Devices".

#### 4.4.17 Tracer Wire

Tracer wire to be 10 gauge, multi-strand shall be placed on top and attached in two places on each length of P.V.C. watermain. All connections shall be made with “Dryconn Waterproof Connectors” or approved equal.

#### 4.4.18 Requirement for Looping

To all degrees reasonable, watermains shall be looped to the satisfaction of the Town Engineer. An alternative to be considered with the approval of Town Engineer, is the installation of an automatic flushing station.

#### 4.4.19 Testing and Acceptance

The complete water system including service connections to the property line and hydrants shall be tested in accordance with the Town’s Watermain Commissioning Protocol available on the Town’s website at [www.thebluemountains.ca](http://www.thebluemountains.ca)

### 4.5 Roadways

#### 4.5.1 Road Works

All road allowances within a plan of subdivision shall be constructed with asphalt roadways complete with concrete curbs and gutters (as per standard drawing 16-STD-U1) designed and constructed in accordance with the most recent requirements and specifications of the Town, OPSS and OPSD. The geometric standard of the roadway shall be as stipulated in the Town’s Engineering Standards and Drawings and designated by the Town. The balance of the road allowance not occupied by the roadway, driveways, or sidewalks shall be graded and completely top soiled and sodded or hydro-seeded to the satisfaction of the Town.

Roadways with a rural, open ditch, cross section will only be considered in deferred rural areas where groundwater levels are proven to be well below proposed ditch grade and shall not be provided unless approved by the Town.

#### 4.5.2 Classification

All roadways shall be classified according to the traffic volume expected and to the intended use of the roadway. For predominantly residential areas, the classifications shall be as follows:

Local – Rural

Local – Urban

Collector – Minor

Collector – Major

Arterial

For industrial and commercial areas the roads shall be classified as Local or Collector dependent on the length of street, traffic volume expected and amount of truck traffic.

#### 4.5.3 Geometric Design Elements

The Town may, dependent on circumstances, modify the geometric design elements to better suit the needs of the Works. For example, the road allowance width may be modified to introduce additional features as warranted.

The standard road allowances shall comply with the following table:

Geometric Detail	Local		Collector		Arterial
	Rural	Urban	Minor	Major	
Min R.O.W.	20	20	20	26	30
Design Speed	50	50	60	60	60
Min. Safe Stop Distance	65	65	85	85	85
Min. K Value (Sag)	12	12	18	18	18
Min. K Value (Crest)	8	8	15	15	15
Min. Horizontal Radius	80	80	180	180	180
Pavement Width	6.0m with 1.5m shoulders	8.5	10	14	14
Pavement Crossfall (%)	2	2	2	2	2
Top Course Asphalt (HL3)	40	40	50	50	50
Bottom Course Asphalt (HL4)	40	40	50	50	50
Granular A	150	150	150	200	200
Granular B	450	450	450	450	450
Min. Grade (%)	0.5	0.5	0.5	0.5	0.5
Max. Grade (%)	8	8	6	6	6
Max. Grade for through roads at intersections (%)	3.5	3.5	3.0	3.0	2.0
Max. Grade for stop roads at intersections (%)	2.0	2.0	2.0	1.5	1.0
Intersection Angle (degrees)	80-90	80-90	80-90	80-90	80-90
Min. Tangent Length between reverse curves	30	30	50	60	130

A 3m x 3m permanent easements may be required on lots off the R.O.W., subject to Ontario Hydro layout.

#### 4.5.4 Horizontal Curve

Centreline radii less than 80 m will not be accepted.

In general “right angle bends” will not be permitted on local streets except in the case of “Courts” or “Crescents” servicing no more than 50 residential units. Where permitted, these bends must not have a deflection angle greater than 110 degrees, have a minimum inside curb radius of 15 m and must be designed with an expanded bulb.

#### 4.5.5 Vertical Alignment

All grades shall be referenced to edge of pavement or lip of gutter and referenced to geodetic datum. Longitudinal roadway grades shall conform to Table 4.5.2

Table 4.5.2 Minimum and Maximum Road Grades

Roadway Classification	Grade (%)		
	Minimum	Desirable Maximum	Maximum
Local – Rural	0.5	6.0	8.0
Local – Urban	0.5	6.0	8.0
Collector - Minor	0.5	6.0	8.0
Collector - Major	0.5	5.0	6.0
Arterial	0.5	4.0	6.0

Cul-de-sac and expanded bulb corners shall be designed with the centreline profile increased to ensure that a minimum lip of gutter grade of 0.5% is maintained along the full length of the lip of gutter, to account for length increases due to curvature.

The minimum grade of the curb return at corner curves shall be increased to 0.6% where drainage is not intercepted by either storm sewer inlet or surface conveyance to an approved drainage system.

#### 4.5.6 Vertical Curves

All points of grade change in excess of 1% shall be designed with vertical curves. The minimum visibility curves to be used are outlined in Table 4.5.3. The minimum tangent length of any road grade shall be 9.0 m.

Minimum K Vales

Classification or Design Speed	K	
	Crest VC Min Stopping Site Distance	Sag VC Headlight Control
Lane / Local	7	12
Collector	7	12
50 km/hr	7	12
60 km/hr	15	20
70 km/hr	22	25
80 km/hr	35	30

The minimum length of vertical curve is 30 m except for:

- Smoothing vertical curves for super-elevation runoff and tangent runout, which can be reduced to 15 m and 20 m respectively,
- Adverse design conditions, reduced lengths may be permitted.

In the vicinity of sag vertical curves, the cross slope shall be adjusted as necessary to maintain a minimum lip of gutter grade of 0.5% to the lowpoint.

#### 4.5.7 Super-elevation

Super-elevation is required on Collector and Arterial Roadways with a design speed of 50 km/hr and over and is to conform to the guidelines in the TAC Manual.

#### 4.5.8 Intersections

Roadways should be designed to intersect at right angle, however, roadways may intersect at angle up to 80° and such angle should be maintained for a minimum distance of 40 m. Intersections on curves are to be avoided. Where intersections must be placed on a curve, calculations and drawings must be submitted confirming the adequacy of intersection sight distance requirements in the TAC manual.

#### 4.5.8 Fire Routes

All public and private roadways shall conform to the Town's Fire Route By-law, 2001-88.

#### 4.5.9 Intersection Spacing

Intersections should be spaced a minimum of 60 m apart on local and collector roads and 80 m apart on arterial roads.

#### 4.5.10 Intersection Sight Distance

Intersections shall be designed with sufficient sight distances for design vehicles to depart from a stopped position and make the desired manoeuvre through the intersection.

#### 4.5.11 Backfall at Intersecting Streets

At all street intersections the normal crossfall of the major street shall not be interrupted by the crown line of the minor street. A 1% or 2% backfall shall be provided on the minor street at all street intersections. This backfall shall continue to the end of the curb return radii to facilitate proper drainage of the intersection. Overland flow routing of storm drainage through the intersection must be maintained.

#### 4.5.12 Curb Return Radii at Intersections

The curb return radii at street intersections shall conform to the following dimensions:

Pavement width Street A	Pavement width Street B	Curb Return Radii
8.5 m	8.5 m	10.0 m
8.5 m	10.0 m	10.0 m
8.5 m	12.8 m	10.0 m

#### 4.5.13 Cul-De-Sacs

Cul-de-sacs will be permitted on dead-ended low volume local roadways only, provided that the number of dwellings units developed on the cul-de-sac does not exceed 40 units and the length of the cul-de-sac measured from the centerline of the intersecting street to the centre of the cul-de-sac bulb does not exceed 250 m. The length of the Cul-de-sac can be increased to 500 m with a maximum of 80 dwelling units if a secondary access restricted to emergency use is located within 85 m of the end of the bulb connecting the cul-de-sac with another municipal roadway or lane.

Cul-de-sac bulbs on local residential roadways shall have an 20 m radius road allowance and shall be designed with a minimum lip of gutter (edge of pavement) radius of 15 m and a 25 m curb return measured at lip of gutter (edge of pavement).

Geometric requirements for cul-de-sacs shall apply for both symmetrical and offset bulbs.

Islands will not be approved inside cul-de-sacs.

Cul-de-sac egress longitudinal road grades shall not exceed +4% and shall be from centre bulb to intersecting roadway.

#### 4.5.14 P-Loops

The centerline length of a looped local roadway with a single entrance from an intersecting main local or collector standard roadway shall not exceed 850 m nor service more than 85 dwelling units or the equivalent commercial or industrial properties.

The centre line length of the primary leg of a P-loop shall not exceed 180 m. Centre line lengths shall be measured between centre line intersections of connecting roadways.

All single entry looped local roadways in excess of the above limitations shall be provided with a secondary access restricted to emergency use connecting the internal loop to another municipal roadway or lane.

Islands may be approved inside P-Loops provided that the island is constructed with an acceptable hard surfacing or landscaped to the satisfaction of the Town.

#### 4.5.15 Single Access Developments

The maximum number of residential units or equivalent commercial or industrial properties that may be constructed with a single access is 85.

With a secondary access for emergency conditions, the maximum number of residential units or equivalent commercial or industrial properties that may be constructed with a single access is 150.

#### 4.5.16 Secondary Access Design Criteria

Where secondary accesses are required to single entrance developments for emergency conditions, they shall be:

- 3.5 m wide centred within a minimum 6.0 m right of way provided there are no obstructions or curves
- the traveled surface shall be asphalt, concrete, paving stone or turf stone or approved alternate
- capable of supporting firefighting equipment
- designed with adequate radii, width, horizontal and vertical alignments as that required for fire routes under the Ontario Building Code.
- provided with a removable gate or barrier pre-approved by the Town.

#### 4.5.17 Driveway Entrances

All new residential driveways shall be paved with 65 mm HL3A from curb to the property line on a base of a minimum of 200 mm Granular `A`.

The minimum clear distance between the edge of driveway and a utility structure or hydrant shall be 1.5 m.

The minimum setback from lot line shall equal the “Exterior Side Yard, Minimum” for the applicable use in conformance with the Zoning By-Law.

Rural driveways shall include an entrance culvert unless the driveway is sited at a ditch highpoint. The maximum length of culvert is 9.0 m.

The maximum width of an urban driveway curb cut shall be 6.0 m and 4.0 m driveway width.

The minimum allowable design grade of any residential driveway shall be 2%. Driveway grades shall be away from the building and the use of reverse grade driveways is not permitted.

The maximum allowable design grade of any portion of driveway on municipal lands shall be 4% and on private lands, the maximum grade may be increased to 6%.

#### 4.5.18 Special Road Designs

Special road designs, which are not covered by The Blue Mountains Engineering Standards, shall be in accordance with the most recent provisions of the geometric design standards manual and urban street geometrics, as adopted by the Municipal Engineers Association. Special designs may be required in high density residential, commercial and industrial areas. Consideration of special designs must be pre-approved by the Town’s Engineer.

#### 4.5.19 Pavement Design (Roadways)

Pavement design shall be completed by the geotechnical consultant in accordance with the most recent The Blue Mountains Engineering Standards, OPSS and OPSD.

Tests of sub-grade materials must be conducted by a certified soils laboratory and be acceptable to the Town. Copies of tests, along with proposed road designs, shall be submitted to the Town. Minimum thickness of asphalt and granular material shall be as indicated on Town Standard Drawings in all cases.

#### 4.5.20 Top Course Asphalt

Approval to place top course asphalt is required from the Town’s Engineer. The following must be completed:

- all sidewalk, curb and boulevard work;
- raise maintenance hole and catchbasin frames;
- raise water valve box
- flush and sweep surface and evenly apply tack coat;

- base course asphalt pad as required in accordance with OPSS;
- sewer video inspection and acceptance by the Town;

Place top course asphalt in accordance with OPSS;

4.5.21 Curbs and Gutters

Minimum grade on curb is 0.75% desirable, 0.5% minimum.

The Town, at its sole discretion, may require barrier, mountable or semi-mountable curbs.

Prior to final acceptance of curb and gutter, all blemishes shall be rectified by removing a minimum 1m section of curb and replacing.

4.6 Street Name and Traffic Signs

4.6.1 Traffic Control Plan

The Traffic Control plan shall show the proposed location of signs to be installed in the subdivision. The plan shall be part of the engineering drawings, which must be approved by the Town.

4.6.2 Street Name Signs

Street name signs shall be placed at every intersection and shall be double sided. Street names shall be approved by the Town.

Signs are to be aluminum, anodized both sides, according to the following requirements:

Sizes	Material
600 mm -	1.6 mm utility series
600 mm – 900 mm	2.0 mm No. 655T6
over 900 mm	3.2 mm No. 655T6

4.6.3 Traffic Control Signs

Temporary regulatory signs must be reflective. All permanent signs must be to Town Standard. Traffic control signs shall be erected upon completion of road base granular.

Traffic control signs shall conform to the most recent versions of the Ontario Traffic Manuals or the Highway Traffic Act Regulations for Ontario.

All traffic control signs are to be made with high intensity type reflective sheeting ( engineer grade) approved by the Ministry of Transportation Ontario, the current version of the Ontario Traffic Manuals and the Town’s Engineer, including colours.

## 4.7 Roadway Markings

The Consultant shall design pavement markings for all roadways over two lanes in width or as required by the Town. The design shall be in accordance with the Ontario Traffic Manual and approved by the Town's Engineer. These pavement markings will be installed on the top coat of asphalt and, in some circumstances at the discretion of the Town Engineer, on the base coat of asphalt.

All roadway markings shall be installed in accordance with OPSS 532.

## 4.8 Traffic Signals

Traffic Signals are to be designed on individual site-specific bases and shall include emergency vehicle pre-emption detector equipment.

## 4.9 Street/Site Lighting

The minimum standard for street lighting shall be 70 W HPS set on 9 m sectional steel or concrete poles. Each light must be controlled by a dusk to dawn photoelectric cell. Power feed shall be completely underground. The lights shall generally be placed on the south or east side of the road. Particular care shall be taken to adequately illuminate the intersections. Under no circumstances shall street light poles be located in the front slope or centreline of ditches. Architectural style luminaries and poles will be considered on a case by case basis. The Town reserves the right to limit the number of alternative styles and types within the Town.

### 4.9.1 Lighting Levels and Uniformity Ratio

Lighting shall be supplied and installed on all streets, pedestrian walkways and areas of common use.

Road Classification	ROW / Pavement Width	Average Illumination Level	Max to Avg Uniformity Ratio
Residential	20 m/8.5 m	2 Lux	6:1
Urban Collector	26 m/14.5 m or 8.5 m	6 Lux	3:1
Minor Arterial, Major Collector	30 m/16.0 m	9 Lux	3:1
Walkways		2 Lux	6:1

All lighting shall be designed such that light pollution is minimized. If required by the Town, the Consultant shall submit an Illumination Study prepared by a qualified engineer addressing light

pollution abatement and/or photometric design calculations demonstrating average illumination and uniformity ratio achieved.

#### 4.9.2 Light Source

The light source shall be High Pressure Sodium or for certain applications and with site specific approval, metal halide. Minimum wattage of lights shall be 70 watts and all intersections must have a light located at the intersection with 100 watts.

### 4.10 Residential Lot Drainage And Sodding

#### 4.10.1 General

All lot drainage shall conform to the Stormwater Management Report, Standard Practice Policy Bulletin P:02-01 and Town Engineering Standards.

The Consultant shall be responsible for approval and certification of the design and final grading for each lot at time of building permit application to the satisfaction of the Chief Building Official.

#### 4.10.2 Lot Grading Criteria

Lot grading shall provide for the following:

- rear to front lot grading is permitted except in areas of high groundwater levels. A maximum of three rear lots shall outlet between any two lots;
- rear lot catchbasins shall be eliminated wherever possible;
- maximum number of lots drained by a rear lot CB shall be 5;
- where several lots drain through a swale to a rear lot catchbasin on private property, a 3m wide easement shall be provided for the drainage swale in favour of the serviced lots and a 4m wide easement for the CB and lead in favour of the Town;
- where rear lot catchbasins are used, all buildings shall be protected from flooding if the inlet is blocked or surcharged by a major storm event;
- maximum ponding depth for drainage swales is 0.35 m.
- minimum slope for swales shall be 2.0%;
- swale profile shall be 3:1 or flatter
- a minimum of 3 of the rear yards shall be graded at 2% - 5% slope;
- each lot shall have at least one side yard with a maximum slope of 2% for 1.0m continuous width from front to rear yard;
- maximum slope between houses shall be 4:1;
- driveways shall have minimum 2% and maximum 6% slope (on the apron);
- no part of the driveway shall slope greater than 4% on the Town right of way;

- grade around houses shall be a minimum of 2% away from houses from a point 200 mm below top of foundation wall or as required by OBC.
- Finish grade tolerance is 50 mm at lot corners, grade change points, spot grades, etc
- Finish grade tolerance is 25 mm in swales and ditches

#### 4.10.3 Retaining Walls

Retaining walls shall be constructed according to the following:

- the wall and tie-back shall not come closer to the property line than 300mm;
- retaining wall design and construction shall be approved by the Town's Engineer, the Building Department and may require a building permit in accordance with Section 2 of the OBC;
- privately owned retaining walls shall be constructed solely on private property;
- Non-climbable fencing or equal shall be installed at the top of the wall if height excess is 0.6 m.

#### 4.10.4 Rough Grading

Prior to the issuance of any certificates by the Town accepting the Works, lots shall be rough graded to the below tolerances.

- Achieve positive drainage to the satisfaction of the Town Engineer;
- Lot corners, grade changes and spot elevations: 300mm;
- Swales and ditches, except side yard swales, without finishing topsoil: 100mm

### 4.11 Block Grading

#### 4.11.1 General

All block grading shall conform to the Storm Water Management Report.

The Consultant shall be responsible for approval and certification of the design and final grading for each block at time of building permit application to the satisfaction of the Chief Building Official.

#### 4.11.2 Block Grading Criteria

The criteria for block grading are as follows:

- where catchbasins are used for block drainage all buildings and structures shall be protected from storm water if the inlet is blocked or surcharged by a major storm event;
- where block drainage is surcharged to an existing overland flow route, the route shall be protected from erosion;

- no more than 5% of the block surface area shall drain directly onto the abutting road allowance;
- minimum slope for swales shall be 2%;
- maximum ponding depth for swales shall be 0.35 m.

#### 4.11.3 Ground Cover

The requirement for block ground cover is as follows:

- all blocks shall be sodded using 100 mm topsoil and No. 1 nursery sod for 5 m width around their perimeter when base course asphalt is placed on roadways, the remainder of the block shall be at minimum seeded using 100 mm topsoil, with seed of the quality and quantity approved by the Town, and mulch;
- all swales and drainage easements shall be sodded using 100 mm topsoil and staked No. 1 nursery sod;
- All slopes greater than 10% shall be protected from erosion.

#### 4.11.4 Rough Grading

Prior to the issuance of any certificates by the Town accepting the Works, blocks shall be rough graded to the below tolerances.

- Achieve positive drainage to the satisfaction of the Town Engineer;
- Lot corners, grade changes and spot elevations: 300 mm;
- Swales and ditches, except side yard swales, without finishing topsoil: 150 mm

### 4.12 Erosion and Sediment Control

#### 4.12.1 General

All erosion and sediment controls are temporary measures constructed prior to any other site work and shall be maintained until any disturbed areas are stabilized and approved for removal by the Town.

All erosion and sediment control measures shall be inspected by the Consultant once per week and after each rainfall of 10 mm or greater. Inspection reports shall be forwarded to the Town's Engineer within 5 days of inspection.

Erosion and sediment control measures shall be designed in accordance with Provincial guidelines.

#### 4.12.2 Catchbasin Sediment Control

All catchbasins shall be provided with sediment control during construction activities and shall be maintained until any disturbed areas are stabilized and approved for removal by the Town.

#### 4.12.3 Stone Mud Pad Construction Entrance

In order to reduce the tracking of mud onto paved streets, a pad of crushed stone shall be constructed at the site entrance and exit leading onto any existing road. The stone pad shall be a minimum of 450 mm thick, 35 m long and 7 m wide. The first 5 m from the property line shall be constructed with Granular 'A'. The next 15 m shall be 50 mm clear stone and the remaining 15 m shall be constructed with 150 mm rip rap.

This stone mud pad must be maintained as required given the site conditions to ensure there is no mud tracking on the municipal roads. The Town's Engineer may direct additional measures to be taken to eliminate mud tracking up to and including vehicle washing prior to exiting the site.

In some cases the drawings shall specify a required truck hall route.

#### 4.13 Utilities

The appropriate utility company, or their approved contractor, shall install the services for Bell, Hydro, Gas, Cable TV. Utility crossings for new roads shall be placed prior to placement of granular road base material. Utility crossings for existing roads shall have the asphalt surface saw cut and removed for a width of the trench plus a minimum of 0.5 m out from each side of the trench walls. Minimum depth of bury for utilities is 0.9 m, unless otherwise approved by the Town's Engineer.

Utilities installation shall require full time engineering supervision to be approved by the Town's Engineer.

Compaction of backfill for utility trenches shall be 95% Standard Proctor Dry Density.

#### 4.14 Canada Post

The Consultant must communicate directly with Canada Post for locating of their proposed facilities. All proposed locations must be shown on the Composite Utility Plan. Any temporary placement of post boxes must be placed in accordance with the approved final location.

#### 4.15 Landscaping

##### 4.15.1 General Streetscape Standards

Streetscaping will be considered on a site-specific basis.

#### 4.15.2 Standards and Guidelines for Naturalization Areas

All disturbed natural open-space blocks and lands adjacent to conservation areas, as well as the lands surrounding stormwater management facilities, are to be re-vegetated using naturalizing plant materials. The planting design must employ native plants using a variety of trees shrubs and ground covers to re-establish the local ecosystem. If the site had been previously disturbed, landscape restoration strategies must be employed to reinstate a naturalized landscape condition.

#### 4.15.3 Notes for Naturalization Submission Drawings

The following layout note is to be included on the submission drawings for all areas to be naturalized:

All plantings and hard landscape features are to be staked out on site and approved by the Landscape Architect and Town's Engineer prior to installation. Any deviations from the approved landscape plans require prior Town approval.

## 5. GEOTECHNICAL

### 5.1 Geotechnical Report

When a Geotechnical Report is required for a project, the Geotechnical Engineering Consultant shall prepare a report on the existing soil conditions which shall include, but not be limited to, the following:

- The identification, description and limits of the existing soil regimes, including the extent of topsoil and its suitability for reuse;
- Suitability of native materials for trench backfill;
- The conditions under which the native material may be used as trench backfill;
- The procedures to be used for high moisture contents and water table levels which may affect the proposed servicing or structural works of the concerned area and surrounding lands;
- The extent of native material which is unsuitable for trench backfill and the procedure for dealing with it such that it will not affect the structural stability of the proposed municipal services;
- Areas and procedures to be followed where blasting may be required with due consideration to surrounding structures and services;
- The minimum road material depths for granular and pavement design;
- Any special recommendation for bedding materials;
- Potential corrosive or chemical problems that may affect services or structures (e.g. high sulphates) and the method of resolving such problems;

- Potential corrosively related to the installation of watermain and appurtenances;
- Recommendations in dealing with filling conditions within the road allowances, on building lands, in the construction of berms etc;
- Identify problem areas and recommend mitigating procedures regarding the stability of existing slopes and the extent of unstable soils or conditions.
- Any special recommendations to be followed in the design and construction of building foundations.
- The engineering properties of the native material including frost susceptibility, natural moisture content, compaction characteristics, relative density and structural integrity.
- Recommendations in achieving proper compaction.
- Recommendations in dealing with deep excavation of trenches.
- Recommendations in dealing with septic or well systems that may be affected by the proposed building and servicing works.

The report is to confirm that sufficient boreholes have been taken to establish definite requirements and recommendations for the servicing and building works. General Soils Report must identify minimum bearing capacity of the native soil (i.e. 75 kPa) preferably on a hole by hole basis. Boreholes located in the area of proposed underground municipal services are to be taken to a depth of at least one (1) meter below the deepest trench.

Requirements and recommendations contained within this report along with borehole logs and grain size analysis of the native soils are to be incorporated by the Consultant into the first submission to the Town. Any such requirements and recommendations that are not so incorporated are to be drawn to the Town's attention with specific reasons.

## 5.2 Geotechnical Engineering Inspection

The General Consultant must have their own site representative on site during any grading and/or construction works.

The Geotechnical Consultant must ensure that OPSS 514 regarding backfilling and compaction within road allowances and lots where fill exceeds 1.0m in thickness is strictly adhered to. The Geotechnical Consultant's certification must make reference to this specification.

During construction, the Geotechnical Consultant shall supervise the installation of bedding or embedment and the backfilling of all trenches within road allowances and easements. A trench backfill certification is required to indicate that sufficient tests have been carried out to obtain a representative report as to the compaction of the backfill and they find the backfill to be in compliance with Town Specifications and requirements.

A final subgrade certification is to confirm that the final subgrade conditions are equal to or better than those anticipated in the preparation of the pavement design. If these conditions are less than what was anticipated, the owner and the Town are to be immediately advised with a new pavement design recommendation.

Where grading operations require the placement of "engineered fill" the Geotechnical Engineer must certify that the fill located at 1.0m below finished grade and deeper has been sufficiently compacted to assure a minimum bearing capacity of 75 kPa and a 98% Standard Proctor Density.

The material testing of any major structure, as determined by the Town, is to be carried out by an independent testing firm pre-approved by the Town. Such testing is to be carried out in accordance with the latest revision of the O.P.S.S. and C.S.A. requirements. All test results are to be forwarded to the Consultant, and the Town, with the appropriate comments and recommendations. Upon completion of the material testing, the testing firm is to certify to the owner and the Town that the material requirements for the concerned structure have been achieved.

## 6 REQUIREMENTS FOR TOWN GARBAGE/RECYCLING COLLECTION

In order to quantify for Town garbage/recycling collection services, new developments or redevelopments (buildings) must adhere to the requirements outlined in By-law #2003-16 Solid Waste Collection, including amendment #2004-24 and any subsequent amendments, and other associated documents. It should be noted that these are general requirements only and the Town reserves the right to enact additional requirements during detailed review of specific projects. The Town will review each development or redevelopment individually and ultimately reserves the right to designate the type of collection, access and storage required.

Developments and redevelopments that meet the Town's eligibility requirements must provide the required facilities which allow for municipal collection of garbage and recyclable materials. If the facilities cannot, as determined by the Town, be provided, the requirements will be listed in the legal documentation concerning the development and notice given to all future owners of the need to provide and maintain private collection service until such requirements are met.

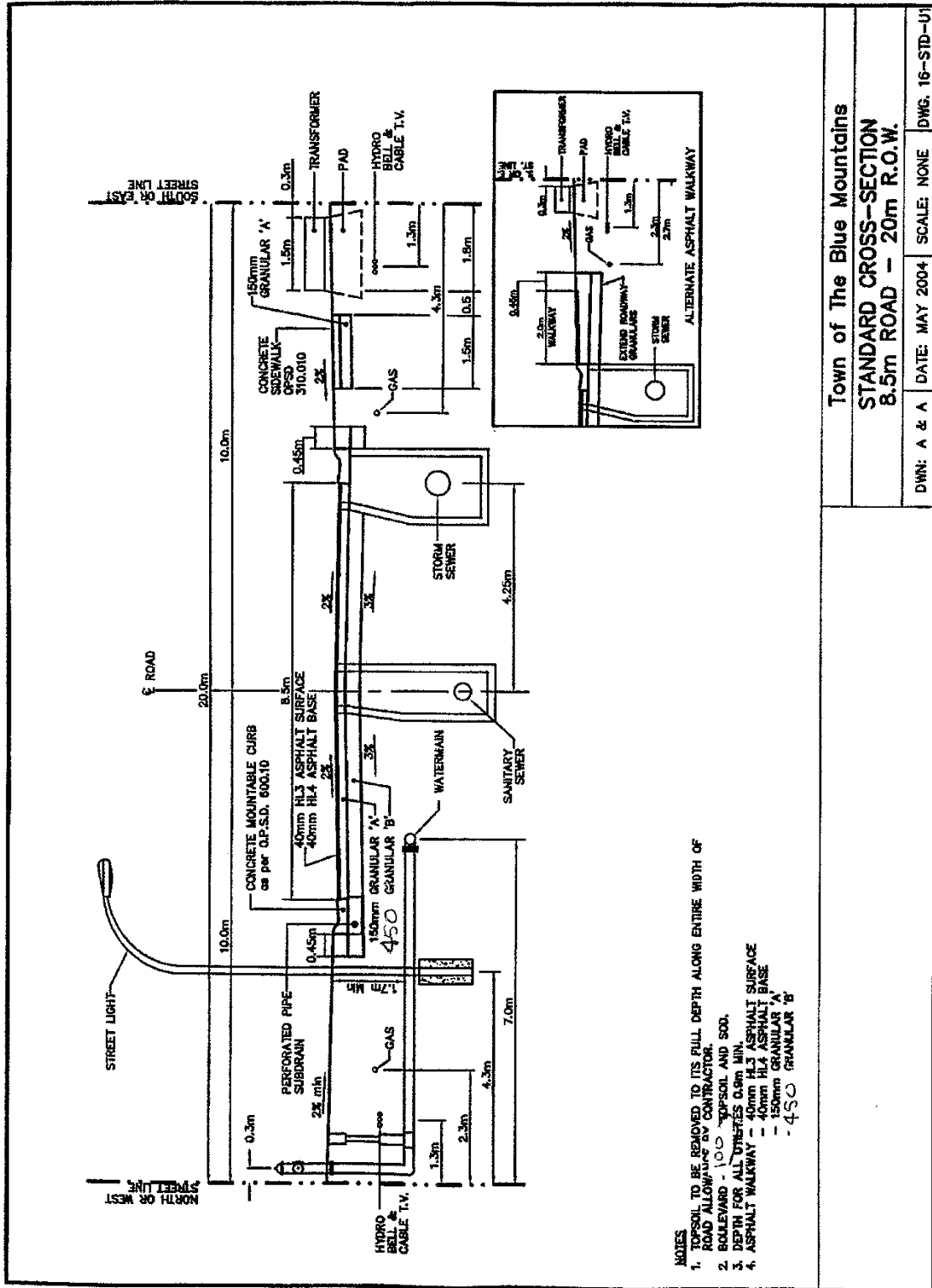
All municipal collection services are subject to the conditions required by the applicable By-laws.

To ensure the Town has the opportunity to review site plans as they pertain to garbage/recycling collection, applications must include details on:

- access routes;
- loading facilities;
- garbage rooms/storage facilities;

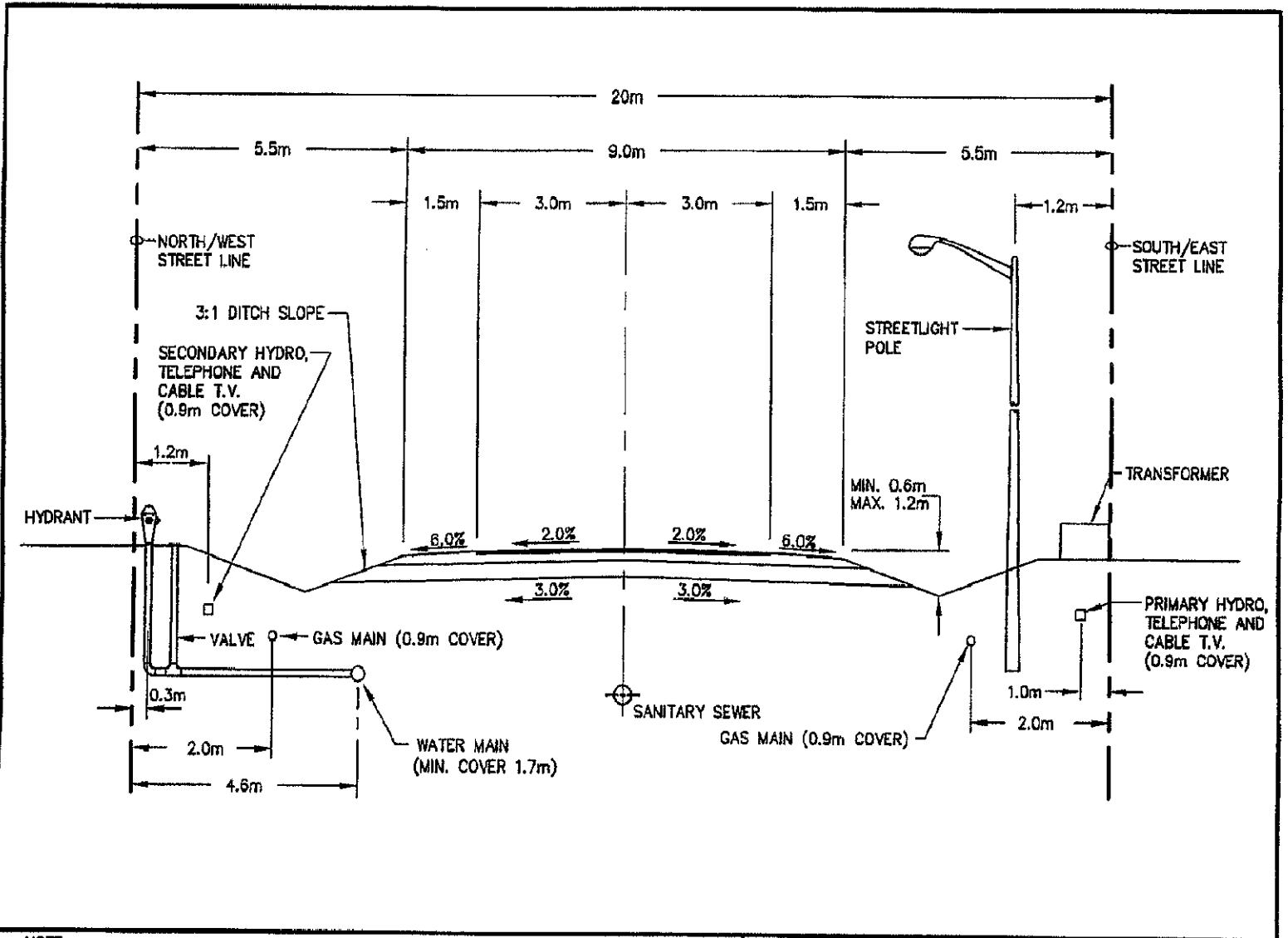
- recycling rooms/storage facilities;
- size and number of garbage containers to be used; and
- number of dwelling units in the development/total ground floor area/number of stories.

Failure to comply with these guidelines and any additional requirements imposed by the Town will result in collection services not being approved or suspension of collection services.



Town of The Blue Mountains  
 STANDARD CROSS-SECTION  
 8.5m ROAD - 20m R.O.W.

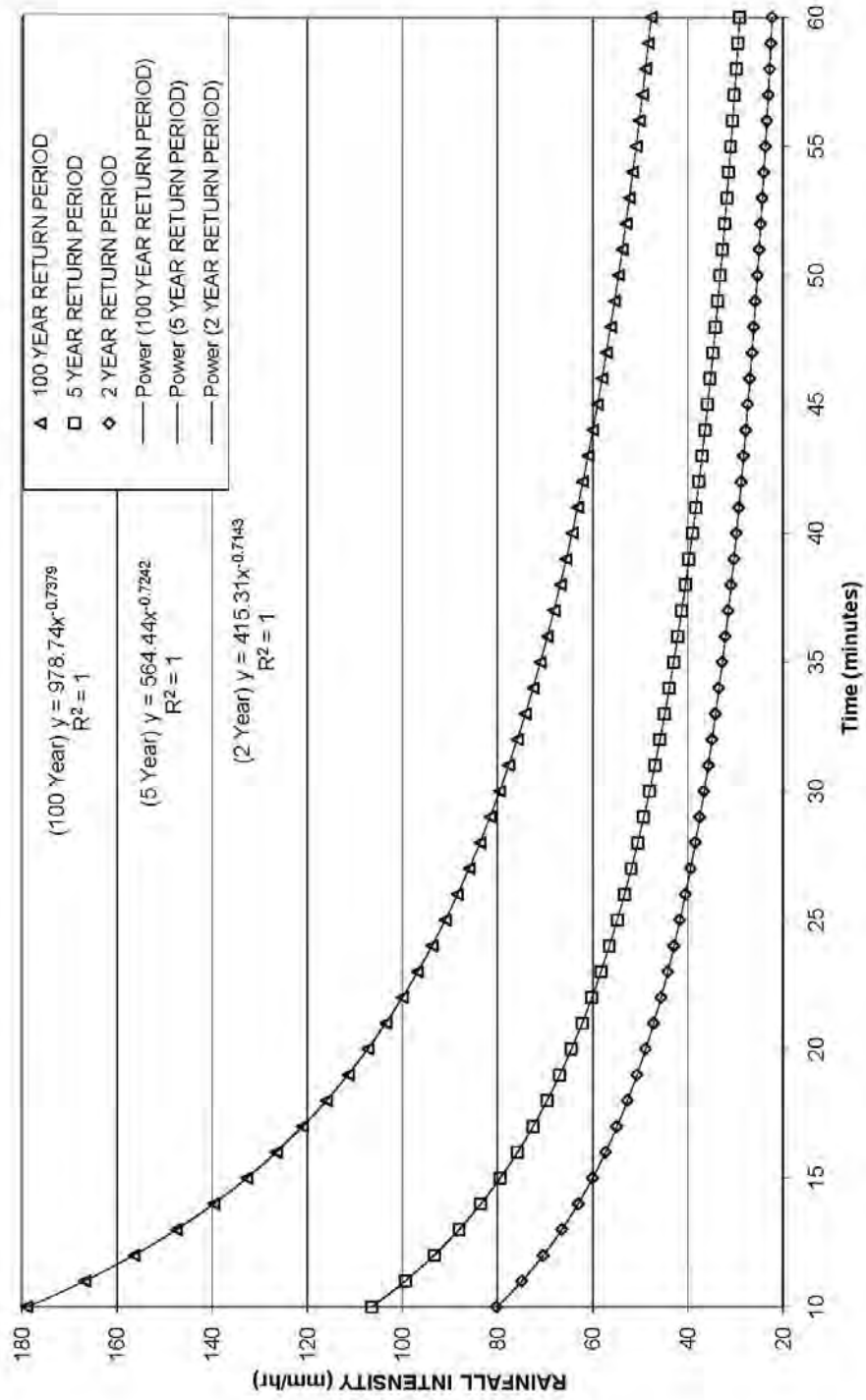
DWN: A & A DATE: MAY 2004 SCALE: NONE DWG. 16-STD-U1



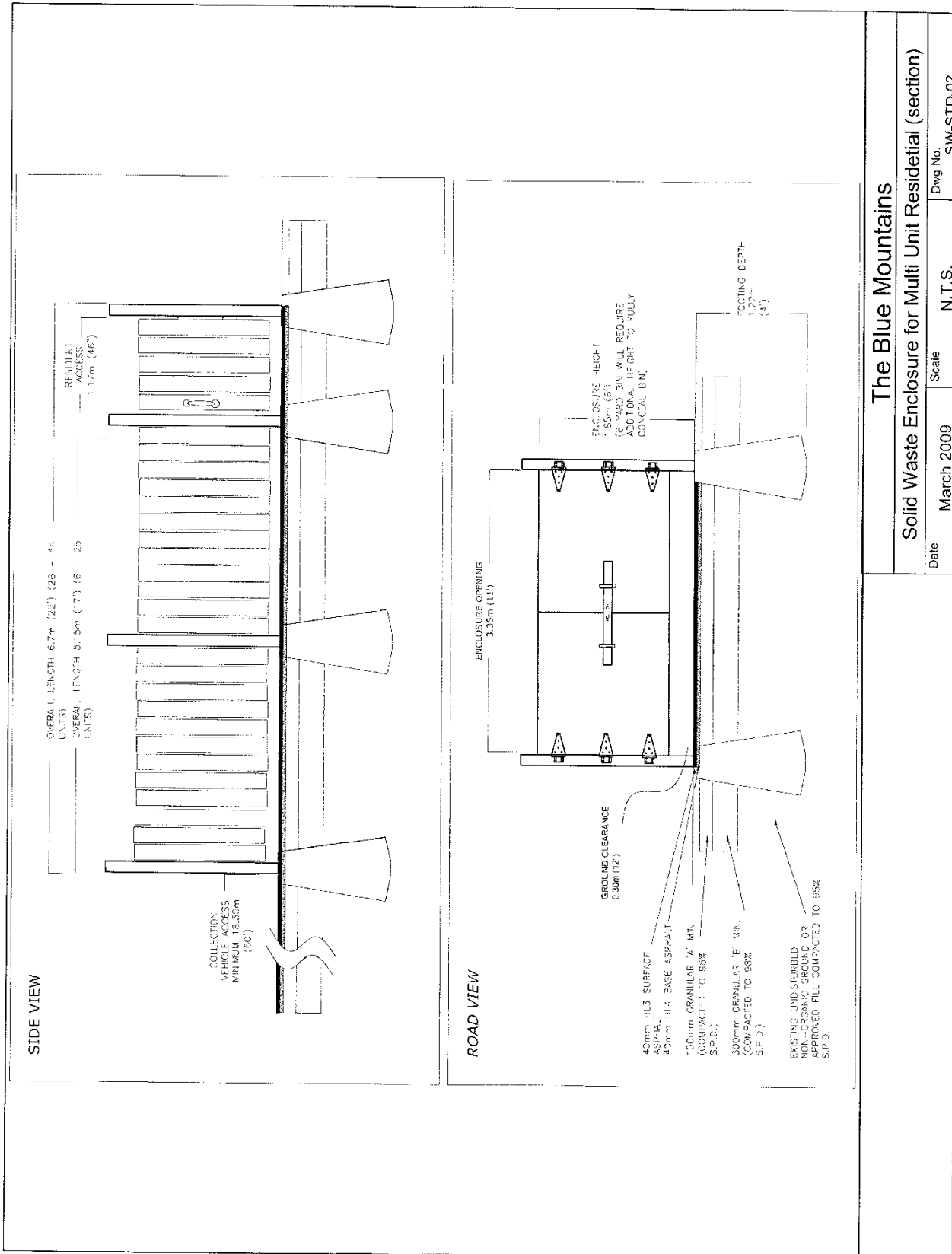
NOTE:  
 ROAD - 40mm HL3 SURFACE COURSE ASPHALT  
 - 40mm HL4 BASE COURSE ASPHALT  
 - 150mm GRANULAR 'A'  
 - 4-50 GRANULAR 'B' OR 'C'  
 BOULEVARD - 100 TOPSOIL AND NURSERY SOD

<b>Town of The Blue Mountains</b>			
<b>RURAL STANDARD CROSS-SECTION</b>			
<b>9.0m ROAD - 20m R.O.W.</b>			
DWN: A & A	DATE: FEB. 1998	SCALE: NONE	DWG. No. 16-STD-R2

OWEN SOUND INTENSITY DURATION FREQUENCY VALUES







<b>The Blue Mountains</b>			
<b>Solid Waste Enclosure for Multi Unit Residential (section)</b>			
Date	March 2009	Scale	N.T.S.
Dwg No.	SW-STD-02		

REV.	ALTERATION	DATE	BY

KING U.S. ORDER NO.:	KING CAN. ORDER NO.:
CUSTOMER ORDER NO.:	

**SPECIFICATIONS**

CATALOGUE NO.: K820-HGFL-III-100(MOG)  
-HPS-120-KPL10

QUANTITY: GLASS, FLAT  
GLOBE MAT'L: TYPE III  
IES CLASSIFIC.: 100W  
WATTAGE: HIGH PRESSURE SODIUM  
LIGHT SOURCE: 120V  
LINE VOLTAGE: BLACK  
PAINT: BY OTHERS

**BALLAST INFORMATION:**

BALLAST TYPE: HX-HPF  
BALLAST MANU.: ADVANCE / MAGNETEK  
CATALOG NUMBER: 71A8091 / S100MLTC3M

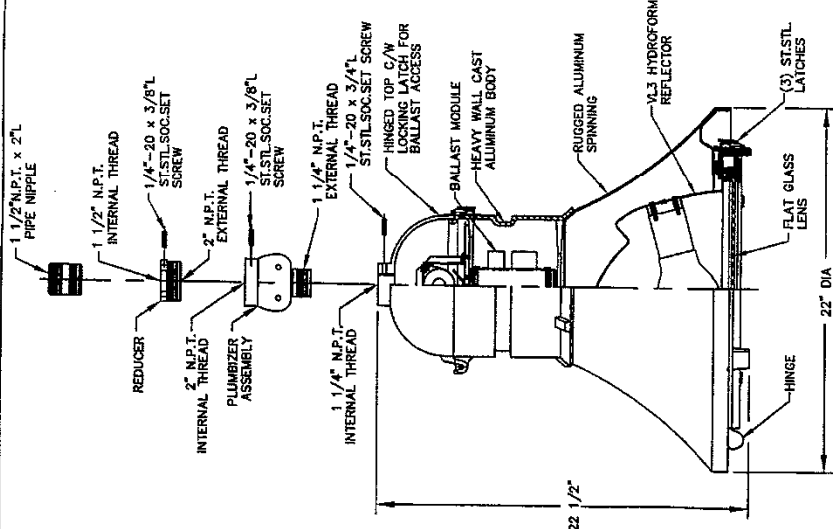
**OPTIONS:**

QUICK DISCONNECT  
 TERMINAL BLOCK  
 PLEASE SELECT ONE  
 OTHER: KPL-10 LEVELING DEVICE

FOR WIRING DIAGRAM SEE DRAWING 209B0206

VC-ORDER 0844



**NOTE:**

- 1) LAMP BY OTHERS
- 2) UNDERSIDE OF SPINNING TO BE PAINTED SAME COLOR AS REST OF LUMINAIRE
- 3) PIPE SEALER TO BE USED ON ALL N.P.T. THREADED COMPONENTS

PART	REVISION
GLOBE	
CAPITAL	
OPTICS	
BALLAST	
TERMINAL	
OTHERS	

CERT. I.D.	CS	<input type="checkbox"/>	ET	<input type="checkbox"/>
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**CUSTOMER APPROVAL:**

**KING LUMINAIRE**

440 WALKERS LANE, P.O. BOX 7, WESTPORT, OHIO 44091  
1100 EAST WALKER AVE, SULLY, ILL. 60087

DRAWING NAME:	DATE:	DWG. BY:	REV.
APPROVA/MFG DWG	9/20/05	M.L.	
DWG. NUMBER:	8844-5		
PROJECT/CUSTOMER:			

**The Blue Mountains**

Street Lighting Fixture Style A

Date	Scale	N.T.S.	Dwg No.
March 2009			LT-STD-A-FIXTURE

REV.	ALTERATION	DATE	BY

KING U.S. ORDER NO.:	KING CAN. ORDER NO.:
CUSTOMER ORDER NO.:	

**SPECIFICATIONS**  
 CATALOGUE NO.: K829-HCSH-III-100(MOG)  
 -HFS-120-KPL10-PBC

**QUANTITY:** HYDROFORM GLASS SHALLOW LENS  
**IES LTG. CLASS.:** TYPE III  
**WATTAGE:** 100W  
**SOCKET SIZE:** MOGUL  
**LIGHT SOURCE:** HIGH PRESSURE SODIUM  
**LINE VOLTAGE:** 120V  
**PAINT:** BLACK  
**ANSI 554 LAMP BY OTHERS**

**BALLAST SPECIFICATIONS**  
**SUPPLIED:** ALTERNATE  
 HX-HPF HX-HPF  
**BALLAST TYPE:** UNIVERSAL  
**BALLAST MANU.:** ADVANCE  
**CATALOG NUMBER:** S100MLTC3M 71A8091

**OPTIONS:**  
 QUICK DISCONNECT   
 TERMINAL BLOCK   
 OTHER: KPL10 LEVELING DEVICE  
 PHOTO BUTTON CELL

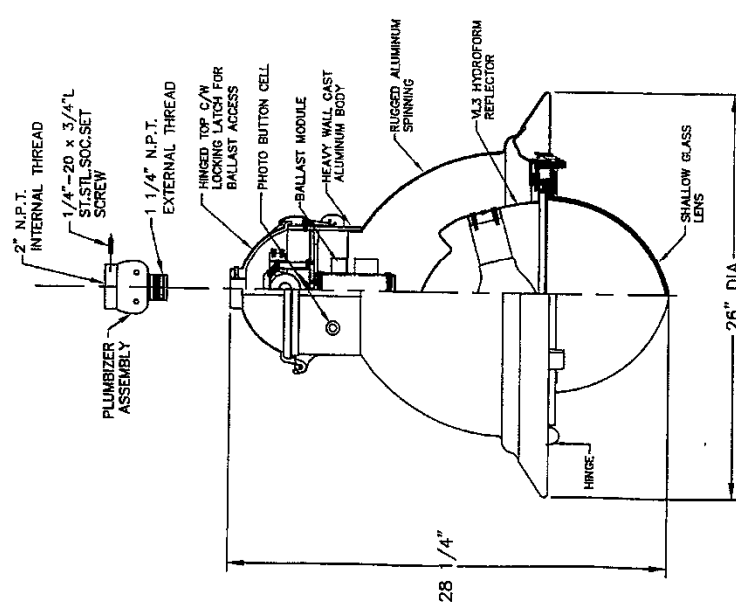
FOR WIRING DIAGRAM SEE  
 DRAWING 209B0207

**CUSTOMER APPROVAL:**  
**KING LUMINAIRE**  
640 WALTON'S LINE, P.O. BOX 7, CAMDEN, ONTARIO, CANADA L7R 3M8  
 1153 WYKE AVENUE, OHIO  
 U.S.A. 44607

DRAWING NAME:	DWC NUMBER:	DATE:	REV.:
APPROVAL DWG	9927-3	10/2/06	M.L.
PROJECT/CUSTOMER:			

VIG-009874 06271



- NOTE:**
- 1) LAMP BY OTHERS
  - 2) UNDERSIDE OF SPINNING TO BE PAINTED SAME COLOR AS REST OF LUMINAIRE
  - 3) PIPE SEALER TO BE USED ON ALL N.P.T. THREADED COMPONENTS

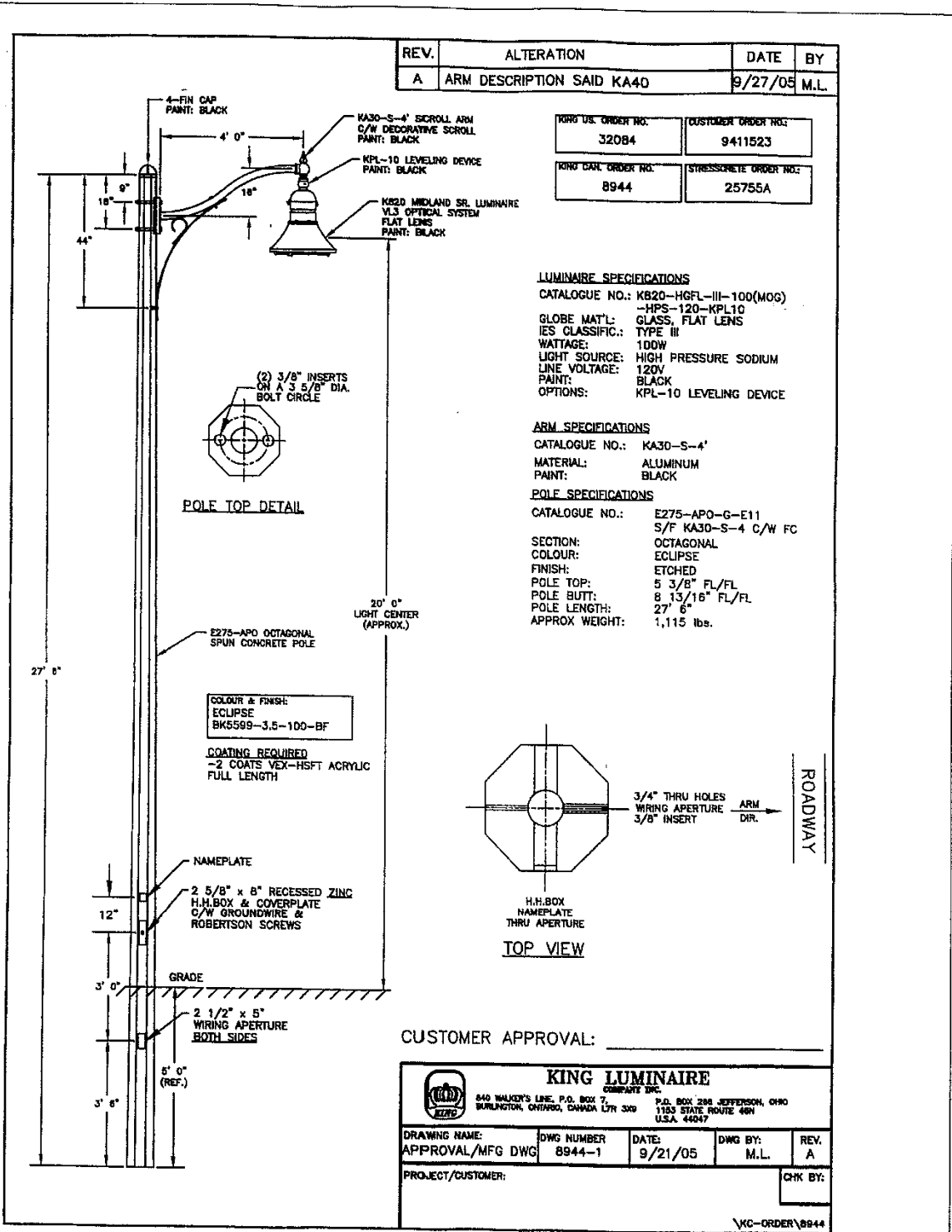
PART	PLANT REFERENCE DWG. # 5	REVISION
GLOBE		
CAPITAL		
OPTICS		
BALLAST		
FINIAL		
OTHERS		

CERT. I.D.    CS        ET   

**The Blue Mountains**

Street Lighting Fixture Style B

Date	Scale	Dwg No.
March 2009	N.T.S.	LT-STD-B-FIXTURE



REV.	ALTERATION	DATE	BY
A	ARM DESCRIPTION SAID KA40	9/27/05	M.L.

KING US. ORDER NO. 32084	CUSTOMER ORDER NO. 9411523
KING CAN. ORDER NO. 8944	STRESSURE ORDER NO. 25755A

**LUMINAIRE SPECIFICATIONS**  
 CATALOGUE NO.: KB20-HGFL-III-100(MOG)  
 -HPS-120-KPL10  
 GLOBE MAT'L: GLASS, FLAT LENS  
 IES CLASSIFIC.: TYPE III  
 WATTAGE: 100W  
 LIGHT SOURCE: HIGH PRESSURE SODIUM  
 LINE VOLTAGE: 120V  
 PAINT: BLACK  
 OPTIONS: KPL-10 LEVELING DEVICE

**ARM SPECIFICATIONS**  
 CATALOGUE NO.: KA30-S-4'  
 MATERIAL: ALUMINUM  
 PAINT: BLACK

**POLE SPECIFICATIONS**  
 CATALOGUE NO.: E275-APO-G-E11  
 S/F KA30-S-4 C/W FC  
 SECTION: OCTAGONAL  
 COLOUR: ECLIPSE  
 FINISH: ETCHED  
 POLE TOP: 5 3/8" FL/FL  
 POLE BUTT: 8 13/16" FL/FL  
 POLE LENGTH: 27' 6"  
 APPROX WEIGHT: 1,115 lbs.

COLOUR & FINISH:  
 ECLIPSE  
 BK5589-3.5-100-BF

COATING REQUIRED  
 -2 COATS VEX-HSFT ACRYLIC  
 FULL LENGTH

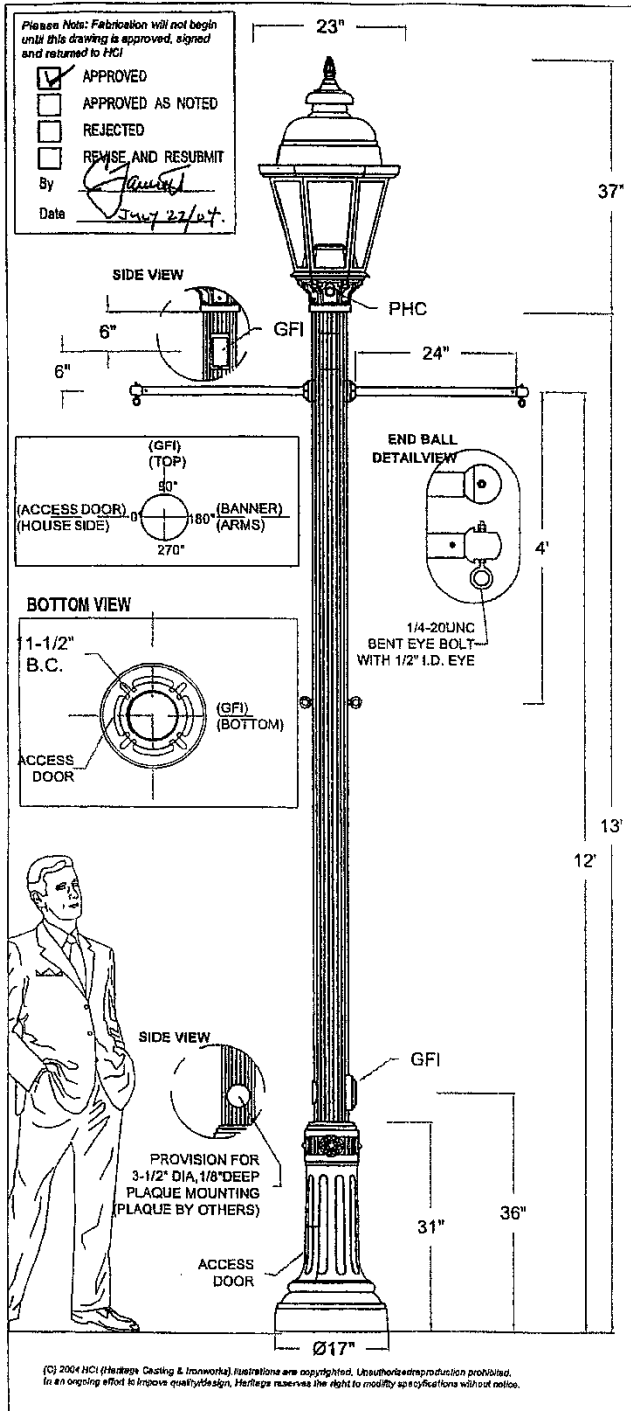
CUSTOMER APPROVAL: \_\_\_\_\_

**KING LUMINAIRE**  
 COMPANY INC.  
 840 WALKER'S LINE, P.O. BOX 7, BURLINGTON, ONTARIO, CANADA L7N 3X0  
 P.O. BOX 284 JEFFERSON, OHIO 1123 STATE ROUTE 46N U.S.A. 44047

DRAWING NAME: APPROVAL/MFG DWG	DWG NUMBER: 8944-1	DATE: 9/21/05	DWG BY: M.L.	REV. A
PROJECT/CUSTOMER:				CHK BY:

KC-ORDER\8944

<b>The Blue Mountains</b>			
Street Lighting Standard Style A			
Date	March 2009	Scale	N.T.S.
		Dwg No.	LT-STD-A-POLE



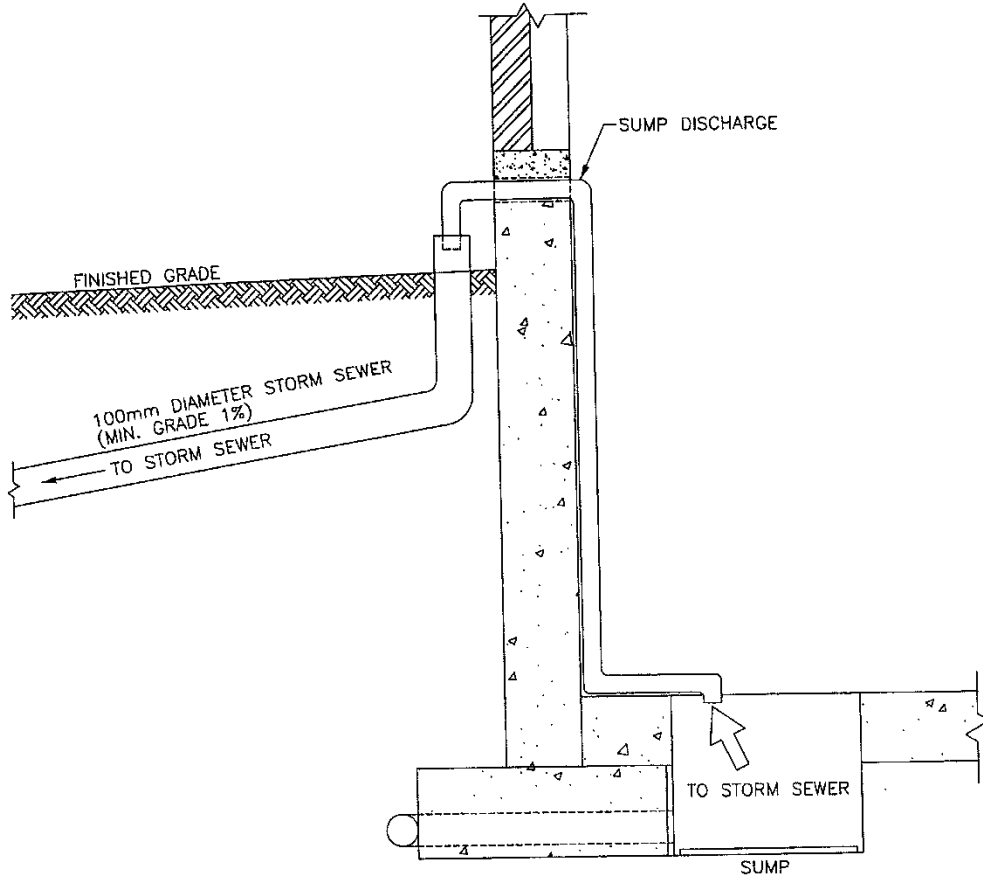
**Approval Drawing**  
Light Standard: F146-L-MOD-P452-5FC

**Diffuser Type:** Clear.  
**Diffuser Material:** Tempered glass.  
**Optical System:** Roadway type multi faceted, highly polished cutoff reflector.  
**Light distribution:** IES Type III  
**Luminaire Housing Material:** Cast and spun aluminum.  
**Hood:** Hinged for easy access to lamp and ballast.  
**Ballast:** HPS high power factor mounted on removable plate. A quick disconnect wiring system allows for fast easy ballast maintenance.  
 Wattage - 150W  
 Voltage - 120V  
 Socket - Mogul (4KV).  
**Photocontrol:** Luminaire intergrated button type photocell 120V.  
**Receptacles:** Duplex GFI top and bottom orientation (SEE DETAIL)  
**Pole:** Extruded fluted aluminum .250(6mm) thick with 12 flutes.  
**Base Cover:** One-piece cast aluminum permanently welded to pole  
**Anchor Bolts:** 4 galvanized 19mm (3/4") x 610mm (24") long. Bolt Circle 11-1/2"  
**Banner Arms:** Made out of 1-1/4" round steel tubing with 2" dia cast aluminum ball drilled 1/4"DIA with eye bolt. (20lbs max. loading)  
**Finish:** Electrostatically applied, thermoset polyester powder-coat finish with XL4 four part corrosion inhibiting process.  
**Colour:** Black RAL # 9011

Date: JUL.21,2004 Drawing No: 4354A-1  
 Model: F146-L-MOD-CTG-150HPS-120V-SR-3-PCB-P452-5FC-13-GFI(TOP)-GFI(BOTTOM)-BA2H-BM-EB  
 Project: TOWN OF THE BLUE MOUNTAINS  
 Please Note: Fabrication will not begin until this drawing is approved, signed and returned to HCI

1280 Fewster Drive, Mississauga, Ontario, Canada L4W 1A4  
 Tel: (905) 238-2648 Fax: (905) 238-9060  
 Toll Free Canada & USA 1-800-267-3175  
 E: sales@hclighting.com WEB: www.hclighting.com

<b>The Blue Mountains</b>		
<b>Street Lighting Standard Style B</b>		
Date	Scale	Dwg No.
March 2009	N.T.S.	LT-STD-B-POLE



NOTES:

1. PIPE SHALL BE 100mm DIA. PVC SDR28 WHITE SEWER PIPE.
2. MIN. SLOPE OF PIPE TO BE 1 %.
3. JUNCTION OF SUMP DISCHARGE AND STORM SERVICE MUST BE 100mm ABOVE FINISHED GRADE AND IS NOT TO BE SEALED.
4. SUMP DISCHARGE PIPE TO BE CONNECTED TO THE SUMP PUMP AND FASTENED AS PER PART 7 OF THE ONTARIO BUILDING CODE.

<b>The Blue Mountains</b>			
Residential Storm Sewer Connection (100mm)			
Date	March 2009	Scale	N.T.S.
		Dwg No.	ST-STD-SUMP