GEI Consultants

CHAPMAN'S

Chapman's Pheonix Phase 3

September 2024 Stormwater Management Report

Markdale, ON

Submitted to:
Chapman's Ice Cream
100 Chapman's Crescent
Markdale, ON, N0C 1H0

Submitted by:
GEI Consultants Canada Ltd.
1260 2nd Ave E #1
Owen Sound, ON
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September, 2024
Project No. 2401219

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1. Introduction

Chapman's Ice Cream (Chapman's) is proposing to construct a 16,258 m^2 (175,000 sq. ft.) addition to the north side of the existing Ice Cream Production Facility located at 100 Chapman's Crescent in the northerly end of Markdale, Municipality of Grey Highlands, where shown in **Figure 1**. For the purpose of this report, Highway 10 (Toronto Street) is assumed to run in a north-south direction and is located east of the subject property.

The original 14.57 ha property consists of two production facilities: the peanut-free Phoenix 1 plant and the non-peanut free Nut House plant, and a Waste Treatment building. Several smaller auxiliary buildings and parking areas are spread throughout the subject property. About 2015, Chapman's acquired an additional 33 ha of land immediately north of the original property. The newly acquired lands are within the adjacent Township of West Grey. About 2017, Chapman's built a 90,000 sq. ft. addition (Pheonix 2), which extended the original building footprint to the original northerly property line. The currently proposed addition is to be constructed on the north side of the Phoenix Building, on the recently acquired lands within the Township of West Grey.

The original SWM Report (March 2010), prepared in support of the Phoenix 1 plant Site Plan Development, was updated in November 2016 to include the 2017 Pheonix 2 freezer addition. No change was required to the SWM Pond at that time. The purpose of this report is to update the Stormwater Management (SWM) plan for the subject property to ensure that it will appropriately service the Site with the planned Pheonix 3 addition. The current stormwater management plan was approved by the Ministry of the Environment and Climate Change (MOECC) on June 15, 2010 with an Amended Certificate of Approval for Industrial Sewage Works (No. 8028-83PS3Z), a copy of which is included as **Appendix A**. This report will support a further amendment to the current CofA.

2. Existing conditions

2.1. Historical Drainage – Prior to 2011

Prior to the construction of the original Phoenix 1 Building in 2011, the subject property was divided into two drainage areas. Runoff from the undeveloped easterly portion of the property generally drained overland from southeast to northwest, to the neighbouring property to the north.

Runoff from the developed portion of the Site, which at that time consisted of a Dry Goods Warehouse (converted now to the Nut House building) and associated parking, drained via a storm sewer system through an oil/grit separator, to the southerly inlet of a SWM facility where all runoff water was stored and fully infiltrated into the ground.

2.2. Existing Conditions and Site Development

In 2009, after a fire destroyed the original off-site Chapman's Plant, the Phoenix 1 building and associated parking and servicing was constructed about 2011 on the subject property. To address the increased stormwater runoff from the property, the size of the existing SWM facility was increased by extending the SWM facility to the east at its northerly end and adding a forebay and an additional inlet point. The stormwater management system is outlined in the supporting SWM Report prepared by Gamsby and Mannerow Ltd. (now GEI Consultants Canada Ltd.) dated March 2010.

The storm sewer system located to the south of the Nut House plant continues to outlet to the oil/grit separator and the SWM facility's southerly inlet while a separate storm sewer system that drains runoff from the rooftop and parking areas for the Phoenix plant discharges to the easterly inlet of the SWM facility.

As part of the construction of the Phoenix 1 plant, a swale was constructed at the toe of the grassed slope to the east of the Phoenix plant. The swale directed runoff from the easterly undeveloped portion of the site to the grassed field to the north, where runoff was expected to naturally disperse and infiltrate into the native sandy soils.

In June 2010, the MOECC provided the current Amended Certificate of Approval No. 8028-83PS3Z for the larger SWM Facility and forebay system to provide stormwater quantity control and quality treatment for the Phoenix 1 plant and associated parking and driving areas.

In 2015-2016 another addition to the plant, the Pheonix 2 building, associated parking and servicing was constructed on the subject property. As part of the construction of the Phoenix 2 plant, the existing easterly swale was extended to the existing SWM facility to the west. The swale ran on the north side of Pheonix 2 building and directed runoff from the easterly undeveloped portion of the site, the entire rooftop of Pheonix 2 building, and parking areas, to the existing SWM facility.

In this revision of the stormwater management report, the easterly swale has been extended northerly, instead of going to the existing SWM facility. This easterly swale will provide drainage for the easterly portion of the Pheonix development and reduce flows to the SWM pond. The swale has been modelled as a combination of an infiltration trench and an enhanced grassed swale.

2.3. Existing SWM Facility

The existing SWM facility is designed as an infiltration basin with an "L-shaped" geometry to receive inflow from each of the developed portions of the easterly Phoenix plant area and the westerly Nut House plant area, through two separate inlet points.

Runoff from the Nut House plant area continues to receive pre-treatment via an oil/grit separator prior to discharging to the southerly point of the SWM facility main basin.

Runoff from the Phoenix plant area discharges at the easterly point of the SWM facility, receiving pre-treatment within an 80 m-long forebay. A 1.0 m-high flow check dam, consisting of rip-rap, filter cloth and a 25 mm clear stone cover, separates the forebay from the main basin to provide filtration of flows prior to entering the main basin where infiltration occurs. Under greater runoff events, inflows may pond in the forebay to a depth of 1.0 m prior to spilling over the flow check at an elevation of 413.25.

The forebay is generally designed in accordance with the MECP's Stormwater Management Planning and Design Manual (SWMPD Manual).

The bottom of the forebay varies in elevation from 412.25 m to 412.50 m and the bottom of the main basin is set at an elevation of 412.25 m. This leaves a main basin depth of 2.25 m with 3:1 side slope.

2.4. Consideration for the Proposed Easterly Infiltration Trench

The proposed easterly SWM facility is designed as a long linear infiltration trench. According to the SWMPD Manual, in designing infiltration systems, it is typically recommended to limit the depth of stormwater ponding to no more than 0.60 m to prevent compaction of the basin bottom. However, since approximately 2-3 m of soil will be removed to create the infiltration trench, that soil is generally 2.3 times heavier than water, and that water storage to that depth would be infrequent, compaction is not considered to be an issue.

No forebay is proposed for the easterly infiltration trench. All runoff water is intended to be stored and infiltrated into the ground. The system is proposed to have a highflow overflow weir to manage major storm events.

2.5. Soil Conditions

Local soils are known to be quite pervious. A previous stormwater management report, prepared by D.J. Peach and Associates Ltd. in May of 2001 for the existing westerly SWM infiltration pond (prepared in support of the original Dry Goods Warehouse (now Nut House plant) development) "conservatively" estimated a hydraulic conductivity of the soil to be 360 mm/hr (k = 1.0 x 10-2 cm/s) "based on past experience with similar soils".

In November 2009, a geotechnical investigation was conducted by Golder Associates on the property that also provided an estimation of the infiltration rate. A borehole was drilled in the location of the easterly portion of the existing SWM facility, two samples were taken, and grain size distributions were completed for each sample. Other than topsoil encountered in the top 0.24 m of the borehole, the remaining 5.55 m (to a depth of 408.66 m) consisted of compact to dense sand and gravel, with a trace silt, and cobbles. The geotechnical investigation states that "the estimated infiltration rate for a clean sand and gravel surface is 35 L/min/m2", which is equal to 2100 mm/hr (k = 5.8 x 10-2 cm/s). The relevant pages from the Golder Associates geotechnical report are provided in **Appendix B.**

The 2010 Gamsby and Mannerow Ltd (G&M) SWM Report in support of the main Phoenix 1 plant, analyzed the stormwater management facility using the low infiltration rate, or low 'K', of 360 mm/hr, and also with the high infiltration rate, or high 'K' of 2100 mm/hr. It was found that under either

condition, the SWM facility was sufficiently sized to hold and infiltrate all storm events up to and including runoff from a 1:100-year design storm event.

Since the existing SWM facility was constructed and the Phoenix plant developed in 2011, the existing SWM Facility has continued to operate as designed. Based on visual observations during runoff events, flows rarely are seen to be conveyed the full length of the forebay before infiltrating. Ponded runoff is rarely seen in the SWM main basin, indicating the infiltration rate of the soils in the bottom of the SWM Facility are likely closer to, or higher than, the high infiltration rate. Operator observations are included in **Appendix C.** As such, we are comfortable proceeding with the infiltration rate of 2100 mm/h (k=5.8 x 10-2 cm/s) for this updated modelling of the existing SWM facility

In August 2024, GEI Consultants Canada Ltd conducted a geotechnical investigation for the proposed easterly infiltration trench. Two boreholes were drilled in the location of the proposed infiltration trench and grain size distributions were completed for each sample. The boreholes encountered sand with gravel, silt and clay with infiltration rate ranging from 18 mm/hr to 37 mm/hr. An average infiltration rate of 27.5 mm/h was used for the modelling of the proposed infiltration trench. The relevant pages from the GEI geotechnical investigation are provided in **Appendix B**.

3. Design Rainfall Events

Mount Forest rainfall IDF data provided by Environment Canada was used in the MIDUSS model (see **Appendix D)** analyses to determine the expected runoff from the site under existing and post-development conditions. The two (2) closest rainfall data stations to Markdale, which are maintained by Environment Canada, are Owen Sound and Mount Forest. Markdale is located approximately equal distances to both locations. Since Mount Forest is inland from Lake Huron and Georgian Bay, much like Markdale, it was chosen as being more representative of rainfall data for the Markdale area.

The Chicago parameters and the total depth of rainfall used for the various design rainfall events are as follows:

Coefficient	5-Year	100-Year
A	1012.69	1702.25
B	8.094	9.944
C	0.820	0.827
R	0.375	0.375
Duration (min)	360	360

4. Proposed Conditions

4.1. Proposed Development and Drainage Patterns

The proposed development includes the construction of approximately 16,258 m2 (175,000 sq. ft.) Pheonix 3 addition to the existing Phoenix plant and proposed associated parking and driveways.

Part of the existing northerly storm sewer system and easterly swale would be removed to allow construction of the building addition. The existing storm sewer west of the addition would be utilized to direct runoff from the west half of the rooftop of the new proposed building (Pheonix 3), as well as the asphalt area to the north-west of the building, to the existing westerly SWM pond.

The existing westerly storm sewers would continue to direct runoff from the west half of the rooftops of the existing Phoenix buildings (Phoenix 1 and 2) to the existing SWM Facility.

The easterly swale is proposed to be extended to the north instead of to the existing westerly SWM facility. The easterly half of the rooftop runoff from all of the Pheonix buildings (1, 2 and 3) and easterly parking areas would be redirected northerly in an infiltration trench, which would ultimately overflow to the Rocky Saugeen River under major flow events. This would result in less runoff directed towards the existing westerly SWM facility. The undeveloped grass area along the east portion of the site would continue to drain by the easterly swale to the lands to the north.

4.2. MIDUSS Modelling and Results

For the proposed 175,000 sq. ft addition, the site is modelled as five drainage catchments that reflect the areas draining to the existing westerly SWM facility's inlet points at its southerly and easterly ends and the proposed easterly infiltration trench. Catchment 100 generally represents the west half of the proposed Pheonix 3 building and the west half of the rooftops of the existing Phoenix plants (1 and 2) area, draining to a northerly storm sewer system to the existing westerly SWM facility. Catchment 200 represents the Phoenix plant area draining to a southerly storm sewer system to the existing westerly SWM facility. Catchment 300 generally represents the Nut House plant area in the westerly portion of the site.

Catchment 400 generally represents the east half of the new Pheonix 3 building, the easterly parking areas and the east half of the rooftops of the existing Phoenix plants (1 and 2), which will drain to the proposed easterly infiltration trench (secondary SWM facility). Catchment 500 represents the northerly green fields that also would drain to the easterly infiltration trench.

The development is modelled as five (5) drainage catchments, described in Table 2.

Table 2 – Summary of Modelled Catchments

Catchment	Description	Area (ha)	Impervious Level (%)
100	North-westerly Area – Ex Pheonix Building. And West Half of the New Building, and East Parking Area of Existing Pheonix Building.	3.1	90
200	South-easterly Area – Ex. Phoenix Building and Parking Area	4.14	90
300	Westerly Area – Nuthouse Building and Parking Area	5.96	80
400	North-easterly - East Half of the New Building and East Parking Areas	7.33	40
500	Northerly – Field area to the Easterly Iinfiltration Trench	6.09	0

Catchments 100, 200 and 300 drain to the existing westerly SWM pond while Catchments 400 and 500 drain to the proposed easterly infiltration trench.

The following Table 3 summarizes the modeled inflows to the existing westerly SWM facility, the depth to which water would pond in the facility, and the infiltration rate from the facility under the 1:5-year and 1:100-year design storm events. Post-development MIDUSS modeling is included as **Appendix D.** A Stage-Storage-Discharge table was created to model the existing SWM facility and is included in **Appendix E.**

Table 3 – Summary of Results – existing westerly SWM Facility

Westerly SWM Facility Design Characteristic	Design Storm Event	
	5-Year	100-Year
Combined Flow to SWM Facility (m^3/s)	2.143	3.515
Depth of Water in SWM Facility (m)	0.73	1.23
Maximum Water Level Elevation in SWM Facility (m)	413.98	413.48
Maximum Infiltration Rate (m^3/s)*	0.973	1.249

*Infiltration rate and soil in SWM pond = 2100 mm/hr. after Golder associated geotechnical investigation in November 2009.

As shown in Table 3, under the 1:100-year design storm event, the maximum depth of ponding expected in the westerly SWM facility is 1.23 m, or an elevation of 413.48 m, which provides a freeboard of 1.02 m to the elevation of the overflow weir of the SWM facility (414.50 m). Therefore, the existing westerly SWM facility is expected to continue to provide sufficient capacity to store and infiltrate runoff from the subject property for proposed development conditions under design storm events up to, and including, the 1:100-year design storm event.

For the easterly catchments, the following Table 4 summarizes the modeled inflows to the proposed easterly infiltration trench, the depth to which water would pond in the trench, and the infiltration rate from the trench under the 1:5-year and 1:100-year design storm events. Since the elevation of the trench is not consistent along its length, an average depth of 2m is used for the modelling. Post-development MIDUSS modeling is included as **Appendix D.** A Stage-Storage-Discharge table was created to model the Trench and is included in **Appendix E.**

Table 4 – Summary of Results – Proposed Easterly Infiltration Trench.

SWM Facility Design Characteristic	Design Storm Event	
	5-Year	100-Year
Flow to SWM Facility (m^3/s)	0.488	0.862
Depth of Water in SWM Facility (m)	1.36	1.69
Maximum Infiltration Rate (m^3/s)*	0.017	0.197

*Infiltration rate and soil in trench = 27.5 mm/hr. after GEI geotechnical investigation in August 2024.

As shown in Table 4, under the 1:100-year design storm event, the maximum depth of ponding expected in the easterly infiltration trench is 1.69 m, which provides a freeboard of 0.31 m to the elevation of the overflow weir of the trench.

Therefore, the proposed easterly infiltration trench is expected to provide sufficient capacity to store and infiltrate runoff from the subject property for proposed development conditions under design storm events up to, and including, the 1:100-year design storm event.

A Plan & Profile drawings of the proposed easterly infiltration trench is included in **Appendix F.**

Since the proposed trench would also provide a major storm overland flow route for the Town of Markdale, a check was performed to analyze the hydraulic capacity. As per the analysis, the trench has a hydraulic capacity of 32.77 m^3/s at the shallowest part at a slope of 0.5%. The 100-year flow and the Regional storm (Hurricane Hazel) flow into the trench from the Town were calculated to be 8.21 m^3/s and 5.81 m^3/s which are less than the hydraulic capacity of the trench. Hence the Infiltration trench is sized appropriately to carry the 100-year and Regional Storm flows from the Town and the development.

5. Water Quality

MECP guidelines indicate that for an infiltration-type SWM facility to be implemented in the SWM of runoff from an entire site, including roads and parking lots, pre-treatment is necessary to minimize the potential for suspended sediments to "blind" the bottom of the basin and reduce its ability to provide maximum infiltration. As per MECP guidelines, pre-treatment is required for a 25mm – 4 hour storm.

Since less flows are expected to drain to the existing westerly SWM facility than what was previously approved under the Amended Certificate of Approval as a result of proposed development, the existing SWM facility forebay expected to continue to provide sufficient pre-treatment for inflows from the property.

The proposed easterly infiltration trench is proposed to be vegetated, and would act also as an enhanced grass swale to provide pre-treatment for a 25mm – 4-hour storm. Since the runoff from the site during storm events up to 100-year is expected to be fully infiltrated without outlet, no direct runoff into the Rocky Saugeen River is expected.

Since all runoff conveyed by the storm sewer systems from the subject property runoff is expected to be infiltrated into the ground, no further treatment to off-site surface water is considered necessary.

6. Summary

Chapman's Ice Cream proposes to construct an approximately 16,258 m2 (175,000 sq. ft.) Pheonix 3 addition onto the existing Phoenix plant with associated paved parking and driving areas.

The existing westerly SWM facility was designed as an infiltration basin and is expected to provide sufficient capacity to store and infiltrate runoff from the proposed development during storm events up to, and including, the 1:100-year design storm event. Pre-treatment of runoff from the Phoenix plant areas would continue be provided by the forebay prior to discharging to the main portion of the existing SWM facility as well as the stone berm separating the forebay from the main infiltration basin. Pre-treatment of runoff from the Nut House plant area would continue to be provided by an existing oil/grit separator prior to discharging to the SWM facility.

The proposed easterly infiltration trench, designed as a secondary infiltration SWM facility, is expected to provide enough capacity to store and infiltrate runoff from the proposed development during storm events up to, and including, the 1:100-year design storm event. The vegetated swale is expected also to provide pre-treatment of runoff before fully infiltrating in the ground. Greater flows, ultimately would discharge into the grassed field to the north and to the Rocky Saugeen River.

All of which is respectfully submitted,

GM BLUEPLAN ENGINEERING LIMITED

Prepared by:

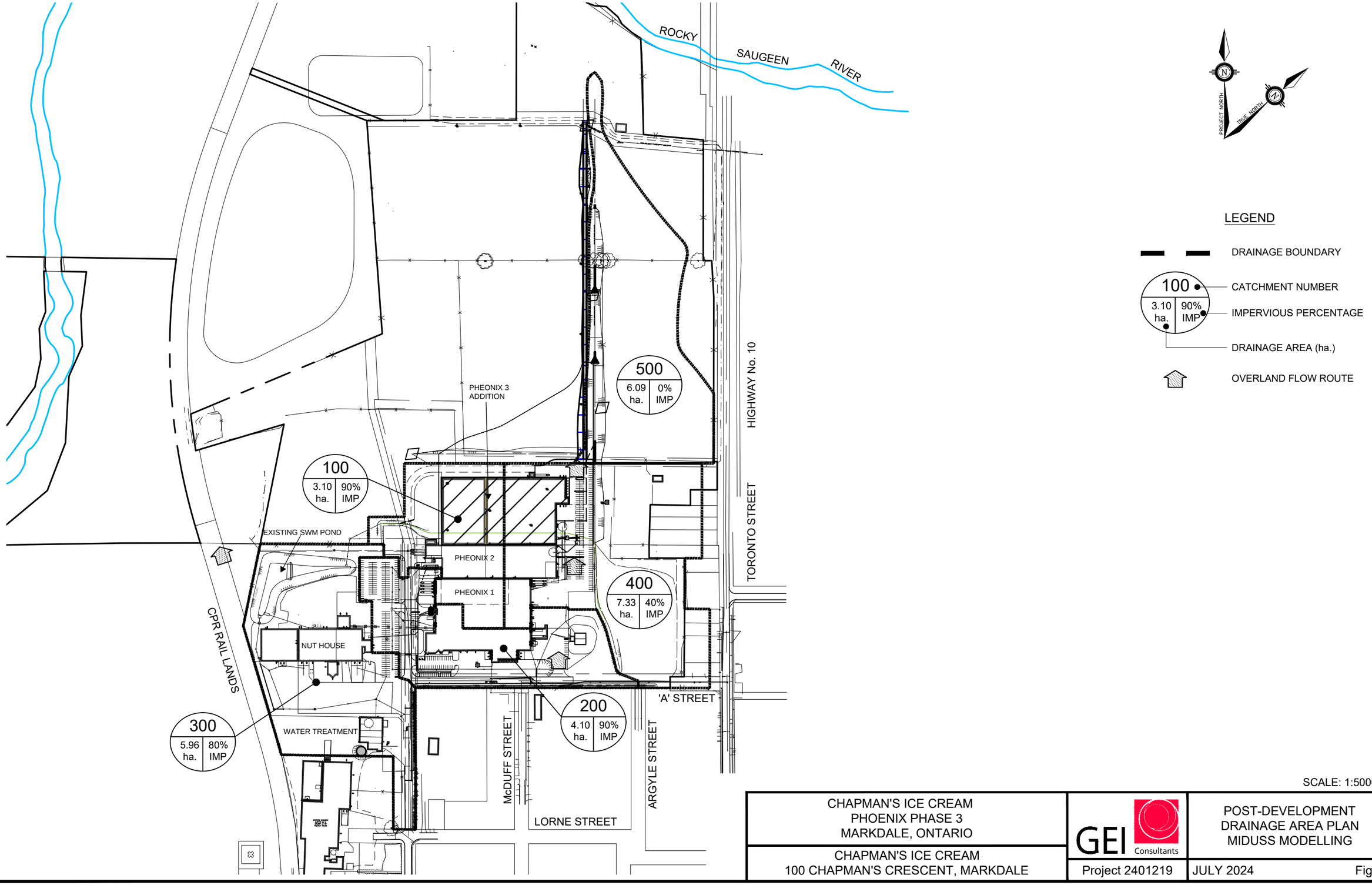
Rasvinder Singh, E.I.T.

Reviewed by:

John Slocombe, P.Eng.

RS/JS:clw

Figures



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CHAPMAN'S ICE CREAM PHOENIX PHASE 3 MARKDALE, ONTARIO	GEI Consultants	POST-DEVELOPMENT DRAINAGE AREA PLAN MIDUSS MODELLING
CHAPMAN'S ICE CREAM 100 CHAPMAN'S CRESCENT, MARKDALE	Project 2401219	JULY 2024 Fig. 1

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Appendix A

MOECC ECA NO. 8028-83PS3Z

209018
SWM

Ontario

Ministry of the Environment
Ministère de l'Environnement

AMENDED CERTIFICATE OF APPROVAL
INDUSTRIAL SEWAGE WORKS
NUMBER 8028-83PS3Z
Issue Date: June 15, 2010

David Chapman's Ice Cream Limited
150 Lorne St Markdale
Grey Highlands, Ontario
N0C 1H0

Site Location: Chapman's Ice Cream Facility
150 Lorne St Part 2-15, Ref. Plan 16R326
Grey Highlands Municipality, County of Grey
N0C 1H0

You have applied in accordance with Section 53 of the Ontario Water Resources Act for approval of:

upgrading an existing stormwater management facility to service a total drainage area of 14.57 ha (including existing developed area) with approximately 50% impervious area at the expanded Chapman's Ice Cream Limited facility located at 150 Lorne Street, Village of Markdale, Municipality of Grey Highlands. The stormwater management facility is designed to provide quality control for storm events up to 1:5 years return frequency and quantity control for storm events up to 1:100 years return frequency, discharging during major storm events through an existing municipal stormwater management facility into the Rocky Saugeen River, consisting of the following:

PROPOSED WORKS:

FOREBAY

- one (1) 25 m long grassed ditch conveying stormwater runoff from the site to a forebay described below;

- one (1) 70 m long and 1.5 m deep forebay with side slopes of 3H:1V and a bottom area of 500 m^2 equipped with a 1.0 m high flow check berm consisting of rip-rap, filter cloth and a 25 mm clear stone cover, providing quality control, discharging to an infiltration basin described below;

INFILTRATION BASIN

- one (1) **upgraded** infiltration basin located downstream of the oil and grit separator, providing a total stormwater holding capacity of 7540 m^3 with bottom of basin dimensions of 82.5 m long, 12 m wide, bottom elevation of 412.25 m masl, 3H:1V side slopes, and a total basin depth of

2.25 m, equipped with a rip-rap protected emergency overflow structure at 415.25 m masl discharging to a drainage ditch along the CPR railroad into an existing municipal stormwater management facility; and

- including all controls and appurtenances.

all in accordance with the Application for Approval of Industrial Sewage Works submitted by Chapman's Ice Cream Limited dated August 28, 2001 and design specifications and drawings prepared by Gamsby and Mannerow Engineers, Owen Sound, Ontario, and the following additional document:

1. "Chapman,s Ice Cream New Production Facility Stormwater Management Report" dated November 2009, Revised March 2010, prepared by Gamsby and Mannerow Limited, Consulting Professional Engineers, Owen Sound.

2. A letter from J. B. Solocombe, P. Eng., Gamsby and Mannerow Limited, to Stefanos Habtom, P. Eng., MOE dated May 14, 2010 providing a response to technical review comments dated May 10, 2010.

SEWAGE WORKS APPROVED UNDER CERTIFICATE OF APPROVAL No. 2261-56LKJ4 ON JANUARY 31, 2002:

a stormwater management facility to service an existing total drainage area of 4.0 ha consisting of 1.05 ha of production and office building, 1.0 ha of paved parking area, 1,55 ha of undeveloped gravel area, and 0.4 ha of grassed area, consisting of the following:

OIL AND GRIT SEPARATOR

- one (1) existing precast concrete oil and grit separator (Model # STC 4000) with an inside diameter of 3.048 meters, an oil holding capacity of 3,490 litres, a sediment holding capacity of 14,060 litres, and a 50 litres/sec maximum flow treatment capacity; designed to provide a level 1 quality treatment (up to 81% TSS removal) for stormwater flows from the 1.0 ha paved parking area and 1.55 ha of undeveloped gravel area, discharging to the south side of the infiltration basin described above;

all in accordance with the Application for Approval of Industrial Sewage Works submitted by Chapman's Ice Cream Limited dated August 28, 2001 and design specifications and drawings prepared by D. J. Peach & Associates Ltd. Durham, Ontario, and the following additional documents:

1. Letter from D.J. Peach & Associates Ltd. dated November 28, 2001 sent to Ministry of the Environment, attention S. Habtom - supplemental design brief.

2. Letter from D.J. Peach & Associates Ltd. dated December 14, 2001 sent to Ministry of the Environment, attention S. Habtom - additional design information.

3. Letter from D.J. Peach & Associates Ltd. dated January 17, 2002 sent to Ministry of the Environment, attention S. Habtom - additional design information.

For the purpose of this Certificate of Approval and the terms and conditions specified below, the following definitions apply:

"*Certificate* " means this entire certificate of approval document, issued in accordance with Section 53 of the Ontario Water Resources Act, and includes any schedules;

"*Director* " means any *Ministry* employee appointed by the Minister pursuant to section 5 of the Ontario Water Resources Act;

"*District Manager* " means the District Manager of the Owen Sound Area Office of the *Ministry* ;

"*Ministry* " means the Ontario Ministry of the Environment;

"*Owner* " means David Chapman's Ice Cream Limited and includes its successors and assignees;

"*Proposed Works* " means the sewage works described in the *Owner* 's application, this *Certificate* and in the supporting documentation referred to herein, to the extent approved by this *Certificate* ;

"*Works* " means the sewage works described in the *Owner* 's application, this *Certificate* and in the supporting documentation referred to herein, to the extent approved by this *Certificate* .

You are hereby notified that this approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. GENERAL PROVISIONS

(1) Except as otherwise provided by these Conditions, the *Owner* shall design, build, install, operate and maintain the *Works* in accordance with the description given in this *Certificate* , the application for approval of the works and the submitted supporting documents and plans and specifications as listed in this *Certificate* .

(2) Where there is a conflict between a provision of any submitted document referred to in this *Certificate* and the Conditions of this *Certificate* , the Conditions in this *Certificate* shall take precedence, and where there is a conflict between the listed submitted documents, the document bearing the most recent date shall prevail.

(3) Where there is a conflict between the listed submitted documents, and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.

2. EXPIRY OF APPROVAL

The approval issued by this *Certificate* will cease to apply to those parts of the *Proposed Works* which have not been constructed within **five (5) years** of the date of this *Certificate* .

3. CHANGE OF OWNER

The *Owner* shall notify the *District Manager* and the *Director* , in writing, of any of the following changes within **thirty (30) days** of the change occurring:

(a) change of *Owner* ;

(b) change of address of the *Owner* ;

(c) change of partners where the *Owner* is or at any time becomes a partnership, and a copy of the most recent declaration filed under the Business Names Act, R.S.O. 1990, c.B17 shall be included in the notification to the *District Manager* ; and

(d) change of name of the corporation where the *Owner* is or at any time becomes a corporation, and a copy of the most current information filed under the Corporations Information Act, R.S.O. 1990, c. C39 shall be included in the notification to the *District Manager* .

4. OPERATION AND MAINTENANCE.

(1) The *Owner* shall ensure that the design minimum liquid retention volume(s) is maintained at all times.

(2) The *Owner* shall inspect the *Works* at least **once a year** and, if necessary, clean and maintain the *Works* to prevent the excessive buildup of sediments and/or vegetation.

(3) The *Owner* shall maintain a logbook to record the results of these inspections and any cleaning and maintenance operations undertaken, and shall keep the logbook at *Owner* 's Operational Headquarters for inspection by the *Ministry* . The logbook shall include the following:

(a) the name of the *Works* ;

(b) the date and results of each inspection, maintenance and cleaning, including an

estimate of the quantity of any materials removed; and

(c) the date of each spill within the catchment area, including follow-up actions / remedial measures undertaken.

5. RECORD KEEPING

The *Owner* shall retain for a minimum of **five (5) years** from the date of their creation, all records and information related to or resulting from the operation and maintenance activities required by this *Certificate* .

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is imposed to ensure that the *Works* are built and operated in the manner in which they were described for review and upon which approval was granted. This condition is also included to emphasize the precedence of Conditions in the *Certificate* and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review.

2. Condition 2 is included to ensure that the *Works* are constructed in a timely manner so that standards applicable at the time of Approval of the *Works* are still applicable at the time of construction, to ensure the ongoing protection of the environment

3. Condition 3 is included to ensure that the *Ministry* records are kept accurate and current with respect to approved works and to ensure that subsequent owners of the works are made aware of the certificate and continue to operate the works in compliance with it.

4. Condition 4 is included to require that the *Works* be properly operated and maintained such that the environment is protected .

5. Condition 5 is included to require that all records are retained for a sufficient time period to adequately evaluate the long-term operation and maintenance of the *Works* .

This Certificate of Approval revokes and replaces Certificate(s) of Approval No. 2261-56LKJ4 issued on January 31, 2002

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

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

The Notice should also include:

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

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

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, 15th Floor
Toronto, Ontario
M5G 1E5

AND

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

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca**

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

DATED AT TORONTO this 15th day of June, 2010

THIS CERTIFICATE WAS MAILED
ON June 17, 2010
JC
(Signed)

Jennifer Barolet, P.Eng.
Director
Section 53, *Ontario Water Resources Act*

SH/

c: District Manager, MOE Owen Sound
John Slocombe, Gamsby and Mannerow Limited

Appendix B

EXCERPTS FROM GOLDER ASSOCIATES GEOTECHNICAL REPORT (NOVEMBER 2009) & GEI GEOTECHNICAL INVESTIGATION (AUGUST 2024)

UPDATED FOR NEW LOCATION

November 2009

GEOTECHNICAL INVESTIGATION

Chapman's Ice Cream Plant
Markdale, Ontario

Submitted to:
Mr. Joe Jacobs, Vice President - Operations
Chapman's Ice Cream
160 Main Street West
Markdale, Ontario
N0C 1H0

Report Number: 09-1132-1058-R02

Distribution:

4 Copies - Chapman's Ice Cream
2 Copies - Benoit International Inc.
2 Copies - Golder Associates Ltd.

Golder Associates

Component	Thickness (mm)	
	Truck Routes and Parking	Automobile Parking
HL 3 Sheet Asphalt	50	40
HL 8 Binder Asphalt	60	50
Granular A Base	150	150
Granular B Subbase	400	300

Effective drainage of the granular pavement materials should be provided using stub drains at all catchbasin locations and/or full width granular construction and ditches with inverts at least 0.5 metres below the adjacent subgrade level or continuous subdrains.

The asphalt should be produced, placed and compacted in accordance with the current Ontario Provincial Standard Specifications (OPSS) for medium duty pavements. Milled notches having depths equal to the new surface asphalt thickness by 300 millimetres wide should be provided where new construction abuts existing pavements and care should be taken to properly tack coat all milled surfaces and butt joints.

Consideration should be given to utilizing concrete pavement in concentrated truck turning and loading dock areas.

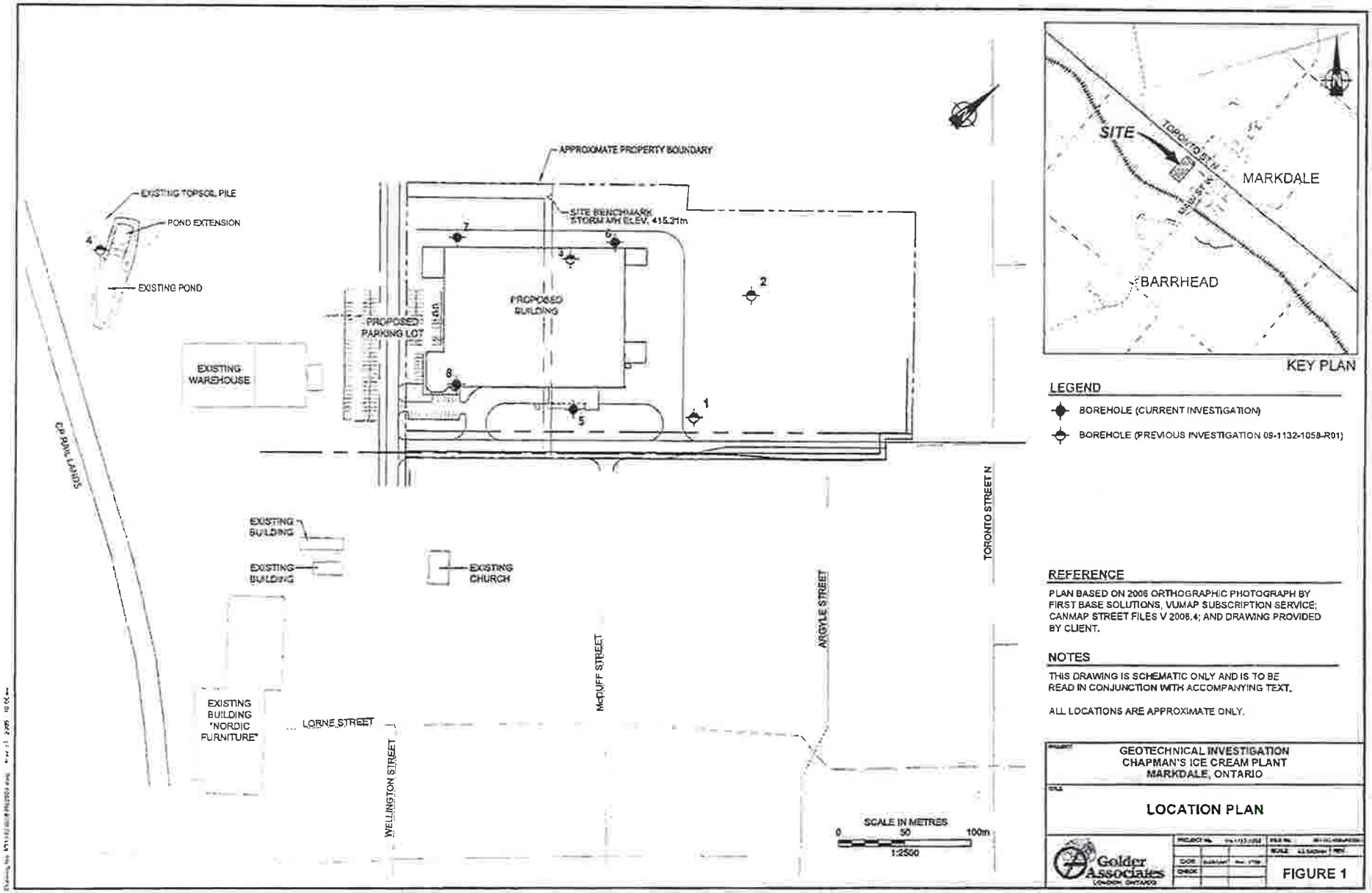
In addition, concrete pavement would be beneficial to support the trailer dolly wheels should they be parked in an area of the plant.

The concrete pavement should consist of a minimum of 200 millimetres of concrete and 300 millimetres of Granular A compacted to 100 per cent of standard Proctor maximum dry density.

Construction activities should be coordinated to minimize the amount of construction traffic over the exposed subgrade and partially completed pavements.

5.7 Stormwater Management Facility

It is understood that the existing stormwater pond is to be extended to the north and stormwater infiltrated into the sand and gravel layer. The estimated infiltration rate for a clean sand and gravel surface is 35 litres per minute per square metre. To maintain this rate, it is essential that the infiltration surface be kept clear of silts, debris and vegetation.


APPROXIMATE PROPERTY BOUNDARY
EXISTING TOPSOIL PILE
POND EXTENSION
EXISTING POND
SITE BENCHMARK
STORM MH ELEV. 415.21m
PROPOSED BUILDING
PROPOSED PARKING LOT
EXISTING WAREHOUSE
CP RAIL LANDS
EXISTING BUILDING
EXISTING BUILDING
EXISTING CHURCH
EXISTING BUILDING "NORDIC FURNITURE"
LORNE STREET
WELLINGTON STREET
McDUFF STREET
ARGYLE STREET
TORONTO STREET N
SCALE IN METRES
0
50
100m
1:2500
SITE
TORONTO ST N
MARKDALE
BARRHEAD
KEY PLAN
LEGEND
BOREHOLE (CURRENT INVESTIGATION)
BOREHOLE (PREVIOUS INVESTIGATION 09-1132-1058-R01)
REFERENCE
PLAN BASED ON 2006 ORTHOGRAPHIC PHOTOGRAPH BY FIRST BASE SOLUTIONS, VUMAP SUBSCRIPTION SERVICE; CANMAP STREET FILES V 2006.4; AND DRAWING PROVIDED BY CLIENT.
NOTES
THIS DRAWING IS SCHEMATIC ONLY AND IS TO BE READ IN CONJUNCTION WITH ACCOMPANYING TEXT.
ALL LOCATIONS ARE APPROXIMATE ONLY.
GEOTECHNICAL INVESTIGATION
CHAPMAN'S ICE CREAM PLANT
MARKDALE, ONTARIO
LOCATION PLAN
Golder Associates
LONDON, ONTARIO
FIGURE 1

PROJECT: 09-1132-1058

RECORD OF BOREHOLE 4

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: October 28, 2009

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

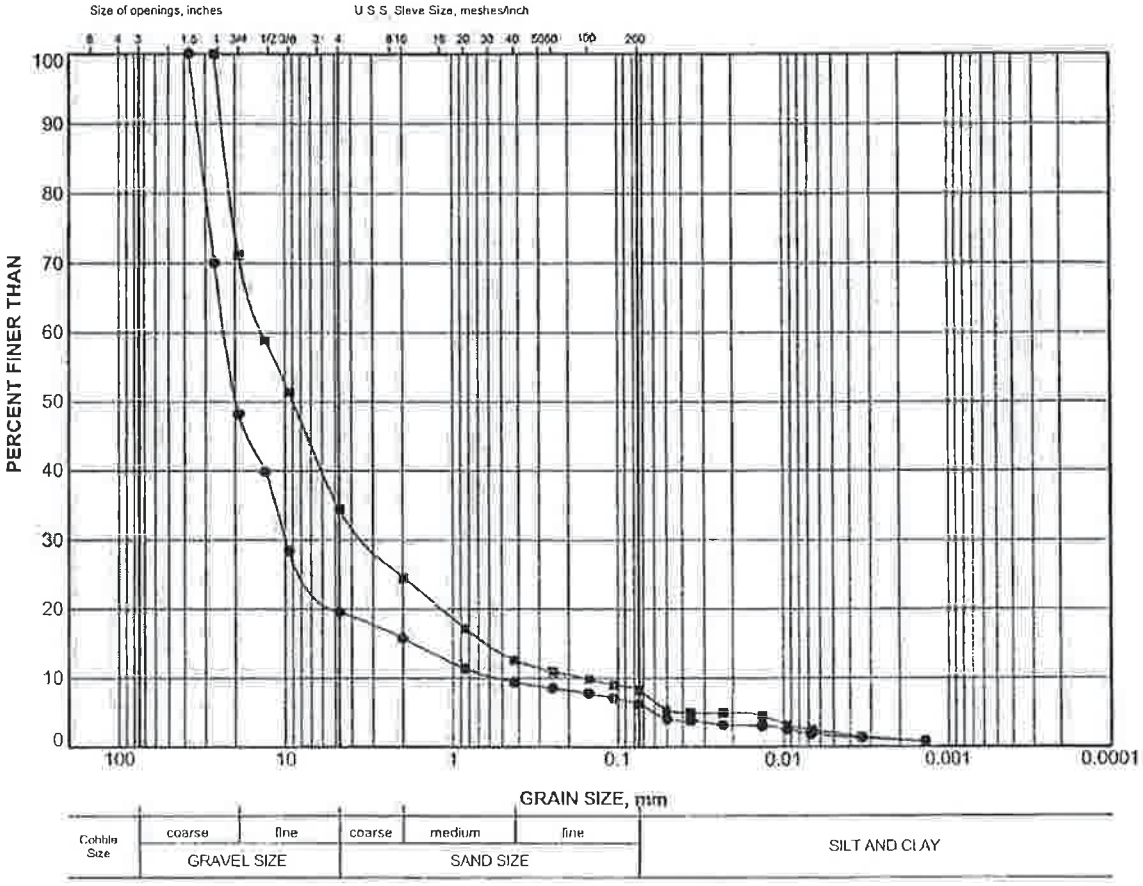
DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-4} 10^{-5} 10^{-6} 10^{-7}) / WATER CONTENT PERCENT Wp W Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		(Previous Report No. 09-1132-1058-R01)										
0	POWER AUGER HOLLOW STEM	GROUND SURFACE		414.45								
		TOPSOIL		0.00 414.21								
				0.24				414				
1					1	SS	12			O		
								413				
2					2	SS	37			O	MH	Borehole dry during drilling on October 28, 2009.
								412				
3		Compact to dense brown SAND AND GRAVEL, trace silt, with cobbles			3	SS	10			O		
					4	SS	44			O	MH	
								411				
4					5	SS	20			O		
								410				
5					6	SS	11			O		
								409				
					7	SS	18			O		
				408.66								
6		END OF BOREHOLE		5.79								
7												
8												
9												

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: RA

CHECKED:



LEGEND

SYMBOL	BOREHOLE	SAMPLE	ELEV (m)
●	4	2	412.7
■	4	4	411.2

PROJECT

GEOTECHNICAL INVESTIGATION
CHAPMAN'S ICE CREAM PLANT
MARKDALE, ONTARIO

TITLE

GRAIN SIZE DISTRIBUTION

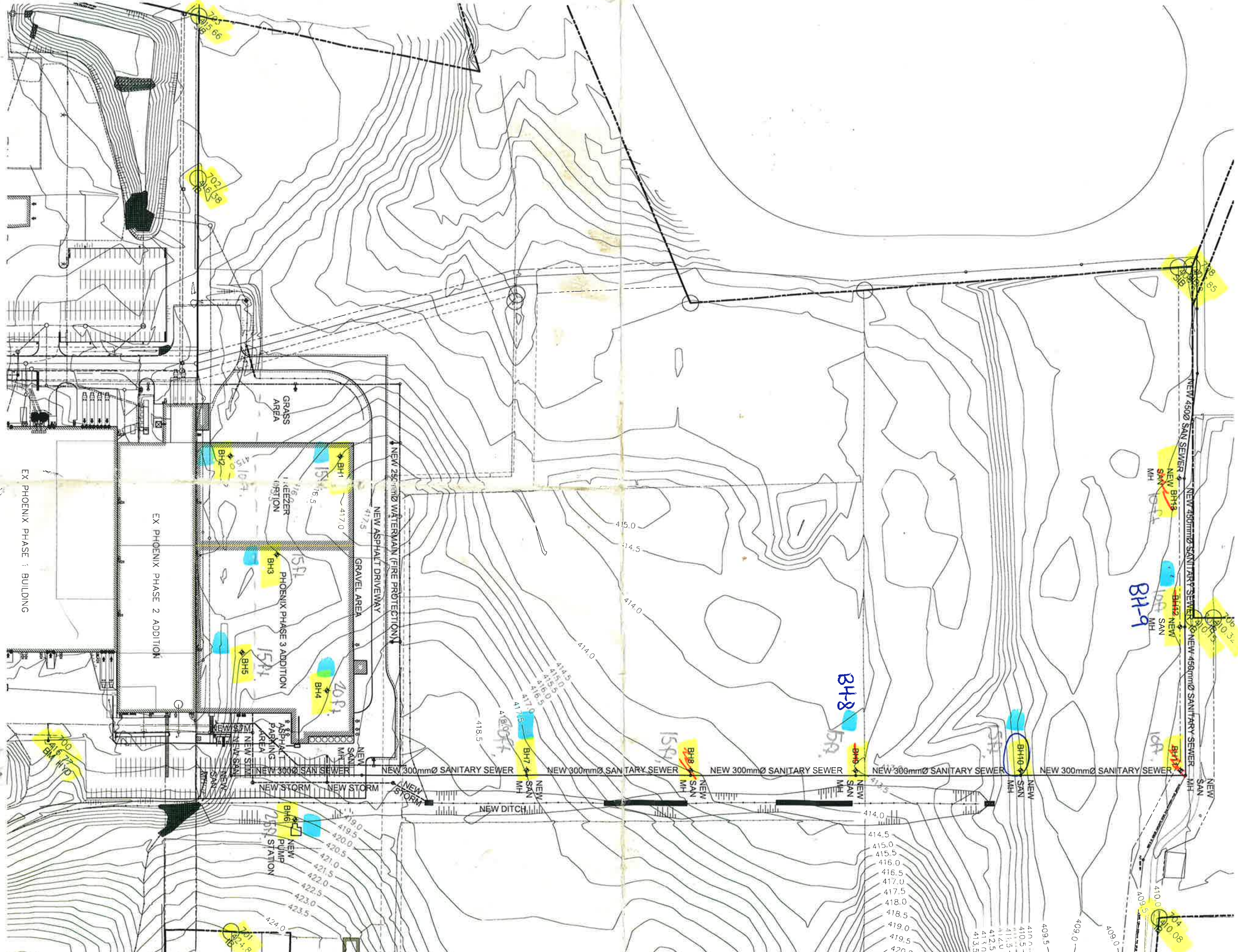
SAND AND GRAVEL

Golder Associates
LONDON, ONTARIO

PROJECT No.	09-1132-1058		FILE No.	0911321058-R020A1
			SCALE	N/A
DRAWN	WTF	Nov 07/09	REV	
CHECK				

FIGURE A-1

LON_SSD 8.5x11_LONG.CDT


EX PHOENIX PHASE 1 BUILDING
EX PHOENIX PHASE 2 ADDITION
PHOENIX PHASE 3 ADDITION
FREEZER OPTION
GRASS AREA
GRAVEL AREA
NEW ASPHALT DRIVEWAY
NEW 250mmØ WATERMAIN (FIRE PROTECTION)
ASPHALT PARKING AREA
NEW STM
NEW SAN
NEW STORM
NEW 300Ø SAN SEWER
NEW 300mmØ SANITARY SEWER
NEW 450Ø SAN SEWER
NEW 450mmØ SANITARY SEWER
NEW SAN MH
NEW DITCH
NEW PUMP STATION
BH1
BH2
BH3
BH4
BH5
BH6
BH7
BH8
BH9
BH10
BH11
BH12
BH13
BH-8
BH-9
700 416.77 BM HYD
701 424.84 IB
702 416.38 IB
703 415.66 SIB
704 410.08
706 410.34
708 ... 85 SIB
415.0
414.5
414.0
418.5
419.0
419.5
420.0
420.5
421.0
421.5
422.0
422.5
423.0
423.5
424.0
409.0
409.5
410.0

GEI Consultants Canada Ltd.

Barrie, Guelph, Owen Sound, Listowel, Kitchener, London, Hamilton, GTA

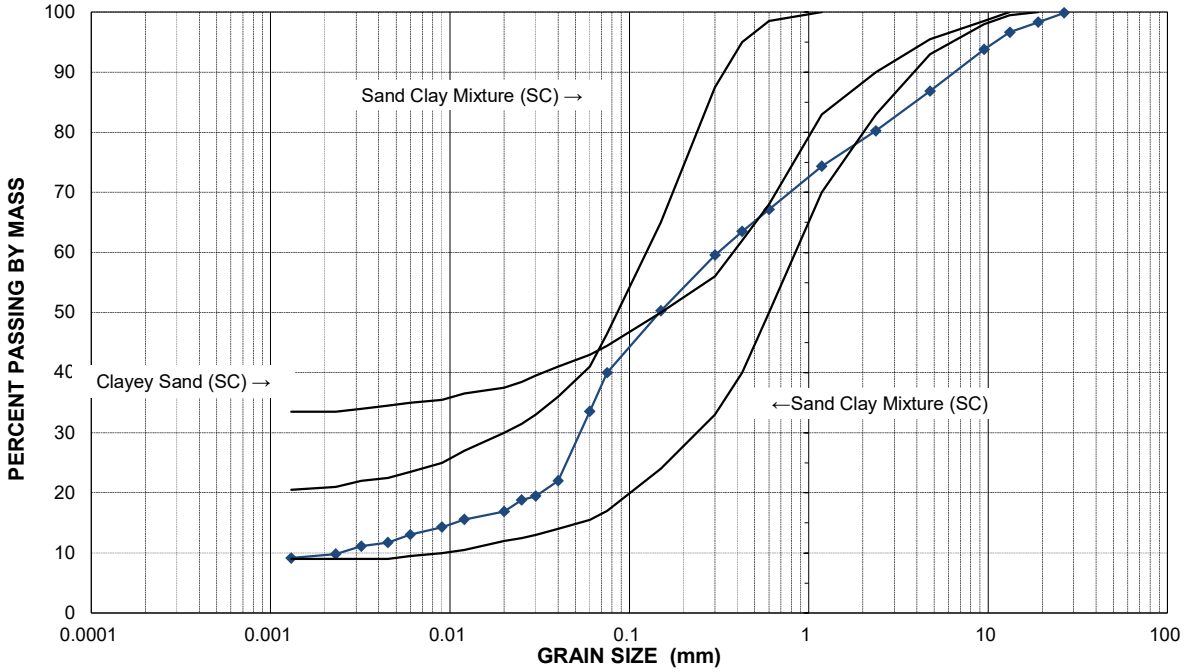
1260 - 2nd Avenue E., Unit 1 Owen Sound, ON N4K 2J3

Phone 519-376-1805 Fax 519-376-8977

PARTICLE SIZE ANALYSIS

PROJECT:	Chapman's Pheonix 3 Addition	FILE NO.:	2401219 (215158)
LOCATION:	Markdale, ON	LAB SAMPLE NO.:	S-5596 (RCVD Aug 2)
CLIENT :	David Chapman's Ice Cream	SAMPLE DATE:	August 2, 2024
SOIL TYPE:	Sand with Silt and a little Gravel and Clay	SAMPLED BY:	EW
GRAPH # :	8 - Clayey Sands, Sand-Clay Mixtures	SOURCE:	BH-7 @ 4.6 to 5.2 mbgs

PARTICLE SIZE DISTRIBUTION



←		FINE	MEDIUM	COARSE	FINE	COARSE
CLAY	SILT	SAND			GRAVEL	

SIEVE SIZE PARTICLE DIA. (mm)	PERCENT PASSING SAMPLE	HYDROMETER PARTICLE DIA. (mm)	PERCENT PASSING SAMPLE
26.5	99.9	0.0600	33.5
19	98.3	0.0400	22.0
13.2	96.7	0.0300	19.4
9.5	93.8	0.0250	18.8
4.75	86.8	0.0200	16.9
2.36	80.2	0.0120	15.6
1.180	74.3	0.0090	14.3
0.600	67.1	0.0060	13.0
0.425	63.5	0.0045	11.7
0.300	59.6	0.0032	11.1
0.150	50.3	0.0023	9.8
0.075	40.0	0.0013	9.2

D_{10} : 0.002 mm **D_{60} : 0.3 mm** **Cu : 150**

Coefficient of Permeability: 4×10^{-6} cm/sec **"T" Time : N/A mins/cm**

Comments:

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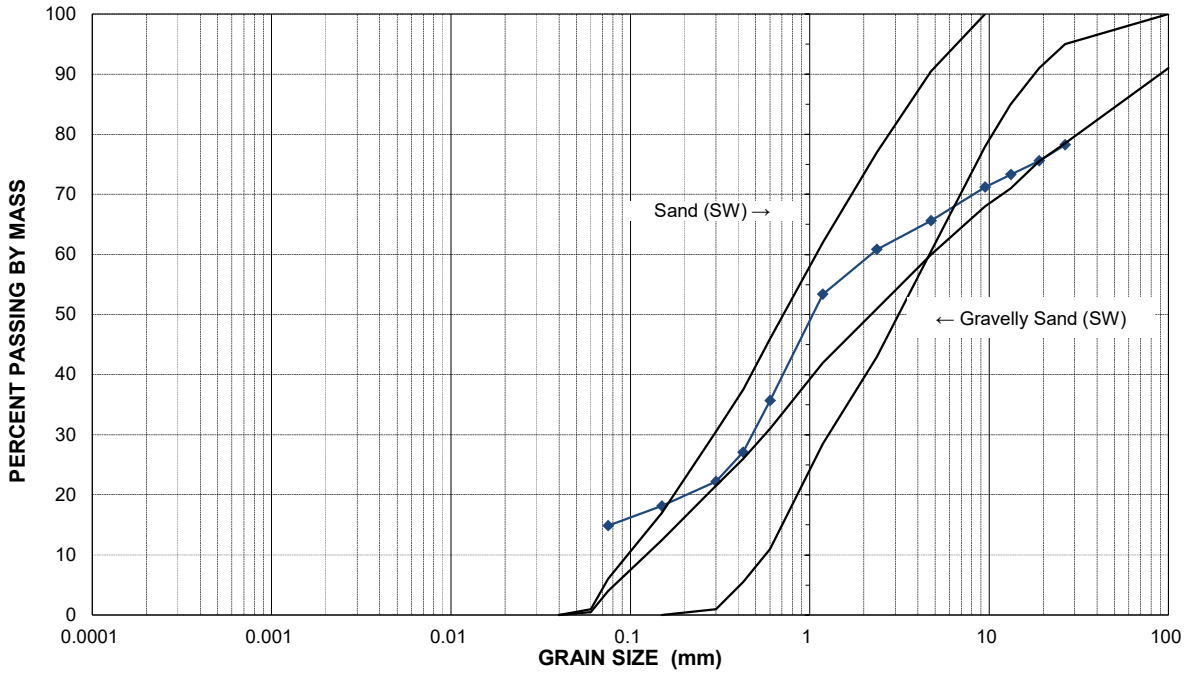
Phone 519-376-1805 Fax 519-376-8977

PARTICLE SIZE ANALYSIS

PROJECT:	Chapman's Pheonix 3 Addition	FILE NO.:	2401219 (215158)
LOCATION:	Markdale, ON	LAB SAMPLE NO.:	S-5597 (RCVD Aug 2)
CLIENT :	David Chapman's Ice Cream	SAMPLE DATE:	August 2, 2024
SOIL TYPE:	Sand with Gravel with a little Fines	SAMPLED BY:	EW
GRAPH # :	5 - Well Graded Sands, Gravelly Sands Cu > 4	SOURCE:	BH-10 @ 1.5 to 2.2 mbgs

PARTICLE SIZE DISTRIBUTION



←		FINE	MEDIUM	COARSE	FINE	COARSE
CLAY	SILT	SAND			GRAVEL	

SIEVE SIZE PARTICLE DIA. (mm)	PERCENT PASSING SAMPLE	HYDROMETER PARTICLE DIA. (mm)	PERCENT PASSING SAMPLE
26.5	78.2	0.0600	
19	75.6	0.0400	
13.2	73.3	0.0300	
9.5	71.2	0.0250	
4.75	65.6	0.0200	
2.36	60.9	0.0120	
1.180	53.4	0.0090	
0.600	35.7	0.0060	
0.425	27.1	0.0045	
0.300	22.2	0.0032	
0.150	18.1	0.0023	
0.075	14.9	0.0013	

D_{10} : 0.02 mm **D_{60} : 2 mm** **Cu : 67**

Coefficient of Permeability: 4×10^{-4} cm/sec **"T" Time : N/A mins/cm**

Comments: D10 Value Extrapolated

Appendix C

EXISTING SWM POND RECORDS

EQUIPMENT MAINTENANCE LOG BOOK

DATE	TIME	EQUIPMENT ADJUSTMENT OR REPAIR	SIGNATURE
MAY 15/13	10:00 AM	Visually inspected retention pond walls. full perimeter of pond and inspected basin. No standing water. No issues with side walls. Removed both man hole cover to Stormceptor STC-4000 studge judged the oil pipe location Had 8" of silt and skim of oil on top of water column less than 1mm SBye	
MAY 22	14	Visual inspection of retention pond, walked perimeter of pond and inspected basin. No standing water. Some minimal washing away of south side wall. Removed both man hole cover inspected Stormceptor. Had 8" of silt and a skim of oil on top of water column less than 1mm SBye	

DATE	TIME	EQUIPMENT ADJUSTMENT OR REPAIR	SIGNATURE
Apr 17/15	11:00 a.m	removed cover put had flow still have snow run off. Will check again in 2 weeks	CB
Aug 4/15	10:30	Visually inspected retention pond, walked perimeter of pond, inspected basin no standing water some wash away from top of south wall removed both manhole coves had 8" of silt and a stain of oil or tar or water column, less than 1mm	CB
May 19/16	1:00	Visually inspected retention pond walked perimeter of pond. some soil erosion at top of south end of silt. no standing water in basin removed both manhole coves had 8" of silt and a stain of oil less than 1mm in water column	CB

DATE	TIME	EQUIPMENT ADJUSTMENT OR REPAIR	SIGNATURE
MAY 31/17	10:00 am	Visually inspected retention pond. inspected basin no standing water Some wash away from top of south wall Removed one manhole cover oil present, hard to determine how much - Bob Johnson to call safety Clean to suck out	CB
June 7/17		Bob had safety clean onsite sucked oil off top then went to bottom to clean out silt and sand also with that removed 1000 gallons of water. CB	CB
MAY 6/18	10am	Visually inspected retention pond inspected basin no standing water Some gravel wash away from south wall of top of basin Removed man hole cover 2" silt and minimal oil on top of water GD	

DATE	TIME	EQUIPMENT ADJUSTMENT OR REPAIR	SIGNATUR
June 10/9	10:30	Visually inspected pond walked perimeter. No standing water some wash away of gravel on south rim. Removed man hole covers less than 3" of silt. 1mm or less of oil in column.	GB
MAY 20 2020	11am	Visually inspected pond walked perimeter. No standing water. Some gravel washed down from driveway on south side. Remove man hole covers less than 3" of silt and less than 1mm of oil in column	GB
June 15/2021	10:30	Visually inspected pond walked perimeter No standing water. Some water washed away south side of pond Removed manhole covers less than 4" of silt and less than 1mm of oil in colum	GB

Appendix D

POST-DEVELOPMENT MIDUSS MODELLING & FLOW CALCULATIONS

```
"                MIDUSS Output ----------------------------------------------->"
"                MIDUSS version                          Version 2.25  rev. 473"
"                MIDUSS created                        Sunday, February 7, 2010"
"           10   Units used:                                          ie METRIC"
"                Job folder:          C:\MY JOBS\215158 chapmans new addition\"
"                                                                      July2024"
"                Output filename:       215158 PostDev 5 year July 2024 new.out"
"                Licensee name:                                               "
"                Company                                                      "
"                Date & Time last used:                 8/16/2024 at 4:28:07 PM"
" 31          TIME PARAMETERS"
"       10.000   Time Step"
"      360.000   Max. Storm length"
"     2400.000   Max. Hydrograph"
" 32          STORM Chicago storm"
"            1   Chicago storm"
"     1012.690   Coefficient A"
"        8.094   Constant B"
"        0.820   Exponent C"
"        0.375   Fraction R"
"      360.000   Duration"
"        1.000   Time step multiplier"
"             Maximum intensity           92.903    mm/hr"
"             Total depth                 47.813    mm"
"            6   005hyd   Hydrograph extension used in this file"
" 33          CATCHMENT 100"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          100   North-westerly Area - Ex Pheonix Building. And West Half of the New
Building, and East Parking Area of Existing Pheonix Building."
"       90.000   % Impervious"
"        3.100   Total Area"
"       60.000   Flow length"
"        2.000   Overland Slope"
"        0.310   Pervious Area"
"       60.000   Pervious length"
"        2.000   Pervious slope"
"        2.790   Impervious Area"
"       60.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       65.000   Pervious SCS Curve No."
"        0.142   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"       13.677   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.880   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
```

```
"        0.518   Impervious Initial abstraction"
"                     0.518     0.000     0.000     0.000 c.m/sec"
"             Catchment 100          Pervious   Impervious Total Area "
"             Surface Area           0.310      2.790      3.100      hectare"
"             Time of concentration  52.073     3.542      4.399      minutes"
"             Time to Centroid       260.427    171.110    172.689    minutes"
"             Rainfall depth         47.813     47.813     47.813     mm"
"             Rainfall volume        148.22     1333.97    1482.19    c.m"
"             Rainfall losses        41.000     5.746      9.271      mm"
"             Runoff depth           6.813      42.067     38.541     mm"
"             Runoff volume          21.12      1173.66    1194.78    c.m"
"             Runoff coefficient     0.142      0.880      0.806      "
"             Maximum flow           0.003      0.518      0.518      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                     0.518     0.518     0.000     0.000"
" 33          CATCHMENT 200"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          200   Southeasterly Area - Ex. Pheonix Building and Parking Area"
"       90.000   % Impervious"
"        4.140   Total Area"
"       40.000   Flow length"
"        2.000   Overland Slope"
"        0.414   Pervious Area"
"       40.000   Pervious length"
"        2.000   Pervious slope"
"        3.726   Impervious Area"
"       40.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       65.000   Pervious SCS Curve No."
"        0.142   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"       13.677   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.874   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                     0.721     0.518     0.000     0.000 c.m/sec"
"             Catchment 200          Pervious   Impervious Total Area "
"             Surface Area           0.414      3.726      4.140      hectare"
"             Time of concentration  40.828     2.777      3.453      minutes"
"             Time to Centroid       247.189    169.835    171.211    minutes"
"             Rainfall depth         47.813     47.813     47.813     mm"
"             Rainfall volume        197.94     1781.49    1979.44    c.m"
"             Rainfall losses        41.001     6.006      9.506      mm"
"             Runoff depth           6.812      41.806     38.307     mm"
```

```
"             Runoff volume          28.20      1557.70    1585.90    c.m"
"             Runoff coefficient     0.142      0.874      0.801      "
"             Maximum flow           0.004      0.720      0.721      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                     0.721     1.239     0.000     0.000"
" 33          CATCHMENT 300"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          300   Westerly Area - Nuthouse Building and Parking Area"
"       80.000   % Impervious"
"        5.960   Total Area"
"       50.000   Flow length"
"        2.000   Overland Slope"
"        1.192   Pervious Area"
"       50.000   Pervious length"
"        2.000   Pervious slope"
"        4.768   Impervious Area"
"       50.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       65.000   Pervious SCS Curve No."
"        0.143   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"       13.677   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.878   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                     0.905     1.239     0.000     0.000 c.m/sec"
"             Catchment 300          Pervious   Impervious Total Area "
"             Surface Area           1.192      4.768      5.960      hectare"
"             Time of concentration  46.677     3.175      4.871      minutes"
"             Time to Centroid       254.110    170.446    173.709    minutes"
"             Rainfall depth         47.813     47.813     47.813     mm"
"             Rainfall volume        569.93     2279.70    2849.63    c.m"
"             Rainfall losses        40.998     5.830      12.864     mm"
"             Runoff depth           6.814      41.982     34.949     mm"
"             Runoff volume          81.23      2001.71    2082.93    c.m"
"             Runoff coefficient     0.143      0.878      0.731      "
"             Maximum flow           0.011      0.904      0.905      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                     0.905     2.143     0.000     0.000"
" 54          POND DESIGN"
"        2.143   Current peak flow    c.m/sec"
"        0.656   Target outflow    c.m/sec"
"       4863.6   Hydrograph volume    c.m"
```

```
"           6.   Number of stages"
"      412.250   Minimum water level    metre"
"      414.700   Maximum water level    metre"
"      412.250   Starting water level    metre"
"            0   Keep Design Data: 1 = True; 0 = False"
"                  Level Discharge    Volume"
"                412.250    0.5740     0.000"
"                412.850    0.9030  1140.000"
"                413.450     1.232  2760.000"
"                414.050     1.561  4860.000"
"                414.500     1.807  6660.000"
"                414.700     3.442  7540.000"
"              Peak outflow                  0.973    c.m/sec"
"              Maximum level               412.982    metre"
"              Maximum storage            1497.145    c.m"
"              Centroidal lag                3.247   hours"
"                   0.905     2.143     0.973     0.000 c.m/sec"
" 40           HYDROGRAPH   Combine    1000"
"             6   Combine "
"          1000   Node #"
"                 To SWM 1"
"              Maximum flow                  0.973    c.m/sec"
"              Hydrograph volume          4849.321    c.m"
"                      0.905     2.143     0.973     0.973"
" 40           HYDROGRAPH Start - New Tributary"
"             2   Start - New Tributary"
"                      0.905     0.000     0.973     0.973"
" 33           CATCHMENT 400"
"             1   Triangular SCS"
"             1   Equal length"
"             1   SCS method"
"           400   North-easterly - East Half of the New Building and East Parking
Areas"
"        40.000   % Impervious"
"         7.330   Total Area"
"      120.000   Flow length"
"         2.000   Overland Slope"
"         4.398   Pervious Area"
"      120.000   Pervious length"
"         2.000   Pervious slope"
"         2.932   Impervious Area"
"      120.000   Impervious length"
"         2.000   Impervious slope"
"         0.250   Pervious Manning 'n'"
"        65.000   Pervious SCS Curve No."
"         0.143   Pervious Runoff coefficient"
"         0.100   Pervious Ia/S coefficient"
"        13.677   Pervious Initial abstraction"
"         0.015   Impervious Manning 'n'"
"        98.000   Impervious SCS Curve No."
```

```
"        0.879   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                     0.483     0.000     0.973     0.973 c.m/sec"
"             Catchment 400          Pervious   Impervious Total Area "
"             Surface Area           4.398      2.932      7.330      hectare"
"             Time of concentration  78.928     5.368      19.766     minutes"
"             Time to Centroid       292.022    174.023    197.120    minutes"
"             Rainfall depth         47.813     47.813     47.813     mm"
"             Rainfall volume        2102.79    1401.86    3504.66    c.m"
"             Rainfall losses        40.996     5.802      26.919     mm"
"             Runoff depth           6.816      42.010     20.894     mm"
"             Runoff volume          299.77     1231.74    1531.51    c.m"
"             Runoff coefficient     0.143      0.879      0.437      "
"             Maximum flow           0.030      0.482      0.483      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                     0.483     0.483     0.973     0.973"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                     0.483     0.483     0.483     0.973"
" 40          HYDROGRAPH Next link "
"            5   Next link "
"                     0.483     0.483     0.483     0.973"
" 33          CATCHMENT 500"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          500   North Field Area"
"        0.000   % Impervious"
"        6.090   Total Area"
"      100.000   Flow length"
"        4.000   Overland Slope"
"        6.090   Pervious Area"
"      100.000   Pervious length"
"        4.000   Pervious slope"
"        0.000   Impervious Area"
"      100.000   Impervious length"
"        4.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       65.000   Pervious SCS Curve No."
"        0.142   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"       13.677   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                     0.051     0.483     0.483     0.973 c.m/sec"
```

```
"             Catchment 500          Pervious   Impervious Total Area "
"             Surface Area           6.090      0.000      6.090      hectare"
"             Time of concentration  57.467     3.908      57.466     minutes"
"             Time to Centroid       266.781    171.686    266.781    minutes"
"             Rainfall depth         47.813     47.813     47.813     mm"
"             Rainfall volume        2911.78    0.00       2911.78    c.m"
"             Rainfall losses        41.001     5.778      41.001     mm"
"             Runoff depth           6.812      42.034     6.812      mm"
"             Runoff volume          414.84     0.00       414.84     c.m"
"             Runoff coefficient     0.142      0.000      0.142      "
"             Maximum flow           0.051      0.000      0.051      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                     0.051     0.488     0.483     0.973"
" 54          POND DESIGN"
"        0.488   Current peak flow    c.m/sec"
"        0.656   Target outflow    c.m/sec"
"       1946.4   Hydrograph volume    c.m"
"           5.   Number of stages"
"        0.000   Minimum water level    metre"
"        2.000   Maximum water level    metre"
"        0.000   Starting water level    metre"
"            0   Keep Design Data: 1 = True; 0 = False"
"                  Level Discharge    Volume"
"                  0.000     0.000     0.000"
"                 0.5000   0.00600   208.500"
"                  1.000   0.01300   838.500"
"                  1.500   0.01900  1899.000"
"                  2.000    0.4830  3399.000"
"             Peak outflow                  0.017    c.m/sec"
"             Maximum level                 1.359    metre"
"             Maximum storage            1600.900    c.m"
"             Centroidal lag               21.917   hours"
"                  0.051     0.488     0.017     0.973 c.m/sec"
" 38          START/RE-START TOTALS 500"
"            3   Runoff Totals on EXIT"
"             Total Catchment area                      26.620    hectare"
"             Total Impervious area                     14.216    hectare"
"             Total % impervious                        53.403"
" 19          EXIT"
```

```
"                MIDUSS Output ----------------------------------------------->"
"                MIDUSS version                            Version 2.25  rev. 473"
"                MIDUSS created                          Sunday, February 7, 2010"
"           10   Units used:                                            ie METRIC"
"                Job folder:          C:\MY JOBS\215158 chapmans new addition\"
"                                                                        July2024"
"                Output filename:     215158 PostDev 100 year July 2024 new.out"
"                Licensee name:                                                 "
"                Company                                                        "
"                Date & Time last used:                 8/16/2024 at 4:15:45 PM"
" 31          TIME PARAMETERS"
"       10.000   Time Step"
"      360.000   Max. Storm length"
"     2400.000   Max. Hydrograph"
" 32          STORM Chicago storm"
"            1   Chicago storm"
"     1702.250   Coefficient A"
"        9.944   Constant B"
"        0.827   Exponent C"
"        0.375   Fraction R"
"      360.000   Duration"
"        1.000   Time step multiplier"
"             Maximum intensity          141.192    mm/hr"
"             Total depth                 76.794    mm"
"            6   100hyd   Hydrograph extension used in this file"
" 33          CATCHMENT 100"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          100   North-westerly Area - Ex Pheonix Building. And West Half of the New
Building, and East Parking Area of Existing Pheonix Building."
"       90.000   % Impervious"
"        3.100   Total Area"
"       60.000   Flow length"
"        2.000   Overland Slope"
"        0.310   Pervious Area"
"       60.000   Pervious length"
"        2.000   Pervious slope"
"        2.790   Impervious Area"
"       60.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       65.000   Pervious SCS Curve No."
"        0.259   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"       13.677   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.914   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
```

```
"        0.518   Impervious Initial abstraction"
"                     0.850     0.000     0.000     0.000 c.m/sec"
"             Catchment 100          Pervious   Impervious Total Area "
"             Surface Area           0.310      2.790      3.100      hectare"
"             Time of concentration  30.296     2.959      3.794      minutes"
"             Time to Centroid       229.484    168.169    170.041    minutes"
"             Rainfall depth         76.794     76.794     76.794     mm"
"             Rainfall volume        238.06     2142.55    2380.61    c.m"
"             Rainfall losses        56.886     6.576      11.607     mm"
"             Runoff depth           19.908     70.218     65.187     mm"
"             Runoff volume          61.71      1959.08    2020.79    c.m"
"             Runoff coefficient     0.259      0.914      0.849      "
"             Maximum flow           0.012      0.848      0.850      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                     0.850     0.850     0.000     0.000"
" 33          CATCHMENT 200"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          200   Southeasterly Area - Ex. Pheonix Building and Parking Area"
"       90.000   % Impervious"
"        4.140   Total Area"
"       40.000   Flow length"
"        2.000   Overland Slope"
"        0.414   Pervious Area"
"       40.000   Pervious length"
"        2.000   Pervious slope"
"        3.726   Impervious Area"
"       40.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       65.000   Pervious SCS Curve No."
"        0.259   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"       13.677   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.906   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                     1.179     0.850     0.000     0.000 c.m/sec"
"             Catchment 200          Pervious   Impervious Total Area "
"             Surface Area           0.414      3.726      4.140      hectare"
"             Time of concentration  23.754     2.320      2.979      minutes"
"             Time to Centroid       221.040    167.393    169.043    minutes"
"             Rainfall depth         76.794     76.794     76.794     mm"
"             Rainfall volume        317.93     2861.34    3179.26    c.m"
"             Rainfall losses        56.924     7.190      12.163     mm"
"             Runoff depth           19.869     69.604     64.631     mm"
```

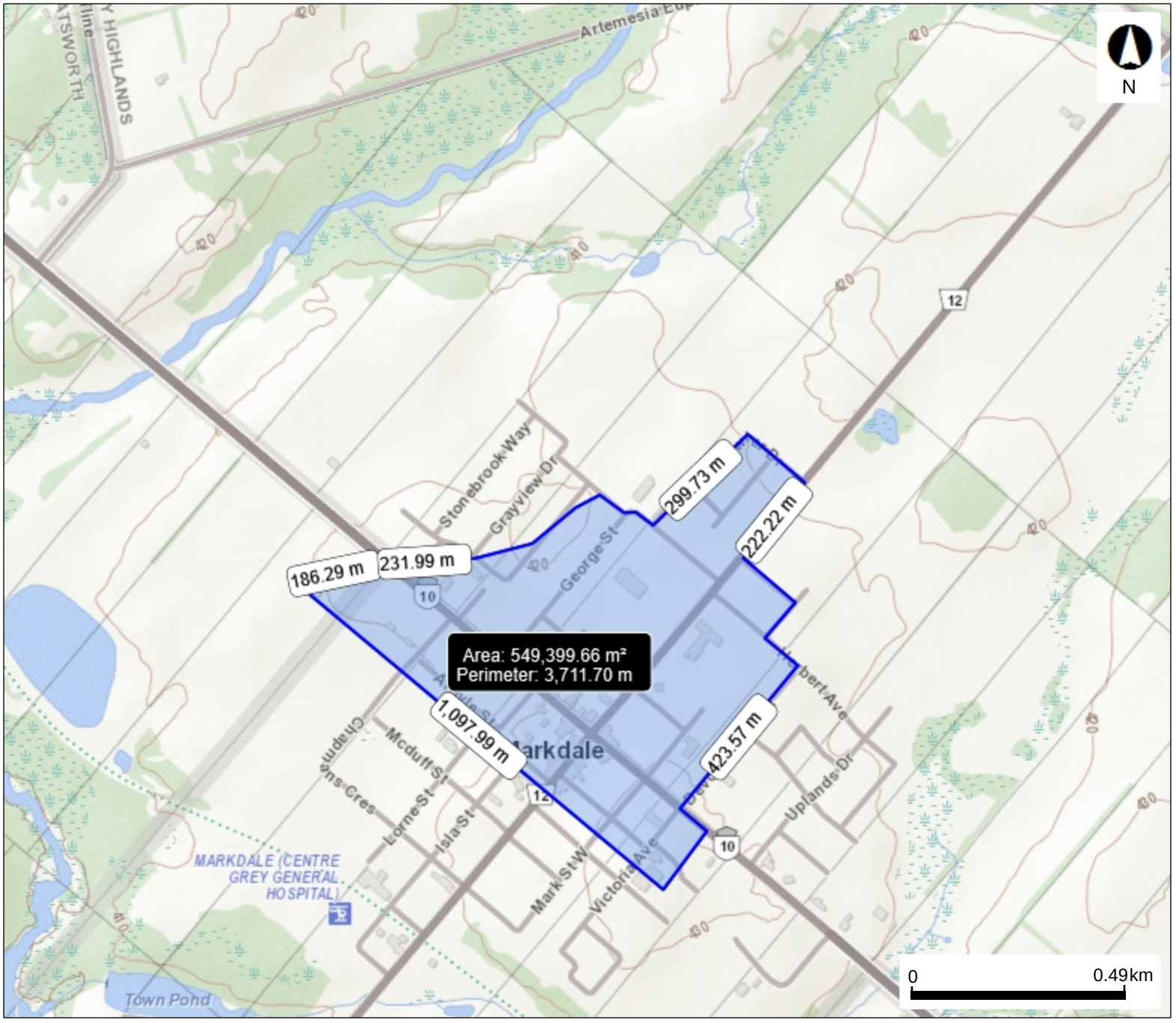
```
"             Runoff volume          82.26      2593.45    2675.71    c.m"
"             Runoff coefficient     0.259      0.906      0.842      "
"             Maximum flow           0.017      1.176      1.179      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                     1.179     2.029     0.000     0.000"
" 33          CATCHMENT 300"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          300   Westerly Area - Nuthouse Building and Parking Area"
"       80.000   % Impervious"
"        5.960   Total Area"
"       50.000   Flow length"
"        2.000   Overland Slope"
"        1.192   Pervious Area"
"       50.000   Pervious length"
"        2.000   Pervious slope"
"        4.768   Impervious Area"
"       50.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       65.000   Pervious SCS Curve No."
"        0.259   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"       13.677   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.912   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                     1.485     2.029     0.000     0.000 c.m/sec"
"             Catchment 300          Pervious   Impervious Total Area "
"             Surface Area           1.192      4.768      5.960      hectare"
"             Time of concentration  27.157     2.652      4.276      minutes"
"             Time to Centroid       225.457    167.792    171.613    minutes"
"             Rainfall depth         76.794     76.794     76.794     mm"
"             Rainfall volume        915.38     3661.53    4576.91    c.m"
"             Rainfall losses        56.918     6.770      16.800     mm"
"             Runoff depth           19.875     70.024     59.994     mm"
"             Runoff volume          236.91     3338.73    3575.64    c.m"
"             Runoff coefficient     0.259      0.912      0.781      "
"             Maximum flow           0.048      1.477      1.485      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                     1.485     3.515     0.000     0.000"
" 54          POND DESIGN"
"        3.515   Current peak flow    c.m/sec"
"        0.656   Target outflow    c.m/sec"
"       8272.1   Hydrograph volume    c.m"
```

```
"           6.   Number of stages"
"      412.250   Minimum water level    metre"
"      414.700   Maximum water level    metre"
"      412.250   Starting water level    metre"
"            0   Keep Design Data: 1 = True; 0 = False"
"                  Level Discharge    Volume"
"                412.250    0.5740     0.000"
"                412.850    0.9030  1140.000"
"                413.450     1.232  2760.000"
"                414.050     1.561  4860.000"
"                414.500     1.807  6660.000"
"                414.700     3.442  7540.000"
"             Peak outflow                  1.249    c.m/sec"
"             Maximum level               413.481    metre"
"             Maximum storage            2869.918    c.m"
"             Centroidal lag                3.305   hours"
"                  1.485     3.515     1.249     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    1000"
"            6   Combine "
"         1000   Node #"
"                To SWM 1"
"             Maximum flow                  1.249    c.m/sec"
"             Hydrograph volume          8283.969    c.m"
"                     1.485     3.515     1.249     1.249"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                     1.485     0.000     1.249     1.249"
" 33          CATCHMENT 400"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          400   North-easterly - East Half of the New Building and East Parking
Areas"
"       40.000   % Impervious"
"        7.330   Total Area"
"      120.000   Flow length"
"        2.000   Overland Slope"
"        4.398   Pervious Area"
"      120.000   Pervious length"
"        2.000   Pervious slope"
"        2.932   Impervious Area"
"      120.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       65.000   Pervious SCS Curve No."
"        0.259   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"       13.677   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
```

```
"        0.918   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                     0.834     0.000     1.249     1.249 c.m/sec"
"             Catchment 400          Pervious   Impervious Total Area "
"             Surface Area           4.398      2.932      7.330      hectare"
"             Time of concentration  45.920     4.485      16.814     minutes"
"             Time to Centroid       249.583    170.668    194.150    minutes"
"             Rainfall depth         76.794     76.794     76.794     mm"
"             Rainfall volume        3377.39    2251.59    5628.98    c.m"
"             Rainfall losses        56.893     6.324      36.665     mm"
"             Runoff depth           19.901     70.470     40.128     mm"
"             Runoff volume          875.23     2066.18    2941.41    c.m"
"             Runoff coefficient     0.259      0.918      0.523      "
"             Maximum flow           0.131      0.821      0.834      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                     0.834     0.834     1.249     1.249"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                     0.834     0.834     0.834     1.249"
" 40          HYDROGRAPH Next link "
"            5   Next link "
"                     0.834     0.834     0.834     1.249"
" 33          CATCHMENT 500"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          500   North Field Area"
"        0.000   % Impervious"
"        6.090   Total Area"
"      100.000   Flow length"
"        4.000   Overland Slope"
"        6.090   Pervious Area"
"      100.000   Pervious length"
"        4.000   Pervious slope"
"        0.000   Impervious Area"
"      100.000   Impervious length"
"        4.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       65.000   Pervious SCS Curve No."
"        0.259   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"       13.677   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                     0.220     0.834     0.834     1.249 c.m/sec"
```

```
"             Catchment 500          Pervious   Impervious Total Area "
"             Surface Area           6.090      0.000      6.090      hectare"
"             Time of concentration  33.434     3.266      33.434     minutes"
"             Time to Centroid       233.515    168.687    233.515    minutes"
"             Rainfall depth         76.794     76.794     76.794     mm"
"             Rainfall volume        4676.74    0.00       4676.74    c.m"
"             Rainfall losses        56.896     6.394      56.896     mm"
"             Runoff depth           19.898     70.400     19.898     mm"
"             Runoff volume          1211.80    0.00       1211.80    c.m"
"             Runoff coefficient     0.259      0.000      0.259      "
"             Maximum flow           0.220      0.000      0.220      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                     0.220     0.862     0.834     1.249"
" 54          POND DESIGN"
"        0.862   Current peak flow    c.m/sec"
"        0.656   Target outflow    c.m/sec"
"       4153.2   Hydrograph volume    c.m"
"           5.   Number of stages"
"        0.000   Minimum water level    metre"
"        2.000   Maximum water level    metre"
"        0.000   Starting water level    metre"
"            0   Keep Design Data: 1 = True; 0 = False"
"                  Level Discharge    Volume"
"                  0.000     0.000     0.000"
"                 0.5000   0.00600   208.500"
"                  1.000   0.01300   838.500"
"                  1.500   0.01900  1899.000"
"                  2.000    0.4830  3399.000"
"             Peak outflow                  0.197    c.m/sec"
"             Maximum level                 1.692    metre"
"             Maximum storage            2475.156    c.m"
"             Centroidal lag               15.272   hours"
"                  0.220     0.862     0.197     1.249 c.m/sec"
" 38          START/RE-START TOTALS 500"
"            3   Runoff Totals on EXIT"
"             Total Catchment area                      26.620    hectare"
"             Total Impervious area                     14.216    hectare"
"             Total % impervious                        53.403"
" 19          EXIT"
```

Catchment Area



Legend

This map should not be relied on as a precise indicator of routes or locations, nor as a guide to navigation. The Ontario Ministry of Agriculture, Food and Agribusiness (OMAFA) shall not be liable in any way for the use or any information on this map. of, or reliance upon, this map.

Map Created: 9/20/2024
Map Center: 44.32324 N, -80.64824 W

RATIONAL METHOD PEAK FLOW CALCULATIONS
Chapmans Markdale
OWEN SOUND MOE RAINFALL IDF DATA

Drainage Area: A=	54.94	ha
Runoff Coefficient: C=	0.6	for 2yr
Hydraulic Length: L=	900	m
Average Slope: S=	1.00%	

IDF Data - Environment Canada
OWEN SOUND (1965-2006)

	a	**b**
2 yr	21.8	-0.701
5 yr	28.8	-0.703
10 yr	33.5	-0.704
25 yr	39.3	-0.705
50 yr	43.7	-0.706
100 yr	48	-0.706

Runoff Coefficients

2 yr C	0.60	Adjusted Runoff Coefficient
5 yr C	0.60	
10 yr C	0.60	
25 yr C	0.66	
50 yr C	0.72	
100 yr C	0.75	

Time of Concentration

	Airport Method	**Bransby Method**
2 yr C	48.90	34.37
5 yr C	48.90	34.37
10 yr C	48.90	34.37
25 yr C	43.03	34.37
50 yr C	37.16	34.37
100 yr C	34.23	34.37

	1:2 yr	**1:5 yr**	**1:10 yr**	**1:25 yr**	**1:50 yr**	**1:100 yr**
Time of Concentration (min):	34.37	34.37	34.37	34.37	34.37	34.37
Rainfall Intensity (mm/hr):	32.22	42.61	49.59	58.21	64.77	71.14
Runoff Coefficient :	0.60	0.60	0.60	0.66	0.72	0.75
Peak Flow (m^3/s):	2.974	3.933	4.577	5.910	7.173	8.208

```
"                MIDUSS Output ----------------------------------------------->"
"                MIDUSS version                            Version 2.25  rev. 473"
"                MIDUSS created                          Sunday, February 7, 2010"
"           10   Units used:                                            ie METRIC"
"                Job folder:           C:\MY JOBS\215158 chapmans new addition\"
"                                    Regional Storm MIDUSS (catchment to the Swale)"
"                Output filename:                             215158 regional.out"
"                Licensee name:                                                  "
"                Company                                                         "
"                Date & Time last used:                 9/20/2024 at 11:28:34 AM"
" 31          TIME PARAMETERS"
"       60.000   Time Step"
"     2880.000   Max. Storm length"
"     3600.000   Max. Hydrograph"
" 32          STORM Historic"
"            5   Historic"
"     2880.000   Duration"
"       48.000   Rainfall intensity values"
"                  2.028     2.028     2.028     2.028     2.028"
"                  2.028     2.028     2.028     2.028     2.028"
"                  2.028     2.028     2.028     2.028     2.028"
"                  2.028     2.028     2.028     2.028     2.028"
"                  2.028     2.028     2.028     2.028     2.028"
"                  2.028     2.028     2.028     2.028     2.028"
"                  2.028     2.028     2.028     2.028     2.028"
"                  2.000     6.000     4.000     6.000    13.000"
"                 17.000    13.000    23.000    13.000    13.000"
"                 53.000    38.000    13.000"
"              Maximum intensity            53.000    mm/hr"
"              Total depth                 284.980    mm"
"            6   250hyd   Hydrograph extension used in this file"
" 33          CATCHMENT 101"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          101   No description"
"       60.000   % Impervious"
"       54.940   Total Area"
"      900.000   Flow length"
"        1.000   Overland Slope"
"       21.976   Pervious Area"
"      900.000   Pervious length"
"        1.000   Pervious slope"
"       32.964   Impervious Area"
"      900.000   Impervious length"
"        1.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       84.000   Pervious SCS Curve No."
"        0.836   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
```

```
"        4.838   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.964   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                    5.812     0.000     0.000     0.000 c.m/sec"
"             Catchment 101          Pervious   Impervious Total Area "
"             Surface Area           21.976     32.964     54.940     hectare"
"             Time of concentration  148.822    27.103     71.714     minutes"
"             Time to Centroid       2664.418   2333.246   2454.625   minutes"
"             Rainfall depth         284.980    284.980    284.980    mm"
"             Rainfall volume        6.2627     9.3941     15.6568    ha-m"
"             Rainfall losses        46.639     10.345     24.862     mm"
"             Runoff depth           238.341    274.635    260.118    mm"
"             Runoff volume          5.2378     9.0531     14.2909    ha-m"
"             Runoff coefficient     0.836      0.964      0.913      "
"             Maximum flow           2.083      3.973      5.812      c.m/sec"
" 38          START/RE-START TOTALS "
"            3   Runoff Totals on EXIT"
"             Total Catchment area                        0.000    hectare"
"             Total Impervious area                       0.000    hectare"
"             Total % impervious                          0.000"
" 19          EXIT"
```

Appendix E

STAGE-STORAGE-DISCHARGE TABLE FOR SWM FACILITIES

212285 SURFACE WATER MANAGEMENT POND DESIGN
CHAPMANS ICE CREAM - PROJECT PHOENIX NEW MAIN PLANT
NOVEMBER 2016

Pond Dimensions - Excluding Forebay

Bottom Length:	82.50	m
Bottom Width:	12.00	m
Side Slopes:	3.00	:1
Depth:	3.00	
Top Length:	100.50	m
Top Width:	32.00	m

Infiltration - Excluding Forebay

Bottom Area	=	990	sq m
K	=	2088	mm/hr
	=	0.058	cm/s (High K Design)

Stage (m)	Surface Area (m^2)	Incremental Volume (m^3)	Storage Volume (m^3)	Infiltration Discharge (m^3/s)	Overflow Discharge (m^3/s)
412.25	1600.00	0.00	0.00	0.574	0.000
412.85	2200.00	1140.00	1140.00	0.903	0.000
413.45	3200.00	1620.00	2760.00	1.232	0.000
414.05	3800.00	2100.00	4860.00	1.561	0.000
414.50	4200.00	1800.00	6660.00	1.807	0.000
414.70	4600.00	880.00	7540.00	1.917	1.525

Note: - Infiltration pond storage volume includes the volume of the forebay.
- Infiltration discharge rate does not include infiltration that might occur in the forebay

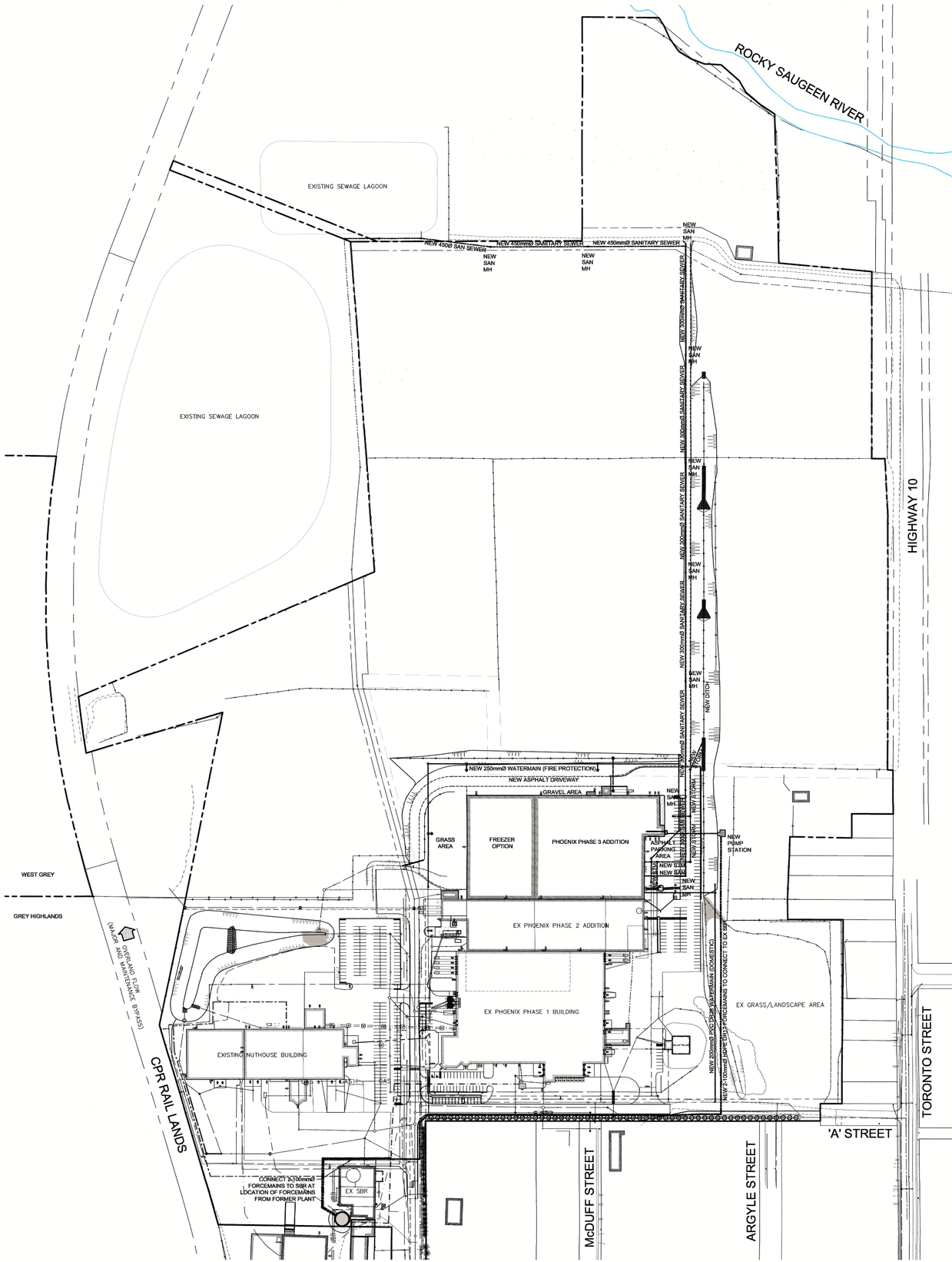
215158 (Enhanced Grassed Swale)
CHAPMANS ICE CREAM - PROJECT PHOENIX NEW MAIN PLANT
August 2024

Bottom Length:	275.00	m	Bottom Area =	0	sq m
Bottom Width:	0.00	m	Infiltration rate	27.50	mm/hr
Side Slopes:	3.00	:1	=	0.00076	cm/s
Depth:	2.00				
Top Length:	287.00	m			
Top Width:	12.00	m			

Stage (m)	Surface Area (m^2)	Incremental Volume (m^3)	Storage Volume (m^3)	Infiltration Discharge (m^3/s)	Overflow Discharge (m^3/s)	
0.00	0.00	0.00	0.00	0.000	0.000	
0.50	834.00	208.50	208.50	0.006	0.000	
1.00	1686.00	630.00	838.50	0.013	0.000	
1.50	2556.00	1060.50	1899.00	0.019	0.000	
2.00	3444.00	1500.00	3399.00	0.025	0.457	Overflow

Appendix F

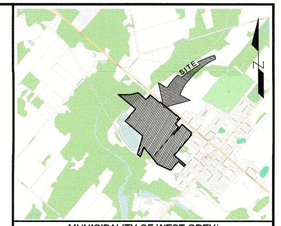
DESIGN DRAWINGS



GREY HIGHLANDS
M2 ZONING PROVISIONS
HEAVY INDUSTRIAL
ENTIRE SITE

	REQUIRED	PROVIDED
MIN. LOT AREA	8,000 sq m	510,322 sq m
MIN. LOT FRONTAGE	60.0m	31.78m
MIN. SETBACKS		
FRONT YARD	15.0m	112.48m
REAR YARD	7.5m	536.87m
SIDE YARD	7.5m	182.70m
SIDE YARD (EXT)	7.5m	9.53m
MAX. LOT COVERAGE	20%	9.7%
PARKING REQUIREMENTS		
OFFICE 1/30 m² 4,843m²/30m²	162 SPACES	162 SPACES
STORAGE 1/100 m² UP TO 3000m² 1/200 m² OVER 3000m² 24,211m² TOTAL	137 SPACES	137 SPACES
MANUFACTURING 1/40 m² UP TO 3000m² 1/200 m² OVER 3000m² 36,966m² TOTAL	245 SPACES	249 SPACES
	544 SPACES	546 SPACES

1% OF LOT COVERAGE EQUALS 5103.2m² (54,932ft²)



MUNICIPALITY OF WEST GREY/
MUNICIPALITY OF GREY HIGHLANDS
LOCATION PLAN
N.T.S.

LEGEND

LIST OF DRAWINGS

SITE PLAN INFORMATION
GEI CONSULTANTS
1260 2nd AVENUE EAST, UNIT 1
OWEN SOUND, ON N4K 2J3
PHONE: (519) 376-1805
WEBSITE: geiconsultants.com

BENCHMARK No. 1 - 416.77m
TOP NUT ON FIRE HYDRANT LOCATED ON THE EAST SIDE OF THE MAIN PLANT.

BENCHMARK No. 2 - 417.31m
TOP NUT ON FIRE HYDRANT LOCATED ON THE WEST SIDE OF THE MAIN PLANT.

No.	DATE	ISSUE/REVISION	INTIAL
2	20/09/2024	ISSUED FOR SVCA/MECP APPROVAL	JBS
1	16/08/2024	ISSUED FOR REVIEW	JBS

LICENSED PROFESSIONAL ENGINEER
J. B. SLOCOMBE
Sept 23, 2024
PROVINCE OF ONTARIO

MUNICIPALITY OF GREY HIGHLANDS

CHAPMAN'S ICE CREAM
100 CHAPMAN'S CRESCENT
MARKDALE, ONTARIO

OVERALL SITE PLAN

GEI Consultants
GEI CONSULTANTS, INC.
1260-2ND AVENUE EAST
OWEN SOUND, ONTARIO N4K 2J3
(519)376-1805

DESIGNED BY: JBS	DATE: AUG 2024	CHECKED BY: JBS
DRAWN BY: KB	PROJECT No. 2401219	DRAWING No. SP-01
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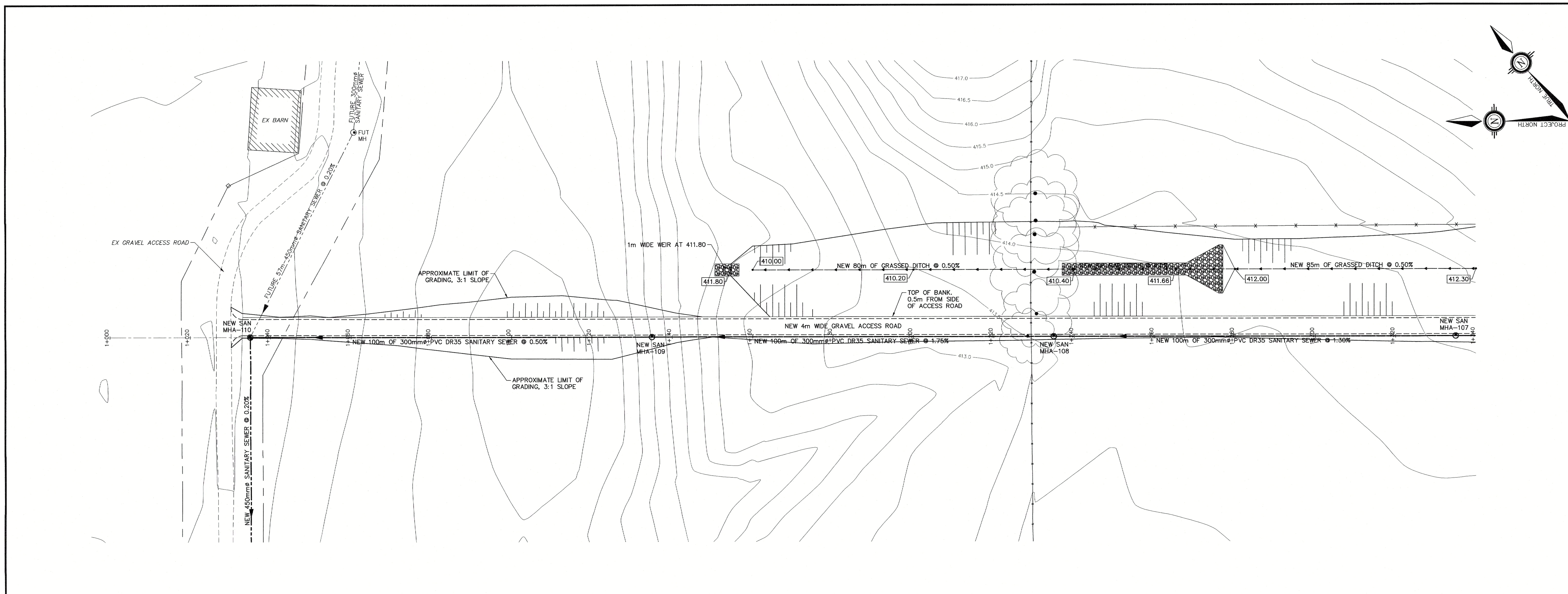

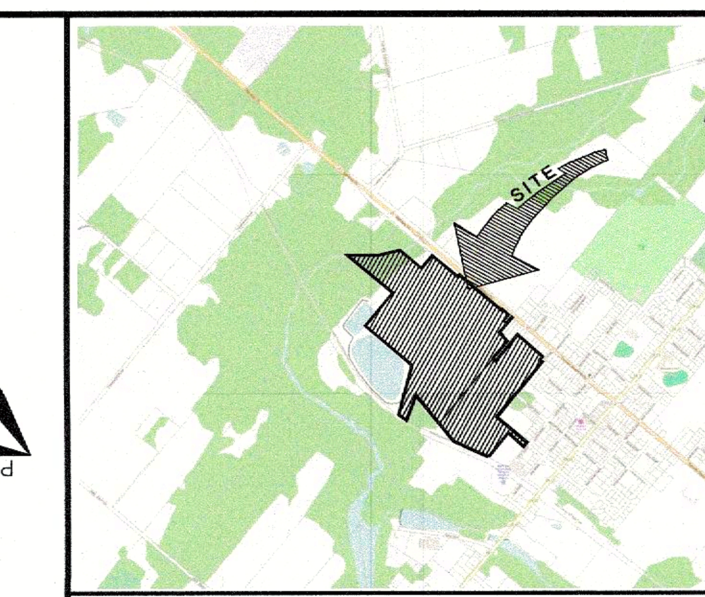

MUNICIPALITY OF WEST GREY/
MUNICIPALITY OF GREY HIGHLANDS
LOCATION PLAN
N.T.S.

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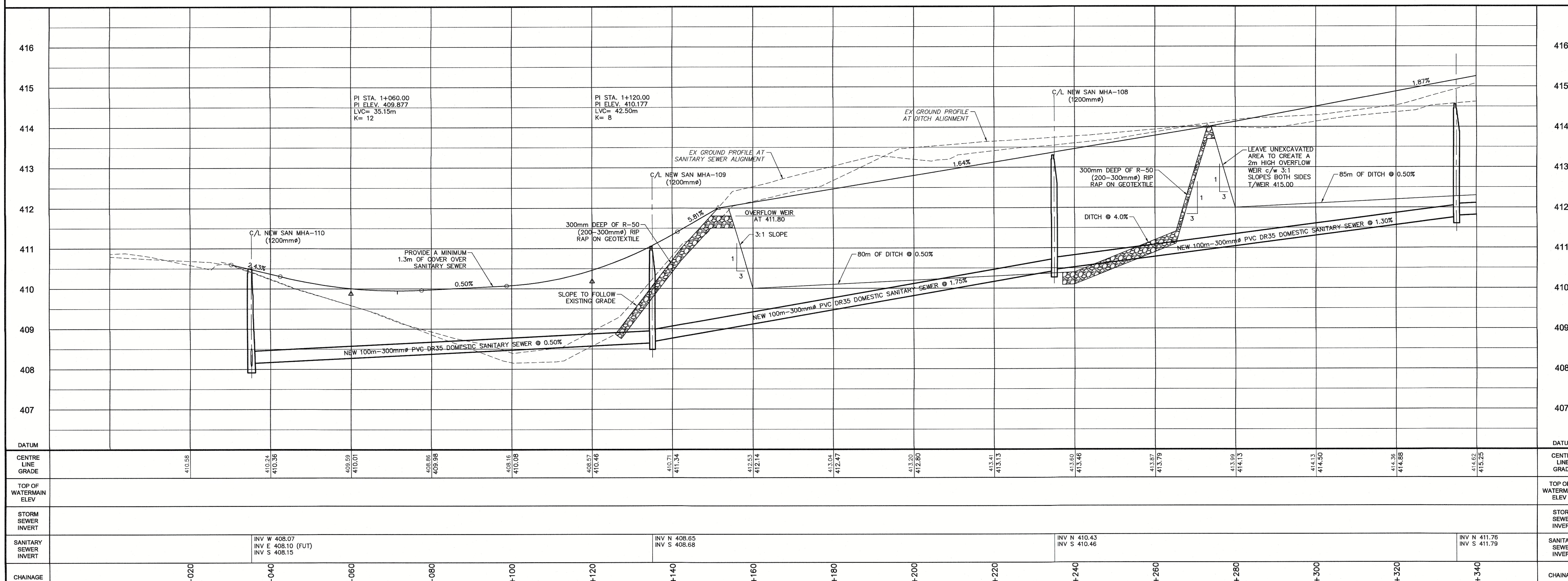

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100 CHAPMAN'S CRESCENT
MARKDALE, ONTARIO

PLAN AND PROFILE

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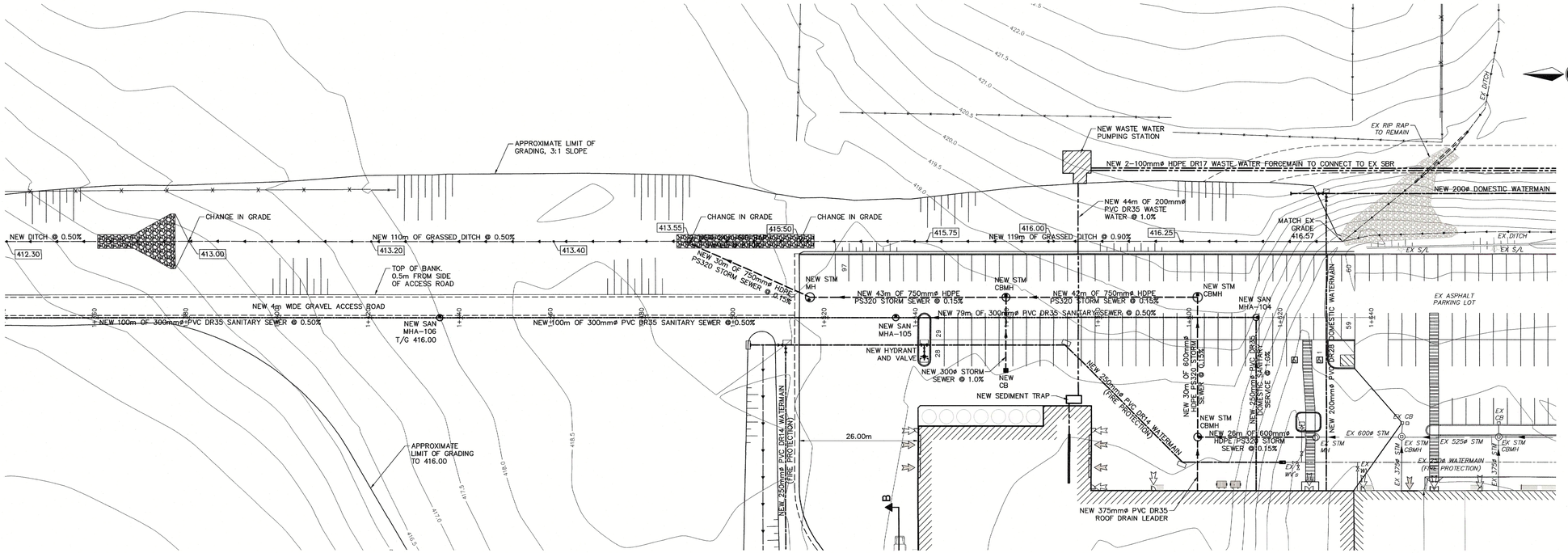

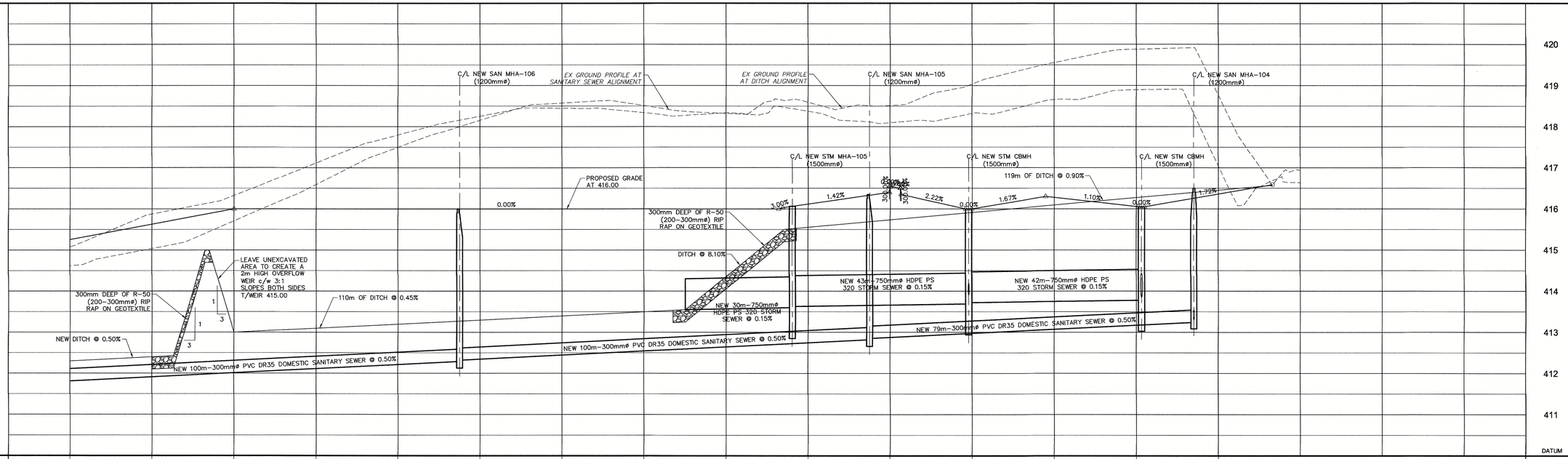

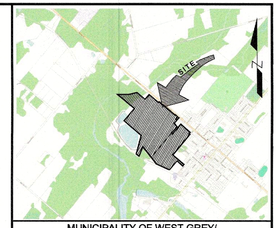

MUNICIPALITY OF WEST GREY/
MUNICIPALITY OF GREY HIGHLANDS
LOCATION PLAN
N.T.S.

LEGEND

LIST OF DRAWINGS

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