SERVICING & STORMWATER MANAGEMENT REPORT

PETAWAWA BIOFUEL LP

SOUTHGATE BIOFUEL FACILITY
ECO-PARK LOT, DUNDALK, ON
Project No.: 2019-0413-20

October 2, 2020

WALTERFEDY
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Eco-Park Lot, Dundalk, ON

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1.0 INTRODUCTION

WalterFedy was retained by Petawawa Biofuel LP to prepare a Servicing and Stormwater Management Report in support of the Site Plan Development for a biofuel facility located in Dundalk, ON, within the township of Southgate. The site will be used as an anaerobic digestion facility and is expected to receive and process approximately 73, 000 tonnes of organic waste a year. This waste will be transformed into biogas and digestate.

The purpose of this report is to identify how the site will be serviced, including water, sanitary and storm connections to the municipal infrastructure. The report will discuss the existing boundary servicing conditions and the availability in the municipal system to accommodate the development. Stormwater management design has been presented, demonstrating consistency with the Township of Southgate design criteria.

1.1 Background

The proposed development is located on the southern side of Eco Parkway, approximately 600 m east of the intersection with Ida Street. Eco Parkway currently exists as a gravel road. The site is approximately 2.02 ha, and is surrounded by a future development lot to the west and north, a wetland and municipal sewage treatment lagoons to the south, and to the east by a developed industrial lot. One lot has been developed on the northern side of Eco Parkway by Lystek, who operates a biosolids management facility there. A creek also exists along the western property line of the lot. This creek drains from the northern side of Eco Parkway, beneath the road through a culvert, and southerly towards the sanitary lagoon of the subject property.

The site is currently zoned as M1 (General Industrial) and will remain as such. The development itself will consist of a ventilated processing building with below-grade organic waste storage areas, for a total building footprint of approximately 1,448 m^2. The site will also include a tank yard that includes below-grade pasteurizer tanks, a hydrolyzer tank, anaerobic digester tank, digestate storage tank, and a solid organic waste bunker.

1.2 Reference Reports and Drawings

In preparation of this report, the following background information was referenced:

1. *Draft Geotechnical Investigation – Dundalk EcoPark – 100 Eco Parkway, Township of Southgate, Ontario*, V.A. Wood (Guelph) Incorporated, July 2019, prepared for Petawawa Biofuel LP
2. *Eco-Parkway Plan and Profile Drawings,* Triton Engineering Services Limited, July 2012

The following guidance documents were also referenced in preparation of this report:

1. *Municipal Servicing Standards*, Township of Southgate, June 2016.
2. *Design Guidelines for Sewage Works*, Ministry of the Environment and Climate Change, March 2019.
3. *Design Guidelines for Drinking Water Systems,* Ministry of the Environment and Climate Change, May 2019.

2.0 EXISTING INFORMATION

2.1 Existing Topography

The site is an open field with a wooded area approximately 4,000 m^2 on the northern half of the site near the northern limits. An approximately 1- to 1.5-m-tall berm exists along the eastern limits, separating the site from the neighbouring property. The ditch immediately outside the property boundaries also separates the site from the property to the west.

Existing topographical information was obtained from a survey by Van Harten Surveying Inc., dated July 22, 2019. The topography of the site generally falls from an elevation of between 509.5 m and 510.0 m along the eastern limits, to an elevation towards the western ditch of approximately 506.0 m. The edge-of-gravel elevations fronting the site range between 339.0 m and 339.5 m, meaning the majority of the site is sunken below the road elevations.

2.2 Geotechnical Report

A preliminary geotechnical investigation was completed by V.A. Wood (Guelph) Incorporated in June 2019 to assess the existing soils and groundwater conditions.

The investigation consisted of seven boreholes. Surficial topsoil was encountered at all boreholes, with a depth between 150 and 300 mm. This topsoil was underlain with approximately 400 mm of sand at the northeastern corner of the site (BH-2), and approximately 500 mm of organic silty sand at BH4. These sand and organic silty sand layers, as well as the topsoil at the other boreholes, were underlain with silty sand till to the full depth of the borehole.

Groundwater was encountered approximately 0.8 to 2.4 m below the surface during the drilling operation. Piezometers were installed in BH-3 and BH-6, and free water surfaces were discovered to be approximately 0.3 m below the surface. The topsoil and loose, saturated zones are not suitable to support the foundations. The Geotechnical Report states the depths to suitable bearing stratum for all the completed boreholes ranges between 2.6 and 3.3 m.

2.3 Existing Servicing and Utilities

A 150-mm-diameter watermain exists along Eco Parkway, and municipal hydrants exist along the northern side of the road. A 38-mm-diameter HDPE “Goldstripe” sanitary forcemain also fronts the site, servicing the Lystek sewage treatment plant to the east. Due to the size of this forcemain, it is assumed to only service the leachate from the treatment plant. This forcemain connects to a manhole approximately 150 m west of the site’s western limits, where it transitions to a 250-mm-diameter gravity sewer. This gravity sewer then combines with a 600-mm-diameter concrete sanitary sewer, which flows towards the sanitary lagoons.

No storm sewer infrastructure exists along Eco Parkway. All runoff from storm events is conveyed to the ditch/tributary along the western limits of the site. This tributary flows towards the Foley Drain, south of the site.

Overhead hydro lines also exist on the northern side of Eco Parkway.

3.0 REVIEW AGENCIES

3.1 Township of Southgate

The Township of Southgate will be responsible for the review and approval of the final Site Plan, as well as final Site Servicing, Grading, and Stormwater Management designs.

3.2 Grand River Conservation Authority

The Grand River Conservation Authority will be responsible for reviewing the grading and servicing design since a portion of the development takes place within their estimated floodplain limits. The GRCA has issued a permit to the Owner previously, based on the site plan provided to them.

3.3 Ministry of the Environment, Conservation and Parks

The Ministry of the Environment, Conservation and Parks (MECP) has reviewed aspects of this project to date and has granted an Environmental Compliance Approval (ECA) for process-related aspects of this project including waste, odour, and air. We anticipate that an ECA will also be required for stormwater management.

4.0 SANITARY SERVICING

Southgate Township does not explicitly state an industrial sanitary flow rate in their *Municipal Servicing Standards* (June 2016). The MECP *Design Guidelines for Sewage Works* (March 2019) explains that sanitary flows for industrial developments vary greatly depending on many factors, including the type of industry/process for which the development is designed. As a result, the average industrial water demand as outlined in the MECP's *Design Guidelines for Drinking Water Systems* (March 2019) is also considered to be the average sanitary flow rate from the development. Industrial water demands typically range from 35 $m^{3/}$ha/day to 55 $m^{3/}$ha/day, depending on if the development is light or heavy industrial. For the purpose of design calculations, the development was considered to be medium industrial, and an average rate of 45 $m^{3/}$ha/day was used. The peaking factor is typically 2 to 4 times the average rate, so a peak factor of 3 was used for design calculations. According to Southgate Township's standards, the industrial flow rate is to be coupled with an extraneous flow rate of 0.15 L/s/ha. The table below summarizes the sanitary demand for the proposed development.

Table I: Proposed Sanitary Flows

Site Area	2.02 ha
Design Flow Rate	45 m^3/ha/day (0.521 L/s/ha)
Peak Factor	3.0
Peak Sanitary Flow	**3.16 L/s**
Extraneous Flow Allowance	0.15 L/s/ha
Total Extraneous Flow	**0.30 L/s**
Total Sanitary Flow	**3.46 L/s**

The anticipated peak sanitary flow from the proposed development is 3.46 L/s, which will be collected to a submersible pump station located within the building footprint. The grinder pump station will convey sewage via private forcemain to the existing forcemain located on Eco Parkway. The total dynamic head for the grinder pump station will be specified to overcome pressure in the Eco Parkway forcemain. A check valve and isolation valve will be included as part of the grinder pump station design to allow for protection and maintenance of the building.

Refer to the Sanitary Sewer Design Sheet in Appendix A for a detailed calculation of sanitary flow from the site.

5.0 WATER SERVICING

5.1 Design Criteria

The MECP states that watermain distribution systems are to be designed to convey the larger of the maximum daily demand combined with fire flow, or the peak hourly demand. Additionally, it is recommended that the average daily flow from any development be conveyed with a resulting pressure within the range of 350 kPa (50 psi) to 470 kPa (70 psi).

The guidelines also stipulate that the minimum resultant pressure under any non-fire demand scenario shall not be less than 275 kPa (40 psi). With the inclusion of fire flows, the minimum residual pressure in the distribution system shall not be less than 140 kPa (20 psi). Static pressure in the system cannot exceed 700 kPa (100 psi) in any scenario.

5.2 Domestic Water Demand

Southgate Township's *Municipal Servicing Standards* directs the domestic water demand calculations for industrial developments to the guidelines outlined within the MECP *Design Guidelines for Drinking-Water Systems*.

As stipulated by the MECP, and previously discussed in the sanitary servicing portion of the report, the domestic water demand for industrial projects is between 35 $m^{3/}$ha/day to 55 $m^{3/}$ha/day, depending on whether the development is light or heavy industrial. For the purpose of design calculations, the development was considered to be medium industrial, and an average rate of 45 $m^{3/}$ha/day was used. The peaking factor varies depending on production schedule; however, a factor of 2.0 was used for the maximum daily demand, and a factor of 4.0 was assumed for the peak hourly demand.

The domestic water demands are summarized in Table II below.

Table II: Proposed Domestic Water Demands

Site Area	2.02 ha
Average Daily Demand (MECP)	45 m^3/ha/day (0.521 L/s/ha)
Peaking Factors	
Maximum Day Peaking Factor (MECP)	2.0
Maximum Hour Peaking Factor (MECP)	4.0
Peak Water Demand	
Total Maximum Day Domestic Demand	**2.10 L/s**
Total Peak Hourly Domestic Demand	**4.20 L/s**

The maximum daily demand for the proposed development is estimated to be 2.10 L/s, and the maximum hourly demand is expected to be 4.20 L/s. Calculations can also be found in Appendix B.

5.3 Fire Flow Demand

In addition to the daily domestic demand from the proposed development, fire flow demands are required to assess the adequacy of any proposed watermain system. Triton Engineering Services Limited, who serves as the Township's Engineer, provided an estimated static pressure within the existing 150-mm-diameter watermain on Eco Parkway of 94 psi, based on topography. However, at 20 psi, the available flow in the system is only 45.4 L/s, which would not provide adequate fire protection. It was also noted that the Township is in the early process of constructing a water tower. When the water tower is fully constructed, the available flows within the system will change. It is assumed that, following construction of the tower, available fire flow will be adequate to support the site. Since this development will be constructed prior to the completion of the water tower, an on-site water supply for fire protection will be required. Adequate groundwater supply must be demonstrated by well testing by a certified hydrogeologist.

The fire protection water supply will be provided via groundwater supply. The volume and rate requirements are summarized below as per the Ontario Building Code.

Table III: Fire Protection Water Supply Calculations

Water Supply Coefficient (K) [1]	19
Building Dimensions	
Building Footprint	1450 m^2
Building Height[2]	12 m
Volume (V)	17400 m^3
Spatial Coefficients (S_{TOT})[3]	1.0
Minimum Supply of Water (Q = K*V*S_{TOT})	**330,600 L**
Minimum Supply Rate[4]	**9000 L/min (150 L/s)**

[1] *Noncombustible construction conforming to Article 3.1.4.6 of the OBC – no fire-resistance ratings on structural members*
[2] *Based on Site Elevations drawing. Assumed entire building is 12m floor to ceiling.*
[3] *No other developments are within 10m of the proposed building, so no exposure charges are applied.*
[4] *From Table 2 of OFM-TG-03-1999*

The required minimum water supply flow rate for the proposed development is 9000 L/min, and the minimum supply of water is 330,600 L (330.6 m^3) if a storage option is preferred over a well supply. Applying this supply rate to the storage volume results in a flow time of 36.7 minutes.

5.4 Service Design

The water service for the proposed development will only be responsible for providing domestic demand to the building, as fire demand will be available via groundwater. The domestic demand can be met via a 50-mm-diameter service. The fire demand will be supplied via pumped groundwater. A 150-mm-diamter watermain is proposed to service a private hydrant, as well as the building's sprinkler system.

Assuming the Township's future water tower will provide adequate pressure in the municipal watermain on Eco Parkway to service the fire demand of the subject development, a 150-mm-diameter service connected to this municipal watermain is proposed. This service will be capped at property line with a threaded hole fixture, allowing for the 50-mm-diameter service to reach the building. If the municipal watermain can provide adequate fire protection in the future, then the fire pump will be decommissioned, and the fire and water services will be split at property line.

6.0 STORM SERVICING AND STORM WATER MANAGEMENT

As per Southgate Township's requirements, stormwater runoff from the site is to be controlled to pre-development rates for the 5-year through the 100-year design storms. Drainage areas were delineated and catchment parameters were determined for inclusion in pre- and post-development modeling. The stormwater management design for proposed conditions was completed using the Modified Rational Method. Storm catchment areas for pre- and post-development can be found in Figures 1 and 2, respectively.

Quality control guidelines for the Township are directed to the MECP *Stormwater Management Planning and Design Manual* (March 2003). This manual stipulates that "Enhanced" protection that removes a long-term average of 80% of total suspended solids (TSS) for up the 25mm storm event is required.

6.1 Pre-Development Peak Flows

The existing conditions were modeled using the Rational Method to determine the existing peak release rates. The site appears to drain from east-to-west towards the existing ditch, with no controls in place. The site consists mostly of grass and a patch of trees, so a runoff coefficient of 0.25 was used for the entire 2.02 ha development area.

The peak flow rates for the 5-year and 100-year design storms for the existing site are summarized in Table IV and Table V. Rainfall parameters were gathered from the Ministry of Transportation (MTO) IDF Curve Lookup Tool. These flow rates are not to be exceeded in post-development conditions.

Table IV: Rainfall Intensity Summary

Parameters $I = A \times (T_c/60)^b$	5-yr Storm	100-yr Storm
A	30.6	51.0
B	-0.699	-0.699
Time of Concentration (T_c) (min)	10[1]	10[1]
Intensity (mm/hr), I	**107.1**	**178.4**

[1]*Time of Concentration of 10 minutes was assumed for design calculations*

Table V: Rational Method Calculation Summary

Parameters Q = 2.78AIR	5-year Storm	100-yr Storm
Area (ha), A	2.02	2.02
Intensity (mm/hr), I	107.1	178.4
Runoff Coefficient (unitless), R	0.25	0.25
Peak Flow (L/s), Q	**150.2**	**250.3**

The peak flow rates for existing conditions is 150.2 L/s for the 5-year storm and 250.3 L/s for the 100-year storm. The impervious percentage of the site is increasing to approximately 50%, with an overall runoff coefficient of 0.6, thus greatly increasing the peak flow rates. As a result, quantity controls will be required to control the post-development peak flow rates to pre-development rates for all storm events from the 5-year through the 100-year.

6.2 Post-Development Peak Flows

The Modified Rational Method was used to determine the amount of storage required on site to control the post-development peak flow rates to pre-development levels. The site was divided into four catchments, which are summarized in Table VI.

Table VI: Catchment Areas

Catchment ID	Description	Area (ha)	Runoff Coefficient
101	Existing flow to Western Ditch	2.02	0.25
201	Gravel and Equipment	0.72	0.75
202	Proposed Building	0.14	1.00
203	Uncontrolled to Ditch	0.60	0.20
204	Containment Area	0.56	0.70

Catchment 204 represents the containment area for the storage tanks behind the proposed building. The containment area is designed to contain any potential leaks from the storage tanks and to control the 100-year storm in the event it coincides with any spillage. This area is approximately 0.56 ha, leaving 1.46 ha of the site that needs to be controlled to pre-development peak flow rates.

The proposed grading of the site was designed in a specific way to ensure that runoff from the gravel area, building footprint, and the equipment areas of the site will be conveyed to a depressed area acting as a dry-pond, with a culvert controlling the outlet flow rate. These two areas are represented by Catchments 201 and 202. Catchment 203 represents the area of the site that drains uncontrolled to the western ditch. This catchment generates a peak flow rate towards the ditch of 36 L/s for the 5-year storm event, and 59 L/s for the 100-year storm event. Subtracting these flow rates from the pre-development peak flow rates results in an available peak flow for Catchments 201 and 202 of 114 L/s for the 5-year storm event, and 191 L/s for the 100-year storm event. These results are summarized in Table VII.

Table VII: Post-Development Peak Flow Summaries

Storm Event	Pre-Development Flow Rate (L/s)	Uncontrolled Flow to Ditch (L/s)	Controlled Flow to Ditch (L/s)	Storage Requirements (m^3)	Maximum Ponding
5-Year Storm	150.2	36	115	65.3	507.28
100-year Storm	250.3	59	191	108.8	508.53

The Modified Rational Method calculations indicate that a minimum storage volume of 108.8 m^3 is required to control the post-development peak flow rates to pre-development levels for the 100-year storm event. The grading of the site allows for storage up to 123 m^3 in the dry-pond if required. The maximum ponding level for the pond is 508.53. The lid elevation for CB1 is proposed at 508.50 m, resulting in a maximum ponding of 0.03 m on the gravel surface. The bottom of the dry-pond will be at an elevation of 507.0 m, with a top-of-bank elevation of 508.60 m along the northern property line, which acts as an emergency overflow. A 300-mm-diameter culvert, with a 275-mm-diameter orifice under the proposed gravel driveway, with an invert at 507.10 will convey some of the stored volume to the ditch at a controlled rate. This culvert is sized to control release rates from the dry-pond to the allowable release rates. The culvert invert is higher than the pond bottom to promote infiltration. Thus, stormwater peak quantity control for all storm events for the 5-year storm through the 100-year storm is maintained to pre-development levels. Refer to drawings C2-1 and C3-1 for the grading and servicing design of the site. Stormwater peak flow calculations can be found in Appendix C.

6.3 Quality Control

Stormwater quality objectives within the site require “Enhanced” protection, resulting in 80% long-term average removal of total suspended solid for the 25 mm storm event.

A Stormceptor EFO6 oil-grit-separator (OGS) unit will provide 84% TSS removal and will meet water quality objectives for the gravel and other hardscaped areas with vehicle traffic and potential salt applications, before being conveyed to the dry-pond. The roof of the building is considered clean water and will be directed to the dry-pond directly without pre-treatment. A catchbasin in the gravel area will collect all the runoff from the hard surfaces. This catchbasin will convey flows to a manhole with an outlet sized to only allow runoff from rainfall up to the 25 mm storm event to enter the OGS unit prior to entering the dry-pond. Another outlet from this manhole is designed to be higher and sized to convey any remaining runoff from rainfalls greater than the 25mm storm event directly to the dry-pond. It is understood that a treatment train approach is preferred, and this is satisfied via infiltration in the dry-pond.

The 25 mm storm event for the gravel area generates an intensity of 89.81 mm/hr, and a design flow of 134.72 L/s. A 375-mm-diameter storm sewer sloped at 0.60% has capacity for 135.81 L/s, and can convey the 25 mm storm event to the OGS unit. The higher outlet is proposed to be a 375-mm-diameter pipe at 1.0%, which has capacity to convey the entire 5-year storm event to the dry-pond.

7.0 SITE GRADING

The grading of the site respects the existing grades along all property lines, as well as the existing road grades on Eco Parkway. The site is graded to comply with slopes outlined as part of the Accessibility for Ontarians with Disabilities Act (AODA), and Southgate Township standards.

The grading also allows for the stormwater water management objectives of directing minor and major flows towards the ditch along the western property limits. The majority of the site is graded directly towards this ditch. A containment berm is proposed around the outdoor storage tanks, providing adequate volume to contain the substances in the event of a leakage.

The containment volume is required to be at least 100% of the above-ground volume of all tanks, which is 4475 m^3. This volume has been approved by the MECP. This volume is achieved via a combination of retaining walls and berms. The grades at the eastern side of the containment area are at an elevation of 507.20 m, and the

grades at the western side are at an elevation of 507.00 m, allowing for runoff to drain to a catchbasin at an elevation of 506.90. The top-of-wall and top-of-berm elevations are at a minimum elevation of 508.10 to allow for a containment volume of approximately 5050 m^3. The catchbasin within this containment area will be equipped with a valve to control the release of runoff. The water will be sampled prior to being released and conveyed to the ditch west of the site.

A ramp at approximately 10% is also proposed from the gravel area behind the building to the bottom of the containment area, providing access to the pump house, catch basin, and monitoring equipment.

8.0 EROSION AND SEDIMENT CONTROL

Sediment tracked onto the roadway during the course of construction will be cleaned by the Contractor. To help minimize the amount of mud being tracked onto the roadway, a mud mat will be installed at the primary construction exit. Additionally, silt fence will be installed around the development area to eliminate sediment from leaving the site, and will remain in place and be maintained until landscaping has been completed and soil has been vegetated. Silt fence will also be installed around stockpiles on site, with the stockpiles kept a minimum 2.5 m from the property boundary.

Filter fabric will be wrapped around storm and sanitary structures to prevent silt or sediment-laden water from entering inlets. These will be inspected periodically to ensure that they have been properly installed and function as designed throughout construction. Coir log check dams will also be installed within the existing ditch to prevent sediment from flowing downstream.

It is assumed that the Contractor will keep in mind weather conditions when scheduling work to minimize dust migrating to surrounding developments due to construction activities.

The controls will be maintained, and accumulated sediments removed, once their capture capacity has been decreased by one third. It is proposed that, during construction activities, visual monitoring will be conducted bi-weekly and within 24 hours of any rainfall event of 25 mm or greater. During the construction period, monitoring will consist of visual observation for the effectiveness of the sediment and erosion controls and sediment migration off site. Construction inspections will be conducted until such time as the construction activities are complete and vegetation has established itself to a density equivalent to 70% of the background native vegetation density.

9.0 CONCLUSIONS

Based on the analysis presented in this report it is concluded that:

- A sanitary forcemain will be required to pump the sanitary flows from the site to the 38-mm-diameter municipal forcemain within the right-of-way.
- The existing 150-mm-diameter watermain within the right-of-way is sufficient to provided domestic water demand for the proposed building.

- The municipal system cannot currently provide the necessary fire protection for the proposed development. A flow rate of 150 L/s is required to provide fire protection to the site, and only 45.4 L/s is available in the system at 20 psi. It is currently proposed the fire demand will be drawn from groundwater.

- Stormwater quantity control is provided via a dry-pond. 5-year and 100-year storm events are controlled to a peak flow rate lower than the existing conditions peak flow rates.

- Stormwater quality control is provided via an EFO-6 OGS unit, and a treatment train approach is provided in the dry-pond.

- Grading of the site complies with AODA and Township of Southgate guidelines.

- Perimeter silt fence, silt fence at the base of all stock piles, silt sacs in storm structures and a construction entrance mud mat would be required to provide erosion and sediment control.

All of which is respectfully submitted,

WALTERFEDY

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FIGURES

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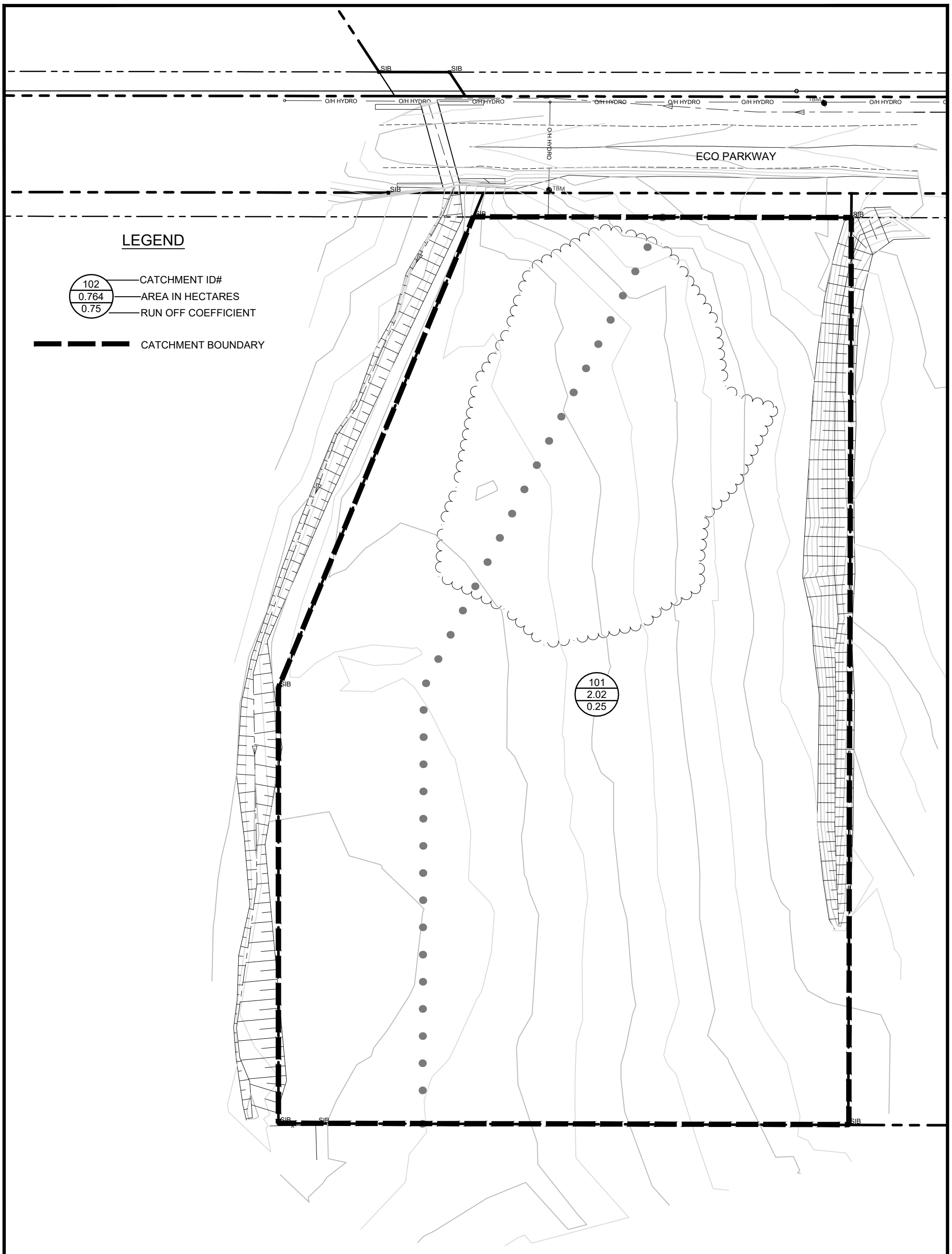

PROJECT:

SOUTHGATE BIOFUEL FACILITY

TITLE:

EXISTING CATCHMENT AREAS

WALTERFEDY

KITCHENER OFFICE
675 Queen Street South, Suite 111, Kitchener, Ontario N2M 1A1
T: 519.576.2150 F: 519.576.5499 walterfedy.com

SCALE: 1:750	DATE: 2020.10.02
DRAWN BY: TK	PROJECT NO.: 2019-0413-20
CHECKED BY: DF	FILE: 2019-0413-20 - SWM

SHEET NO.:

FIG-1

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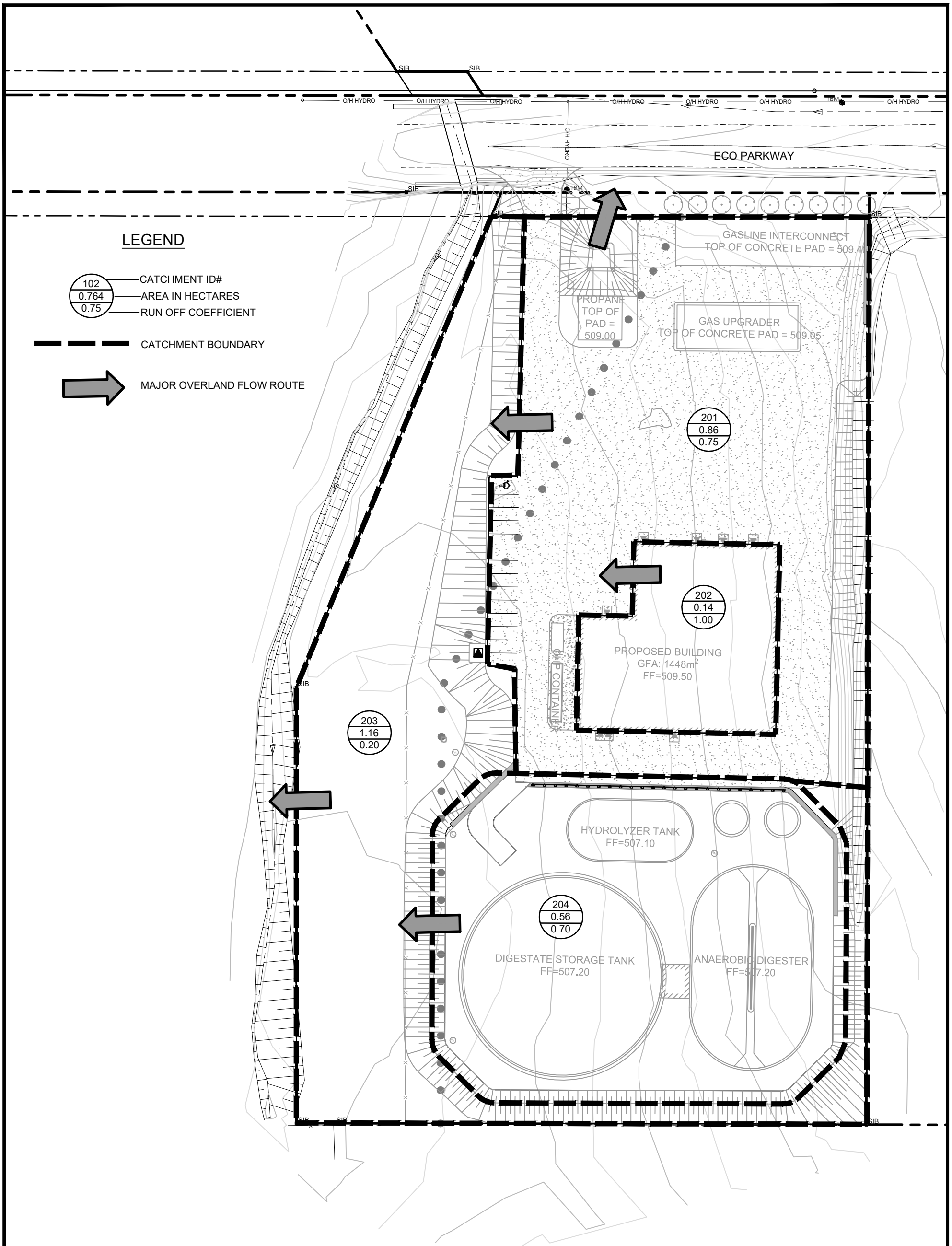

PROJECT:

SOUTHGATE BIOFUEL FACILITY

TITLE:

PROPOSED CATCHMENT AREAS

WALTERFEDY

KITCHENER OFFICE
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SCALE: 1:750	DATE: 2020.10.02
DRAWN BY: TK	PROJECT NO.: 2019-0413-20
CHECKED BY: DF	FILE: 2019-0413-20 - SWM

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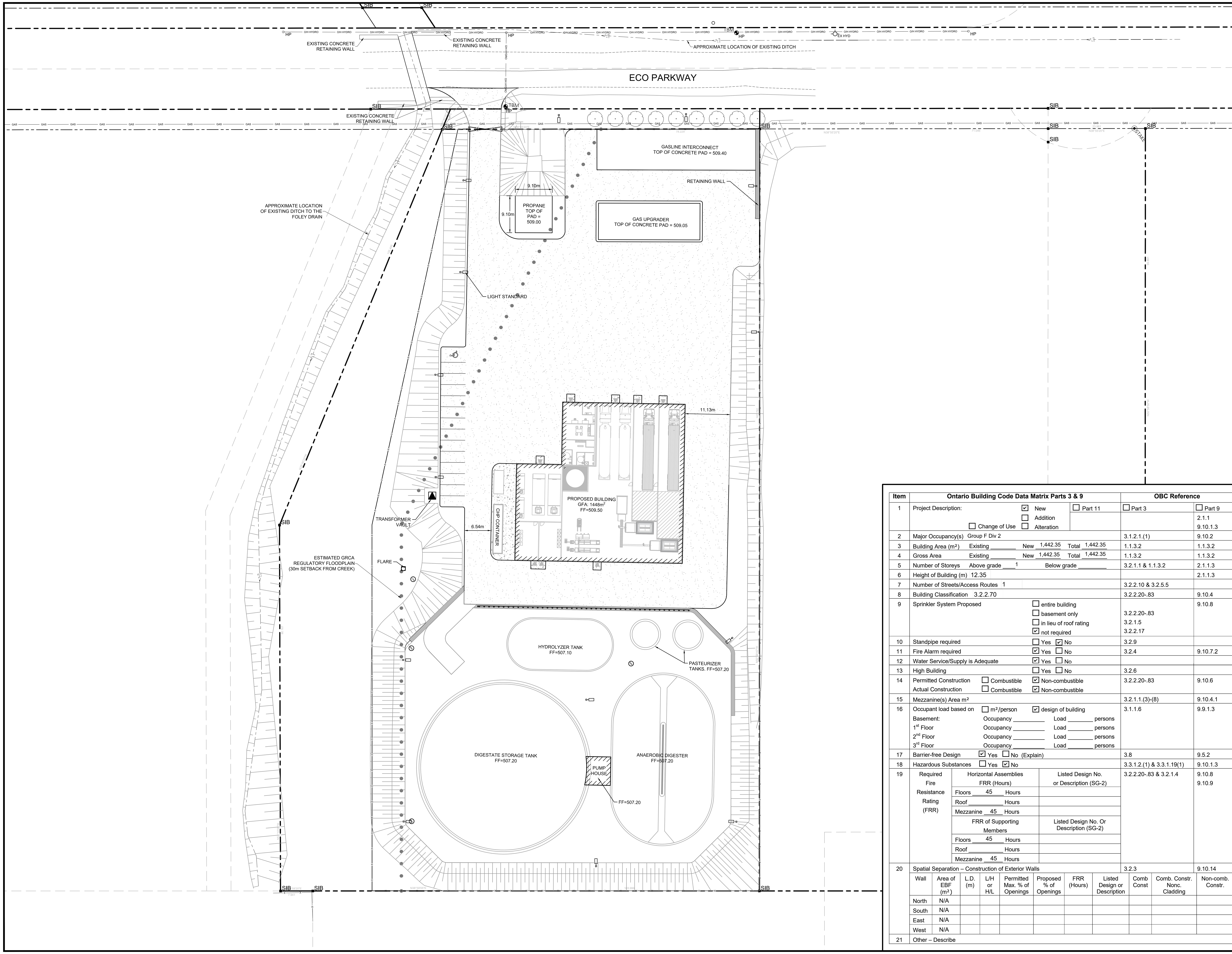
FIG-2

DRAWINGS

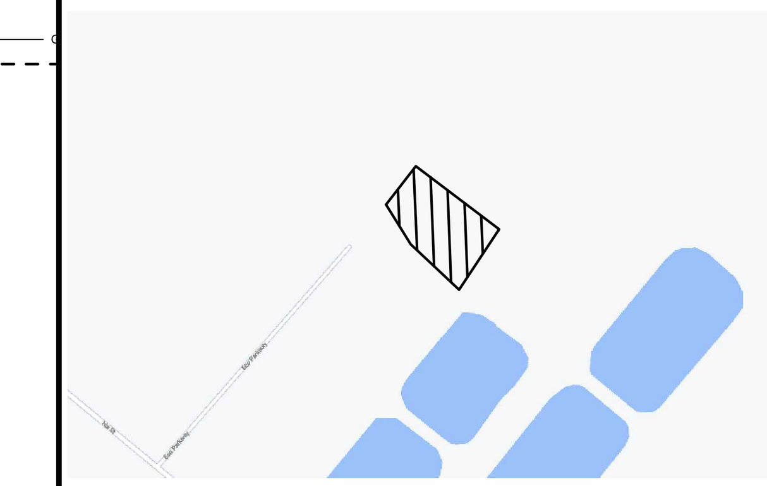


Item	Ontario Building Code Data Matrix Parts 3 & 9	OBC Reference	
1	Project Description: [x] New [ ] Addition [ ] Change of Use [ ] Alteration [ ] Part 11	[ ] Part 3	[ ] Part 9 2.1.1 9.10.1.3
2	Major Occupancy(s) Group F Div 2	3.1.2.1.(1)	9.10.2
3	Building Area (m²) Existing ____ New 1,442.35 Total 1,442.35	1.1.3.2	1.1.3.2
4	Gross Area Existing ____ New 1,442.35 Total 1,442.35	1.1.3.2	1.1.3.2
5	Number of Storeys Above grade 1 Below grade ____	3.2.1.1 & 1.1.3.2	2.1.1.3
6	Height of Building (m) 12.35		2.1.1.3
7	Number of Streets/Access Routes 1	3.2.2.10 & 3.2.5.5	
8	Building Classification 3.2.2.70	3.2.2.20-.83	9.10.4
9	Sprinkler System Proposed [ ] entire building [ ] basement only [ ] in lieu of roof rating [x] not required	3.2.2.20-.83 3.2.1.5 3.2.2.17	9.10.8
10	Standpipe required [ ] Yes [x] No	3.2.9	
11	Fire Alarm required [x] Yes [ ] No	3.2.4	9.10.7.2
12	Water Service/Supply is Adequate [x] Yes [ ] No		
13	High Building [ ] Yes [ ] No	3.2.6	
14	Permitted Construction [ ] Combustible [x] Non-combustible Actual Construction [ ] Combustible [x] Non-combustible	3.2.2.20-.83	9.10.6
15	Mezzanine(s) Area m²	3.2.1.1.(3)-(8)	9.10.4.1
16	Occupant load based on [ ] m²/person [x] design of building Basement: Occupancy ____ Load ____ persons 1st Floor Occupancy ____ Load ____ persons 2nd Floor Occupancy ____ Load ____ persons 3rd Floor Occupancy ____ Load ____ persons	3.1.1.6	9.9.1.3
17	Barrier-free Design [x] Yes [ ] No (Explain)	3.8	9.5.2
18	Hazardous Substances [ ] Yes [x] No	3.3.1.2.(1) & 3.3.1.19(1)	9.10.1.3
19	Required Fire Resistance Rating (FRR): Horizontal Assemblies FRR (Hours) / Listed Design No. or Description (SG-2) Floors 45 Hours Roof ____ Hours Mezzanine 45 Hours FRR of Supporting Members / Listed Design No. Or Description (SG-2) Floors 45 Hours Roof ____ Hours Mezzanine 45 Hours	3.2.2.20-.83 & 3.2.1.4	9.10.8 9.10.9
20	Spatial Separation – Construction of Exterior Walls	3.2.3	9.10.14
21	Other – Describe		

Item 20 detail:

Wall	Area of EBF (m²)	L.D. (m)	L/H or H/L	Permitted Max. % of Openings	Proposed % of Openings	FRR (Hours)	Listed Design or Description	Comb Const	Comb. Constr. Nonc. Cladding	Non-comb. Constr.
North	N/A									
South	N/A									
East	N/A									
West	N/A									

Petawawa Biofuel



true north
project north

date	issuance	no.
2020.10.02	ISSUED FOR SITE PLAN APPROVAL	

customer
PETAWAWA BIOFUEL

project
SOUTHGATE BIOFUELS FACILITY
ECO PARKWAY, DUNDALK, ON

title
SITE PLAN

WALTERFEDY

675 Queen Street South, Suite 111
Kitchener, Ontario, Canada N2M 1A1
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walterfedy.com

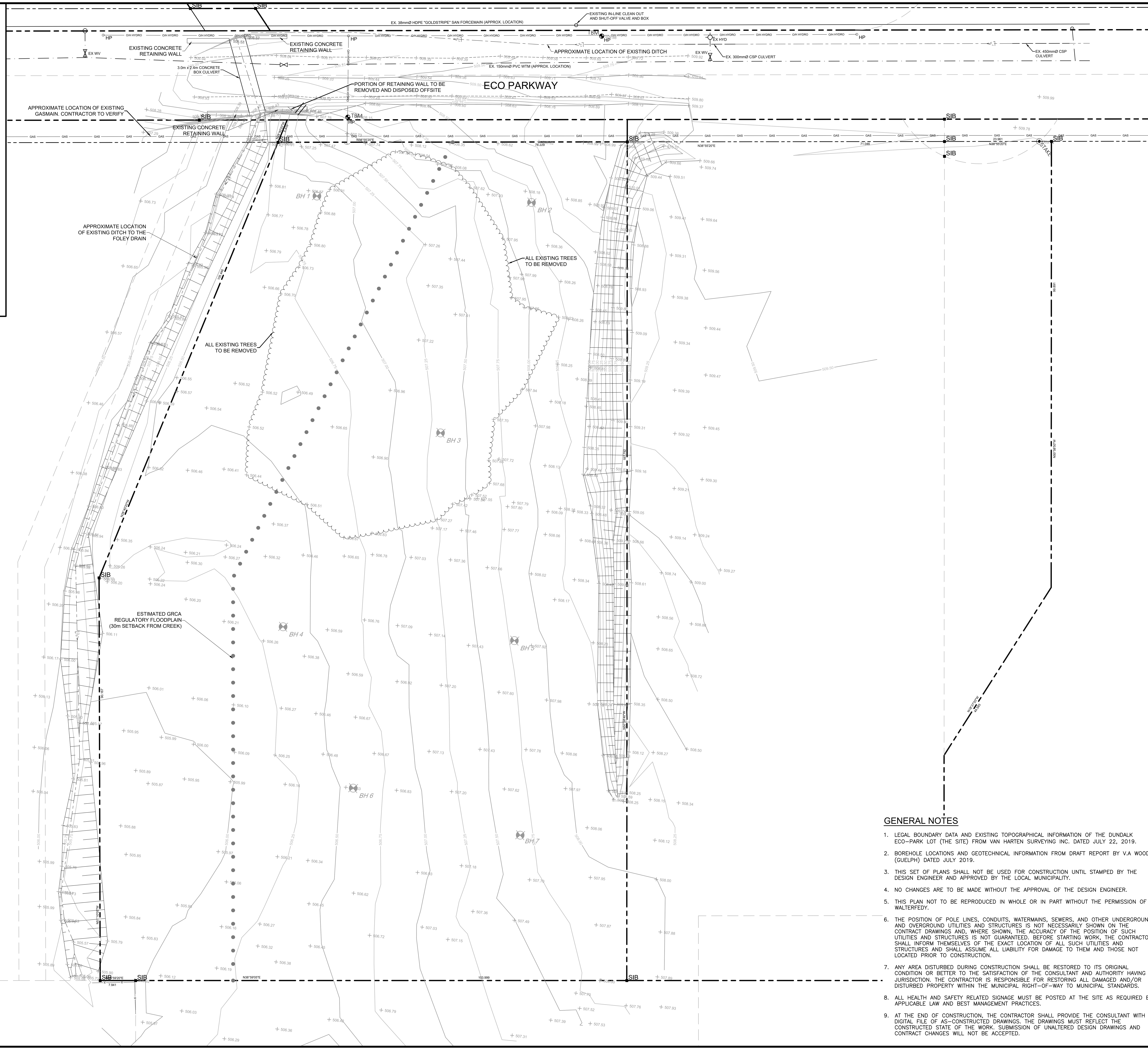
LICENSED PROFESSIONAL ENGINEER D. R. FERGUSON 100159406 2020.10.02 PROVINCE OF ONTARIO

scale:	1:400
date:	2020.10.02
job no.:	2019-0413-20
CAD file:	2019-0413-20 - SP PLOT
drawn by:	TK
checked by:	DF

sheet no.: C1-0

LEGEND

(line symbol)	PROPERTY LINE
(line symbol)	LEGAL EASEMENT
■ SIB	STANDARD IRON BAR
EX HP	EXISTING HYDRO POLE
(symbol)	EXISTING GUY WIRE
EX SIGN	EXISTING SIGN
EX HYD	EXISTING FIRE HYDRANT
EX WV	EXISTING WATERMAIN VALVE
EX CS	EXISTING CURB STOP
BOREHOLE No.	EXISTING BOREHOLE LOCATION
ELEV	EXISTING SPOT ELEVATION
325.0	EXISTING MAJOR CONTOUR
(line symbol)	EXISTING MINOR CONTOUR
(symbol)	EXISTING EMBANKMENT
(symbol)	EXISTING TREE DRIPLINE
(line symbol)	EXISTING SANITARY SERVICE
(line symbol)	EXISTING STORM SERVICE
(line symbol)	EXISTING WATERMAIN
GAS	EXISTING GASMAIN
O/H HYDRO	EXISTING OVERHEAD HYDRO LINE
(line symbol)	EXISTING DITCH CENTRELINE
(line symbol)	EXISTING CHAINLINK FENCE
(line symbol)	EXISTING GRAVEL
● ● ● ● ●	ESTIMATED GRCA REGULATORY FLOODPLAIN



GENERAL NOTES

1. LEGAL BOUNDARY DATA AND EXISTING TOPOGRAPHICAL INFORMATION OF THE DUNDALK ECO–PARK LOT (THE SITE) FROM VAN HARTEN SURVEYING INC. DATED JULY 22, 2019.
2. BOREHOLE LOCATIONS AND GEOTECHNICAL INFORMATION FROM DRAFT REPORT BY V.A WOOD (GUELPH) DATED JULY 2019.
3. THIS SET OF PLANS SHALL NOT BE USED FOR CONSTRUCTION UNTIL STAMPED BY THE DESIGN ENGINEER AND APPROVED BY THE LOCAL MUNICIPALITY.
4. NO CHANGES ARE TO BE MADE WITHOUT THE APPROVAL OF THE DESIGN ENGINEER.
5. THIS PLAN NOT TO BE REPRODUCED IN WHOLE OR IN PART WITHOUT THE PERMISSION OF WALTERFEDY.
6. THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS, AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS AND, WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, THE CONTRACTOR SHALL INFORM THEMSELVES OF THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND SHALL ASSUME ALL LIABILITY FOR DAMAGE TO THEM AND THOSE NOT LOCATED PRIOR TO CONSTRUCTION.
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8. ALL HEALTH AND SAFETY RELATED SIGNAGE MUST BE POSTED AT THE SITE AS REQUIRED BY APPLICABLE LAW AND BEST MANAGEMENT PRACTICES.
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Petawawa Biofuel

true north | project north

date	issuance	no.
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customer
PETAWAWA BIOFUEL

project
SOUTHGATE BIOFUEL FACILITY
ECO PARKWAY, DUNDALK, ON

title
EXISTING CONDITIONS AND REMOVALS PLAN

WALTERFEDY

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LICENSED PROFESSIONAL ENGINEER
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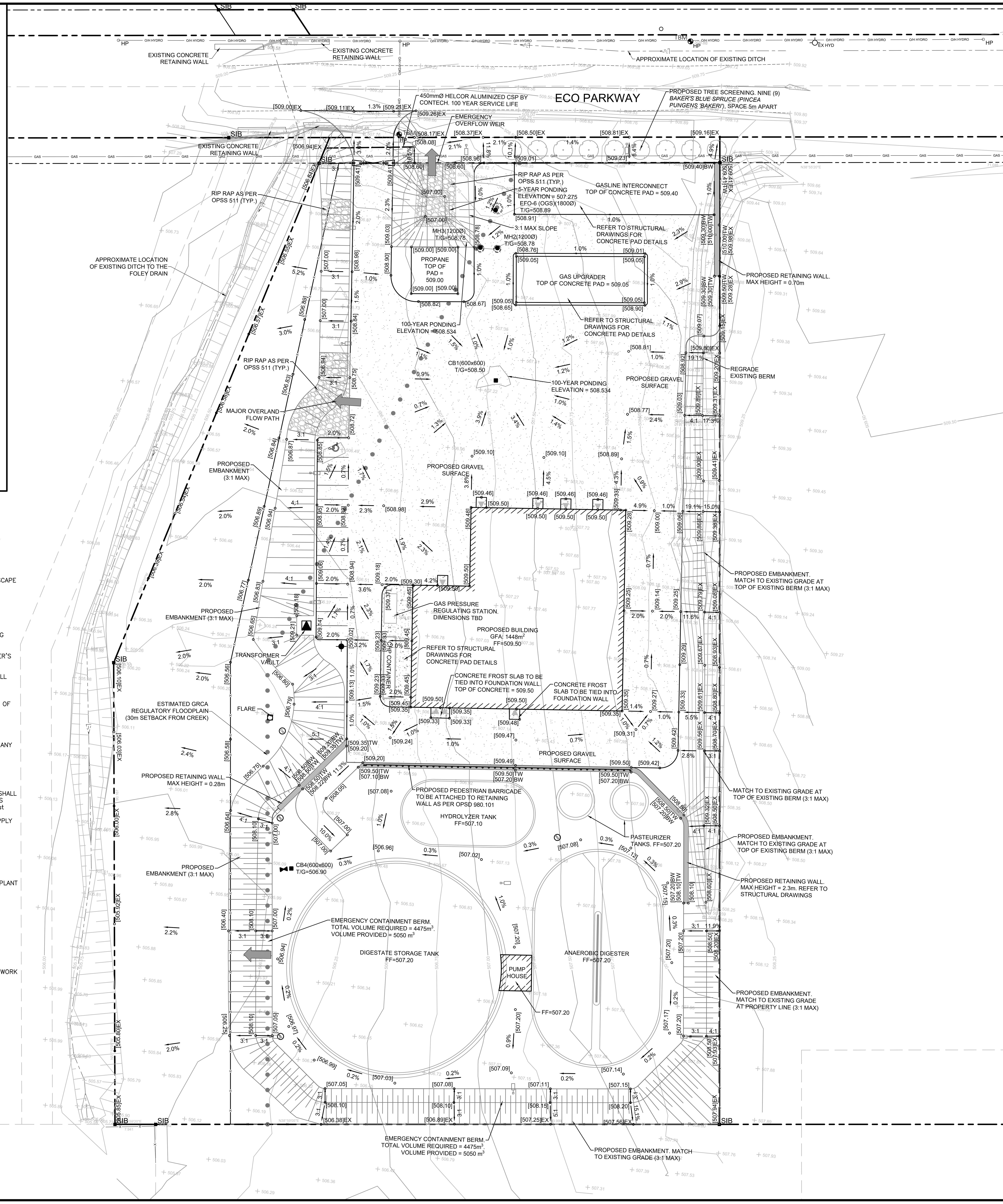
2020.10.02
PROVINCE OF ONTARIO

scale:	1:400
date:	2020.09.30
job no.:	2019-0413-20
CAD file:	2019-0413-20 - EX PLOT
drawn by:	TK
checked by:	DF

sheet no.:
C1-1

LEGEND

	PROPERTY LINE
	LEGAL EASEMENT
SIB	STANDARD IRON BAR
EX HP	EXISTING HYDRO POLE
	EXISTING GUY WIRE
EX SIGN	EXISTING SIGN
EX HYD	EXISTING FIRE HYDRANT
EX WV	EXISTING WATERMAIN VALVE
EX CS	EXISTING CURB STOP
BOREHOLE No.	EXISTING BOREHOLE LOCATION
+ ELEV	EXISTING SPOT ELEVATION
325.0	EXISTING MAJOR CONTOUR
	EXISTING MINOR CONTOUR
	EXISTING EMBANKMENT
	EXISTING TREE DRIPLINE
	EXISTING OVERHEAD HYDRO LINE
	EXISTING DITCH CENTRELINE
	EXISTING CHAINLINK FENCE
	EXISTING GRAVEL
	ESTIMATED GRCA REGULATORY FLOODPLAIN
CB	PROPOSED CATCHBASIN
MH	PROPOSED STORM MANHOLE
HYD	PROPOSED FIRE HYDRANT
	PROPOSED LAMP STANDARD
+ [123.45]	PROPOSED GRADE
2.0%	PROPOSED DRAINAGE ARROW/SLOPE
	PROPOSED EMBANKMENT (3:1 MAX UNLESS OTHERWISE NOTED)
	PROPOSED CHAINLINK FENCE
	PROPOSED CONCRETE SURFACE
	PROPOSED GRAVEL SURFACE
	PROPOSED RIPRAP



LANDSCAPE NOTES

1. ALL WORKMANSHIP SHALL CONFORM TO THE LANDSCAPE ONTARIO SPECIFICATIONS STANDARDS.
2. ALL NURSERY STOCK SHALL MEET STANDARDS OF THE CANADIAN NURSERY TRADES ASSOCIATION, LATEST EDITION.
3. ALL PLANT MATERIAL SHALL BE STAKED FOR LOCATION BY LANDSCAPE ARCHITECT AND CONTRACTOR JOINTLY.
4. BACKFILL IS TO CONSIST OF MATERIAL NATIVE TO THE SITE.
5. ALL TREES SHALL HAVE AN EARTH SAUCER AT ITS BASE WITH A DIAMETER AS LARGE AS EXCAVATED AREA TO RETAIN WATER.
6. ALL BURLAP SHALL BE CUT AND BURIED BELOW SURFACE DURING PLANTING.
7. CONTRACTOR SHALL MAINTAIN ALL LANDSCAPE AREAS UNTIL OWNER'S ACCEPTANCE OF PROJECT.
8. SPREAD MULCH TO A MINIMUM 100mm COMPACTED DEPTH ON ALL TREE PITS AND PLANTING BEDS.
9. STAKING OF TREES SHALL BE AS PER MUNICIPAL STANDARDS. ALTERNATIVE METHODS MAY BE ACCEPTABLE WITH THE APPROVAL OF THE LANDSCAPE ARCHITECT PRIOR TO INSTALLATION.
10. REPORT ALL DISCREPANCIES IN WRITING TO THE LANDSCAPE ARCHITECT AND CONSULTANT.
11. CONTRACTOR TO LOCATE ALL UNDERGROUND UTILITIES PRIOR TO ANY WORK.
12. PLANTING MAY BE ADJUSTED TO SUIT LOCATIONS OF SITE UTILITY STRUCTURES/SERVICES.
13. SUBMIT A WRITTEN GUARANTEE TO THE EFFECT THAT ALL PLANTS ACCEPTED DURING THE PERIOD OF JANUARY 1st TO JULY 15th SHALL BE GUARANTEED UNTIL JULY 15th THE FOLLOWING YEAR. PLANTS ACCEPTED DURING THE PERIOD OF JULY 15th TO DECEMBER 31st SHALL BE GUARANTEED FOR ONE YEAR FROM THE DATE OF ACCEPTANCE. THE GUARANTEE PERIODS LISTED ABOVE SHALL APPLY TO ALL "NURSERY GROWN" PLANTS.
14. ALL MATERIALS TO BE APPROVED BY LANDSCAPE ARCHITECT AND CONSULTANT PRIOR TO INSTALLATION.
15. CHECK AND VERIFY ALL DIMENSIONS AND QUANTITIES PRIOR TO COMMENCEMENT OF WORK. ANY DISCREPANCIES ARE TO BE REPORTED TO THE LANDSCAPE ARCHITECT AND CONSULTANT. QUANTITIES NOTED WITHIN THE PLAN SUPERSEDE THOSE IN THE PLANT SCHEDULE. ANY SUBSTITUTIONS ARE TO BE APPROVED BY THE LANDSCAPE ARCHITECT AND CONSULTANT.
16. PLANTING BEDS ARE TO BE MOUNDED A MINIMUM 100mm.
17. SOD ANY AREAS MARKED WITH NURSERY SOD ON 150mm CLEAN TOPSOIL. FINE GRADE AND SOD ALL BOULEVARD AREAS TO MUNICIPAL SPECIFICATIONS AND REPAIR DAMAGE TO ADJACENT PROPERTIES, AS REQUIRED. REFER TO WRITTEN SPECIFICATION RELATED TO THIS PROJECT FOR TURF GRASS MIXTURE.
18. FINAL INSPECTION AND ACCEPTANCE OF PLANTING WORK SHALL COINCIDE WITH THE FINAL INSPECTION AND ACCEPTANCE OF ALL WORK INCLUDED IN THE CONTRACT.
19. AT THE TIME OF FINAL INSPECTION ALL PLANTS SHALL BE IN A HEALTHY, VIGOUROUS GROWING CONDITION, PLANTED IN FULL ACCORDANCE WITH DRAWINGS AND CONDITIONS.

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GRADING NOTES

1. THIS PLAN IS TO BE USED AS GRADING ONLY. ANY OTHER INFORMATION IS FOR ILLUSTRATION PURPOSES.
2. MATCH EXISTING GRADES AT ALL PROPERTY LINES AND/OR LIMITS OF CONSTRUCTION EXCEPT WHERE PROPOSED GRADES ARE NOTED.
3. MANAGEMENT OF EXCESS MATERIALS SHALL BE IN ACCORDANCE WITH OPSS 180. ENVIRONMENTALLY IMPACTED SOILS, WHERE AND WHEN ENCOUNTERED, SHALL BE MANAGED ON SITE AS REQUIRED UNTIL SUCH TIME THAT LABORATORY TESTING RESULTS HAVE CONFIRMED THE NATURE OF THE IMPACTS AND A SUITABLE DISPOSAL METHOD.
4. SURPLUS MATERIAL OF ALL TYPES NOT REQUIRED FOR BACKFILL, GRADING OR LANDSCAPING SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND BE REMOVED FROM THE SITE AS DIRECTED BY THE CONSULTANT. THE COSTS OF ALL OFFSITE DISPOSAL SHALL BE BORNE BY THE CONTRACTOR UNLESS A SPECIFIC PROVISION IS MADE IN THE CONTRACT DOCUMENTS FOR PAYMENT FROM DISPOSAL OF A SPECIFIC SURPLUS MATERIAL.
5. MATERIALS TO BE REMOVED SHALL BE NEATLY SAW–CUT ALONG ITS LIMITS, IN ADVANCE OF THE REMOVAL. THE LIMITS OF REMOVAL SHALL BE AS NOTED ON THE PLANS UNLESS AN EXTENSION OR REDUCTION OF THE MATERIAL TO BE REMOVED IS APPROVED IN ADVANCE BY THE CONSULTANT. AS SUCH, THE COSTS OF ANY OVER–EXCAVATION NOT APPROVED IN ADVANCE SHALL BE THE FINANCIAL RESPONSIBILITY OF THE CONTRACTOR. THIS RESPONSIBILITY SHALL ALSO EXTEND TO RESTORATION OR REPLACEMENT OF DISTURBED FEATURES AND SURFACES DUE TO UNAUTHORIZED EXCAVATION.
6. ALL FILL PLACED ON SITE SHALL BE COMPACTED TO A MINIMUM 98% SPMDD (UNLESS OTHERWISE RECOMMENDED BY THE GEOTECHNICAL ENGINEER OR ON THE DRAWINGS AND IN THE SPECIFICATIONS). ALL MATERIAL SHALL BE PLACED IN LAYERS NOT EXCEEDING 200mm LIFTS EXCEPT WHERE UNDER PAVING, AND WALKS WHEN LAYERS SHALL BE 150mm MAX.
7. MAXIMUM SLOPE IN GRASSED AREAS TO BE 3:1. SLOPES GREATER THAN 3:1 TO BE LANDSCAPED WITH LOW MAINTENANCE GROUND COVER. MINIMUM SLOPE IN GRASSED AREAS TO BE 1%. GRASS SWALES WITH A SLOPE LESS THAN 1% TO BE UNDERLAIN WITH A FRENCH DRAIN.
8. FINISH GRADE AT FOUNDATION WALLS TO BE MINIMUM 150mm BELOW THE TOP OF FOUNDATION WALL/BRICK LINE UNLESS SPECIFIED OTHERWISE ON THE DRAWINGS.
9. CONTRACTOR TO PROVIDE POSITIVE DRAINAGE ON ALL SURFACES TO THE APPROPRIATE OUTLET STRUCTURE. AREAS OF PONDING CAUSED BY CONSTRUCTION ERROR WILL BE REPAIRED BY THE CONTRACTOR TO THE SATISFACTION OF THE CONSULTANT AT THE CONTRACTORS EXPENSE.
10. SHOULD THE NATURE OF THE SOIL AT THE DEPTH INDICATED PROVE UNSATISFACTORY AS DETERMINED BY THE GEOTECHNICAL ENGINEER, THE EXCAVATION SHALL BE CARRIED DOWN TO SUCH A DEEPER LEVEL AS THE GEOTECHNICAL ENGINEER MAY REQUIRE UNTIL A SATISFACTORY BEARING STRATUM IS REACHED.
   - 10.1. THIS CONTRACTOR SHALL BE PAID THE COST OF SUCH EXTRA EXCAVATION AT THE UNIT PRICE ESTABLISHED IN THE CONTRACT (WRITER TO CONFIRM IN FRONT END).
   - 10.2. ALL EXTRA DEPTHS OF EXCAVATION AND FILLING MUST HAVE THEIR AREA AND VOLUME DOCUMENTED BY AN INDEPENDENT INSPECTION AND TESTING COMPANY OR THE CONSULTANT TO QUALIFY FOR PAYMENT.
   - 10.3. QUANTITIES USED FOR PAYMENT OF EXCAVATION AND FILLING AT EXTRA DEPTHS TO BE DETERMINED BY THE CONSULTANT.

Petawawa Biofuel

true north | project north

date	issuance	no.
2020.10.02	ISSUED FOR SITE PLAN APPROVAL	

customer
PETAWAWA BIOFUEL

project
SOUTHGATE BIOFUEL FACILITY
ECO PARKWAY, DUNDALK, ON

title
GRADING PLAN

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Kitchener, Ontario, Canada N2M 1A1
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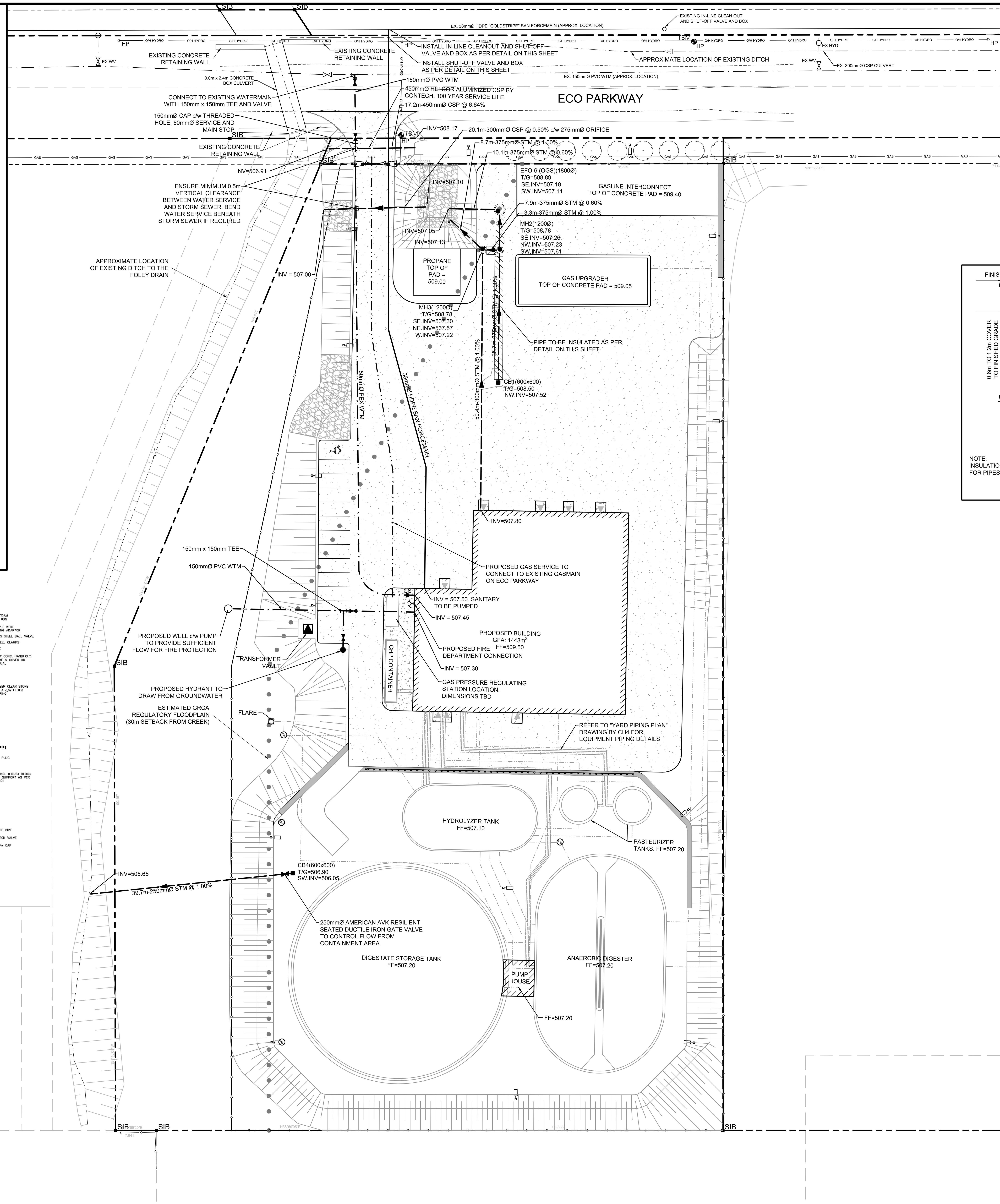
walterfedy.com

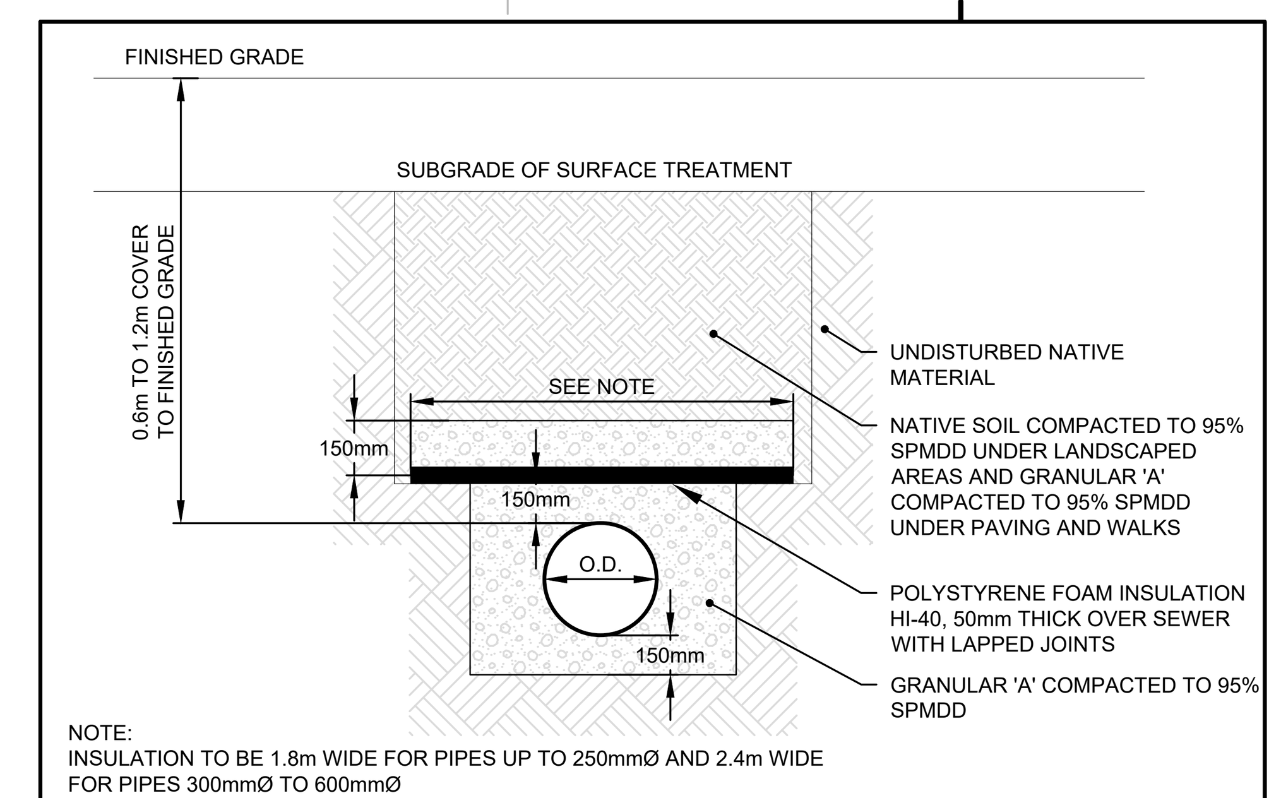
LICENSED PROFESSIONAL ENGINEER
D. R. FERGUSON
100159406
2020.10.02
PROVINCE OF ONTARIO

scale:	1:400	sheet no.: C2-1
date:	2020.10.01	
job no.:	2019-0413-20	
CAD file:	2019-0413-20 - GRD PLOT	
drawn by:	TK	
checked by:	DF	

LEGEND

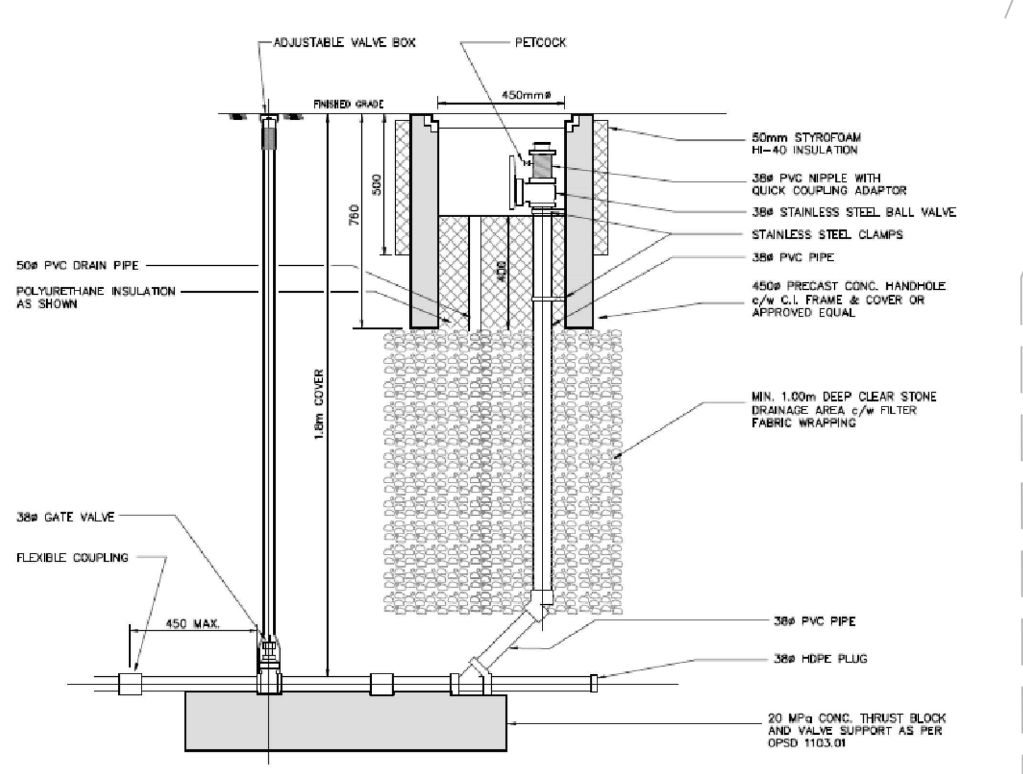
	PROPERTY LINE
	LEGAL EASEMENT
SIB	STANDARD IRON BAR
EX HP	EXISTING HYDRO POLE
	EXISTING GUY WIRE
EX SIGN	EXISTING SIGN
EX HYD	EXISTING FIRE HYDRANT
EX WV	EXISTING WATERMAIN VALVE
EX CS	EXISTING CURB STOP
BOREHOLE No.	EXISTING BOREHOLE LOCATION
	EXISTING EMBANKMENT
	EXISTING TREE DRIPLINE
	EXISTING SANITARY SERVICE
	EXISTING STORM CULVERT
	EXISTING WATERMAIN
	EXISTING GASMAIN
	EXISTING OVERHEAD HYDRO LINE
	EXISTING DITCH CENTRELINE
	EXISTING CHAINLINK FENCE
	EXISTING GRAVEL
	ESTIMATED GRCA REGULATORY FLOODPLAIN
	PROPOSED HYDRO TRANSFORMER
CB	PROPOSED CATCHBASIN
MH	PROPOSED STORM MANHOLE
HYD	PROPOSED FIRE HYDRANT
WV	PROPOSED WATERMAIN VALVE
CS	PROPOSED CURB STOP
	PROPOSED FIRE DEPARTMENT CONNECTION
	PROPOSED SANITARY SEWER/SERVICE
	PROPOSED STORM SEWER/SERVICE
	PROPOSED WATERMAIN/SERVICE
	PROPOSED GASMAIN
	PROPOSED LAMP STANDARD
	PROPOSED PIPE INSULATION
	PROPOSED CHAINLINK FENCE
	PROPOSED EMBANKMENT (3:1 MAX UNLESS OTHERWISE NOTED)
	PROPOSED CONCRETE SURFACE
	PROPOSED GRAVEL SURFACE
	PROPOSED RIPRAP





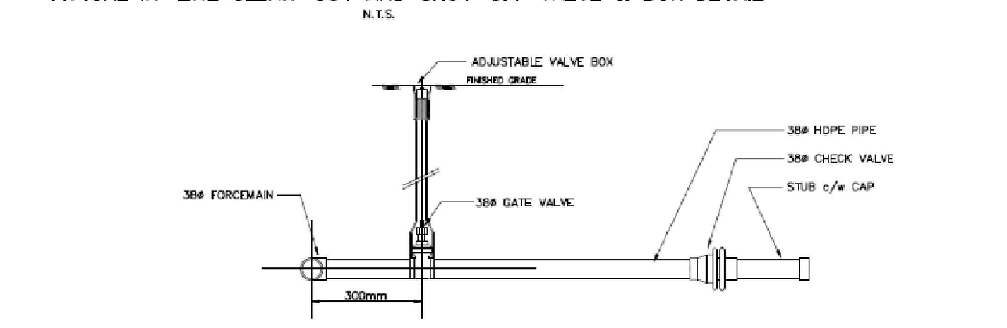
SHALLOW PIPE INSULATION DETAIL

N.T.S.



TYPICAL IN-LINE CLEAN-OUT AND SHUT-OFF VALVE & BOX DETAIL

N.T.S.



TYPICAL SERVICE LEAD

N.T.S.

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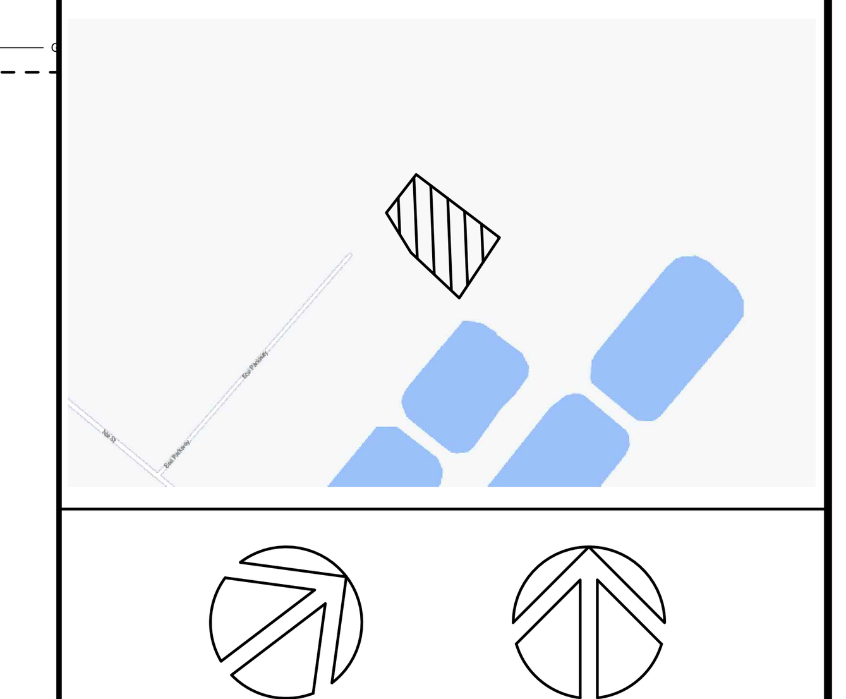
GENERAL SERVICING

1. THIS PLAN IS TO BE USED FOR SERVICING ONLY: ANY OTHER INFORMATION SHOWN IS FOR ILLUSTRATION PURPOSES ONLY.
2. ALL WORK TO BE COMPLETED IN ACCORDANCE WITH THE REGULATIONS SET OUT BY THE MUNICIPALITY HAVING JURISDICTION.
3. RIGID PIPE BEDDING: CLASS 'B' AS PER OPSD 802.030 (EARTH EXCAVATION, TYPE 1 OR 2 SOIL), OPSD 802.031 (EARTH EXCAVATION, TYPE 3 SOIL), OPSD 802.032 (EARTH EXCAVATION, TYPE 4 SOIL)
4. FLEXIBLE PIPE BEDDING: AS PER OPSD 802.010 (EARTH)
5. NATIVE FILL MATERIAL IN ACCORDANCE WITH SECTION 31 30 00 SHALL BE DEPOSITED IN THE TRENCH, FOR THE FULL WIDTH OF THE TRENCH, COMPACTED TO 95% STANDARD PROCTOR MAXIMUM DRY DENSITY IN LAYERS NOT OVER 300mm DEPTH, EXCEPT WHERE UNDER PAVING, AND WALKS WHEN LAYERS SHALL BE 150mm MAX.
6. SITE SERVICING CONTRACTOR TO TERMINATE ALL SERVICES 1.0m FROM FOUNDATION WALL AND COORDINATE WITH THE GENERAL OR MECHANICAL CONTRACTOR AS REQUIRED TO FACILITATE THE CONNECTION.
7. WHEN BELL AND SPIGOT PIPE IS LAID, THE BELL END OF THE PIPE SHALL BE LAID UPGRADE.
8. PIPE SHALL BE KEPT CLEAN AND DRY AS WORK PROGRESSES. THE TRENCH SHALL BE KEPT DRY.
9. A REMOVABLE WATERTIGHT BULKHEAD SHALL BE INSTALLED DAILY AT THE OPEN END OF THE LAST PIPE LAID.
10. PIPE SHALL NOT BE LAID UNTIL THE PRECEDING PIPE JOINT HAS BEEN COMPLETED AND THE PIPE IS BEDDED AND SECURED IN PLACE.
11. ALL PIPE ENDS SHALL BE THOROUGHLY CLEANED PRIOR TO THE INSTALLATION OF GASKETS. ALL GASKETS TO BE LUBRICATED PRIOR TO BEING INSTALLED OR AS RECOMMENDED BY THE PIPE MANUFACTURER.
12. A TEMPORARY LOCATION MARKER 50x75mm SHALL BE PLACED AT THE END OF ALL CAPPED SERVICE CONNECTIONS. THE MARKER SHALL BE PLACED 300mm ABOVE THE PLUGGED END OF THE SERVICE PIPE, CUT AT LEAST 500mm ABOVE THE FINISHED GRADE, AND MARKED WITH BRIGHT PAINT.
13. ALL MANHOLES, BASINS, CHAMBERS ETC. TO BE INSTALLED LEVEL AND PLUMB TO THE SATISFACTION OF THE CONSULTANT.

Petawawa Biofuel



true north   project north

date	issuance	no.
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customer

PETAWAWA BIOFUEL

project

SOUTHGATE BIOFUEL FACILITY

ECO PARKWAY, DUNDALK, ON

title

SERVICING PLAN

WALTERFEDY

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drawn by:	TK
checked by:	DF

sheet no.:

C3-1

LEGEND

- PROPERTY LINE
- LEGAL EASEMENT
- SIB — STANDARD IRON BAR
- EX HP — EXISTING HYDRO POLE
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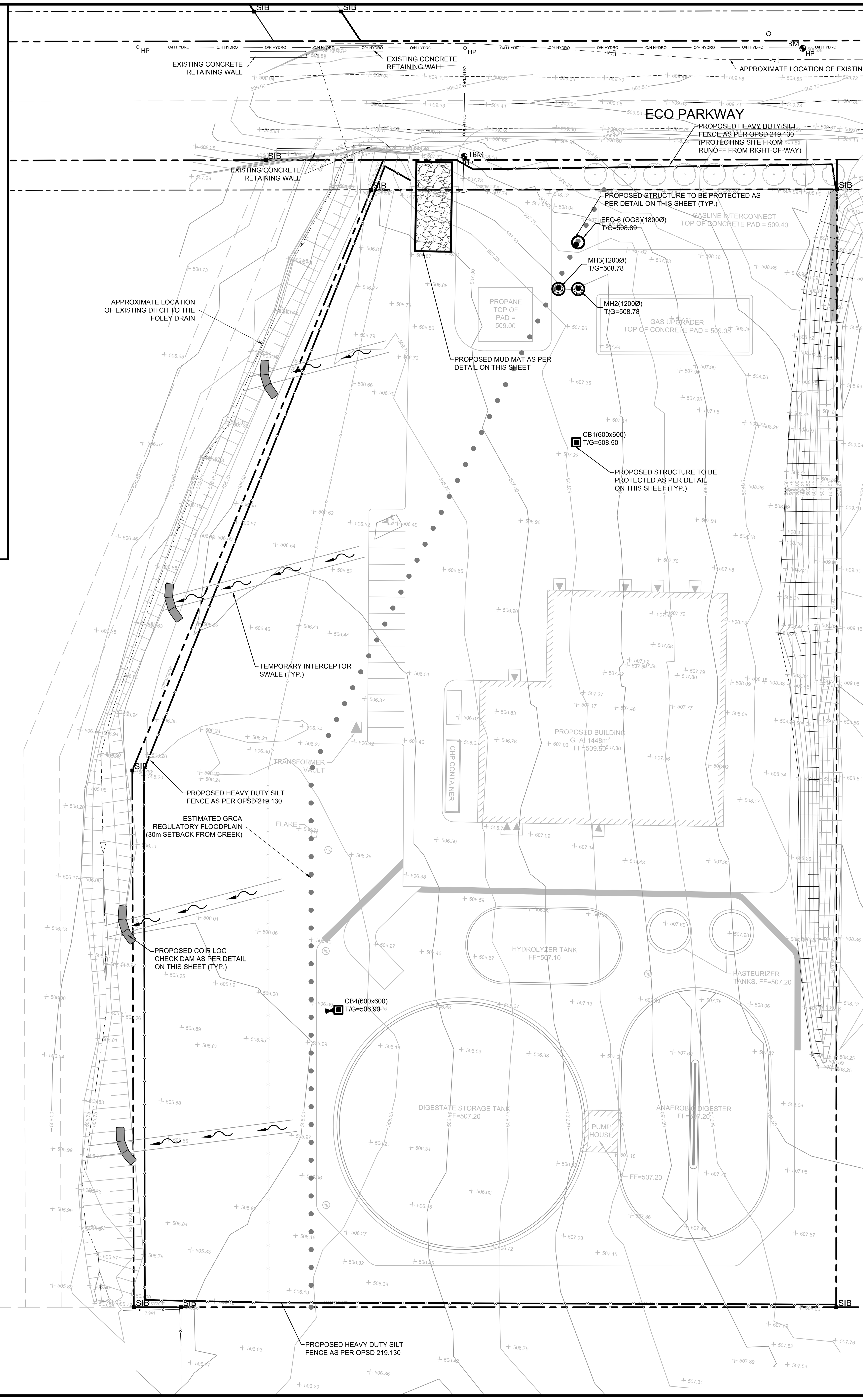
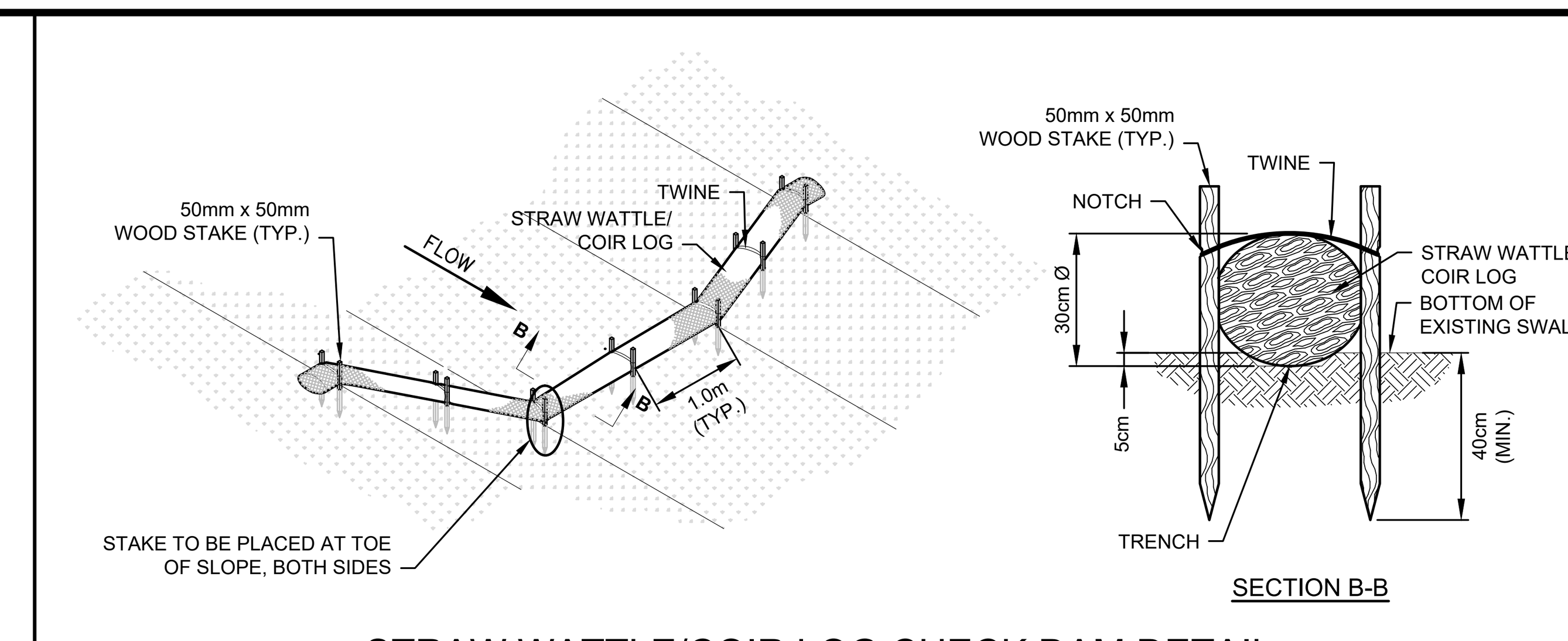
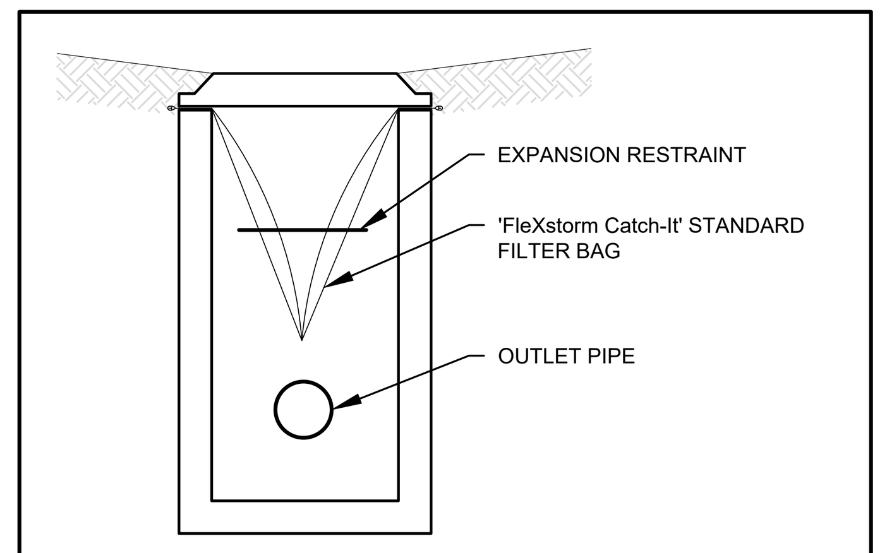
- EXISTING EMBANKMENT
- EXISTING TREE DRIPLINE
- EXISTING OVERHEAD HYDRO LINE
- EXISTING DITCH CENTRELINE
- EXISTING CHAINLINK FENCE
- EXISTING GRAVEL
- CB — PROPOSED CATCHBASIN
- MH — PROPOSED STORM MANHOLE
- HYD — PROPOSED FIRE HYDRANT
- PROPOSED EMBANKMENT (3:1 MAX UNLESS OTHERWISE NOTED)
- PROPOSED CHAINLINK FENCE
- PROPOSED CONCRETE SURFACE
- PROPOSED GRAVEL SURFACE
- PROPOSED RIPRAP
- HEAVY DUTY SILT FENCE
- LIGHT DUTY SILT FENCE
- COIL LOG CHECK DAMS
- PROPOSED STRUCTURE TO BE PROTECTED
- PROPOSED MUD MAT





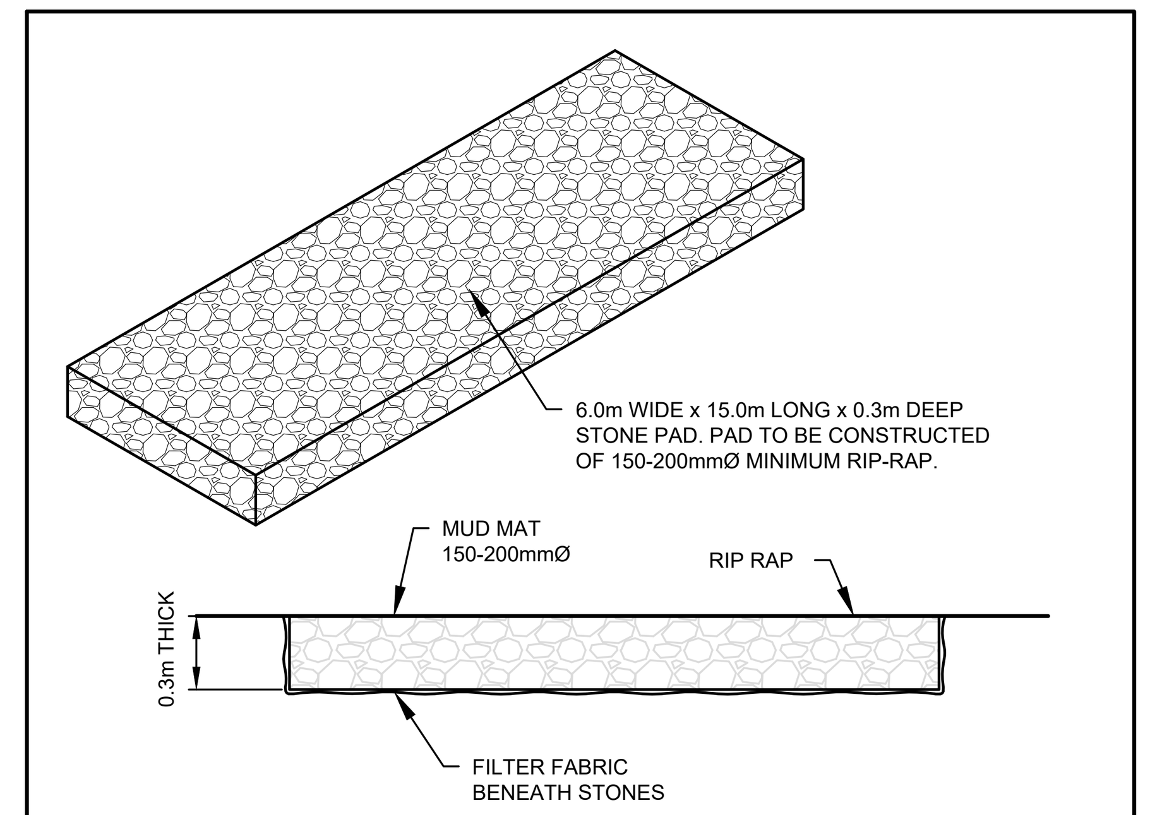
STRAW WATTLE/COIR LOG CHECK DAM DETAIL
N.T.S.



MAINTENANCE SCHEDULE:

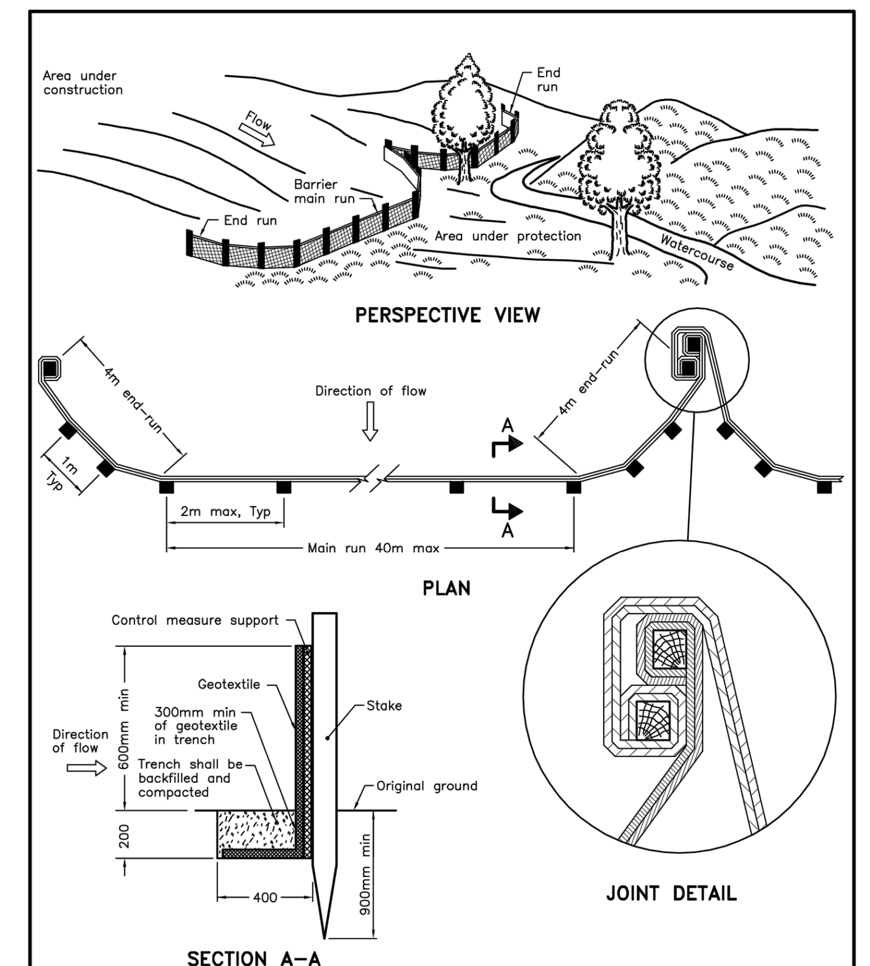
- INSPECT AFTER EVERY MAJOR RAIN EVENT
- INSPECT EVERY 3 WEEKS MINIMUM
- SILTSACK SHOULD NEVER BE OVER HALF FULL
- FULL BAG CAN BE REMOVED, DUMPED, CLEANED, AND REUSED (TO REMOVE INSERT 25mm REBAR INTO REMOVAL FLAP POCKETS) (TO DUMP INSERT 25mm REBAR INTO BOTH DUMPING STRAPS)
- ANY DEBRIS THAT ENTERS STRUCTURE TO BE CLEANED IMMEDIATELY

TEMPORARY SILTATION CONTROL DETAIL
N.T.S.



NOTE:
1. MUD MAT TO BE CONSTRUCTED PRIOR TO ANY SITE WORKS AND TO BE THE DESIGNATED ACCESS FOR ALL CONSTRUCTION TRAFFIC.
2. CONTRACTOR TO CLEAN MUD MAT DAILY. MAT TO BE MAINTAINED IN GOOD WORKING ORDER UNTIL GRADING WORKS ARE COMPLETED AND GRANULAR "A" & "B" HAVE BEEN PLACED.
3. CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVAL OF ANY MUD/SEDIMENT TRACKED ON TO MUNICIPAL ROADS.

CONSTRUCTION MUD MAT DETAIL
N.T.S.



NOTE:
A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING — Nov 2015 — Rev 2
HEAVY-DUTY SILT FENCE BARRIER
OPSD 219.130

GENERAL NOTES

1. LEGAL BOUNDARY DATA AND EXISTING TOPOGRAPHICAL INFORMATION OF THE DUNDALK ECO–PARK LOT (THE SITE) FROM VAN HARTEN SURVEYING INC. DATED JULY 22, 2019.
2. BOREHOLE LOCATIONS AND GEOTECHNICAL INFORMATION FROM DRAFT REPORT BY V.A WOOD (GUELPH) DATED JULY 2019.
3. THIS SET OF PLANS SHALL NOT BE USED FOR CONSTRUCTION UNTIL STAMPED BY THE DESIGN ENGINEER AND APPROVED BY THE LOCAL MUNICIPALITY.
4. NO CHANGES ARE TO BE MADE WITHOUT THE APPROVAL OF THE DESIGN ENGINEER.
5. THIS PLAN NOT TO BE REPRODUCED IN WHOLE OR IN PART WITHOUT THE PERMISSION OF WALTERFEDY.
6. THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS, AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS AND, WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, THE CONTRACTOR SHALL INFORM THEMSELVES OF THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND SHALL ASSUME ALL LIABILITY FOR DAMAGE TO THEM AND THOSE NOT LOCATED PRIOR TO CONSTRUCTION.
7. ANY AREA DISTURBED DURING CONSTRUCTION SHALL BE RESTORED TO ITS ORIGINAL CONDITION OR BETTER TO THE SATISFACTION OF THE CONSULTANT AND AUTHORITY HAVING JURISDICTION. THE CONTRACTOR IS RESPONSIBLE FOR RESTORING ALL DAMAGED AND/OR DISTURBED PROPERTY WITHIN THE MUNICIPAL RIGHT–OF–WAY TO MUNICIPAL STANDARDS.
8. ALL HEALTH AND SAFETY RELATED SIGNAGE MUST BE POSTED AT THE SITE AS REQUIRED BY APPLICABLE LAW AND BEST MANAGEMENT PRACTICES.
9. AT THE END OF CONSTRUCTION, THE CONTRACTOR SHALL PROVIDE THE CONSULTANT WITH A DIGITAL FILE OF AS–CONSTRUCTED DRAWINGS. THE DRAWINGS MUST REFLECT THE CONSTRUCTED STATE OF THE WORK. SUBMISSION OF UNALTERED DESIGN DRAWINGS AND CONTRACT CHANGES WILL NOT BE ACCEPTED.

EROSION CONTROL NOTES

1. ALL EROSION CONTROL FENCING, TEMPORARY FILTRATION AND MUD MATS MUST BE INSTALLED BY THE CONTRACTOR AND INSPECTED BY THE CONSULTANT PRIOR TO COMMENCEMENT OF ANY AREA GRADING, EXCAVATING, OR DEMOLITION. CONTRACTOR TO NOTIFY CONSULTANT FOR INSPECTION.
2. ATTACH EROSION CONTROL FENCE TO EXISTING CHAINLINK FENCE WITHIN THE LIMITS OF THE SITE WHERE POSSIBLE.
3. EROSION CONTROL FENCING TO BE PLACED AROUND THE BASE OF ALL STOCKPILES. ALL STOCKPILES TO BE KEPT A MINIMUM OF 2.5m FROM PROPERTY LINES.
2. FILTER FABRIC TO BE TERRAFIX 270R OR APPROVED EQUIVALENT.
3. MUD MATS TO BE PROVIDED ON SITE AT ALL LOCATIONS WHERE CONSTRUCTION VEHICLES EXIT THE SITE. MUD MATS SHALL BE SUPPLIED AS INSTALLED AS PER THE DETAIL ON DRAWING C4–1. CONTRACTOR TO ENSURE ALL VEHICLES LEAVE THE SITE VIA THE MUD MAT AND THAT THE MAT IS MAINTAINED IN A MANNER TO MAXIMIZE ITS EFFECTIVENESS AT ALL TIMES.
4. ALL DITCH INLET CATCHBASINS, CATCHBASINS AND CATCHBASIN MANHOLES TO HAVE TEMPORARY FILTRATION INSTALLED AND MAINTAINED AS PER THE DETAIL ON DRAWING C4–1.
5. NO ALTERNATE METHODS OF EROSION CONTROL PROTECTION SHALL BE PERMITTED UNLESS APPROVED BY CONSULTANT AND THE AUTHORITY HAVING JURISDICTION.
6. ALL EROSION CONTROL STRUCTURES TO REMAIN IN PLACE UNTIL ALL DISTURBED GROUND SURFACES HAVE BEEN RE–STABILIZED EITHER BY PAVING OR RESTORATION WITH VEGETATIVE GROUND COVER.
7. THE CONTRACTOR IS RESPONSIBLE FOR REMOVING SEDIMENTS FROM THE PUBLIC ROADWAY AND SIDEWALKS AT THE END OF EACH WORK DAY OR AS DIRECTED BY THE CONSULTANT.
8. ALL EROSION AND SEDIMENT CONTROL MEASURES TO BE INSPECTED BY THE CONTRACTOR AFTER MAJOR RAINFALL EVENTS AND CLEANED OR REPLACED AS REQUIRED TO MEET THEIR INTENDED FUNCTION. SEDIMENTS TO BE REMOVED WHEN ACCUMULATIONS REACH A MAXIMUM OF ONE THIRD (1/3) THE STRUCTURE CAPACITY.
9. THE CONSULTANT SHALL MONITOR SITE DEVELOPMENT TO ENSURE ALL EROSION CONTROLS ARE INSTALLED AND MAINTAINED TO TOWNSHIP OF SOUTHGATE REQUIREMENTS. CONTRACTOR TO COMPLY WITH THE CONSULTANTS INSTRUCTIONS TO INSTALL, MODIFY, OR MAINTAIN EROSION CONTROL WORKS.
10. THIS PLAN TO BE READ IN CONJUNCTION WITH THE EXISTING CONDITIONS PLAN, SITE SERVICING PLAN, GRADING PLAN, LANDSCAPING PLAN, AND THE STORM WATER MANAGEMENT REPORT DATED OCTOBER 2020.

Petawawa Biofuel

true north — project north

date	issuance	no.
2020.10.02	ISSUED FOR SITE PLAN APPROVAL	

customer
PETAWAWA BIOFUEL

project
SOUTHGATE BIOFUEL FACILITY
ECO PARKWAY, DUNDALK, ON

title
EROSION AND SEDIMENT CONTROL PLAN

WALTERFEDY
675 Queen Street South, Suite 111
Kitchener, Ontario, Canada N2M 1A1
T 519.576.2150 F 519.576.5499
walterfedy.com

LICENSED PROFESSIONAL ENGINEER
D. R. FERGUSON
100159406
2020.10.02
PROVINCE OF ONTARIO

scale:	1:400
date:	2020.10.02
job no.:	2019-0413-20
CAD file:	2019-0413-20 - ESC PLOT
drawn by:	TK
checked by:	DF

sheet no.:
C4-1

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GRADING NOTES

1. MATCH EXISTING GRADES AT ALL PROPERTY LINES AND/OR LIMITS OF CONSTRUCTION EXCEPT WHERE PROPOSED GRADES ARE NOTED.
2. MANAGEMENT OF EXCESS MATERIALS SHALL BE IN ACCORDANCE WITH OPSS 180. ENVIRONMENTALLY IMPACTED SOILS, WHERE AND WHEN ENCOUNTERED, SHALL BE MANAGED ON SITE AS REQUIRED UNTIL SUCH TIME THAT LABORATORY TESTING RESULTS HAVE CONFIRMED THE NATURE OF THE IMPACTS AND A SUITABLE DISPOSAL METHOD.
3. SURPLUS MATERIAL OF ALL TYPES NOT REQUIRED FOR BACKFILL, GRADING OR LANDSCAPING SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND BE REMOVED FROM THE SITE AS DIRECTED BY THE CONSULTANT. THE COSTS OF ALL OFFSITE DISPOSAL SHALL BE BORNE BY THE CONTRACTOR UNLESS A SPECIFIC PROVISION IS MADE IN THE CONTRACT DOCUMENTS FOR PAYMENT FROM DISPOSAL OF A SPECIFIC SURPLUS MATERIAL.
4. MATERIALS TO BE REMOVED SHALL BE NEATLY SAW–CUT ALONG ITS LIMITS, IN ADVANCE OF THE REMOVAL. THE LIMITS OF REMOVAL SHALL BE AS NOTED ON THE PLANS UNLESS AN EXTENSION OR REDUCTION OF THE MATERIAL TO BE REMOVED IS APPROVED IN ADVANCE BY THE CONSULTANT. AS SUCH, THE COSTS OF ANY OVER–EXCAVATION NOT APPROVED IN ADVANCE SHALL BE THE FINANCIAL RESPONSIBILITY OF THE CONTRACTOR. THIS RESPONSIBILITY SHALL ALSO EXTEND TO RESTORATION OR REPLACEMENT OF DISTURBED FEATURES AND SURFACES DUE TO UNAUTHORIZED EXCAVATION.
5. ALL FILL PLACED ON SITE SHALL BE COMPACTED TO A MINIMUM 98% SPMDD (UNLESS OTHERWISE RECOMMENDED BY THE GEOTECHNICAL ENGINEER OR ON THE DRAWINGS AND IN THE SPECIFICATIONS). ALL MATERIAL SHALL BE PLACED IN LAYERS NOT EXCEEDING 200mm LIFTS EXCEPT WHERE UNDER PAVING, AND WALKS WHEN LAYERS SHALL BE 150mm MAX.
6. MAXIMUM SLOPE IN GRASSED AREAS TO BE 3:1. SLOPES GREATER THAN 3:1 TO BE LANDSCAPED WITH LOW MAINTENANCE GROUND COVER. MINIMUM SLOPE IN GRASSED AREAS TO BE 1%. GRASS SWALES WITH A SLOPE LESS THAN 1% TO BE UNDERLAIN WITH A FRENCH DRAIN.
7. FINISH GRADE AT FOUNDATION WALLS TO BE MINIMUM 150mm BELOW THE TOP OF FOUNDATION WALL/BRICK LINE UNLESS SPECIFIED OTHERWISE ON THE DRAWINGS.
8. CONTRACTOR TO PROVIDE POSITIVE DRAINAGE ON ALL SURFACES TO THE APPROPRIATE OUTLET STRUCTURE. AREAS OF PONDING CAUSED BY CONSTRUCTION ERROR WILL BE REPAIRED BY THE CONTRACTOR TO THE SATISFACTION OF THE CONSULTANT AT THE CONTRACTORS EXPENSE.
9. SHOULD THE NATURE OF THE SOIL AT THE DEPTH INDICATED PROVE UNSATISFACTORY AS DETERMINED BY THE GEOTECHNICAL ENGINEER, THE EXCAVATION SHALL BE CARRIED DOWN TO SUCH A DEEPER LEVEL AS THE GEOTECHNICAL ENGINEER MAY REQUIRE UNTIL A SATISFACTORY BEARING STRATUM IS REACHED.
   - 9.1. THIS CONTRACTOR SHALL BE PAID THE COST OF SUCH EXTRA EXCAVATION AT THE UNIT PRICE ESTABLISHED IN THE CONTRACT (WRITER TO CONFIRM IN FRONT END).
   - 9.2. ALL EXTRA DEPTHS OF EXCAVATION AND FILLING MUST HAVE THEIR AREA AND VOLUME DOCUMENTED BY AN INDEPENDENT INSPECTION AND TESTING COMPANY OR THE CONSULTANT TO QUALIFY FOR PAYMENT.
   - 9.3. QUANTITIES USED FOR PAYMENT OF EXCAVATION AND FILLING AT EXTRA DEPTHS TO BE DETERMINED BY THE CONSULTANT.

GENERAL SERVICING

1. ALL WORK TO BE COMPLETED IN ACCORDANCE WITH THE REGULATIONS SET OUT BY THE MUNICIPALITY HAVING JURISDICTION.
2. RIGID PIPE BEDDING: CLASS 'B' AS PER OPSD 802.030 (EARTH EXCAVATION, TYPE 1 OR 2 SOIL), OPSD 802.031 (EARTH EXCAVATION, TYPE 3 SOIL), OPSD 802.032 (EARTH EXCAVATION, TYPE 4 SOIL)
3. FLEXIBLE PIPE BEDDING: AS PER OPSD 802.010 (EARTH)
4. NATIVE FILL MATERIAL IN ACCORDANCE WITH SECTION 31 30 00 SHALL BE DEPOSITED IN THE TRENCH, FOR THE FULL WIDTH OF THE TRENCH, COMPACTED TO 95% STANDARD PROCTOR MAXIMUM DRY DENSITY IN LAYERS NOT OVER 300mm DEPTH, EXCEPT WHERE UNDER PAVING, AND WALKS WHEN LAYERS SHALL BE 150mm MAX.
5. SITE SERVICING CONTRACTOR TO TERMINATE ALL SERVICES 1.0m FROM FOUNDATION WALL AND COORDINATE WITH THE GENERAL OR MECHANICAL CONTRACTOR AS REQUIRED TO FACILITATE THE CONNECTION.
6. WHEN BELL AND SPIGOT PIPE IS LAID, THE BELL END OF THE PIPE SHALL BE LAID UPGRADE.
7. PIPE SHALL BE KEPT CLEAN AND DRY AS WORK PROGRESSES. THE TRENCH SHALL BE KEPT DRY.
8. A REMOVABLE WATERTIGHT BULKHEAD SHALL BE INSTALLED DAILY AT THE OPEN END OF THE LAST PIPE LAID.
9. PIPE SHALL NOT BE LAID UNTIL THE PRECEDING PIPE JOINT HAS BEEN COMPLETED AND THE PIPE IS BEDDED AND SECURED IN PLACE.
10. ALL PIPE ENDS SHALL BE THOROUGHLY CLEANED PRIOR TO THE INSTALLATION OF GASKETS. ALL GASKETS TO BE LUBRICATED PRIOR TO BEING INSTALLED OR AS RECOMMENDED BY THE PIPE MANUFACTURER.
11. A TEMPORARY LOCATION MARKER 50x75mm SHALL BE PLACED AT THE END OF ALL CAPPED SERVICE CONNECTIONS. THE MARKER SHALL BE PLACED 300mm ABOVE THE PLUGGED END OF THE SERVICE PIPE, CUT AT LEAST 500mm ABOVE THE FINISHED GRADE, AND MARKED WITH BRIGHT PAINT.
12. ALL MANHOLES, BASINS, CHAMBERS ETC. TO BE INSTALLED LEVEL AND PLUMB TO THE SATISFACTION OF THE CONSULTANT.

STORM AND SANITARY SEWER

1. POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS: SMOOTH PROFILES, TO OPSS 1841 AND CSA B182.2, WITH SEPARATE GASKET AND INTEGRAL BELL SYSTEM, IN 6.0m NOMINAL LENGTHS AS FOLLOWS:
   - 1.1. 200mm OD AND LARGER: SDR35 PVC WITH 320 kPa STIFFNESS.
2. SUBSURFACE DRAINAGE PIPE AND FITTINGS: TO OPSS 405, PERFORATED PVC PIPE TO OPSS 1841 OR PE PIPE TO OPSS.MUNI 1840, TO CAN/CSA–B182.1; COMPLETE WITH KNITTED SOCK GEOTEXTILE AS REQUIRED (TERRAFIX 270R OR EQUIVALENT).
3. CORRUGATED STEEL PIPE (CSP): TO OPSS 1801 AND CSA G401, COMPLETE WITH COUPLINGS, NEOPRENE GASKETS, BENDS AND OTHER FITTINGS; JOINTING TO BE 2–PIECE BAND WITH ANGLES COMPLETE WITH NEOPRENE GASKETS FOR NON–PERFORATED PIPE.
4. MANHOLES AND CATCHBASIN MANHOLES TO BE PRECAST 1200mm DIAMETER WITH ALUMINUM STEPS AT 300mm SPACING AS PER OPSD 701.010 UNLESS SPECIFIED OTHERWISE.
5. CATCHBASINS TO BE 600mm SQUARE PRECAST AS PER OPSD 705.010. DOUBLE CATCHBASINS TO BE 600x1450mm PRECAST AS PER OPSD 705.020.
6. CATCHBASIN MANHOLES, CATCHBASINS, AND DOUBLE CATCHBASINS TO HAVE A MINIMUM 600mm DEEP SUMP.
7. MANHOLE AND CATCHBASIN, FRAMES, GRATES, CASTINGS, LIDS TO BE AS PER OPSS 1850.
8. CAST IRON FRAMES AND COVERS OR GRATES– STORM SEWERS: TO OPSS 1850 AND (OPSD 400.010, OPSD 400.020), OPSD 401.010 (A, CLOSED).
9. STORM SEWERS AND SERVICES TO HAVE MINIMUM 1.2m COVER TO TOP OF PIPE. WHERE COVER TO TOP OF PIPE IS DEFICIENT, CONTRACTOR SHALL INSTALL SHALLOW BURIED SEWER PIPE IN ACCORDANCE WITH APPLICABLE 'SEWER PIPE INSULATION DETAIL' INDICATED IN DRAWING DETAILS.
10. ALL PIPES, TO BE INSTALLED FLUSH WITH THE INSIDE WALLS OF THE STRUCTURE AND PARGED TO A SMOOTH FINISH.
11. ALL MANHOLES TO BE PRE–BENCHED OR BENCHED WITH 30MPa CONCRETE AS PER OPSD 701.021. BENCHING SHALL EXTEND TO THE SPRING LINE OF LARGEST PIPE IN THE MANHOLE AND SHALL HAVE A SLOPE OF 1:8.
12. CONTRACTOR TO SUPPLY AND PAY FOR CCTV INSPECTION OF ALL SEWER LINES AND STRUCTURES.
13. ACCEPTANCE OF SEWER LINES AND STRUCTURES SHALL BE MADE AFTER THE CONSULTANT HAS REVIEWED THE CCTV DOCUMENTATION AND VIDEOS, AND EXPRESSED IN WRITING THAT THE SEWER LINES AND STRUCTURES ARE ACCEPTABLE.
14. IF CCTV INSPECTIONS SHOW ADDITIONAL CLEANING IS REQUIRED, CLEAN AND RE–INSPECT THE SEWER UNTIL ACCEPTED BY THE CONSULTANT.
15. A MINIMUM OF ONE (1) AND MAXIMUM OF THREE (3) ADJUSTMENT UNITS SHALL BE INSTALLED ON EACH STRUCTURE TO A MINIMUM HEIGHT OF 75mm AND MAXIMUM OF 300mm. THE FIRST ADJUSTMENT UNIT SHALL BE LAID IN A FULL BED OF MORTAR AND ALIGNED WITH THE OPENING IN THE STRUCTURE. SUCCESSIVE ADJUSTMENT UNITS SHALL BE LAID PLUMB TO THE FIRST ADJUSTMENT UNIT AND SEALED ACCORDING TO MANUFACTURER'S RECOMMENDATIONS. FRAMES WITH GRATES OR COVERS SHALL BE SET IN A FULL BED OF MORTAR ON THE ADJUSTMENT UNITS AND SUPPORTED USING SHIMS. ROCKS, STONES AND DEBRIS WILL NOT BE PERMITTED FOR USE AS SHIMS.

FORCEMAIN

1. FORCEMAIN SHALL BE DR26 PVC WITH GASKETED OR FUSION WELDED JOINTS OR DR17 HDPE WITH FUSION WELDED JOINTS.
2. CONSTRUCTION TO CONFORM TO OPSS 412. ALL PRODUCTS TO BE CSA CERTIFIED.
3. INSTALL NO. 14 A.W.C.TYPE T.W.V. 75 660V INSULATED STRANDED COPPER TRACK WIRE RATED FOR UNDERGROUND USE ON ALL FORCEMAINS AND SERVICES.
4. PIPE BEDDING AND BACKFILL TO CONFORM TO OPSD 802.010 AND 802.013. PIPE EMBEDMENT MATERIAL TO SPRINGLINE SHALL CONSIST OF GRANULAR "A". BEDDING FROM SPRINGLINE TO 300MM ABOVE THE PIPE SHALL CONSIST OF SAND. TRENCH BACKFILL SHALL CONSIST OF APPROVED NATIVE MATERIAL COMPACTED TO 95% SPD. SEE FORCEMAIN BEDDING DETAIL.
5. ALL FORCEMAINS TO HAVE MIN. 2.0m COVER.
6. ALL ELBOW BENDS, BOTH VERTICAL AND HORIZONTAL SHALL BE RESTRAINED AT JOINTS.

WATERMAINS

1. POLYVINYL CHLORIDE (PVC) PIPE: MANUFACTURED TO CAST IRON OD (CIOD); COLOUR CODED BLUE, WITH INTEGRAL WALL THICKENED BELL DESIGNED FOR JOINT ASSEMBLY USING AN ELASTOMERIC GASKET CONFORMING TO ASTM D3139 AND CSA B137.3., TO CSA B137.3, COMPLETE WITH TRACER WIRE.
   - 1.1. 100 TO 300mm: TO AWWA C900, DR 18, IPEX OR APPROVED EQUAL.
2. ALL WATER SERVICING TO HAVE MINIMUM 2.0m COVER.
3. ALL WATER SERVICING PROVIDING FIRE FLOWS MUST BE PRESSURE TESTED TO 200 PSI AS PER THE OBC PLUMBING CODE.
4. FITTINGS: FOR POLYVINYL CHLORIDE (PVC) AND MOLECULARLY ORIENTED POLYVINYL CHLORIDE (PVCO) PIPE SHALL BE EITHER:
   - 4.1. GRAY IRON ACCORDING TO AWWA C110/A21.10.
   - 4.2. DUCTILE IRON ACCORDING TO C110/A21.10 OR AWWA C153 AND SHALL BE CEMENT LINED ACCORDING TO AWWA C104/A21.4.
   - 4.3. INJECTION MOULDED POLYVINYL CHLORIDE, BLUE IN COLOUR AND ACCORDING TO AWWA C907 AND CSA B137.2.
   - 4.4. PREFABRICATED POLYVINYL CHLORIDE, BLUE IN COLOUR AND ACCORDING TO AWWA C905 AND CSA B137.3.
5. JOINT RESTRAINTS:
   - 5.1. FOR PVC PIPE AND FITTINGS: TO ASTM F1674 AND AWWA C111, SERRATED RING TYPE; FOR PUSH ON JOINTS UNIFLANGE (SERIES 1300, 1350 & 1360), EBAA (SERIES 1600, 2500 & 2800) OR CLOW (SERIES 300 & 350); OR WEDGE ACTION TYPE AS MANUFACTURED BY EBAA (SERIES 2000PV), OR UNIFLANGE (SERIES 1500) AND STAR STARGRIP 4000, 4100P.
   - 5.2. FOR PVCO PIPE (AWWA C909) AND FITTINGS: SERRATED RING TYPE; FOR PUSH ON JOINTS UNIFLANGE (SERIES 1360), EBAA (SERIES 2500); WEDGE ACTION TYPE AS MANUFACTURED BY CLOW (SERIES 2000 TUF GRIP), STAR (STARGRIP 3500).
   - 5.3. ALL MECHANICAL JOINTS IN TEMPORARY AND PERMANENT CONNECTIONS TO INCLUDE MECHANICAL JOINT RESTRAINTS.
   - 5.4. WATERMAIN FITTINGS WHICH CHANGE DIRECTIONS VERTICALLY OR HORIZONTALLY TO BE FULLY RESTRAINED BY MECHANICAL JOINT RESTRAINT OR THRUST BLOCKS (OPSD 1103.01 AND 1103.02). THREADED ROD WILL NOT BE PERMITTED.
   - 5.5. WATERMAIN FITTINGS TO BE SUPPLIED WITH MECHANICAL JOINT RESTRAINTS. FOR WATERMAIN PIPE SIZES 150mmø OR LESS ALL PIPE JOINTS TO BE RESTRAINED WITHIN 5.0m FROM ALL FITTINGS, IN EACH DIRECTION, UNLESS SHOWN OTHERWISE ON THE CONTRACT DRAWINGS. FOR WATERMAIN PIPE SIZES GREATER THAN 150mmø ALL PIPE JOINTS TO BE RESTRAINED WITHIN 10.0m FROM ALL FITTING, IN EACH DIRECTION, UNLESS SHOWN OTHERWISE ON THE CONTRACT DRAWINGS. ALL TEES TO HAVE MINIMUM 2.0m SOLID PIPE LENGTH ON EACH RUN OF THE TEE, OR PROVIDE A THRUST BLOCK PER OPSD 1103.010.
6. TRACER WIRE:
   - 6.1. T.W.U. #8 GAUGE MULTI–STRANDED COPPER WIRE.
   - 6.2. PVC WATERMAIN SHALL HAVE TWO STRANDED COPPER, AWG #8 TRACER WIRE STRAPPED TO TOP AT 5.0m INTERVALS. TRACER WIRE SHALL BE BROUGHT TO THE SURFACE AT ALL HYDRANTS AND CONNECTED TO THE LOWER FLANGE OF THE HYDRANT.
   - 6.3. DO NOT CONNECT THE TRACER WIRE ON NON–METALLIC SYSTEMS TO NEW OR EXISTING METALLIC WATERMAIN PIPING AND/OR ASSOCIATED FITTINGS
7. WATERMAIN VALVES, 100mm AND LARGER, SHALL BE AS PER AWWA C509–MUELLER A2360–23 OR APPROVED EQUIVALENT (OPEN LEFT) INCLUDING VALVE BOX AND 2.3kg ANODE.
8. HYDRANTS: CONFORM TO AWWA C502 FOR DRY–BARREL HYDRANTS, WITH TWO 63.5mm HOSE NOZZLES AT 180 DEGREES AND A 114.3mm PUMPER NOZZLE WITH A 100mm ULC APPROVED STORTZ CONNECTION; 32mm SQUARE OPERATING NUT, OPEN COUNTER–CLOCKWISE AND HAVE MECHANICAL JOINT END; COMPLETE WITH 150mm LEAD, 150mm GATE VALVE, ANCHOR TEE, VALVE AND BOX PROVIDED IN ACCORDANCE WITH THE TOWNSHIP OF SOUTHGATE.
9. SERVICE PIPE:
   - 9.1. SERVICES LESS THAN 100mm: TYPE K SOFT COPPER, TO ASTM B88 OR POLYETHYLENE TO CSA B137.1 WITH INSERTS (STIFFENER) USED AT CONNECTIONS. OR CROSS–LINKED POLYETHYLENE ("MUNICIPEX" BY REHAU AND "BLUE904" BY IPEX). COPPER SERVICES SHALL HAVE 5.5Kg ANODE.
   - 9.2. SERVICES 100mm OR GREATER: PVC CLASS 150 TO CSA B137.3.
10. ANODES TO BE PROVIDED AS REQUIRED BY THE AUTHORITY HAVING JURISDICTION AND TO THE REQUIREMENTS OUTLINED IN THE CONTRACT SPECIFICATIONS.
11. PETROLATUM TAPE SYSTEMS: TO BE COMPRISED OF THREE COMPONENTS; PASTE, MASTIC, AND TAPE THAT MEET AWWA C217–09, SUPPLIED BY DENSO NORTH AMERICA INC. OR PETRO COATING SYSTEMS LTD. OR RUSTROL SYSTEMS (INTERPROVINCIAL CORROSION CONTROL COMPANY LTD.). ONLY MATERIAL FROM SUPPLIERS LISTED SHALL BE USED. AT NO TIME SHALL MATERIALS FROM EITHER SYSTEM BE UTILISED WITH ONE AND OTHER.
    - 11.1. ALL MECHANICAL JOINT RESTRAINTS TO BE WRAPPED WITH APPROVED PETROLEUM TAPE SYSTEM.
12. PROVIDE ADEQUATE SUMP BELOW CONNECTION, AND PUMPING IF REQUIRED, TO PREVENT CONTAMINATION OF NEW WATERMAIN WITH TRENCH GROUND WATER OR ANY OTHER FOREIGN MATTER.
13. ALL WATERMAIN AND SERVICE COMMISSIONING, PRESSURE/LEAKAGE TESTING, DISINFECTION, BACTERIOLOGICAL ANALYSIS AND FLUSHING TO BE SUCCESSFULLY COMPLETED BY THE CONTRACTOR AND ACCEPTED BY THE TOWNSHIP OF SOUTHGATE AND CONSULTANT PRIOR TO PERMANENT CONNECTION TO WATER DISTRIBUTION SYSTEM. REFER TO CONTRACT SPECIFICATIONS FOR REQUIREMENTS.
    - 13.1. CONTRACTOR TO SUBMIT A WATERMAIN COMMISSIONING PLAN TO THE CONSULTANT AND TOWNSHIP OF SOUTHGATE AT LEAST TWO WEEKS PRIOR TO CHLORINE RESIDUAL & BACTERIOLOGICAL TESTING.

CONSTRUCTION NOTES

GENERAL

1. PRIOR TO CONSTRUCTION, THE CONTRACTOR MUST:
   - 1.1. CHECK AND VERIFY ALL DIMENSIONS AND EXISTING ELEVATIONS WHICH INCLUDES, BUT IS NOT LIMITED TO, THE BENCHMARK ELEVATIONS, EXISTING SERVICE CONNECTIONS AND EXISTING INVERTS.
   - 1.2. OBTAIN ALL UTILITY LOCATES AND REQUIRED PERMITS AND LICENSES.
   - 1.3. VERIFY THAT THE FINISHED FLOOR ELEVATIONS COMPLY WITH THE FINAL ARCHITECTURAL DRAWINGS.
   - 1.4. CONFIRM ALL DRAWINGS USED FOR CONSTRUCTION ARE OF THE MOST RECENT REVISION.
   - 1.5. REPORT DISCREPANCIES IN EXISTING CONDITION INFORMATION IMMEDIATELY TO THE CONSULTANT.
2. THE CONTRACTOR SHALL ASSUME ALL LIABILITY FOR DAMAGE TO EXISTING WORKS. DAMAGE SHALL BE RECTIFIED TO THE SATISFACTION OF THE CONSULTANT AND OWNER.
3. THE CONTRACTOR IS RESPONSIBLE FOR THE TEMPORARY SUPPORT AND/OR RELOCATION OF EXISTING UTILITIES DURING CONSTRUCTION. THE CONTRACTOR SHALL COORDINATE AND COMPLY WITH THE REQUIREMENTS OF ALL UTILITY COMPANIES WHEN CROSSING OR WORKING NEAR THEIR PLANT.
4. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE ACCURACY OF ALL TEMPORARY BENCHMARKS ESTABLISHED FOR DESIGN PURPOSES, PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL REPORT ANY DISCREPANCIES TO THE CONTRACT ADMINISTRATOR BEFORE COMMENCING WORK.
5. THE CONTRACTOR SHALL CONTACT THE CONSULTANT 48 HOURS PRIOR TO COMMENCING WORK TO DETERMINE DEGREE OF INSPECTION AND TESTING REQUIRED FOR CERTIFICATION OF UNDERGROUND SERVICE INSTALLATION.
6. THE RIGHT–OF–WAY (INCLUDING THE BOULEVARD) IS NOT TO BE USED FOR ANY CONSTRUCTION ACTIVITY UNTIL A WORK PERMIT HAS BEEN OBTAINED AS PER THE TOWNSHIP OF SOUTHGATE REQUIREMENTS.
7. ALL WORK ON THE MUNICIPAL RIGHT–OF–WAY WILL BE INSTALLED BY THE SITE CONTRACTOR UPON SUCCESSFUL APPLICATION FOR A WORK PERMIT BY THE CONTRACTOR.
8. LIMIT CONSTRUCTION TO ACCEPTABLE TIMES WITHIN THE TOWNSHIP OF SOUTHGATE NOISE BYLAW. CONSTRUCTION HOURS ARE 7AM TO 8PM MONDAY TO SATURDAY, AND 9AM TO 6PM ON SUNDAY, WITHOUT EXCEPTION.
9. IF, FOR UNFORESEEN REASONS, THE OWNER AND/OR THEIR REPRESENTATIVE MUST ENCROACH ONTO PRIVATE LANDS TO UNDERTAKE ANY WORKS, THEY MUST OBTAIN WRITTEN PERMISSION FROM THE ADJACENT PROPERTY OWNERS PRIOR TO ENTERING UPON THE PRIVATE PROPERTY TO PERFORM ANY WORKS. COPIES OF THESE LETTERS OF CONSENT MUST BE SUBMITTED TO TOWNSHIP OF SOUTHGATE ENGINEERING DEVELOPMENT DIVISION, PRIOR TO ANY WORK BEING PERFORMED. FAILURE TO COMPLY WITH THE ABOVE IS AT THE PROPERTY OWNER'S & CONTRACTOR'S OWN RISK.

TRAFFIC, ACCESS, SAFETY

1. PEDESTRIANS MUST BE ASSURED SAFE PASSAGE ALONG ECO PARKWAY AT ALL TIMES. ALL PEDESTRIAN WALKWAYS MUST BE MAINTAINED AS LONG AS POSSIBLE AFTER WHICH TIME IT IS TEMPORARILY REPLACED BY A SUITABLE GRANULAR MATERIAL TO THE SATISFACTION OF THE CONSULTANT AND TOWNSHIP OF SOUTHGATE.
2. ON STREET PARKING WILL BE PERMITTED FOR ANY CONSTRUCTION VEHICLES OR CONSTRUCTION STAFF. THE CONTRACTOR SHALL PROVIDE ADEQUATE PARKING FACILITIES ON SITE TO SUIT THE NATURE AND LOCATION OF THE WORK.
3. FOR EMERGENCY RESPONSE, CONTRACTOR MUST MAINTAIN CONSTRUCTION ACCESS FREE AND CLEAR OF DEBRIS, MATERIALS, VEHICLES, AND EQUIPMENT.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL TRAFFIC AND SAFETY MEASURES DURING THE CONSTRUCTION PERIOD INCLUDING THE SUPPLY, INSTALLATION, AND REMOVAL OF ALL NECESSARY SIGNALS, DELINEATORS, MARKERS, AND BARRIERS. ALL SIGNS, ETC. SHALL CONFORM TO THE STANDARDS OF THE TOWNSHIP OF SOUTHGATE AND THE MTO MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES.

REMOVALS

1. ALL REMOVALS TO BE IN ACCORDANCE WITH OPSS.MUNI 510.

CONCRETE

1. CONCRETE BARRIER CURB TO BE AS PER OPSD 600.110 – 30MPa @ 28 DAYS CONCRETE TO OPSS 353, 7±1.5% AIR ENTRAINMENT, 19mm MAX COURSE AGGREGATE, 60mm MAX SLUMP.
2. CONCRETE SIDEWALK TO BE AS PER DETAIL ON THIS SHEET – 30MPa @ 28 DAYS CONCRETE TO OPSS 351, 7±1.5% AIR ENTRAINMENT, 19mm MAX COURSE AGGREGATE, 70±20mm SLUMP.
3. UNSHRINKABLE FILL: TO OPSS 1359, 28–DAY COMPRESSIVE STRENGTH: 0.4 – 0.7 MPa, MAXIMUM 25mm COURSE AGGREGATE SIZE.
4. SUBMIT ONE COPY OF ALL PROPOSED CONCRETE MIX DESIGNS DIRECTLY TO THE CONSULTANT A MINIMUM OF TWO WEEKS IN ADVANCE OF SCHEDULED CONCRETE POURING.

GRANULAR

1. ALL GRANULAR BASE, SUBBASE, SUBGRADE AND BACKFILL TO BE PROVIDED AS PER OPSS.MUNI 1010 AND INSTALLED AS PER OPSS.MUNI 314.
2. COARSE GRANULAR FILL: MATERIAL AS SPECIFIED BELOW; COMPACTED TO 98% STANDARD PROCTOR MAXIMUM DRY DENSITY, UNLESS SPECIFIED OTHERWISE, IN LIFTS NOT EXCEEDING 300mm IN COMPACTED THICKNESS; MOISTURE CONTENT WITHIN PLUS OR MINUS 2% OF THE REQUIREMENTS OF ASTM D698.
   - 2.1. GRANULAR 'B', TYPE 2 TO OPSS.MUNI 1010.
3. FINE GRANULAR FILL: MATERIAL AS SPECIFIED BELOW; COMPACTED TO 98% STANDARD PROCTOR MAXIMUM DRY DENSITY, UNLESS SPECIFIED OTHERWISE, IN LIFTS NOT EXCEEDING 150mm IN COMPACTED THICKNESS; MOISTURE CONTENT WITHIN PLUS OR MINUS 2% OF THE REQUIREMENTS OF ASTM D698.
   - 3.1. GRANULAR 'A' TO OPSS.MUNI 1010.

EARTHWORK

1. IN ACCORDANCE WITH THE TOWNSHIP OF SOUTHGATE SITE ALTERATION BY–LAW; NO FILLING, PRE–GRADING OR TREE REMOVAL SHALL OCCUR, IN ADVANCE OF THE FINAL SITE PLAN ENGINEERING ACCEPTANCE, WITHOUT PERMIT. SHOULD THE DEVELOPER OR CONTRACTOR WISH TO PREPARE THE SITE FOR CONSTRUCTION PRIOR TO ENGINEERING ACCEPTANCE, AN APPLICATION FOR A SITE ALTERATION PERMIT MUST BE SUBMITTED BY THE CONTRACTOR TO THE ENGINEERING AND CONSTRUCTION DIVISION FOR REVIEW AND APPROVAL.
2. ANY AREAS WHICH REQUIRE FILL IN EXCESS OF 0.30m ARE SUBJECT TO COMPACTION TESTS AND SUCH TESTS MUST SHOW A MINIMUM COMPACTION OF 98% SPMDD AT ALL DEPTHS.
3. RETAINING WALLS TO BE DESIGNED BY OTHERS. THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS FOR ALL PROPOSED RETAINING WALLS, SIGNED AND SEALED BY A PROFESSIONAL ENGINEER CERTIFIED IN THE PROVINCE OF ONTARIO TO THE CONSULTANT, PRIOR TO CONSTRUCTION. SHOP DRAWINGS TO BE APPROVED BY CONSULTANT IN ADVANCE OF CONSTRUCTION. THE CONTRACTOR SHALL PROVIDE A CERTIFICATE OF COMPLETION COMPLETED BY A CERTIFIED INSPECTION COMPANY BEFORE ACCEPTANCE OF THE WORK.

TOPSOIL/SOD

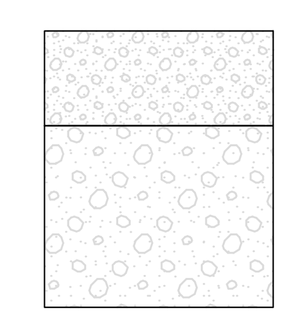
1. TOPSOIL TO BE PROVIDED AND INSTALLED AS PER OPSS 802. SOD TO BE PROVIDED AND INSTALLED AS PER OPSS 803.

OTHER

1. ALL EXISTING SIGNS, MAIL BOXES, POSTS, ETC., WHICH MUST BE REMOVED TO ACCOMMODATE CONSTRUCTION SHALL BE SALVAGED AND REINSTATED AS DIRECTED BY THE CONTRACT ADMINISTRATOR IN EQUAL OR BETTER CONDITION. THE CONTRACTOR SHALL MAKE GOOD ANY DAMAGE CAUSED TO SUCH FACILITIES AT HIS OWN EXPENSE. ALL EXISTING TRAFFIC CONTROL SIGNS MUST BE REINSTATED BY THE END OF EACH WORKING DAY. EXISTING STOP CONTROL SIGNS SHALL BE MAINTAINED AT ALL TIMES DURING CONSTRUCTION TO THE SATISFACTION OF THE ROAD AUTHORITY AND THE CONTRACT ADMINISTRATOR.

LANDSCAPE NOTES

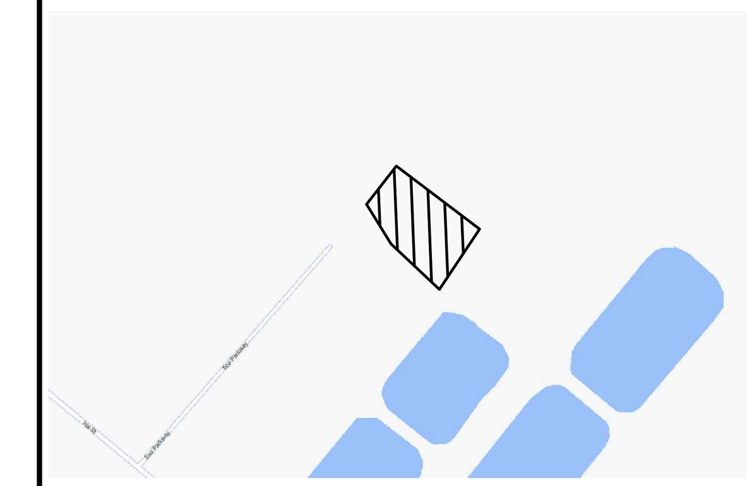
1. ALL WORKMANSHIP SHALL CONFORM TO THE LANDSCAPE ONTARIO SPECIFICATIONS STANDARDS.
2. ALL NURSERY STOCK SHALL MEET STANDARDS OF THE CANADIAN NURSERY TRADES ASSOCIATION, LATEST EDITION.
3. ALL PLANT MATERIAL SHALL BE STAKED FOR LOCATION BY LANDSCAPE ARCHITECT AND CONTRACTOR JOINTLY.
4. BACKFILL IS TO CONSIST OF MATERIAL NATIVE TO THE SITE.
5. ALL TREES SHALL HAVE AN EARTH SAUCER AT ITS BASE WITH A DIAMETER AS LARGE AS EXCAVATED AREA TO RETAIN WATER.
6. ALL BURLAP SHALL BE CUT AND BURIED BELOW SURFACE DURING PLANTING.
7. CONTRACTOR SHALL MAINTAIN ALL LANDSCAPE AREAS UNTIL OWNER'S ACCEPTANCE OF PROJECT.
8. SPREAD MULCH TO A MINIMUM 100mm COMPACTED DEPTH ON ALL TREE PITS AND PLANTING BEDS.
9. STAKING OF TREES SHALL BE AS PER MUNICIPAL STANDARDS. ALTERNATIVE METHODS MAY BE ACCEPTABLE WITH THE APPROVAL OF THE LANDSCAPE ARCHITECT PRIOR TO INSTALLATION.
10. REPORT ALL DISCREPANCIES IN WRITING TO THE LANDSCAPE ARCHITECT AND CONSULTANT.
11. CONTRACTOR TO LOCATE ALL UNDERGROUND UTILITIES PRIOR TO ANY WORK.
12. PLANTING MAY BE ADJUSTED TO SUIT LOCATIONS OF SITE UTILITY STRUCTURES/SERVICES.
13. SUBMIT A WRITTEN GUARANTEE TO THE EFFECT THAT ALL PLANTS ACCEPTED DURING THE PERIOD OF JANUARY 1st TO JULY 15th SHALL BE GUARANTEED UNTIL JULY 15th THE FOLLOWING YEAR. PLANTS ACCEPTED DURING THE PERIOD OF JULY 15th TO DECEMBER 31st SHALL BE GUARANTEED FOR ONE YEAR FROM THE DATE OF ACCEPTANCE. THE GUARANTEE PERIODS LISTED ABOVE SHALL APPLY TO ALL "NURSERY GROWN" PLANTS.
14. ALL MATERIALS TO BE APPROVED BY LANDSCAPE ARCHITECT AND CONSULTANT PRIOR TO INSTALLATION.
15. CHECK AND VERIFY ALL DIMENSIONS AND QUANTITIES PRIOR TO COMMENCEMENT OF WORK. ANY DISCREPANCIES ARE TO BE REPORTED TO THE LANDSCAPE ARCHITECT AND CONSULTANT. QUANTITIES NOTED WITHIN THE PLAN SUPERSEDE THOSE IN THE PLANT SCHEDULE. ANY SUBSTITUTIONS ARE TO BE APPROVED BY THE LANDSCAPE ARCHITECT AND CONSULTANT.
16. PLANTING BEDS ARE TO BE MOUNDED A MINIMUM 100mm.
17. SOD ANY AREAS MARKED WITH NURSERY SOD ON 150mm CLEAN TOPSOIL. FINE GRADE AND SOD ALL BOULEVARD AREAS TO MUNICIPAL SPECIFICATIONS AND REPAIR DAMAGE TO ADJACENT PROPERTIES, AS REQUIRED. REFER TO WRITTEN SPECIFICATION RELATED TO THIS PROJECT FOR TURF GRASS MIXTURE.
18. FINAL INSPECTION AND ACCEPTANCE OF PLANTING WORK SHALL COINCIDE WITH THE FINAL INSPECTION AND ACCEPTANCE OF ALL WORK INCLUDED IN THE CONTRACT.
19. AT THE TIME OF FINAL INSPECTION ALL PLANTS SHALL BE IN A HEALTHY, VIGOUROUS GROWING CONDITION, PLANTED IN FULL ACCORDANCE WITH DRAWINGS AND CONDITIONS.

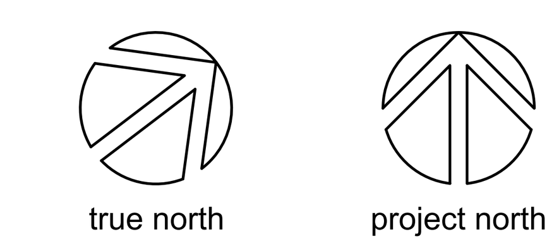


GRAVEL STRUCTURE DETAIL

N.T.S.

Petawawa Biofuel





date	issuance	no.
2020.10.02	ISSUED FOR SITE PLAN APPROVAL	

customer
PETAWAWA BIOFUEL

project
SOUTHGATE BIOFUEL FACILITY
ECO PARKWAY, DUNDALK, ON

title
DETAILS AND NOTES PLAN

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LICENSED PROFESSIONAL ENGINEER
D. R. FERGUSON
100159406
2020.10.02
PROVINCE OF ONTARIO

scale:	NTS	sheet no.:
date:	2020.09.25	C5-1
job no.:	2019-0413-20	
CAD file:	2019-0413-20 - DET PLOT	
drawn by:	TK	
checked by:	DF	

APPENDIX A

Sanitary Demand Calculations

- Sanitary Sewer Design Sheet

SANITARY SEWER DESIGN CALCULATIONS

WALTERFEDY

Project:	Southgate Biofuels Facility		
Project No:	2019-0413-20		
Date:	2020-10-02		
Designed By:	TK	Checked By:	RK

Design Data		
Min. Velocity	0.6	m/s
Max. Velocity	3.0	m/s
Manning's 'n'	0.013	
Infiltration	0.15	l/s/ha

Residential			Industrial		
Peaking Factor			Peaking Factor	3	
Avg. Daily Flow		L/s/ha	Avg. Daily Flow	0.521	L/s/ha

	Residential				Cumulative			Institutional		Infiltration		Total Flow	Design Data			
	Area	Units	Units/Hectare		Area	Population	Peak Factor	Area	Total Area	Area	Total Area		Diameter	Slope	Q_{FULL}	V_{FULL}
	(ha)		*(ppu)*	*(people)*	*(ha)*	*(people)*		*(ha)*		*(ha)*	*(ha)*	*(L/s)*	*(mm)*	*(%)*	*(L/s)*	*(m/s)*
Biofuel Site								2.02	2.020	2.02	2.02	**3.46**				

APPENDIX B

Water Demand Calculations

- Domestic Water Demand
- Water Service Sizing

REQUIRED DOMESTIC FLOW

DGSSMS 2019 AND ONTARIO BUILDING CODE

WALTERFEDY

Project	Southgate Biofuel Facility
Project #	2019-0413-20
Designer	TK
Address	Eco Parkway, Dundalk, ON
Description	Domestic Water Demand

Building Description	Area (ha)	Population	Operating Hours	Demand	Max Daily Peak Factor	Max Hourly Peak Factor	Max Daily Demand (L/s)	Max Hourly Demand (L/s)
Biofuel Facility	2.02	N/A	N/A	45 m3/ha/day	2.00	4.0	2.104	4.208
					TOTAL		**2.104**	**4.208**

Hazen-Williams Equations

$$S = \frac{h_f}{L} = \frac{10.67 Q^{1.852}}{C^{1.852} d^{4.8704}}$$ SI Units

$$S = \frac{h_f}{L} = \frac{4.52 Q^{1.852}}{C^{1.852} d^{4.8704}}$$ US Customary

Q_d *(domestic flow rate)*	2.10	*L/s*
Q_f *(fire flow rate)*		*L/s*
Q *(total flow rate)*	2.10	*L/s*
C *(pipe roughness coefficient)*	150	
d *(inside diameter)*	50	*mm*
k *(conversion factor for units)*	10.67	*SI*
L *(length)*	110	*m*

Unit Conversion

1	*L/s*	=	15.850	*USgpm*
1	*USgpm*	=	0.063	*L/s*
1	*psi*	=	0.70307	*mH_2O*
1	*mH_2O*	=	1.422333	*psi*
1	*kPa*	=	0.101972	*mH_2O*
1	*mH_2O*	=	9.806614	*kPa*
1	*kPa*	=	0.145	*psi*
1	*psi*	=	6.895	*kPa*

Water Turnover - Domestic	1.714	min
Water Turnover - Combined	1.714	min

Domestic Only

S *(hydraulic slope/head loss)*	0.0237	*mH_2O/m*
h_f *(total head loss)*	2.610	*mH_2O*
V *(velocity)*	1.070	*m/s*

Elevation at Source	507	*m*
Head at Source	94	*psi*
Elevation at Building	506.5	*m*
Head at Building	90.998	*psi*

APPENDIX C

Stormwater Management

- Modified Rational Method Calculations
- Storm Sewer Design Sheet

Modified Rational Method

WALTERFEDY

Project	Petawawa Biofuels Facility - Dundalk, ON
Project #:	2019-0413-20
Designed By:	TK
Date:	2020-10-02

Storm Parameters		Controlled Catchment Parameters		Modelling Parameters	
Return Period	5 Years	Area (ha)	0.86	First Time Step (min)	5
A	535.364	Runoff Coefficient, C	0.80	Time Increments (min)	5
B	0	Release Rate (m^3/s)	0.115		
C	-0.699				

$$i\ (mm/hr) = \frac{a}{(t_{min}+b)^c} = AT_{hr}^{\square c}$$

$$Converting\ i = AT_{hr}^{C}\ \text{to}\ i = \frac{a}{(t+b)^c}$$

$$c = C;\ b = 0;\quad a = A \times 60^c$$

Modelling Results	
Storage Required (m^3)	65.300
Peak Outflow (m^3/s)	0.115
Ponding Elevation	507.275

y = 381.92x - 193673

Time (min)	Intensity (mm/hr)	Peak Flow (m^3/s)	Uncontrolled Flow (m^3/s)	Total Flow (m^3/s)	Runoff Volume (m^3)	Discharge Volume (m^3)	Storage Volume (m^3)	Stage (m)
5	173.808	0.332	0.000	0.332	99.650	34.350	65.300	507.275
10	107.065	0.205	0.000	0.205	122.768	68.700	54.068	507.245
15	80.642	0.154	0.000	0.154	138.704	103.050	35.654	507.197
20	65.952	0.126	0.000	0.126	151.250	137.401	13.850	507.140
25	56.427	0.108	0.000	0.108	161.758	171.751	0.000	507.104
30	49.675	0.095	0.000	0.095	170.883	206.101	0.000	507.104
35	44.601	0.085	0.000	0.085	178.999	240.451	0.000	507.104
40	40.626	0.078	0.000	0.078	186.340	274.801	0.000	507.104
45	37.416	0.072	0.000	0.072	193.065	309.151	0.000	507.104
50	34.759	0.066	0.000	0.066	199.286	343.501	0.000	507.104
55	32.519	0.062	0.000	0.062	205.086	377.852	0.000	507.104
60	30.600	0.058	0.000	0.058	210.528	412.202	0.000	507.104
65	28.935	0.055	0.000	0.055	215.662	446.552	0.000	507.104
70	27.474	0.053	0.000	0.053	220.527	480.902	0.000	507.104
75	26.181	0.050	0.000	0.050	225.154	515.252	0.000	507.104
80	25.026	0.048	0.000	0.048	229.571	549.602	0.000	507.104
85	23.988	0.046	0.000	0.046	233.798	583.953	0.000	507.104
90	23.048	0.044	0.000	0.044	237.856	618.303	0.000	507.104
95	22.193	0.042	0.000	0.042	241.758	652.653	0.000	507.104
100	21.412	0.041	0.000	0.041	245.520	687.003	0.000	507.104
105	20.694	0.040	0.000	0.040	249.152	721.353	0.000	507.104
110	20.032	0.038	0.000	0.038	252.665	755.703	0.000	507.104
115	19.419	0.037	0.000	0.037	256.069	790.053	0.000	507.104
120	18.850	0.036	0.000	0.036	259.370	824.404	0.000	507.104
125	18.319	0.035	0.000	0.035	262.577	858.754	0.000	507.104
130	17.824	0.034	0.000	0.034	265.695	893.104	0.000	507.104
135	17.360	0.033	0.000	0.033	268.730	927.454	0.000	507.104
140	16.924	0.032	0.000	0.032	271.688	961.804	0.000	507.104
145	16.514	0.032	0.000	0.032	274.573	996.154	0.000	507.104
150	16.127	0.031	0.000	0.031	277.389	1030.504	0.000	507.104
155	15.762	0.030	0.000	0.030	280.141	1064.855	0.000	507.104
160	15.416	0.029	0.000	0.029	282.831	1099.205	0.000	507.104
165	15.088	0.029	0.000	0.029	285.462	1133.555	0.000	507.104
170	14.776	0.028	0.000	0.028	288.039	1167.905	0.000	507.104
175	14.480	0.028	0.000	0.028	290.563	1202.255	0.000	507.104
180	14.198	0.027	0.000	0.027	293.038	1236.605	0.000	507.104

Modified Rational Method

WALTERFEDY

Project	Petawawa Biofuels Facility - Dundalk, ON
Project #:	2019-0413-20
Designed By:	TK
Date:	2020-10-02

Storm Parameters		Controlled Catchment Parameters		Modelling Parameters	
Return Period	100 Years	Area (ha)	0.86	First Time Step (min)	5
A	892.273	Runoff Coefficient, C	0.80	Time Increments (min)	5
B	0	Release Rate (m^3/s)	0.191		
C	-0.699				

$$i\ (mm/hr) = \frac{a}{(t_{min}+b)^c} = AT_{hr}^{\square c}$$

$$Converting\ i = AT_{hr}^{C}\ \text{to}\ i = \frac{a}{(t+b)^c}$$

$$c = C;\ b = 0;\quad a = A \times 60^c$$

Modelling Results	
Storage Required (m^3)	108.833
Peak Outflow (m^3/s)	0.191
Ponding Elevation	508.534

y = 86.169x - 43711

Time (min)	Intensity (mm/hr)	Peak Flow (m^3/s)	Uncontrolled Flow (m^3/s)	Total Flow (m^3/s)	Runoff Volume (m^3)	Discharge Volume (m^3)	Storage Volume (m^3)	Stage (m)
5	289.680	0.554	0.000	0.554	166.083	57.250	108.833	508.534
10	178.442	0.341	0.000	0.341	204.614	114.500	90.113	508.316
15	134.403	0.257	0.000	0.257	231.174	171.751	59.423	507.960
20	109.920	0.210	0.000	0.210	252.084	229.001	23.083	507.538
25	94.045	0.180	0.000	0.180	269.597	286.251	0.000	507.271
30	82.792	0.158	0.000	0.158	284.806	343.501	0.000	507.271
35	74.335	0.142	0.000	0.142	298.332	400.752	0.000	507.271
40	67.711	0.129	0.000	0.129	310.567	458.002	0.000	507.271
45	62.359	0.119	0.000	0.119	321.775	515.252	0.000	507.271
50	57.932	0.111	0.000	0.111	332.143	572.502	0.000	507.271
55	54.198	0.104	0.000	0.104	341.810	629.753	0.000	507.271
60	51.000	0.097	0.000	0.097	350.880	687.003	0.000	507.271
65	48.225	0.092	0.000	0.092	359.436	744.253	0.000	507.271
70	45.790	0.088	0.000	0.088	367.544	801.503	0.000	507.271
75	43.635	0.083	0.000	0.083	375.257	858.754	0.000	507.271
80	41.710	0.080	0.000	0.080	382.618	916.004	0.000	507.271
85	39.979	0.076	0.000	0.076	389.664	973.254	0.000	507.271
90	38.413	0.073	0.000	0.073	396.426	1030.504	0.000	507.271
95	36.989	0.071	0.000	0.071	402.930	1087.755	0.000	507.271
100	35.686	0.068	0.000	0.068	409.199	1145.005	0.000	507.271
105	34.489	0.066	0.000	0.066	415.253	1202.255	0.000	507.271
110	33.386	0.064	0.000	0.064	421.109	1259.505	0.000	507.271
115	32.365	0.062	0.000	0.062	426.781	1316.756	0.000	507.271
120	31.416	0.060	0.000	0.060	432.283	1374.006	0.000	507.271
125	30.532	0.058	0.000	0.058	437.628	1431.256	0.000	507.271
130	29.707	0.057	0.000	0.057	442.825	1488.506	0.000	507.271
135	28.933	0.055	0.000	0.055	447.884	1545.757	0.000	507.271
140	28.207	0.054	0.000	0.054	452.814	1603.007	0.000	507.271
145	27.523	0.053	0.000	0.053	457.622	1660.257	0.000	507.271
150	26.879	0.051	0.000	0.051	462.316	1717.507	0.000	507.271
155	26.270	0.050	0.000	0.050	466.901	1774.758	0.000	507.271
160	25.693	0.049	0.000	0.049	471.384	1832.008	0.000	507.271
165	25.146	0.048	0.000	0.048	475.771	1889.258	0.000	507.271
170	24.627	0.047	0.000	0.047	480.065	1946.508	0.000	507.271
175	24.133	0.046	0.000	0.046	484.272	2003.759	0.000	507.271
180	23.663	0.045	0.000	0.045	488.396	2061.009	0.000	507.271

Stage Storage

WALTERFEDY

Orifice Diameter	275
Area	0.0594
C	0.6

Stage	Incremental Area	Incremental Volume	Cumulative Volume	Orifice Head	Orifice Discharge	
(m)	*(m^2)*	*(m^3)*	*(m^3)*	*(m)*	*(m^3/s)*	*L/s*
507.00	13.788	0.000	0.000	0.00	0.0000	0.00
507.10	18.573	1.618	1.618	0.00	0.0000	0.00
507.20	24.010	2.129	3.747	0.10	0.0499	49.92
507.30	30.096	2.705	6.453	0.20	0.0706	70.59
507.40	36.834	3.347	9.799	0.30	0.0865	86.46
507.50	44.222	4.053	13.852	0.40	0.0998	99.84
507.60	52.261	4.824	18.676	0.50	0.1116	111.62
507.70	60.950	5.661	24.337	0.60	0.1223	122.27
507.80	70.290	6.562	30.899	0.70	0.1321	132.07
507.90	80.281	7.529	38.427	0.80	0.1412	141.19
508.00	90.922	8.560	46.987	0.90	0.1498	149.75
508.10	102.214	9.657	56.644	1.00	0.1579	157.85
508.20	114.157	10.819	67.463	1.10	0.1656	165.56
508.30	126.750	12.045	79.508	1.20	0.1729	172.92
508.40	139.994	13.337	92.845	1.30	0.1800	179.98
508.50	153.889	14.694	107.539	1.40	0.1868	186.78
508.60	168.434	16.116	123.655	1.50	0.1933	193.33
508.70	183.630	17.603	141.259	1.60	0.1997	199.67
508.80	199.477	19.155	160.414	1.70	0.2058	205.82

WALTERFEDY

RATIONAL METHOD CALCULATIONS

Project:	Southgate Biofuels Facility									Storm Parameters													
Project No:	2019-0413-20									A	30.6												
Date:	02-Oct-20									B	0	Design Frequency	5-yr	Maximum Permitted Full Flow Velocity (m/s)								6	
Designed By:	TK	Checked By:	RK							C	-0.699	Manning's 'n'	0.013	Minimum Permitted Full Flow Velocity (m/s)								0.8	
	Pipe Data			Drainage Area				Time		Design Flow		Pipe Flow											
	From	To	Length	Area	C	AC	∑AC	Inlet	System	I	Q	Diameter	Slope	Q_{FULL}	Q/Q_{FULL}	V_{FULL}	V	Flow Time	Remarks				
			(m)	(ha)				(min)	(min)	(mm/hr)	(L/s)	(mm)	(%)	(L/s)		(m/s)	(m/s)	(min)					
	Gravel Area			0.72	0.75	0.540	0.540		10.00	107.1	160.60												
									To OGS UNIT	89.8	134.72	375	0.60%	135.81	0.99	1.23	1.40	0.00	No Surcharge				
									Overflow to Pond	107.1	160.60	375	1.00%	175.33	0.92	1.59	1.80	0.00	No Surcharge				
									From Building Roof	107.1	43.12	300	1.00%	96.70	0.45	1.37	1.33	0.00	No Surcharge				

3 hr chicago storm

r	0.4	depth	25	mm
duration	3	I	89.81	mm/hr
a	314.235	Q	134.72	L/s
c	-0.699			

Stormceptor®

FORTERRA

Stormceptor® EF Sizing Report

STORMCEPTOR®
ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

10/01/2020

Province:	Ontario
City:	Dundalk
Nearest Rainfall Station:	OWEN SOUND MOE
NCDC Rainfall Station Id:	6132
Years of Rainfall Data:	40

Site Name:	

Drainage Area (ha):	0.72
% Imperviousness:	75.00

Runoff Coefficient 'c': 0.75

Particle Size Distribution:	Fine
Target TSS Removal (%):	80.0

Required Water Quality Runoff Volume Capture (%):	
Estimated Water Quality Flow Rate (L/s):	
Oil / Fuel Spill Risk Site?	Yes
Upstream Flow Control?	No
Peak Conveyance (maximum) Flow Rate (L/s):	135.00
Site Sediment Transport Rate (kg/ha/yr):	

Project Name:	Petawawa BioFuel Facility
Project Number:	33322
Designer Name:	Tyler Keller
Designer Company:	WalterFedy
Designer Email:	tkeller@walterfedy.com
Designer Phone:	519-576-2150
EOR Name:	
EOR Company:	
EOR Email:	
EOR Phone:	

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EFO4	76
EFO6	84
EFO8	87
EFO10	90
EFO12	91

Recommended Stormceptor EFO Model: EFO6

Estimated Net Annual Sediment (TSS) Load Reduction (%): 84

imbrium

THIRD-PARTY TESTING AND VERIFICATION

►**Stormceptor® EF and Stormceptor® EFO** are the latest evolutions in the Stormceptor® oil-grit separator (OGS) technology series, and are designed to remove a wide variety of pollutants from stormwater and snowmelt runoff. These technologies have been third-party tested in accordance with the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**and performance has been third-party verified in accordance with the **ISO 14034 Environmental Technology Verification (ETV)** protocol.

PERFORMANCE

►**Stormceptor® EF and EFO** remove stormwater pollutants through gravity separation and floatation, and feature a patent-pending design that generates positive removal of total suspended solids (TSS) throughout each storm event, including high-intensity storms. Captured pollutants include sediment, free oils, and sediment-bound pollutants such as nutrients, heavy metals, and petroleum hydrocarbons. Stormceptor is sized to remove a high level of TSS from the frequent rainfall events that contribute the vast majority of annual runoff volume and pollutant load. The technology incorporates an internal bypass to convey excessive stormwater flows from high-intensity storms through the device without resuspension and washout (scour) of previously captured pollutants. Proper routine maintenance ensures high pollutant removal performance and protection of downstream waterwavs.

PARTICLE SIZE DISTRIBUTION (PSD)

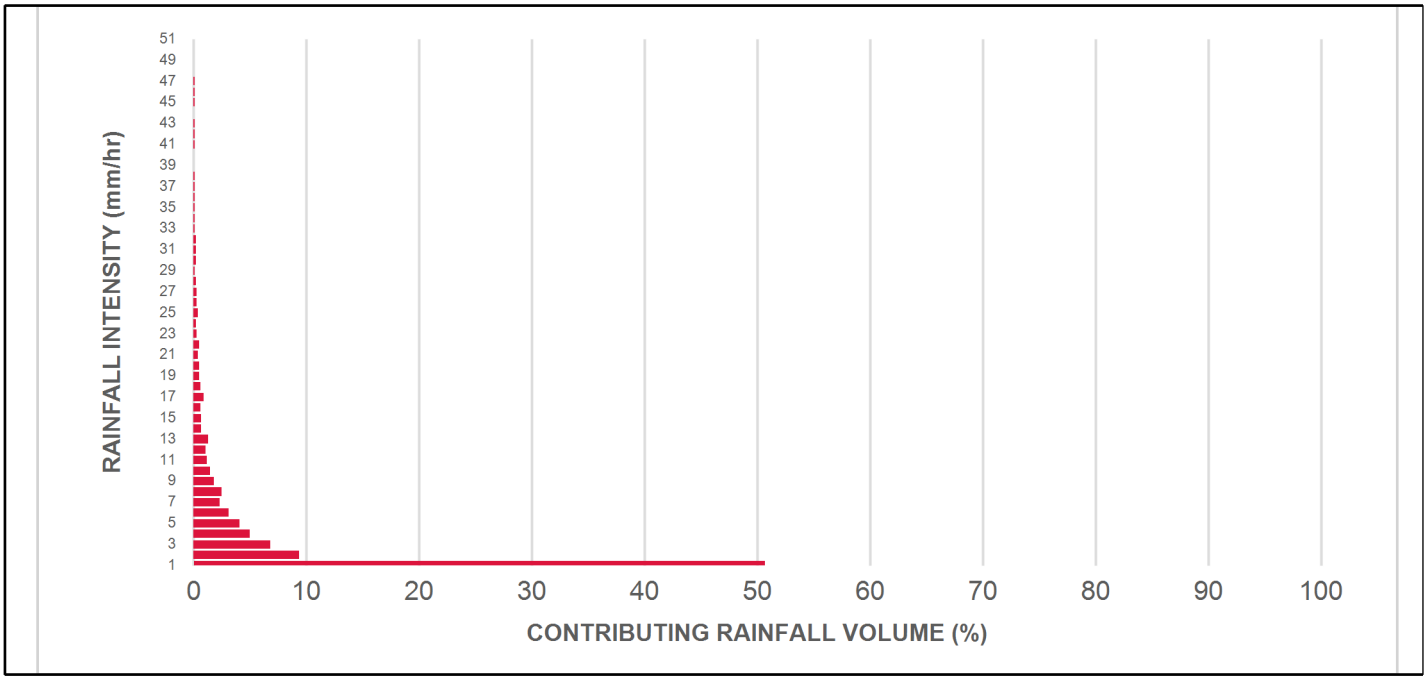
►The **Canadian ETV PSD** shown in the table below was used, or in part, for this sizing. This is the identical PSD that is referenced in the Canadian ETV ***Procedure for Laboratory Testing of Oil-Grit Separators*** for both sediment removal testing and scour testing. The Canadian ETV PSD contains a wide range of particle sizes in the sand and silt fractions, and is considered reasonably representative of the particle size fractions found in typical urban stormwater runoff.

Particle Size (µm)	Percent Less Than	Particle Size Fraction (µm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5

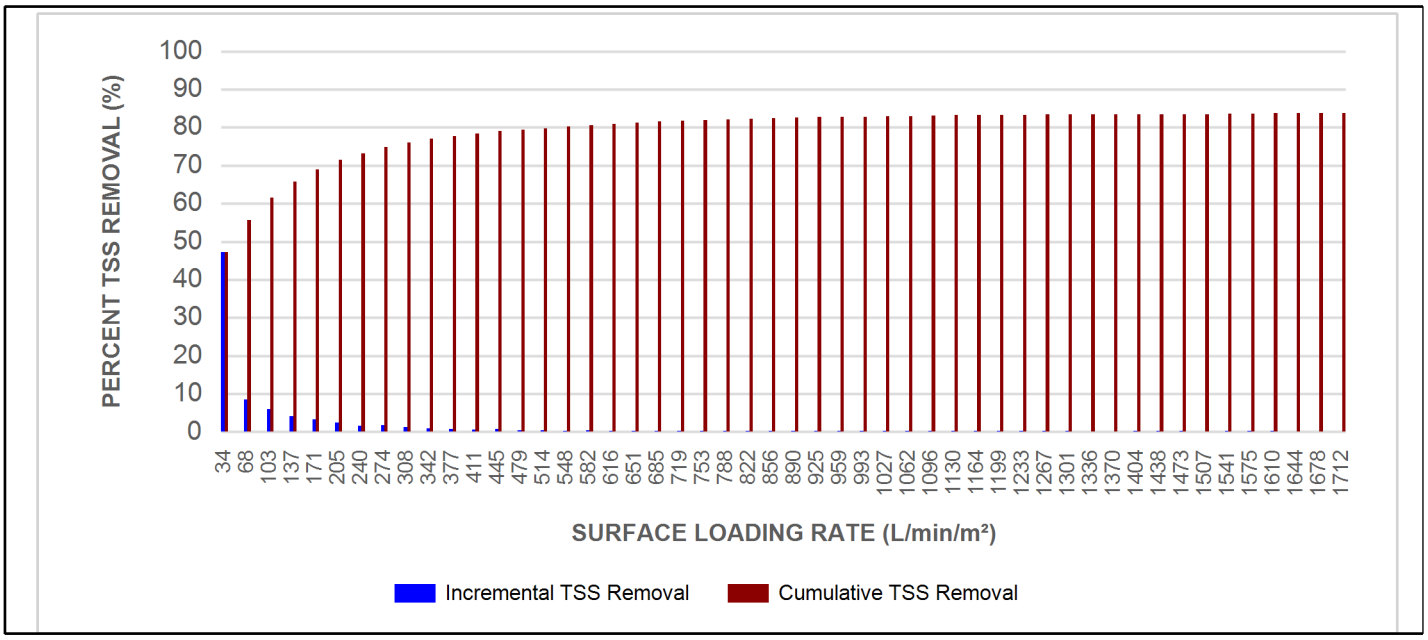
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
1	50.7	50.7	1.50	90.0	34.0	93	47.2	47.2
2	9.4	60.1	3.00	180.0	68.0	91	8.6	55.7
3	6.8	66.9	4.50	270.0	103.0	87	5.9	61.6
4	5.0	71.9	6.00	360.0	137.0	84	4.2	65.8
5	4.1	76.0	7.51	450.0	171.0	79	3.2	69.0
6	3.1	79.1	9.01	540.0	205.0	76	2.4	71.4
7	2.3	81.4	10.51	631.0	240.0	72	1.7	73.1
8	2.5	83.9	12.01	721.0	274.0	70	1.7	74.8
9	1.8	85.7	13.51	811.0	308.0	67	1.2	76.0
10	1.5	87.2	15.01	901.0	342.0	63	1.0	77.0
11	1.2	88.4	16.51	991.0	377.0	61	0.7	77.7
12	1.1	89.5	18.01	1081.0	411.0	58	0.6	78.3
13	1.3	90.8	19.52	1171.0	445.0	57	0.7	79.1
14	0.7	91.5	21.02	1261.0	479.0	56	0.4	79.4
15	0.7	92.2	22.52	1351.0	514.0	55	0.4	79.8
16	0.6	92.8	24.02	1441.0	548.0	54	0.3	80.2
17	0.9	93.7	25.52	1531.0	582.0	53	0.5	80.6
18	0.6	94.3	27.02	1621.0	616.0	52	0.3	80.9
19	0.5	94.8	28.52	1711.0	651.0	52	0.3	81.2
20	0.5	95.3	30.02	1801.0	685.0	52	0.3	81.5
21	0.4	95.7	31.53	1892.0	719.0	51	0.2	81.7
22	0.5	96.2	33.03	1982.0	753.0	51	0.3	81.9
23	0.3	96.5	34.53	2072.0	788.0	51	0.2	82.1
24	0.2	96.7	36.03	2162.0	822.0	51	0.1	82.2
25	0.4	97.1	37.53	2252.0	856.0	51	0.2	82.4

Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
26	0.3	97.4	39.03	2342.0	890.0	51	0.2	82.5
27	0.3	97.7	40.53	2432.0	925.0	50	0.2	82.7
28	0.2	97.9	42.03	2522.0	959.0	50	0.1	82.8
29	0.1	98.0	43.53	2612.0	993.0	50	0.1	82.8
30	0.2	98.2	45.04	2702.0	1027.0	50	0.1	82.9
31	0.2	98.4	46.54	2792.0	1062.0	49	0.1	83.0
32	0.2	98.6	48.04	2882.0	1096.0	49	0.1	83.1
33	0.1	98.7	49.54	2972.0	1130.0	49	0.0	83.2
34	0.1	98.8	51.04	3062.0	1164.0	48	0.0	83.2
35	0.1	98.9	52.54	3153.0	1199.0	48	0.0	83.3
36	0.1	99.0	54.04	3243.0	1233.0	48	0.0	83.3
37	0.1	99.1	55.54	3333.0	1267.0	47	0.0	83.4
38	0.1	99.2	57.05	3423.0	1301.0	47	0.0	83.4
39	0.0	99.2	58.55	3513.0	1336.0	47	0.0	83.4
40	0.0	99.2	60.05	3603.0	1370.0	46	0.0	83.4
41	0.1	99.3	61.55	3693.0	1404.0	46	0.0	83.5
42	0.1	99.4	63.05	3783.0	1438.0	45	0.0	83.5
43	0.1	99.5	64.55	3873.0	1473.0	44	0.0	83.5
44	0.0	99.5	66.05	3963.0	1507.0	43	0.0	83.5
45	0.1	99.6	67.55	4053.0	1541.0	42	0.0	83.6
46	0.1	99.7	69.06	4143.0	1575.0	41	0.0	83.6
47	0.1	99.8	70.56	4233.0	1610.0	40	0.0	83.7
48	0.0	99.8	72.06	4323.0	1644.0	39	0.0	83.7
49	0.0	99.8	73.56	4414.0	1678.0	39	0.0	83.7
50	0.0	99.8	75.06	4504.0	1712.0	38	0.0	83.7
						Estimated Net Annual Sediment (TSS) Load Reduction =		**84 %**

RAINFALL DATA FROM OWEN SOUND MOE RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL FOR THE RECOMMENDED STORMCEPTOR® MODEL



Maximum Pipe Diameter / Peak Conveyance

Stormceptor EF / EFO	Model Diameter		Min Angle Inlet / Outlet Pipes	Max Inlet Pipe Diameter		Max Outlet Pipe Diameter		Peak Conveyance Flow Rate	
	(m)	(ft)		(mm)	(in)	(mm)	(in)	(L/s)	(cfs)
EF4 / EFO4	1.2	4	90	609	24	609	24	425	15
EF6 / EFO6	1.8	6	90	914	36	914	36	990	35
EF8 / EFO8	2.4	8	90	1219	48	1219	48	1700	60
EF10 / EFO10	3.0	10	90	1828	72	1828	72	2830	100
EF12 / EFO12	3.6	12	90	1828	72	1828	72	2830	100

SCOUR PREVENTION AND ONLINE CONFIGURATION

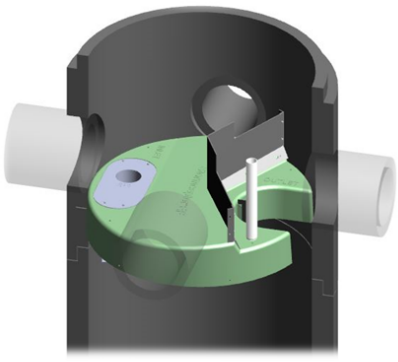
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test performance has been third-party verified in accordance with the ISO 14034 ETV protocol. As a result, Stormceptor EF and EFO are approved for online installation, eliminating the need for costly additional bypass structures, piping, and installation expense.

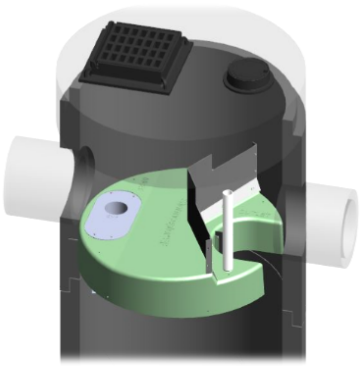
DESIGN FLEXIBILITY

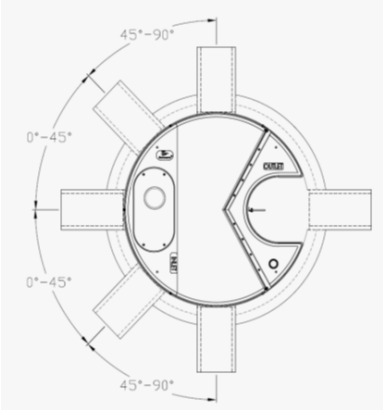
►**Stormceptor® EF** and **EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend angle, and can be modified to ensure performance in submerged conditions.

OIL CAPTURE AND RETENTION

►While Stormceptor® EF will capture and retain oil from dry weather spills and low intensity runoff,**Stormceptor® EFO** has demonstrated superior oil capture and greater than 99% oil retention in third-party testing according to the light liquid re-entrainment testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators** Stormceptor EFO is recommended for sites where oil capture and retention is a requirement.







INLET-TO-OUTLET DROP

Elevation differential between inlet and outlet pipe inverts is dictated by the angle at which the inlet pipe(s) enters the unit.

0° - 45° : The inlet pipe is 1-inch (25mm) higher than the outlet pipe.

45° - 90° : The inlet pipe is 2-inches (50mm) higher than the outlet pipe.

HEAD LOSS

The head loss through Stormceptor EF is similar to that of a 60-degree bend structure. The applicable K value for calculating minor losses through the unit is 1.1. For submerged conditions the applicable K value is 3.0.

Pollutant Capacity

Stormceptor EF / EFO	Model Diameter		Depth (Outlet Pipe Invert to Sump Floor)		Oil Volume		Recommended Sediment Maintenance Depth *		Maximum Sediment Volume *		Maximum Sediment Mass **	
	(m)	(ft)	(m)	(ft)	(L)	(Gal)	(mm)	(in)	(L)	(ft^3)	(kg)	(lb)
EF4 / EFO4	1.2	4	1.52	5.0	265	70	203	8	1190	42	1904	5250
EF6 / EFO6	1.8	6	1.93	6.3	610	160	305	12	3470	123	5552	15375
EF8 / EFO8	2.4	8	2.59	8.5	1070	280	610	24	8780	310	14048	38750
EF10 / EFO10	3.0	10	3.25	10.7	1670	440	610	24	17790	628	28464	78500
EF12 / EFO12	3.6	12	3.89	12.8	2475	655	610	24	31220	1103	49952	137875

*Increased sump depth may be added to increase sediment storage capacity

** Average density of wet packed sediment in sump = 1.6 kg/L (100 lb/ft^3)

Feature	Benefit	Feature Appeals To
Patent-pending enhanced flow treatment and scour prevention technology	Superior, verified third-party performance	Regulator, Specifying & Design Engineer
Third-party verified light liquid capture and retention for EFO version	Proven performance for fuel/oil hotspot locations	Regulator, Specifying & Design Engineer, Site Owner
Functions as bend, junction or inlet structure	Design flexibility	Specifying & Design Engineer
Minimal drop between inlet and outlet	Site installation ease	Contractor
Large diameter outlet riser for inspection and maintenance	Easy maintenance access from grade	Maintenance Contractor & Site Owner

STANDARD STORMCEPTOR EF/EFO DRAWINGS

For standard details, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

STANDARD STORMCEPTOR EF/EFO SPECIFICATION

For specifications, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

STANDARD PERFORMANCE SPECIFICATION FOR "OIL GRIT SEPARATOR" (OGS) STORMWATER QUALITY TREATMENT DEVICE

PART 1 – GENERAL

1.1 WORK INCLUDED

This section specifies requirements for selecting, sizing, and designing an underground Oil Grit Separator (OGS) device for stormwater quality treatment, with third-party testing results and a Statement of Verification in accordance with ISO 14034 Environmental Management – Environmental Technology Verification (ETV).

1.2 REFERENCE STANDARDS & PROCEDURES

ISO 14034:2016 Environmental management – Environmental technology verification (ETV)

Canadian Environmental Technology Verification (ETV) Program's **Procedure for Laboratory Testing of Oil-Grit Separators**

1.3 SUBMITTALS

1.3.1 All submittals, including sizing reports & shop drawings, shall be submitted upon request with each order to the contractor then forwarded to the Engineer of Record for review and acceptance. Shop drawings shall detail all OGS components, elevations, and sequence of construction.

1.3.2 Alternative devices shall have features identical to or greater than the specified device, including: treatment chamber diameter, treatment chamber wet volume, sediment storage volume, and oil storage volume.

1.3.3 Unless directed otherwise by the Engineer of Record, OGS stormwater quality treatment product substitutions or alternatives submitted within ten days prior to project bid shall not be accepted. All alternatives or substitutions submitted shall be signed and sealed by a local registered Professional Engineer, based on the exact same criteria detailed in Section 3, in entirety, subject to review and approval by the Engineer of Record.

PART 2 – PRODUCTS

2.1 OGS POLLUTANT STORAGE

The OGS device shall include a sump for sediment storage, and a protected volume for the capture and storage of petroleum hydrocarbons and buoyant gross pollutants. The minimum sediment & petroleum hydrocarbon storage capacity shall be as follows:

2.1.1	4 ft (1219 mm) Diameter OGS Units:	1.19 m^3 sediment / 265 L oil
	6 ft (1829 mm) Diameter OGS Units:	3.48 m^3 sediment / 609 L oil
	8 ft (2438 mm) Diameter OGS Units:	8.78 m^3 sediment / 1,071 L oil
	10 ft (3048 mm) Diameter OGS Units:	17.78 m^3 sediment / 1,673 L oil
	12 ft (3657 mm) Diameter OGS Units:	31.23 m^3 sediment / 2,476 L oil

PART 3 – PERFORMANCE & DESIGN

3.1 GENERAL

The OGS stormwater quality treatment device shall be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV). The OGS stormwater quality treatment device shall

remove oil, sediment and gross pollutants from stormwater runoff during frequent wet weather events, and retain these pollutants during less frequent high flow wet weather events below the insert within the OGS for later removal during maintenance. The Manufacturer shall have at least ten (10) years of local experience, history and success in engineering design, manufacturing and production and supply of OGS stormwater quality treatment device systems, acceptable to the Engineer of Record.

3.2 SIZING METHODOLOGY

The OGS device shall be engineered, designed and sized to provide stormwater quality treatment based on treating a minimum of 90 percent of the average annual runoff volume and a minimum removal of an annual average 60% of the sediment (TSS) load based on the Particle Size Distribution (PSD) specified in the sizing report for the specified device. Sizing shall be determined using historical rainfall data and a sediment removal performance curve derived from the actual third-party verified laboratory testing data. The OGS device shall also have sufficient annual sediment storage capacity as specified and calculated in Section 2.1.

3.3 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of third-party scour testing conducted in accordance with the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.**

3.3.1 To be acceptable for on-line installation, the OGS device must demonstrate an average scour test effluent concentration less than 10 mg/L at each surface loading rate tested, up to and including 2600 L/min/m^2.

3.4 LIGHT LIQUID RE-ENTRAINMENT SIMULATION TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of completed third-party Light Liquid Re-entrainment Simulation Testing in accordance with the Canadian ETV **Program's Procedure for Laboratory Testing of Oil-Grit Separators,** with results reported within the Canadian ETV or ISO 14034 ETV verification. This re-entrainment testing is conducted with the device pre-loaded with low density polyethylene (LDPE) plastic beads as a surrogate for light liquids such as oil and fuel. Testing is conducted on the same OGS unit tested for sediment removal to assess whether light liquids captured after a spill are effectively retained at high flow rates.

3.4.1 For an OGS device to be an acceptable stormwater treatment device on a site where vehicular traffic occurs and the potential for an oil or fuel spill exists, the OGS device must have reported verified performance results of greater than 99% cumulative retention of LDPE plastic beads for the five specified surface loading rates (ranging 200 L/min/m2 to 2600 L/min/m2) in accordance with the Light Liquid Re-entrainment Simulation Testing within the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.**However, an OGS device shall not be allowed if the Light Liquid Re-entrainment Simulation Testing was performed with screening components within the OGS device that are effective at retaining the LDPE plastic beads, but would not be expected to retain light liquids such as oil and fuel.