Adolphus Reach Resort Preliminary Stormwater Management Report

Prepared for:

2522082 Ontario Inc.

Mr. Del Terrelonge
c/o Stallion Financial
3800 Steeles Avenue West Suite 400
Woodbridge ON. L4L 4G9

Prepared by:

FOREFRONT Engineering Inc. **613.634.9009 tel**
1329 Gardiners Road, Suite 210
Kingston, ON, Canada K7P 0L8

Date: October 2026

Statement of Qualifications and Limitations

The attached Report has been prepared by Forefront Engineering Inc. (Consultant) for the benefit of the Client in accordance with their Agreement.

The information, data, recommendations and conclusions contained in the Report:

1. is subject to the scope, schedule, and other constraints and limitations in the Agreement and the qualifications contained in the Report;
2. represents Consultant's judgement in light of the limitations and industry standards for the preparation of similar reports;
3. may be based on information provided to Consultant which has not been independently verified;
4. has not been updated since the date of issuance of the Report and its accuracy is limited to the time and circumstances in which it was prepared; and
5. must be read as a whole and sections should not be read out of context.

Consultant shall be entitled to rely upon the accuracy and completeness of information that was provided to it and has no obligation to update such information. Consultant accepts no responsibility for any events or circumstances that may have occurred since the date on which the Report was prepared.

Any estimates or opinions regarding expected construction costs or construction schedule provided by Consultant represent Consultant's judgement in light of its experience and the knowledge and information available to it at the time of preparation. Consultant does not make any representations, with respect to such estimates or opinions, and accepts no responsibility for any loss or damage arising from them. Persons relying on such estimates or opinions do so at their own risk.

Except as agreed to in writing by Consultant and Client; as required by law; or to the extent used by governmental reviewing agencies for the purpose of obtaining permits or approvals, the Report and the Information may be used and relied upon only by Client.

Consultant accepts no responsibility to parties other than Client who may obtain access to the Report or the information for any injury, loss or damage suffered by such parties arising from their use of, reliance upon, or decisions or actions based on the Report, except to the extent those parties have obtained the prior written consent of Consultant to use and rely upon the Report and the information. Any injury, loss or damages arising from improper use of the Report shall be borne by the party making such use.

Forefront Engineering Inc

1329 Gardiners Road, Suite 210
Kingston, ON, Canada K7P 0L8

613 634 9009 tel
888.884.9392 fax

October 13, 2026

Mr. Del Terrelonge
2522082 Ontario Inc.
c/o Stallion Financial
3800 Steeles Avenue West Suite 400
Woodbridge ON. L4G9

Dear Mr. Terrelonge

Regarding: Adolphus Reach Resort
Preliminary Stormwater Management Report

The enclosed report details the existing drainage conditions and provides recommendations for stormwater management for the proposed Adolphus Reach Resort.

The proposed Adolphus Reach Resort will feature a variety of lodging options onsite, including two to three-bedroom units with onsite parking.

Lot-level controls, grass swales, an oil grit separator, a dry pond, and filter strip-type stormwater management features are recommended to mitigate any adverse stormwater quantity and stormwater quality effects that site run-off may have on the downstream network.

Preliminary facility details are contained in this report, along with recommended maintenance procedures.

Detailed Site Plan and stormwater facility drawings are required.

The Report demonstrates that adequate stormwater management controls are available for the proposed development.

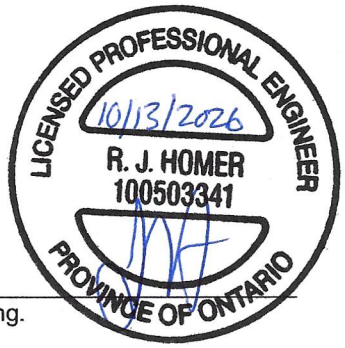
If you have any enquiries or wish to discuss further, please contact this office.

Sincerely,
FOREFRONT ENGINEERING INC.



Jeff Homer, P.Eng.
Jeff.Homer@Forefronteng.ca

FOREFRONT Signatures



Report Prepared By:

Jeff Homer, P. Eng.

Table of Contents

Statement of Qualifications and Limitations
Letter of Transmittal

Page

1. Introduction 3

2. Existing Site Condition 4

3. Proposed Development 5

3.1 Drainage Plan 5
3.2 Water Quantity 6
3.2.1 Analysis 6
3.2.1.1 Rational Method 6
3.2.1.2 Design Storm Events 7
3.2.1.3 Hydrology 7
3.2.2 *Pre-Development Flows* 8
3.2.3 Post-Development Flows 9
3.3 Water Quality 10
3.4 Erosion and Sediment Control 11
3.5 Maintenance 13

4. Quality (Short Term) 14

5. Conclusions 15

Appendices

Appendix A

- Figure 1 - Concept Plan
- Figure 2 - Existing Catchment Areas
- Figure 3 - Proposed Catchment Areas
- Figure 4 - Outlet Details

Appendix B

- Short Duration Rainfall Intensity-Duration-Frequency Data – Belleville Area
- Runoff Coefficient Calculations
- Rational Method Calculations
- Outlet Swale Calculations
- 25 mm Event Stage – Dry Pond Stage Storage Curve
- Echelon Environmental Sizing Report and Cumulative Volume Calculations
- OGS Operations & Maintenance Manual

1. Introduction

Forefront has assembled relevant supporting information for the proposed development at Part of Lots 61 and 62, Front Concession Bay of Quinte, Township of North Marysburgh, in the County of Prince Edward.

The proposed Adolphus Reach Resort by 2522082 Ontario Inc. is located on the south shore of Adolphus Reach, in the Township of North Marysburgh in the County of Prince Edward, on the north side of County Road 7. The property is bounded by existing dwellings along County Road 7 to the east and west, agricultural lands and residential dwellings to the south, and Adolphus Reach to the north. The subject site includes Civic addresses 1315, 1329, and 1357 County Road 7. Refer to Figure 1: Location Plan for the site location.



Figure 1: Location Plan

The subject site is approximately 9.99 hectares and is currently zoned Rural (RU1), Rural Residential (RR1), Rural Residential (RR2), and Environmental Protection (EP).

The proposed Adolphus Reach Resort will consist of a variety of lodging and options onsite, including two to three-bedroom units. A private lane is proposed with an entrance from County Road 7.

The development of the Adolphus Reach Resort is expected to result in an increase in impervious surfaces, which could potentially impact stormwater quantity and quality. This development may have potential impacts on the natural drainage and environment. The report recommends mitigation measures and provides recommendations for the preliminary design of the site.

Refer to Appendix A, **Concept Plan** for the proposed development plan.

2. Existing Site Condition

The site and the surrounding affected drainage area total approximately 19.01 hectares. The subject site is approximately 9.99 hectares and is predominantly vacant land consisting of mixed forest. There is an existing cottage at the rear of the property overlooking Adolphus Reach and an existing residential dwelling fronting County Road 7.

The topography of the property gently slopes from west to east except for an embankment that extends along the north and east of the subject site. The existing embankment slope varies from 1H:1V in rock to 4H:1V and is densely vegetated with trees and brush. The embankment rises in height above Adolphus Reach by approximately 35 to 43m. An existing gravel driveway is cut into the side slope of the embankment, providing access to the existing cottage at the rear of the property. South of the gravel driveway the embankment is an exposed rock face.

The 100-year floodplain elevation of Adolphus Reach in this area is 75.8 and 76.2 including wave uprush.

An existing man-made intermittent pond is located centrally on the property and is considered intermittent only. The pond is not considered to be provincially significant. No defined watercourses have been observed on the subject property. Stormwater runoff from the site is mainly conveyed by sheet flow.

The existing site is divided into three catchments and outlets. All three outlets eventually discharge to Adolphus Reach.

Catchment areas EX1, EX2, and EX3 are approximately 10.99 ha and runoff drains via sheet flow easterly down the east embankment to **Outlet 1,** a defined channel on the adjacent property at 1361 County Road 7.

Along County Road 7, runoff from the road is directed onto the subject property, as there are no defined ditch banks on the north side of County Road 7 in this area. Field investigation has determined that there are no road-crossing culverts along this length of County Road 7 within the catchment area.

Catchment areas EX5 and EX4 are approximately 5.22 hectares and drain easterly to **Outlet 2**, where runoff overtops the existing gravel driveway and sheet flows offsite down the slope across the neighbouring property at 1361 County Road 7.

Area EX6 is approximately 2.60 hectares and drains northerly down the embankment directly to Adolphus Reach (**Outlet 3**) via sheet flow.

The Soil Survey of Prince Edward County identifies the soil cover in this area of Adolphus Reach north of County Road 7 as primarily Farmington Loam (Fl) and rock along the shoreline. Farmington loam consists of shallow deposits on limestone bedrock, a well-drained soil.

Two subsurface investigations have been completed for the property. Ainley Group (2018) completed eight test pits along the top of the existing embankment, identifying shallow overburden consisting of silty sand with gravel and cobbles overlying limestone bedrock at depths of 0.25 to 0.50 m, averaging approximately 0.34 m. The upper limestone was weathered to an average depth of approximately 0.25 m below the bedrock surface. No groundwater infiltration was observed during the investigation.

Pinchin (2026) completed seven test pits within the area investigated for potential in-ground wastewater disposal, identifying similar shallow overburden consisting primarily of silty sand and gravel overlying limestone bedrock at depths ranging from 0.33 to 0.76 m, averaging 0.63 m. The variation in reported depths reflects differences in

investigation locations and local subsurface conditions. Both investigations confirm that the property is generally characterized by shallow overburden underlain by limestone bedrock.

An Environmental Impact Study of the subject property was completed by Ainley Group, dated November 2018. Refer to *Environmental Impact Study, Part of Lots 61 and 62 Front Concession Bay of Quinte, Township of North Marysburgh, Municipality of County of Prince Edward* for further details regarding the natural environment.

Please refer to Appendix A, **Figure 2**: **Pre-Development Catchment Areas** for existing condition details.

Source Protection Area

The subject site and the south region of Adolphus Reach is part of the Quinte Source Protection Area (SPA). Surface runoff from the site outlets into Adolphus Reach and is considered part of Intake Protection Zone 3, the total contributing area to nearby intakes. Activities in this zone may impact water quality, although they generally present less risk to the municipal drinking water. The vulnerability score for the subject area is 6 and is considered a *highly vulnerable aquifer.* The nearest intakes include Picton, Sandhurst Shores and Greater Napanee. The site and nearby area are not considered a significant groundwater recharge area.

3. Proposed Development

The proposed Adolphus Reach Resort will consist of a variety of lodging and options onsite, including one to three-bedroom units with onsite parking.

A private lane is proposed with an entrance from County Road 7.

Existing major flow paths will be maintained, with the proposed drainage and stormwater infrastructure being designed for stormwater quality, the minor and major storm events. Quantity control is not anticipated to be required due to the proximity to Adolphus Reach. Outlets that experienced concentrated flows and sheet flows under pre-development conditions are expected to maintain relatively similar flow characteristics post-development.

3.1 Drainage Plan

The objective of the proposed drainage design is to minimize alterations to existing drainage patterns.

Sheet flow to **Outlet 3** will be maintained through the use of filter strips and a level spreader. Drainage directed to **Outlet 1** will remain at pre-development levels as Catchment Area EX1 remains undisturbed. Drainage directed to **Outlet 2** in pre-development conditions is recommended to be redirected to drain to **Outlet 3**, directly to Adolphus Reach.

A multi-barrier approach is proposed for water quality, sediment, and erosion control. The design includes disconnected roof downspouts, swales, an oil grit separator (OGS), and a dry pond sized to capture and release the 25 mm event over 24 to 48 hours, discharging to a level spreader downstream to promote sheet flow. Riprap will be provided at concentrated flow outlets, and filter strips will be used to receive and promote sheet flow, supporting effective pollutant removal as well as onsite sediment and erosion control. All concentrated outlets will be stabilized with riprap. Filter strips are proposed along the existing gravel driveway, outside the embankment setback, to promote sheet flow, reduce flow velocities, and limit sediment transport offsite.

No stormwater quantity control is proposed except for that resulting from the quality control works implemented.

Erosion control mats or netting are recommended along the steep embankment slopes where buildings are proposed and vegetation will be disturbed. Existing vegetation on the embankment is to remain undisturbed where feasible, in accordance with the recommendations of the Ainley Group Slope Stability Report.

The intermittent man-made pond is to remain in place.

Entrance culverts shall have a minimum diameter of 400 mm.

Roof drain downspouts are to direct runoff to granular surfaces to dissipate flow. Grass surfaces are to be sloped at a minimum of 2% and a maximum of 3H:1V.

Lot-level conveyance controls, culvert crossings, sediment and erosion control plans, and further details will be provided during the detailed design of the grading and drainage for these areas. These details will be depicted on the final engineering drawings.

No direct quality or quantity control is proposed for catchment areas external to the development.

For further details, refer to Appendix A: **Figure 3 Post-Development Conditions**.

3.2 Water Quantity

Urbanization leads to an increase in impermeable surfaces (rooftops and parking areas). The resultant increased peak flows increase the risk to life, the environment, and property damage. Water quantity control is generally required when there will be downstream quantity impacts.

No stormwater quantity control is proposed except for that resulting from the quality control works implemented.

3.2.1 Analysis

The Rational Method will be utilized to design the proposed drainage conveyances onsite.

3.2.1.1 Rational Method

The rational method calculates the peak flow rate at a specific location in a catchment due to the runoff contributed from the entire upstream catchment area. The rational method is represented by the following equation:

$$Q = 0.0028CIA$$

Where:

C = Runoff coefficient
I = Rainfall intensity (mm/hr)
A = Drainage area (ha)

The t_c (time of concentration) will be calculated with The Airport Method and Kirpich Method and the shorter duration will be selected where appropriate, this will provide a conservative flow estimate. In the case that the runoff is limited to sheet flow the Airport Method will be used. A minimum time of concentration of 15 minutes is proposed onsite given the calculated times of concentration are less than 15 minutes.

3.2.1.2 Design Storm Events

Minor and Major Events

The stormwater collection system is to be designed to accommodate runoff as per the rational formula and convey up to the minor event (5-year event). The major overland flow path will convey up to the major event (100-year event).

The 2-year, 5-year and 100-year design storm events are based on IDF rainfall statistics that describe the frequency of rainfall depths over a specified duration. Rainfall intensities with various durations and return periods for the site were obtained from the Environment Canada, See Appendix B: **Short Duration Rainfall Intensity Duration Frequency Data – Belleville Area**. The 100-year design storm event is the major event analysed. The final design will utilize the latest version of the Bellville IDF.

Quality and Erosion Control Event

The Ministry of Environment Stormwater Management Manual (SPMD, 2003) refers to a 12.5mm to 25mm 4-hour Chicago storm event for sizing quality treatment and erosion control facilities in Ontario that are not included in Table 3.2 of the manual.

The following formula has been developed for a 25mm - 4 hr Chicago Design storm event (also known as the geographic 90th percentile event) for sediment and erosion control for this area:

$$I_{25mm} = \frac{498}{(t_c + 9.7)^{0.825}}$$

In the case of oil grit separators, the MECP *Stormwater Management Manual* (2003) recommends that, for enhanced protection, oil grit separators be sized to capture and treat a minimum of 90% of the total runoff volume that occurs on a *long-term average basis* and remove 80% of suspended solids as required by enhanced protection.

3.2.1.3 Hydrology

Runoff Coefficients

The runoff coefficient (C) is a dimensionless coefficient relating the amount of runoff to the amount of precipitation received. It is a larger value for areas with low infiltration and high runoff (pavement, steep gradient), and lower for permeable, well vegetated areas (forest, flat land). Coefficients were assigned based on surface cover and soil conditions as follows:

Urban			
Land Use & Topography	**Runoff Coefficients**		
Asphalt, concrete, roof areas	0.90		
Grassed area, parkland	0.25		
Rural			
	Soil Texture		
Land Use & Topography	**Open Sand Loam**	**Loam or Silt Loam**	**Clay Loam or Clay**
Cultivated			

Flat 0-5% Slopes	0.22	0.35	0.55
Rolling 5-10% Slopes	0.30	0.45	0.6
Hilly 10-30% Slopes	0.40	0.65	0.7
Pasture			
Flat 0-5% Slopes	0.10	0.28	0.4
Rolling 5-10% Slopes	0.15	0.35	0.45
Hilly 10-30% Slopes	0.22	0.4	0.55
Woodlands and Cutover			
Flat 0-5% Slopes	0.08	0.25	0.35
Rolling 5-10% Slopes	0.12	0.3	0.42
Hilly 10-30% Slopes	0.18	0.35	0.52
Bare Rock	**Coverage**		
	30%	50%	70%
Flat 0-5% Slopes	0.40	0.55	0.75
Rolling 5-10% Slopes	0.50	0.65	0.8
Hilly 10-30% Slopes	0.55	0.7	0.85
Lakes and Wetlands	0.05		
Note: Values are a combination of the MECP Guidelines and Ministry of Transportation Design Chart 1.07			

To reflect the unique hydrologic properties within each sub-catchment, a variety of surface cover types were defined. Refer to the composite runoff coefficient calculations in Appendix B for further details.

3.2.2 *Pre-Development Flows*

Runoff coefficients and catchment characteristics were assigned for the existing catchments and are summarized in Table 3-1 below.

Table 3-1 Existing Conditions

Adolphus Reach **Hydraulic Units - Pre-Development Conditions**									
Hydrologic Unit	Description	Est'd C	Area (ha)	Watershed Length (m)	Average Width (m)	Average Grade (%)	Tc (Kirpich Method) (C<0.4)	Tc (Airport Method) (C<0.4)	Cumulative Tc Proposed
Outlet 1									
EX3	External - Sheet Flow to EX1	0.12	5.60	420	119	2.0	9.03	51.9	**51.9**
EX2	External - Sheet Flow to EX1	0.30	0.27	195	13	0.5	8.50	-	15.0
EX1	Site - Sheet Flow to Outlet 1	0.12	5.12	245	213	5.1	4.67	29.3	**81.2**
Outlet 2									
EX4	External - Sheet Flow to EX5	0.12	3.15	300	113	2.0	7.00	44.0	**44.0**
EX5	Site - Sheet Flow to Outlet 2	0.12	2.07	243	83	4.8	4.23	29.6	**73.6**
Outlet 3									
EX6	Site - Sheet Flow to Adolphus Reach	0.20	2.80	140	120	30.4	1.37	11.3	**15.0**

A minimum time of concentration of 15 minutes is recommended. Note that the proposed times of concentrations are cumulative and represent the longest flow path to the outlet. A pre-development runoff coefficient of 0.12 is expected for residential lands surrounded by woodlands with silty sand soil and an average slope of 0.5% to 5%.

Considering catchment area EX6 consists of a steep embankment, a higher coefficient of 0.2 is warranted.

Results shown in Table 3-2 quantify the pre-development peak rate of surface runoff that has been routed through the collection system, eventually discharging to the outlets downstream. Results are grouped by outfall location for all the rainfall events.

Table 3-2 Peak Flows in Pre-Development Conditions

Peak Flows in Pre-Development Conditions (LPS)					
Description	**Area (ha)**	**25mm Quality Event**	**2 Year Design Storm**	**5 Year Design Storm**	**100 Year Design Storm**
		Peak Flow Q (LPS)	Peak Flow Q (LPS)	Peak Flow Q (LPS)	Peak Flow Q (LPS)
Outlet 1 - Adjacent Property Channel	10.99	46	69	93	141
Outlet 2 - Sheet Flow to Adjacent Property	5.22	23	34	46	69
Outlet 3 - Sheet Flow to Adolphus Reach	2.80	55	84	111	185

The peak flow for **Outlet 3** is anticipated to be higher as it includes a steep embankment and a shorter time of concentration.

3.2.3 Post-Development Flows

The development of this site will increase the imperviousness of the site and hence the runoff. Runoff coefficients and catchment characteristics were assigned for the proposed catchments and are detailed in Table 3-3.

Table 3-3 Proposed Conditions

Adolphus Reach **Hydraulic Units - Post-Development Conditions**										
Unit	Description	Est'd C	Area (ha)	Length (m)	Average Width (m)	Average Grade (%)	Tc (Kirpich Method)	Tc (Airport Method) (C<0.4)	Indiv. Tc Proposed	Cumulative Tc Proposed
Outlet 1 - Sheet flow to Adjacent Property Channel										
P3	External Sheet Flow to P1	0.12	5.60	420	119	2.0	9.03	51.9	51.9	51.9
P2	External Sheet Flow to P1	0.30	0.27	195	13	0.5	8.50	-	15.0	15.0
P1	Site - Sheet Flow to Outlet 1	0.12	4.61	245	213	5.1	4.17	29.2	29.2	**81.1**
Outlet 3A - Sheet Flow Directly to Adolphus Reach										
P4	External Sheet Flow to P5	0.12	3.15	300	113	2.0	7.00	44.0	44.0	44.0
P5	Dry Pond & OGS to Outlet 3	0.52	2.57	250	60	3.0	5.20	20.8	5.20	**49.2**
Outlet 3B - Sheet Flow Directly to Adolphus Reach										
P6	Flow directed to Filter Strip	0.28	1.52	86	176	14	1.26	10.4	15.0	**15.0**
P7	Direct to Outlet 3	0.20	1.29	34	218	84	0.31	4.0	15.0	**19.0**

A minimum time of concentration of 15 minutes is recommended. Note that the proposed times of concentration are cumulative and represent the longest flow path to each outlet.

Results shown in Table 3-4 quantify the peak rate of surface runoff calculated with the rational method and assigned catchment characteristics. The post-development uncontrolled flow rates are calculated.

Table 3-4 Uncontrolled Peak Flows in Post-Development Conditions

Uncontrolled Peak Flows in Post-Development (LPS)					
Description	**Area (ha)**	**25mm Quality Event**	**2 Year Design Storm**	**5 Year Design Storm**	**100 Year Design Storm**
		Peak Flow Q (LPS)	Peak Flow Q (LPS)	Peak Flow Q (LPS)	Peak Flow Q (LPS)
Outlet 1 - Adjacent Property Channel	10.48	44	66	89	136
Outlet 3A – OGS & Dry Pond to Adolphus Reach	5.72	131	122	165	252
Outlet 3B - Sheet Flow to Adolphus Reach	2.81	59	90	120	194

The overall site runoff coefficient is increased from a pre-development average of 0.13 to a post-development average of 0.19.

Peak flows to **Outlet 1** are anticipated to be slightly reduced from pre-development levels as a catchment area of 0.42 ha is redirected to **Outlet 3**. Runoff directed to **Outlet 2** in pre-development is to be redirected north to **Outlet 3A**, directly to Adolphus Reach.

Note that catchment area P4 does not contribute during the 25 mm event as it is primarily infiltrated, and the time of concentration is reduced accordingly.

Outlets that experienced concentrated flows and sheet flows under pre-development conditions are expected to maintain relatively similar flow characteristics post-development.

Refer to the **Rational Method Calculations** in Appendix B for the 25 mm 4-hour, 2-year, 5-year and 100-year event calculations and further details.

Figure 4 provides details for the outlet swale from the dry pond stormwater management along the access lane. Preliminary **Swale Calculations** are provided in **Appendix B**.

3.3 Water Quality

The Stormwater Management Planning and Design Manual (SMPD) by the MECP describes various levels of protection of water quality, based on a general relationship between the end-of-pipe stormwater management facilities long-term suspended solids removal and the lethal and chronic effects of suspended solids on aquatic life.

Based on the characteristics of the receiving watercourse, Enhanced Protection (corresponding to the end-of-pipe storage volumes required for the long-term removal of 80% of suspended solids) is required. Stormwater management measures will be implemented to provide in excess of 80% long-term removal of suspended solids.

The SMPD provides limited information for low impact development design (LID), lot level and conveyance controls. The Credit Valley Conservation *Low Impact Development Stormwater Management Planning and Design Guide* focuses on lot-level and conveyance stormwater management practices and is intended to augment the SMPD.

Consistent with LID best management practices the site will provide lot level controls consisting of roof disconnections, where stormwater will sheet flow across pervious grass allowing for infiltration. Runoff from entrances will be directed to pervious grass that grade into the grass swales for quality control. The site is intended to flatten slopes, maximize sheet flow, maintain natural vegetation and natural flow paths.

Oil Grit Separator

Stormwater runoff from Catchment Area P5 is to pass through an OGS unit before discharging offsite. The subject site shall utilize a model Contech PMSU3020-6 oil grit separator (OGS) for quality control. The OGS unit is proposed at the inlet of the dry pond prior to site runoff discharging offsite.

The MECP guidelines recommend that, for enhanced protection, OGS units be sized to capture and treat a minimum of 90% of the total runoff volume that occurs on a *long-term average basis* and remove 80% of suspended solids as required by enhanced protection.

The proposed OGS will provide 82% suspended solids removal, capturing an annual 97.6% of the total runoff volume over a long-term average basis. The OGS is proposed to be utilized in a treatment train approach.

Below is a summary of the design criteria and OGS unit specifications:

Area:	2.57 ha (treated area)
Treatment Capacity	57 L/s
Runoff Coefficient:	0.52
Net Annual Load Removal Efficiency:	82%
Percent Annual Rainfall Treated:	97.6%
Sediment Capacity:	2,402 Litres
Oil Storage Capacity:	696 Litres

Refer to **Appendix B: Echelon Environmental Sizing Report and Cumulative Volume Calculations** for calculations and the **Operations and Maintenance Manual.**

3.4 Erosion and Sediment Control

Given the increase in imperviousness, downstream outlets will experience more frequent flow at varying velocities. As such, control for erosion has been considered. It is proposed that runoff from impervious areas be directed to a dry pond to control and release the 25 mm event over 24 to 48 hours.

Dry Pond

A dry pond is a stormwater management facility designed to temporarily store runoff and release it at a controlled rate to mitigate downstream flooding and provide erosion control. During storm events, runoff is collected in the dry pond basin and gradually discharged through the restricted outlet structure, allowing for attenuation of flows.

Dry ponds are effective for managing erosion control by controlling the 25 mm event and releasing it over 24 to 48 hours. The proposed dry pond is limited to providing erosion control only, and quality control is provided by the OGS. Events greater than the 25 mm event will bypass the dry pond and flow directly to **Outlet 3A**.

A total storage volume of approximately ±167 m^3 is required to control the 25 mm event and release it over 24 to 48 hours. Refer to the **25 mm Event – Dry Pond Stage Storage Curve** in Appendix B for details.

Note that catchment area P5 is to be directed to the OGS and dry pond. During the 25 mm event, it is anticipated that catchment area P4 completely infiltrates and does not contribute runoff during the 25 mm event, and in this case, a minimum time of concentration of 15 minutes is used.

Dry Pond Outlet

In order to control the 25 mm event over 24 to 48 hours, a filter bed with a subdrain is required to reduce the outlet flow. A filter bed media is necessary to achieve a hydraulic conductivity of between 75 to 25 mm/h to reduce outlet flows to a range of ±2 L/s. The Sustainable Technology Evaluation Program (STEP) recommends a filter bed of a blend consisting of 3 parts sand, 2 parts topsoil, and 1 part organic matter to achieve this. Refer to **Figure 4** – **Outlet Details** in Appendix A for preliminary details. Further details are to be provided at the detailed design stage.

The dry pond will drain to the access road swale to a downstream level spreader to promote sheet flow prior to discharging to **Outlet 3A**.

Flows greater than the 25 mm 4-hour event (the 90th percentile event) will bypass the dry pond and outlet directly to **Outlet 3A**.

Outlet 3

The dry pond will outlet to the access lane drainage ditch and is to be directed to **Outlet 3A,** directly to Adolphus Reach. A level spreader is proposed at the outlet in order to achieve sheet flow. Refer to **Figure 4 – Outlet Details** in Appendix A for reference. Detailed profiles and sections for stormwater management are to be provided at the detailed design stage.

Under sheet flow conditions, the MTO Drainage Manual Design Chart 6.06, *Sediment Delivery Ratio for Sheet Flow*, provides a ratio of sediment delivery to quantity eroded. Under proposed conditions, sheet flow to Outlet 3 will travel approximately 50 m or greater through the silty sand and the existing heavily vegetated embankment. The sediment delivery ratio can be expected to be as low as 0%, resulting in suspended solids removal efficiency of up to 100%. A filter strip is proposed at the toe of the slope to promote sheet flow conditions.

To provide sediment and erosion control, a multi-barrier approach is proposed. The design will incorporate a dry pond sized to capture and release the 25 mm event over 24 to 48 hours, discharging to a level spreader downstream to promote sheet flow. Riprap will be provided at concentrated flow outlets, and filter strips will be used to promote sheet flow, supporting effective pollutant removal as well as onsite sediment and erosion control. All concentrated outlets will be stabilized with riprap.

Erosion control mats or netting are recommended along the steep embankment slopes where buildings are proposed and vegetation will be disturbed. Existing vegetation on the embankment is to remain undisturbed where feasible, in accordance with the recommendations of the Ainley Group Slope Stability Report.

Erosion and sediment control plans will be included during the detailed design submission.

Summary

The proposed treatment train is expected to achieve a total suspended solids (TSS) removal rate exceeding 80%, meeting the criteria for enhanced water quality protection. The 25 mm 4-hour event (representing the 90th percentile geographic event) will be controlled onsite and released over 24 to 48 hours, providing erosion and sediment control. Minor and major storm events from the development area will drain directly into Adolphus Reach (Outlet 3), with the conveyance system designed to ensure a safe flow to the outlet. Catchment Area EX1, which drains to Outlet 1 under pre-development conditions, will remain undisturbed. Runoff that drained to Outlet 2 under pre-development conditions is to be redirected to Outlet 3, discharging directly to Adolphus Reach.

Stormwater runoff from the development is not anticipated to adversely affect the natural environment or downstream infrastructure.

3.5 Maintenance

The oil grit separator will separate the oils and sediment from runoff onsite and will require annual maintenance and pumper truck access.

Periodic maintenance inspection of the oil grit separator should be undertaken, and semi-annual maintenance reports (spring and fall) should be completed. Oil grit separators should be inspected regularly to ensure optimum performance. Pollutants collect in these systems at highly varying rates depending on the activities and conditions taking place on the roadways and parking areas. For instance, heavy winter sanding will cause the grit chamber to fill more quickly, but regular sweeping of paved surfaces will slow accumulation.

Based on a ±80% TSS capture efficiency, drainage area of 2.57 ha, runoff coefficient of 0.52, average annual rainfall of 791 mm, annual influent grit concentration of ±100 mg/L, and compacted grit density of 1,600 mg/L, it can be expected that the OGS will accumulate an estimated ±530 L of grit annually. The OGS has 1067 L of grit storage capacity, requiring cleanout of the OGS every ±2 years on average.

The semi-annual reports should provide a summary of the following items:

- Inspection should include and comment on the following:
    - Working order of the system components, including any defects and damage, should be repaired as soon as possible.
    - Quantify the accumulations of hydrocarbons, trash, and sediment in the system. This can be done with a calibrated dipstick, tape measure, or other measuring instrument.
    - Levels of discoloration of absorbent materials used in some systems should be recorded.
    - Hydraulic operation of the oil grit separator (detention time, evidence or occurrence of overflows).
- Condition of structure.
- Inlet obstructions if any.
- Evidence of parking lot spills.
- Maintenance and operational control undertaken during the year.
- Recommendations for the inspection and maintenance program for the coming year.

The system should be cleaned when the level of sediment reaches 75% of the capacity in the isolated sump or when an appreciable level of hydrocarbons and trash has accumulated. If absorbent material is used, it should be replaced when significant discoloration has occurred. Performance will not be impacted until 100% of the sump capacity is exceeded; however, it is recommended that the system be cleaned prior to that for easier removal of sediment.

The level of sediment is easily determined by measuring from the finished grade down to the top of the sediment pile. To avoid underestimating the level of sediment in the chamber, the measuring device must be lowered to the top of

the sediment pile carefully. Particles at the top of the pile typically offer less resistance to the end of the rod than consolidated particles toward the bottom of the pile. Once this measurement is recorded, it should be compared to the as-built drawing for the unit to determine whether the height of the sediment pile off the bottom of the sump floor exceeds 75% of the total height of the isolated sump.

The sediment should be tested to determine the disposal options. The MECP publishes sediment disposal guidelines, which should be consulted for up-to-date information pertaining to the exact parameters and acceptable levels for the various disposal options.

Oil levels greater than 2.5 cm should be removed immediately by a licensed waste management firm.

The following are instructions and best practices for cleaning the oil grit separator unit:

- Work should take place during dry weather and no flow conditions.
- Vacuum trucks are the most effective means of sediment and pollutant removal.
- Completely drain the system and fully excavate the sediment from the sump.
- The system requires cleaning immediately following a large hydrocarbon spill event.
- Hydrocarbon accumulation should be removed using absorbent pads.
- Trash and debris can be separated from the pollutants.
- Confined space entry procedures should be followed.
- Pollutants should be disposed of and handled as per MECP guidelines.

The pipe system will require routine periodic maintenance, including hydro vacuuming, flushing, and debris removal annually. Removal of accumulated sediment will be required. Maintenance is the responsibility of the site Owner.

Maintenance of lot level controls, swales, dry pond, filter strips, and the level spreader will generally be no different than maintenance of lawns and landscape areas. The swales, dry pond and level spreader require routine periodic maintenance, including weed control, and trash removal will be required several times per year. Removal of accumulated sediment and replacement of plantings should be evaluated annually, with a recommended replacement period every 5 years.

4. Quality (Short Term)

Heavy-duty silt fencing is to be provided at all side slopes and down gradient locations to ensure sediment and erosion control during construction. Other control devices, such as straw bales, will also be provided where drainage is concentrated. Sediment and erosion management measures also serve to provide a limit to the grading operations.

The timeframe for land to remain exposed before it is stabilized with sod, mulch, or hydroseeding is to be minimized. Topsoil is to be stockpiled away from watercourses and wetlands.

Rock check dams or straw bale filters are to be provided in overland swale and ditch systems. Clear stone mud mats are to be provided at site entrances during construction. Turbidity curtains are to be provided for all in-water and near-water works.

Inspection of the sediment control works should be undertaken before and after all rainfall (and snowmelt) events. Maintenance is to be undertaken as required to ensure the proper operation of all sediment and erosion controls. Inspection and maintenance are the developer’s responsibility.

5. Conclusions

It is recommended that the development proceed with the mitigation measures detailed in this report to address stormwater quantity, stormwater quality and erosion concerns on the site.

It is recommended that lot-level controls, an oil grit separator (OGS) with a dry pond, level spreaders, and filter strips be implemented to mitigate potential stormwater quantity and quality impacts on the downstream network. A multi-barrier approach is proposed to provide effective pollutant removal and to support onsite erosion and sediment control.

Preliminary facility details are provided herein. Detailed design of swales, culvert crossings, erosion control measures, and outfalls will be provided during the final engineering design of the development.

Works close to or adjacent to the shoreline of Adolphus Reach will require a permit under Quinte Conservation Authority O.REG 319/09 and a work permit from the Ministry of Natural Resources and Forestry prior to construction.

Appendix A

Concept Plan

Figure 2 Pre-Development Catchment Areas

Figure 3 Post-Development Catchment Areas

Figure 4 Outlet Details



POD VILLA 2BDRM	30
POD VILLA 3BDRM	2
MAIN ENTRANCE BUILDING	1
WATER TRTMNT BUILDING	1
ELECTRICAL BUILDING	1
SEPTIC BUILDING	1
PUMP HOUSE	1
TOTAL	37
SHED	1
LAKE HOUSE	1

LEGEND

- PROPOSED ROAD
- BUTTERNUT TREE BUFFER
- 15 m FLOOD LINE SETBACK
- ESCARPMENT SET-BACK
- PROPERTY LINE
- AREA OF PROPOSED RESORT
- 1280 + 1296 COUNTY ROAD 7 239 m SETBACK
- 1338 COUNTY ROAD 7 284 m RADIUS SETBACK
- MAIN ENTRANCE BUILDING 279 m²
- PUMP HOUSE
- 2 BEDROOM CABIN (30) EACH 89 m²
- 3 BEDROOM CABIN (2) EACH 118 m²
- W — WATER TREATMENT BUILDING
- E — ELECTRICAL BUILDING
- SEPTIC BUILDING
- POOL
- SHED
- LAKE HOUSE
- U.G. SEPTIC TANK

Benchmark

No.	Revision/Issue	Date
R10	AS PER CLIENT REQUEST	JUNE 2026
R9	AS PER CLIENT REQUEST	FEBRUARY 2022
R8	UPDATED FOR STM REPORT	JUNE 2021
R7	AS PER CLIENT REQUEST	APRIL 2021

Forefront Engineering Inc
1329 Gardiners Road, Suite 210
Kingston, ON, Canada K7P 0L8
613.634.9009 tel.
1.888.884.9392 fax.

Client: 2522082 ONTARIO INC.

Project: ADOLPHUS REACH RESORT

Drawing: CONCEPT PLAN - OPTION 3

Drawn by: EG	Checked by: KMN	Project No.
Designed by: KMN	Approved by: KMN	Drawing No. C4
Date: SEPT 2025		
Scale: 1:750		



AREA IN HECTARES

#.## ha

#.## ##

RUNOFF COEFFICIENT

CATCHMENT ID

MAJOR FLOW PATH

EXTERNAL AREA= 9.02 ha
PROPOSED SITE AREA = 9.99 ha

TOTAL CATCHMENT AREA= 19.01 ha

Benchmark

No.	Revision/Issue	Date

Forefront Engineering Inc

1329 Gardiners Road, Suite 210
Kingston, ON, Canada K7P 0L8
613.634.9009 tel.
1.866.884.9392 fax.

Client
2522082 ONTARIO INC.

Project
ADOLPHUS REACH RESORT

Drawing
PRE-DEVELOPMENT
CATCHMENT AREAS

Drawn by:	Checked by:	Project No.
JH	KMN	
Designed by:	Approved by:	Drawing No.
JH	KMN	FIG.2
Date: JANUARY 2020		
Scale: 1:2000 (11X17)		

OUTLET 3B

OUTLET 3B

OUTLET 3A

OGS AND DRY POND

ADOLPHUS REACH

ADOLPHUS REACH

FLOOD LINE SETBACK

BUTTERNUT TREE

1.29 ha OUT 3 | 0.20 | P7

1.52 ha OUT 3 | 0.28 | P6

2.57 ha OUT 3 | 0.52 | P5

#1361 EX. BLDG

OUTLET 1

INTERCEPT RUNOFF AND DIRECT TO OUTLET 3

3.15ha EXTERNAL | 0.12 | P4

4.61ha OUT 1 | 0.12 | P1

5.60ha EXTERNAL | 0.12 | P3

0.27ha EXTERNAL | 0.30 | P2

MANHOLE

COUNTY ROAD 7

COUNTY ROAD 7

#1229 #1247 #1271 #1281 #1295 #1296 #1280 #1315 #1329 #1338 #1357 #1361 #1367

0 40 80 m H=1:2000

AREA IN HECTARES

#.## ha

#.## | ##

RUNOFF COEFFICIENT

CATCHMENT ID

MAJOR FLOW PATH

ENHANCED SWALE

TOP OF BANK

WATERCOURSE

EXTERNAL AREA= 9.02 ha
PROPOSED SITE AREA = 9.99 ha

TOTAL CATCHMENT AREA= 19.01 ha

Benchmark

No.	Revision/Issue	Date
R3	FOR UPDATED STM REPORT	OCT 2026
R2	FOR UPDATED STM REPORT	FEB 2023
R1	FOR UPDATED STM REPORT	JUNE 2021

Forefront Engineering Inc

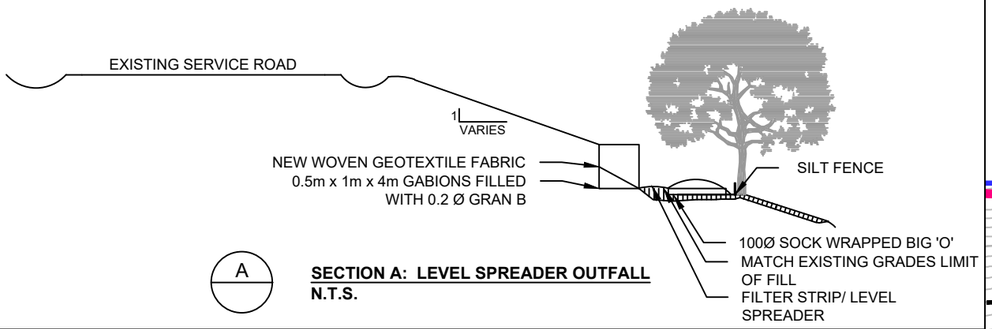
1329 Gardiners Road, Suite 210
Kingston, ON, Canada K7P 0L8
613.634.9009 tel.
1.866.884.9332 fax.

Client
2522082 ONTARIO INC.

Project
ADOLPHUS REACH RESORT

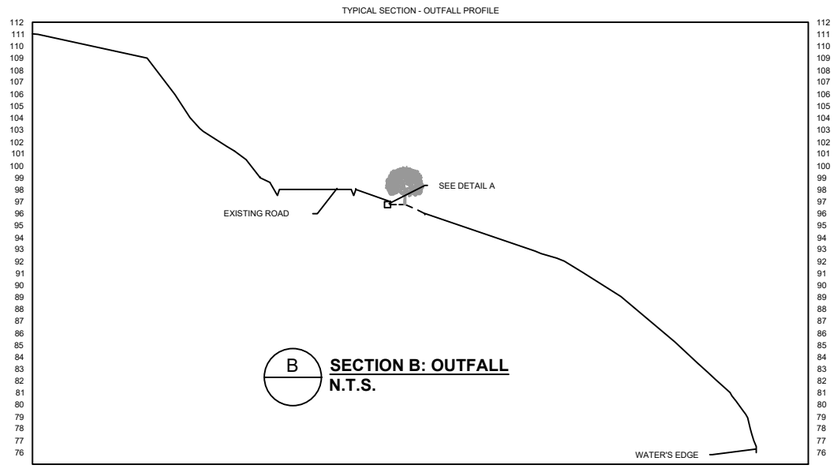
Drawing
POST-DEVELOPMENT CATCHMENT AREAS

Drawn by:	Checked by:	Project No.
JH	KMN	
Designed by:	Approved by:	Drawing No.
JH	KMN	FIG.3
Date: JUNE 2021		
Scale: 1:2000 (11X17)		



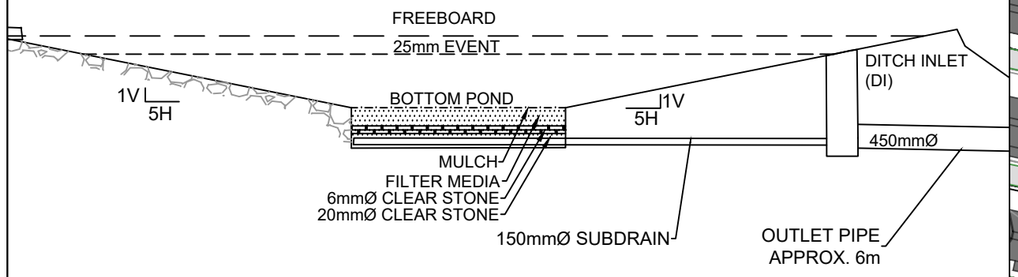
A

SECTION A: LEVEL SPREADER OUTFALL
N.T.S.



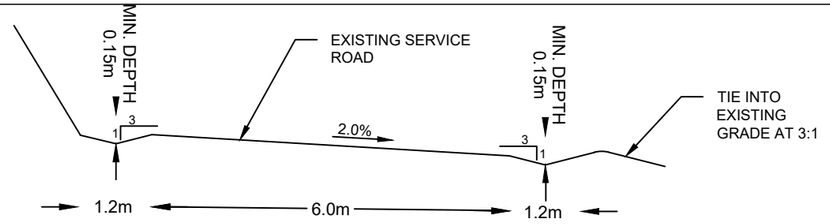
B

SECTION B: OUTFALL
N.T.S.



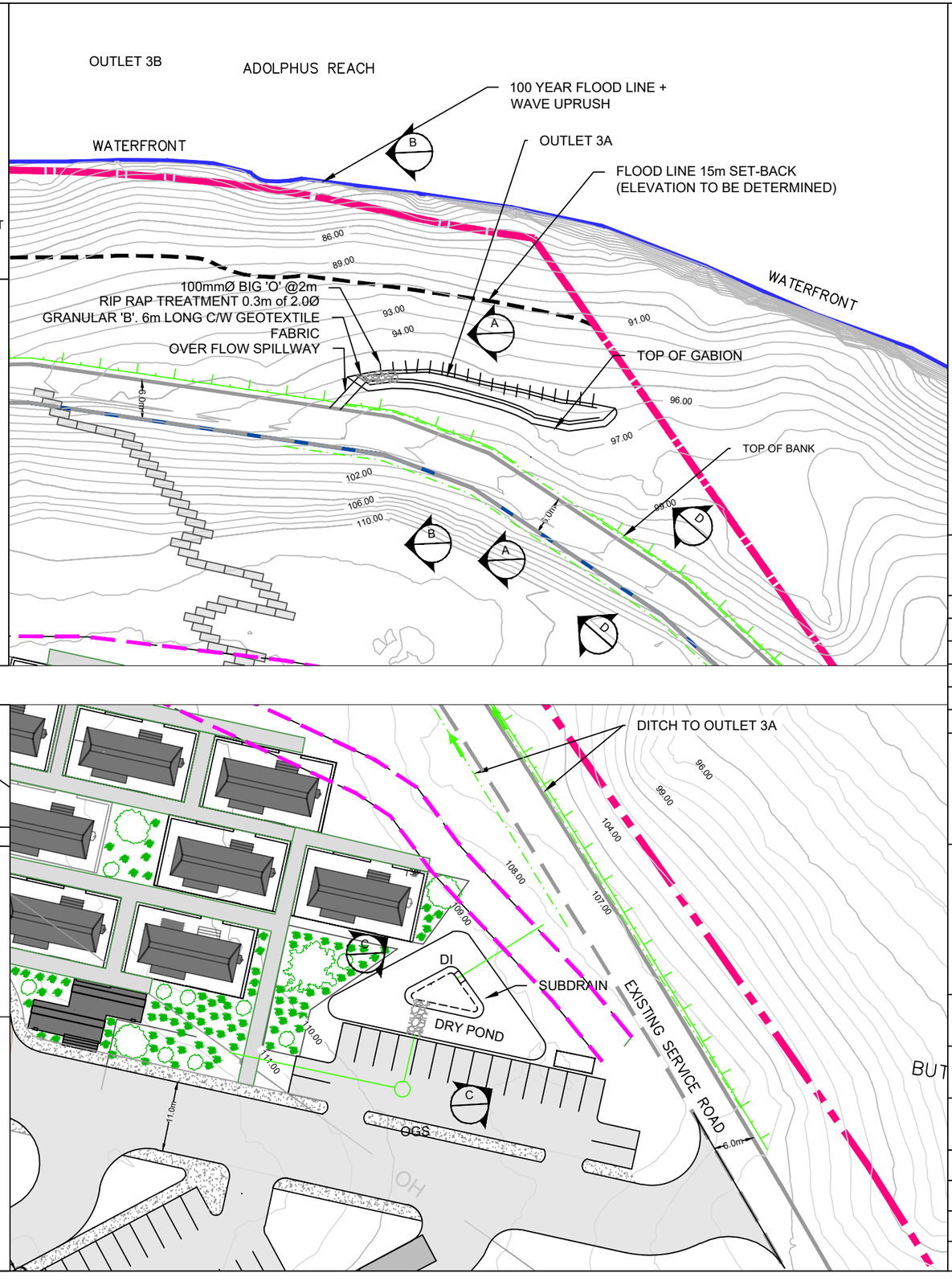
C

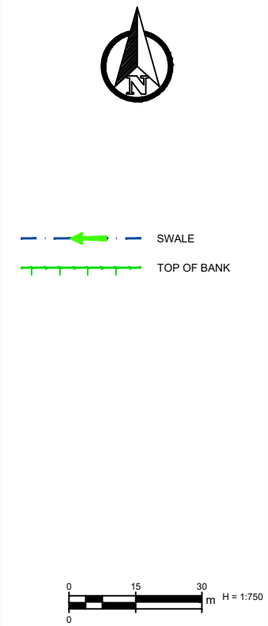
SECTION C: DRY POND STORMWATER MANAGEMENT FACILITY DETAIL
N.T.S.



D

SECTION D: ROADSIDE SWALE DETAIL
N.T.S.





Benchmark

No.	Revision/Issue	Date

Forefront Engineering Inc
1329 Gardiners Road, Suite 210
Kingston, ON, Canada K7P 0L8
613.634.9009 tel.
1.866.884.9392 fax.

Client: 2522082 ONTARIO INC.

Project: ADOLPHUS REACH RESORT

Drawing: OUTLET DETAILS

Drawn by:	Checked by:	Project No.
ED	KMN	
Designed by:	Approved by:	Drawing No.
JH	KMN	FIG. 4
Date: SEPT 2025		
Scale: 1:750		

Appendix B

IDF – Belleville Area

Composite Runoff Coefficients

Rational Method Calculations

Outlet Swale Calculations

25 mm Event Stage – Dry Pond Stage Storage Curve

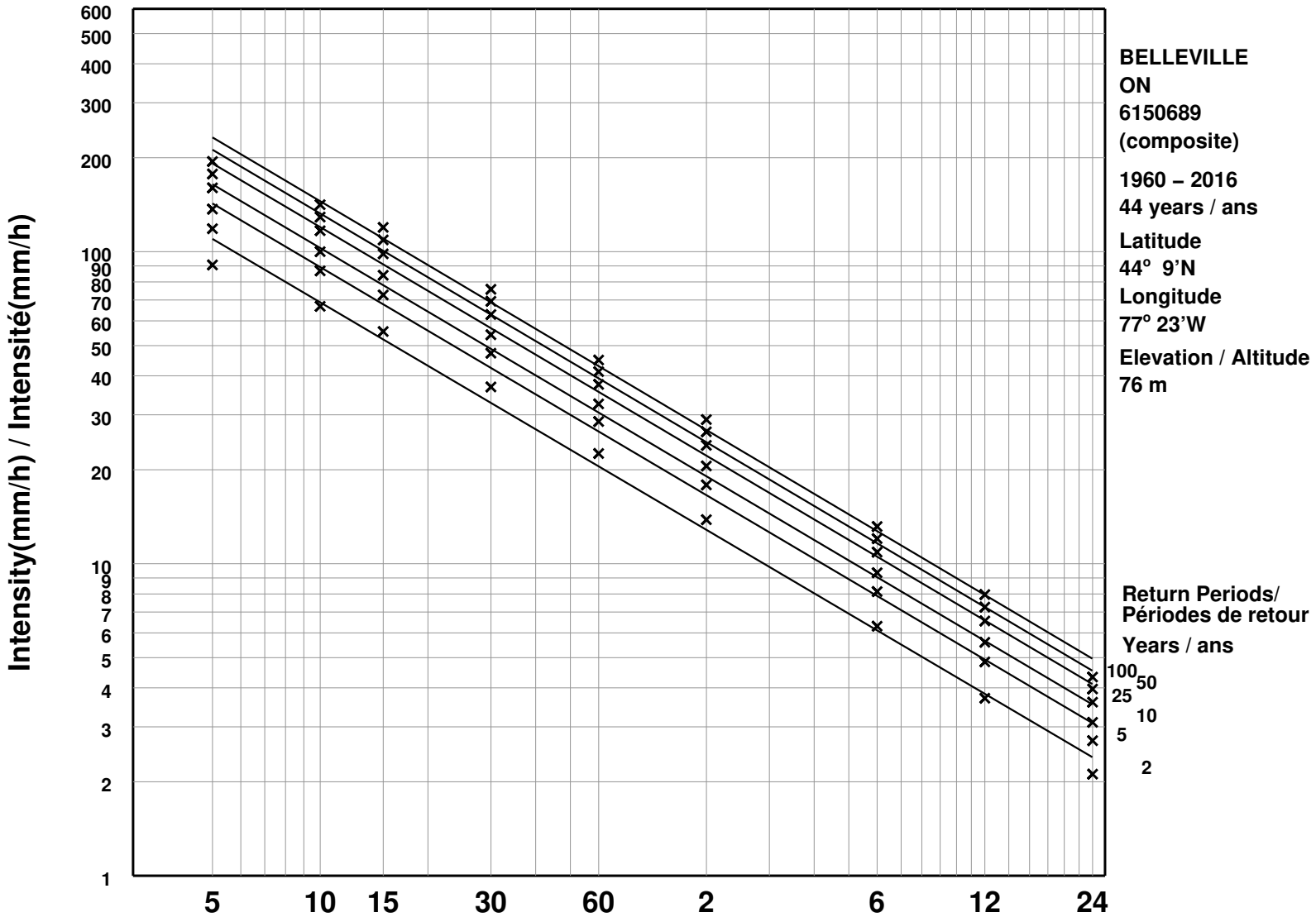
Echelon Environmental Sizing Report and Cumulative Volume Calculations

OGS Operations & Maintenance Manual

Short Duration Rainfall Intensity–Duration–Frequency Data

2022/10/31

Données sur l'intensité, la durée et la fréquence des chutes de pluie de courte durée



Environment Canada Environnement Canada

Canada

Composite Runoff Coefficients
Adolphus Reach Resort
Hydrologic Units - Proposed Conditions

Description	Quantity	Indiv. Area (ha)	Total Area (ha)	Runoff Coefficient C	Comments
Catchment Area P5					
Septic Building	1	0.01	0.01	0.90	
2+3 Bedroom Cabin	23	0.01	0.20	0.90	
Main Entrance Building	1	0.03	0.03	0.90	
Water Treatment Building	1	0.01	0.01	0.90	
Electrical Building	1	0.01	0.01	0.90	
Concrete / Hard Surface	-	-	0.18	0.90	
Lane + Parking Lot	-	-	0.70	0.90	
Proposed Landscape	-	-	0.60	0.12	0-5%, Sand / Farmington Loam Soil
Walkway	-	-	0.25	0.70	Stone Dust Walkway
Existing Grass	-	-	0.58	0.12	
Total			**2.57**	**0.52**	
Catchment Area P6					
2+3 Bedroom Cabin	9	0.009	0.08	0.90	
Concrete / Hard Surface	-	-	0.07	0.90	
Proposed Landscape	-	-	0.05	0.12	0-5%, Sand / Farmington Loam Soil
Walkway	-	-	0.07	0.70	Stone Dust Walkway
Existing Grass / Bare Area	-	-	1.16	0.20	Steep Slope
Total			**1.52**	**0.28**	

$$C_{weighted} = \frac{C_1 * A_1 + C_2 * A_2 + C_3 * A_3 \ldots + C_n * A_n}{A_1 + A_2 + A_3 \ldots A_n}$$

Source: MTO Design Chart 1.07		**Min**	**Max**
Pavement		0.80	0.95
Gravel Roads and Shoulders		0.40	0.60
Roofs		0.70	0.95
Unimproved Areas		0.10	0.30

Land Use & Topography	**Soil Texture**		
	Open Sand Loam	**Loam or Silt Loam**	**Clay Loam or Clay**
Cultivated			
Flat 0-5% Slopes	0.22	0.35	0.55
Rolling 5-10% Slopes	0.30	0.45	0.60
Hilly 10-30% Slopes	0.40	0.65	0.70
Pasture			
Flat 0-5% Slopes	0.10	0.28	0.40
Rolling 5-10% Slopes	0.15	0.35	0.45
Hilly 10-30% Slopes	0.22	0.40	0.55
Woodlands and Cutover			
Flat 0-5% Slopes	0.08	0.25	0.35
Rolling 5-10% Slopes	0.12	0.30	0.42
Hilly 10-30% Slopes	0.18	0.35	0.52
Bare Rock	**Coverage**		
	0.30	0.50	0.70
Flat 0-5% Slopes	0.40	0.55	0.75
Rolling 5-10% Slopes	0.50	0.65	0.80
Hilly 10-30% Slopes	0.55	0.70	0.85
Lakes and Wetlands	0.05		

RATIONAL METHOD CALCULATIONS

Project: Adolphus Reach Resort

Date: Oct 2026

Pre-Development Conditions										**Cumulative**		**25mm -4hr Quality Event**		**2 Year Design Storm**		**5 Year Design Storm**		**100 Year Design Storm**	
Hydrologic Unit	Description	Est'd C	Area (ha)	Watershed Length (m)	Average Width (m)	Average Grade (%)	Tc (Kirpich Method)	Tc (Airport Method) (C<0.4)	Indiv. Tc Proposed	Cumulative Tc Proposed	2.78AC (ha)	Intensity I (mm/hr)	Peak Flow Q (LPS)	Intensity I (mm/hr)	Peak Flow Q (LPS)	Intensity I (mm/hr)	Peak Flow Q (LPS)	Intensity I (mm/hr)	Peak Flow Q (LPS)
Outlet 1 - Sheet flow to Adjacent Property Channel																			
EX.3	External - Sheet Flow to EX.1	0.12	5.60	420	119	2.0	9.03	51.9	51.9	**51.9**	1.87	16.6	31	24.7	46	33.44	62	50.6	94
EX.2	External - Sheet Flow to EX.1	0.30	0.27	195	13	0.5	8.50	-	15.0	15.0	0.23	35.3	8	54.2	12	71.15	16	116.0	26
EX.1	Site - Sheet Flow to Outlet 1	0.12	5.12	245	213	5.1	4.19	29.3	29.3	**81.2**	3.80	12.1	46	18.1	69	24.47	93	37.1	141
Outlet 2 - Sheet flow to Adjacent Property																			
EX.4	External - Sheet Flow to EX.5	0.12	3.15	300	113	2.0	7.00	44.0	44.0	**44.0**	1.05	18.6	20	27.6	29	37.39	39	56.7	60
EX.5	Site - Sheet Flow to Adolphus Reach	0.12	2.07	243	83	4.8	4.23	29.6	29.6	**73.6**	1.74	13.0	23	19.5	34	26.36	46	39.9	69
Outlet 3 - Sheet Flow Directly to Adolphus Reach																			
EX.6	Site - Sheet Flow to Adolphus Reach	0.20	2.80	140	120	30.4	1.37	11.3	15.0	**15.0**	1.56	35.3	55	54.2	84	71.15	111	119.0	185

Adolphus Reach **Hydraulic Units - Post Development Conditions**										**Cumulative**		**25mm -4hr Quality Event**		**2 Year Design Storm**		**5 Year Design Storm**		**100 Year Design Storm**	
Hydrologic Unit	Description	Est'd C	Area (ha)	Watershed Length (m)	Average Width (m)	Average Grade (%)	Tc (Kirpich Method)	Tc (Airport Method) (C<0.4)	Indiv. Tc Proposed	Cumulative Tc Proposed	2.78AC (ha)	Intensity I (mm/hr)	Peak Flow Q (LPS)	Intensity I (mm/hr)	Peak Flow Q (LPS)	Intensity I (mm/hr)	Peak Flow Q (LPS)	Intensity I (mm/hr)	Peak Flow Q (LPS)
Outlet 1 - Sheet flow to Adjacent Property Channel																			
P3	External Sheet Flow to P1	0.12	5.60	420	119	2.0	9.03	51.9	51.9	51.9	1.87	16.6	31	24.7	46	33.4	62	50.6	94
P2	External Sheet Flow to P1	0.30	0.27	195	13	0.5	8.50	-	15.0	15.0	0.23	35.3	8	54.2	12	71.2	16	116.0	26
P1	Site - Sheet Flow to Outlet 1	0.12	4.61	245	213	5.1	4.17	29.2	29.2	**81.1**	3.63	12.1	44	18.1	66	24.5	89	37.1	135
Outlet 3A - Sheet Flow Directly to Adolphus Reach																			
P4	External Sheet Flow to P5	0.12	3.15	300	113	2.0	7.00	44.0	44.0	44.0	1.05	18.6	20	27.6	29	37.4	39	56.7	60
P5	Dry Pond & OGS to Outlet 3	0.52	2.57	250	100	3.0	5.20	20.8		**49.2**	4.77	-	-	25.6	122	34.7	165	52.9	252
P5	Dry Pond & OGS to Outlet 3	0.52	2.57	250	100	3.0	5.20			**15.0**	3.72	35.3	131	Note Catchment P4 does not contribute during the 25mm Event					
Outlet 3B - Sheet Flow Directly to Adolphus Reach																			
P6	Flow directed to Filter Strip	0.28	1.52	86	176	14	1.26	10.4	15.0	**15.0**	1.18	35.3	42	54.2	64	71.2	84	119.0	141
P7	Direct to Outlet 3	0.20	1.29	34	218	84	0.31	4.0	15.0	**19.0**	1.90	31.2	59	47.4	90	62.9	120	102.1	194

Rational Method Calculations

Formula:

Q (LPS) = 2.78* C * I * A

Where:

Q = Peak runoff rate, LPS

C = Composite runoff coefficient

I = Rainfall intensity, mm/hr,
Environment Canada IDF Curve (Quantity Event)

t_c = Time of Concentration, (15 minute minimum)

Kirpich Method $0.0192[L^{0.77}/S_{(m/m)}^{0.385}]$

Airport Method $3.26(1.1 - C)* L^{0.5}/ S_w^{0.33}$

A = Drainage area, ha

25mm - 4 hr (Quality Event)

$$I_{(25mm)} = \frac{498}{(tc + 9.7)^{0.825}}$$

Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Thursday, Oct 8 2026

1:2 Year Peak Flow - Outlet Swale & Access Road

User-defined

Invert Elev (m)	= 99.8000
Slope (%)	= 9.5000
N-Value	= Composite

Calculations

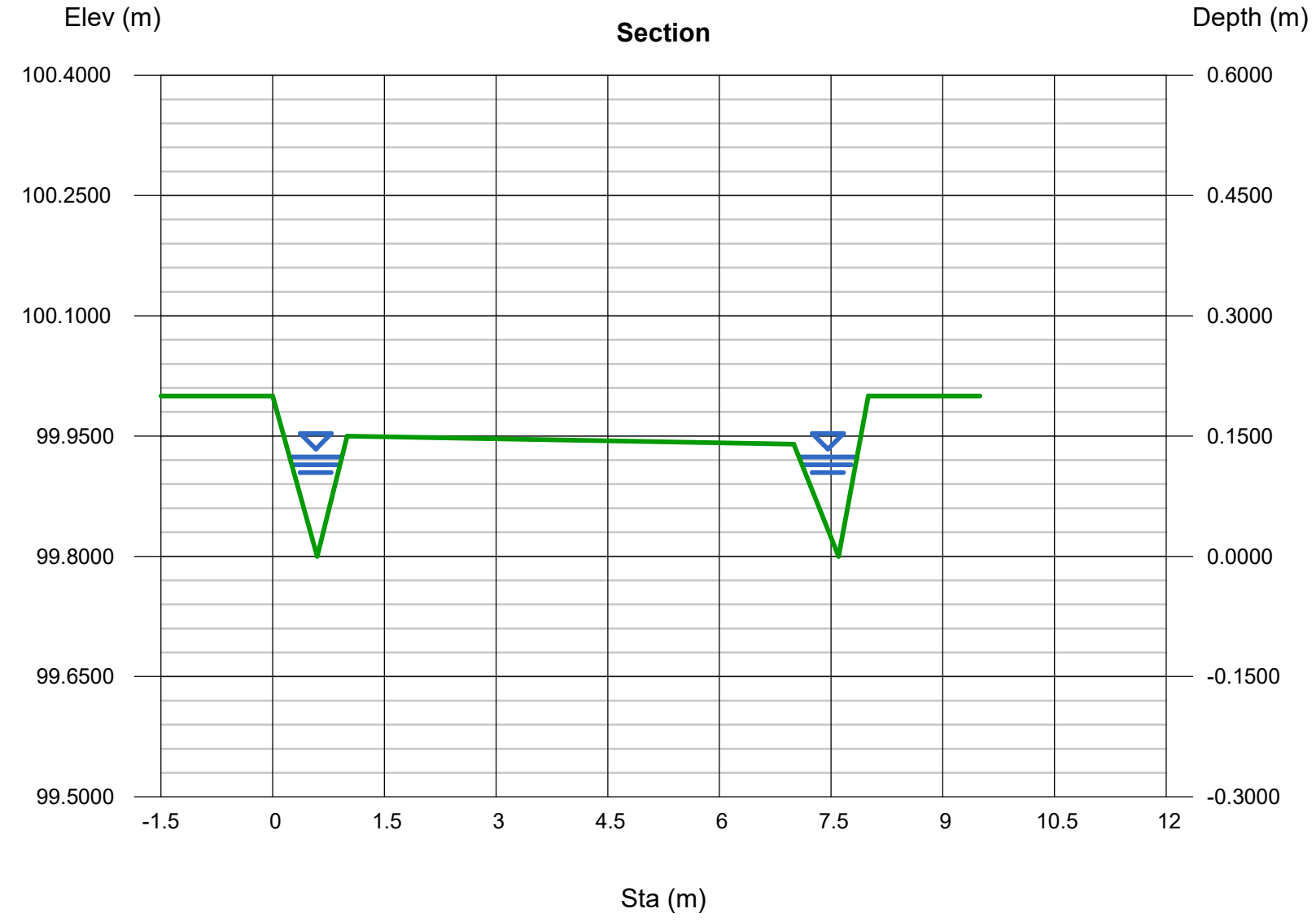
Compute by:	Q vs Depth
No. Increments	= 50

Highlighted

Depth (m)	= 0.1240
Q (cms)	= 0.122
Area (sqm)	= 0.0919
Velocity (m/s)	= 1.3301
Wetted Perim (m)	= 1.5683
Crit Depth, Yc (m)	= 0.1585
Top Width (m)	= 1.4821
EGL (m)	= 0.2142

(Sta, El, n)-(Sta, El, n)...

(0.0000, 100.0000)-(0.6000, 99.8000, 0.035)-(1.0000, 99.9500, 0.035)-(7.0000, 99.9400, 0.035)-(7.6000, 99.8000, 0.035)-(8.0000, 100.0000, 0.035)



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Thursday, Oct 8 2026

1:100 Year Peak Flow - Outlet Swale & Access Road

User-defined

Invert Elev (m)	= 99.8000
Slope (%)	= 9.5000
N-Value	= Composite

Calculations

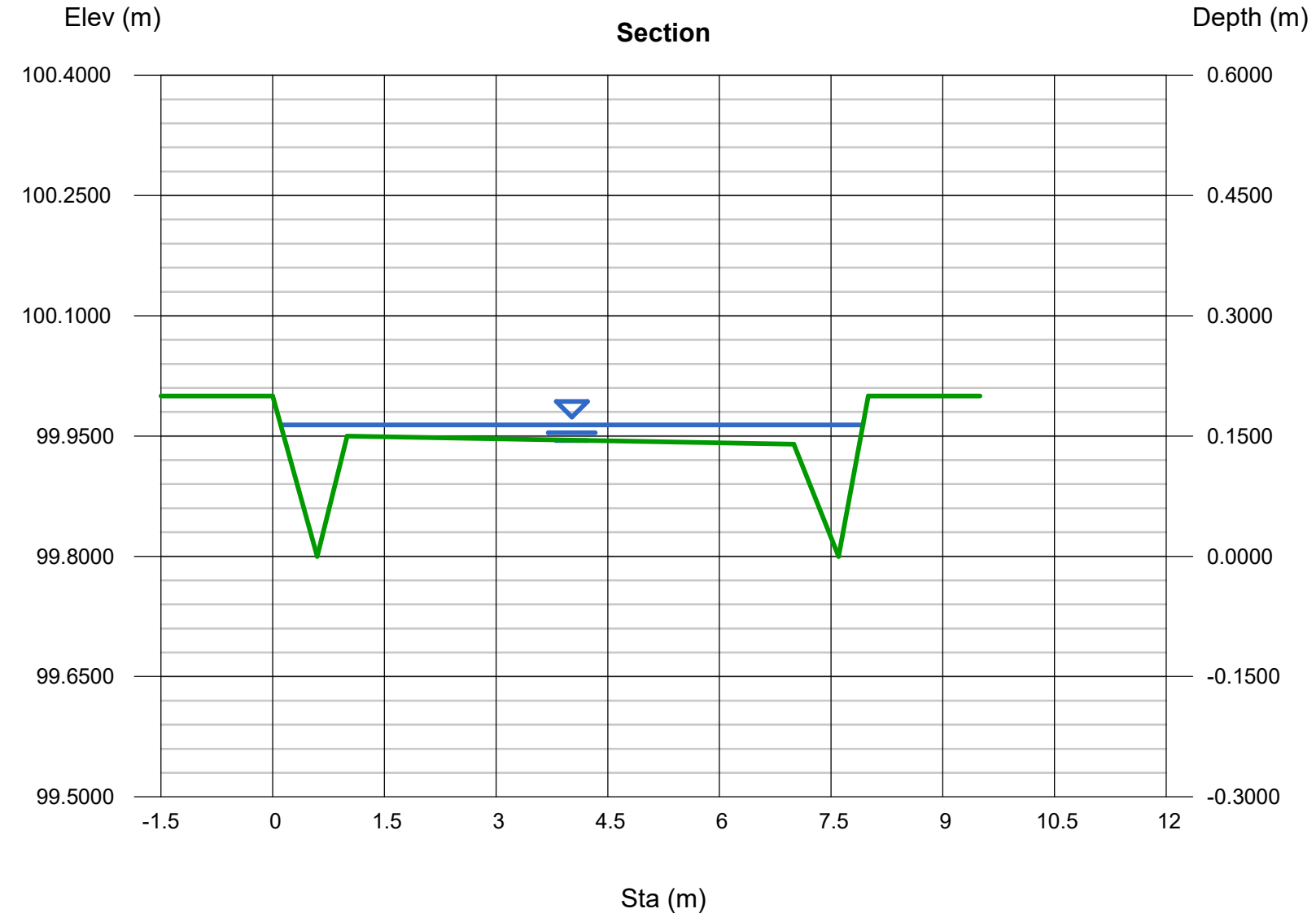
Compute by:	Q vs Depth
No. Increments	= 50

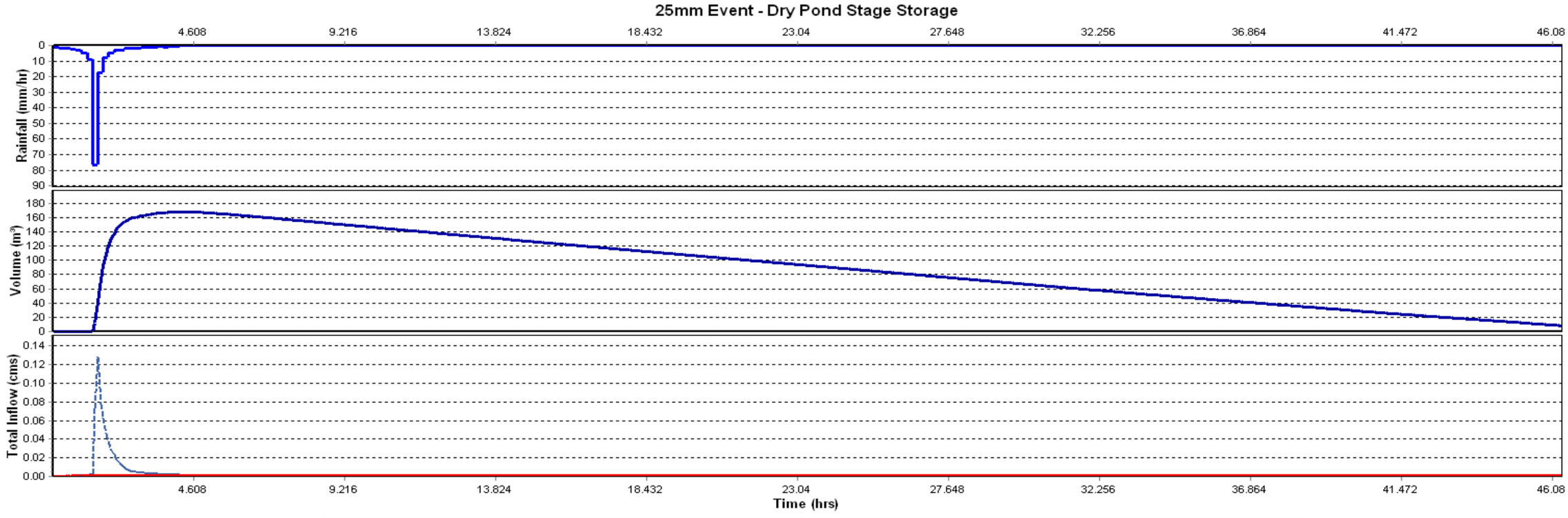
Highlighted

Depth (m)	= 0.1640
Q (cms)	= 0.255
Area (sqm)	= 0.2733
Velocity (m/s)	= 0.9336
Wetted Perim (m)	= 7.9287
Crit Depth, Yc (m)	= 0.1798
Top Width (m)	= 7.8200
EGL (m)	= 0.2085

(Sta, El, n)-(Sta, El, n)...

(0.0000, 100.0000)-(0.6000, 99.8000, 0.035)-(1.0000, 99.9500, 0.035)-(7.0000, 99.9400, 0.035)-(7.6000, 99.8000, 0.035)-(8.0000, 100.0000, 0.035)





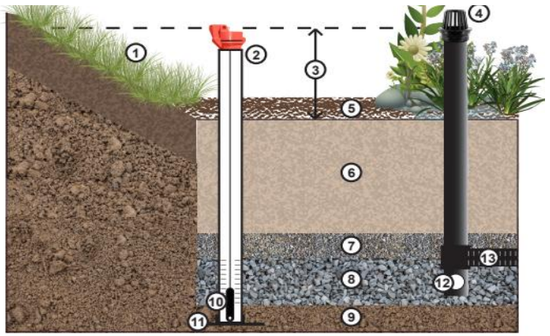
Dry Pond Stage-Storage - Release				
Depth (m)	**Area (m^2)**	**δVolume (m^3)**	**Cumulative Volume (m^3)**	**Release Rate (m^3/s)**
0.00	70	0	0	0.0008
0.10	91	8.0	8	0.0009
0.20	114	10.2	18	0.0009
0.30	140	12.7	31	0.0010
0.40	169	15.5	46	0.0010
0.50	201	18.5	65	0.0011
0.60	235	21.8	87	0.0011
0.70	272	25.3	112	0.0011
0.88	345	55.5	167	0.0012

The filter media is to be a 300 mm depth, 75 mm wood based mulch, 6mm dia. clear stone layer, and 20mm clear stone surrounding an underdrain pipe. Filter Media to be Blend B (STEP), 3 Parts Sand, 2 Parts Topsoil, 1 Part Organics

$$Q_{media} = \frac{K_m \, x \, A_p \, x \, \frac{h}{d_m}}{3.6x10^6}$$

Where
Km is the hydraulic conductivity of the filter media (mm/hr)
Ap is the area of the practice (m2)
h is the total head of water within the dry pond over the outlet pipe (m)
dm is the depth of the filter media (m)

K_m	25	mm/h
A_p	70	m^2
d_m	0.3	m
Outlet Pipe Depth	0.5	m



1. Grass filter strip
2. Monitoring well with removable cap
3. Maximum surface ponding depth
4. Overflow outlet
5. Mulch
6. Filter media
7. 6 mm dia. clear stone choker layer
8. 20 mm dia. clear stone
9. Native soil
10. Water level logger
11. Cap stand
12. Outlet pipe
13. Perforated pipe underdrain

CDS ESTIMATED NET ANNUAL TSS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD
AND A FINE PARTICLE SIZE DISTRIBUTION

Echelon Environmental
55 Albert Street, Suite #200 | Markham, ON, L3P 2T4
www.echelonenvironmental.ca info@echelonenvironmental.ca 905-948-0000

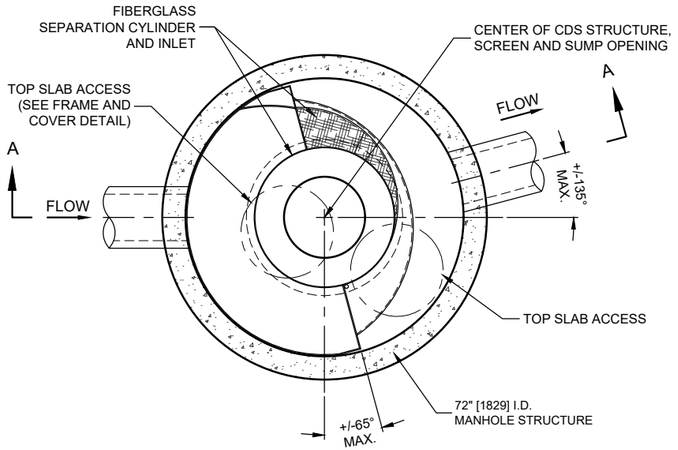
Project Name:	Adoplhus Reach	**Engineer:**	**Forefront Engineering**
Location:	Prince Edward County, ON	**Contact:**	Jeff Homer, P.Eng
OGS ID:	OGS	**Report Date:**	18-Sep-25

Area:	2.570	ha	**Rainfall Station #**	213	
C Value:	0.52		**Particle Size Distribution**	FINE	
CDS Model:	PMSU3020-6		**CDS Treatment Capacity:**	57	l/s

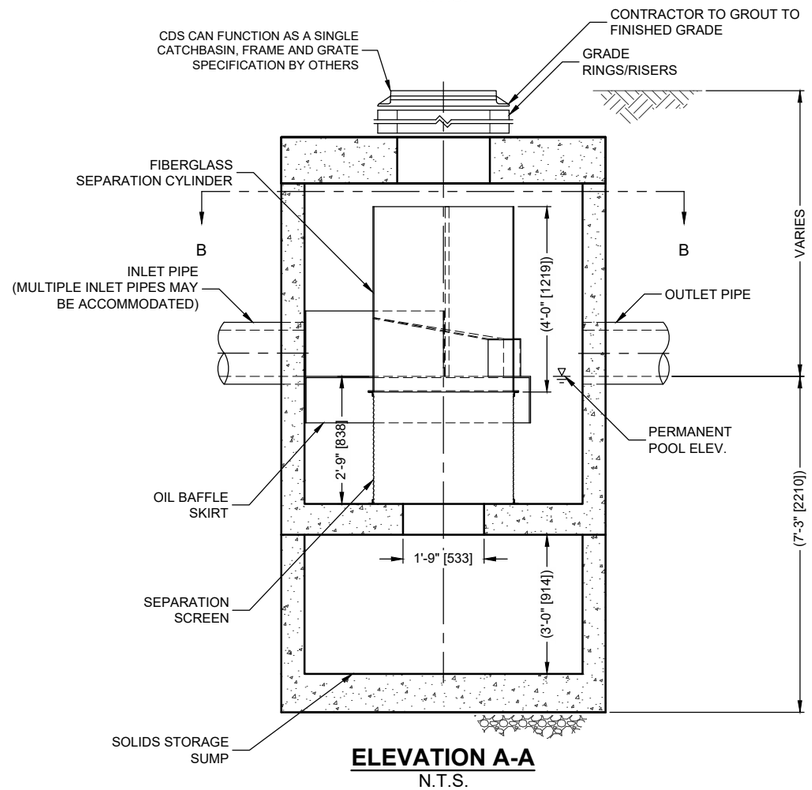
Rainfall Intensity[1] (mm/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (l/s)	Treated Flowrate (l/s)	Operating Rate (%)	Removal Efficiency (%)	Incremental Removal (%)
0.5	9.1%	9.1%	1.9	1.9	3.3	97.9	8.9
1.0	10.7%	19.8%	3.7	3.7	6.6	97.0	10.4
1.5	10.3%	30.1%	5.6	5.6	9.8	96.0	9.9
2.0	8.9%	39.0%	7.4	7.4	13.1	95.1	8.5
2.5	8.2%	47.2%	9.3	9.3	16.4	94.2	7.7
3.0	6.3%	53.5%	11.1	11.1	19.7	93.2	5.8
3.5	4.7%	58.1%	13.0	13.0	23.0	92.3	4.3
4.0	4.7%	62.9%	14.9	14.9	26.2	91.3	4.3
4.5	3.9%	66.7%	16.7	16.7	29.5	90.4	3.5
5.0	3.5%	70.2%	18.6	18.6	32.8	89.5	3.1
6.0	5.9%	76.2%	22.3	22.3	39.4	87.6	5.2
7.0	4.1%	80.2%	26.0	26.0	45.9	85.7	3.5
8.0	3.4%	83.6%	29.7	29.7	52.5	83.8	2.9
9.0	2.1%	85.7%	33.4	33.4	59.0	81.9	1.7
10.0	2.2%	88.0%	37.2	37.2	65.6	80.1	1.8
15.0	6.0%	94.0%	55.7	55.7	98.4	70.7	4.2
20.0	2.8%	96.8%	74.3	56.6	100.0	53.5	1.5
25.0	1.3%	98.1%	92.9	56.6	100.0	42.8	0.6
30.0	1.4%	99.5%	111.5	56.6	100.0	35.7	0.5
35.0	0.3%	99.8%	130.0	56.6	100.0	30.6	0.1
40.0	0.0%	99.8%	148.6	56.6	100.0	26.8	0.0
45.0	0.2%	100.0%	167.2	56.6	100.0	23.8	0.0
50.0	0.0%	100.0%	185.8	56.6	100.0	21.4	0.0
							88.5

Removal Efficiency Adjustment[2] = 6.5%
Predicted Net Annual TSS Removal Efficiency = 82.0%
Predicted Annual Rainfall Treated = 97.6%

1 - Based on 44 years of hourly rainfall data from Canadian Station 6150689, Belleville ON
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.
3 - CDS Efficiency based on testing conducted at the University of Central Florida
4 - CDS design flowrate and scaling based on standard manufacturer model & product specifications



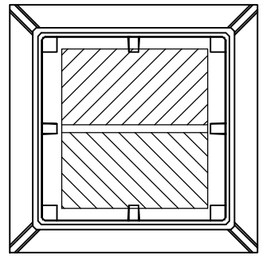
PLAN VIEW B-B
N.T.S.



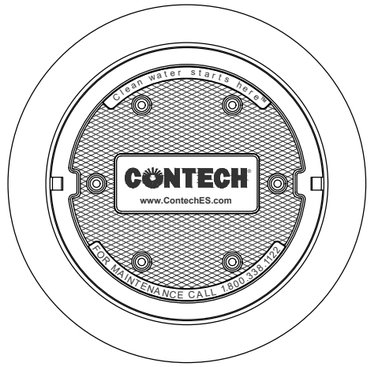
ELEVATION A-A
N.T.S.

CDS PMSU-3020-6-C DESIGN NOTES

THE STANDARD CDS PMSU-3020-6-C CONFIGURATION IS SHOWN.
ANTI-BUOYANCY SLAB MAY BE INCLUDED (NOT SHOWN).
SUMP DEPTH SHOWN IS TYPICAL, CAN BE EXTENDED AS REQUIRED.
HYDRAULIC CHARACTERISTICS VARY BASED ON PIPE SIZE, MATERIAL, AND CDS UNIT SELECTION. FOR CUSTOM HYDRAULIC ANALYSIS PLEASE CONTACT ECHELON ENVIRONMENTAL.
FOR SITE SPECIFIC DRAWINGS PLEASE CONTACT ECHELON ENVIRONMENTAL.



FRAME AND GRATE
(DIMENSIONS VARIES)
N.T.S.



FRAME AND COVER
(DIAMETER VARIES)
N.T.S.

GENERAL NOTES
1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. DIMENSIONS MARKED WITH ( ) ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
3. FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHTS, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS LLC REPRESENTATIVE. www.ContechES.com
4. CDS WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING.
5. STRUCTURE SHALL MEET AASHTO HS20 LOAD RATING, ASSUMING GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION. CASTINGS SHALL MEET HS20 (AASHTO M 306) AND BE CAST WITH THE CONTECH LOGO.
6. IF REQUIRED, PVC HYDRAULIC SHEAR PLATE IS PLACED ON SHELF AT BOTTOM OF SCREEN CYLINDER. REMOVE AND REPLACE AS NECESSARY DURING MAINTENANCE CLEANING.

INSTALLATION NOTES
A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE CDS MANHOLE STRUCTURE (LIFTING CLUTCHES PROVIDED).
C. CONTRACTOR TO ADD JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS, AND ASSEMBLE STRUCTURE.
D. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT PIPES. MATCH PIPE INVERTS WITH ELEVATIONS SHOWN.
E. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO ASSURE UNIT IS WATER TIGHT, HOLDING WATER TO FLOWLINE INVERT MINIMUM. IT IS SUGGESTED THAT ALL JOINTS BELOW PIPE INVERTS ARE GROUTED.

ECHELON ENVIRONMENTAL
55 ALBERT STREET, MARKHAM ON L3P2T4
CONTACT: INFO@ECHELONENVIRONMENTAL.CA
905-948-0000

THIS PRODUCT MAY BE PROTECTED BY ONE OR MORE OF THE FOLLOWING U.S. PATENTS: 5,788,848; 6,641,720; 6,511,595; 6,581,783; RELATED FOREIGN PATENTS, OR OTHER PATENTS PENDING.

CONTECH ENGINEERED SOLUTIONS LLC

CDS PMSU-3020-6-C
ONLINE CDS
STANDARD DETAIL

DATE: 13-FEB-25
REVISION:1
DRAWN BY: PG

STORMWATER TREATMENT UNIT
OPERATION & MAINTENANCE MANUAL

PROJECT NAME
CITY, ON
CDS JOB #



ECHELON ENVIRONMENTAL

505 Hood Road, Unit 26
Markham, ON L3R 5V6
Tel: (905) 948-0000 Fax: (905) 948-0577
Email: info@echelonenvironmental.ca
Website: www.echelonenvironmental.ca

OPERATIONS AND MAINTENANCE GUIDELINES FOR CDS® UNIT MODEL PMSU

(Continuous Deflective Separation Unit)

PROJECT NAME

1. INTRODUCTION

The CDS® unit is an important and effective component of your stormwater management program and proper operation and maintenance of the unit are essential to demonstrate your compliance with local, provincial and federal water pollution control requirements.

Your CDS® system utilizes patented "continuous deflective separation" (CDS®) technology to separate and trap debris, sediment and oil and grease from stormwater runoff. The indirect screening capability of the system allows for 100% removal of floatables and neutrally buoyant material that is larger than the screen aperture.

2. OPERATION OVERVIEW

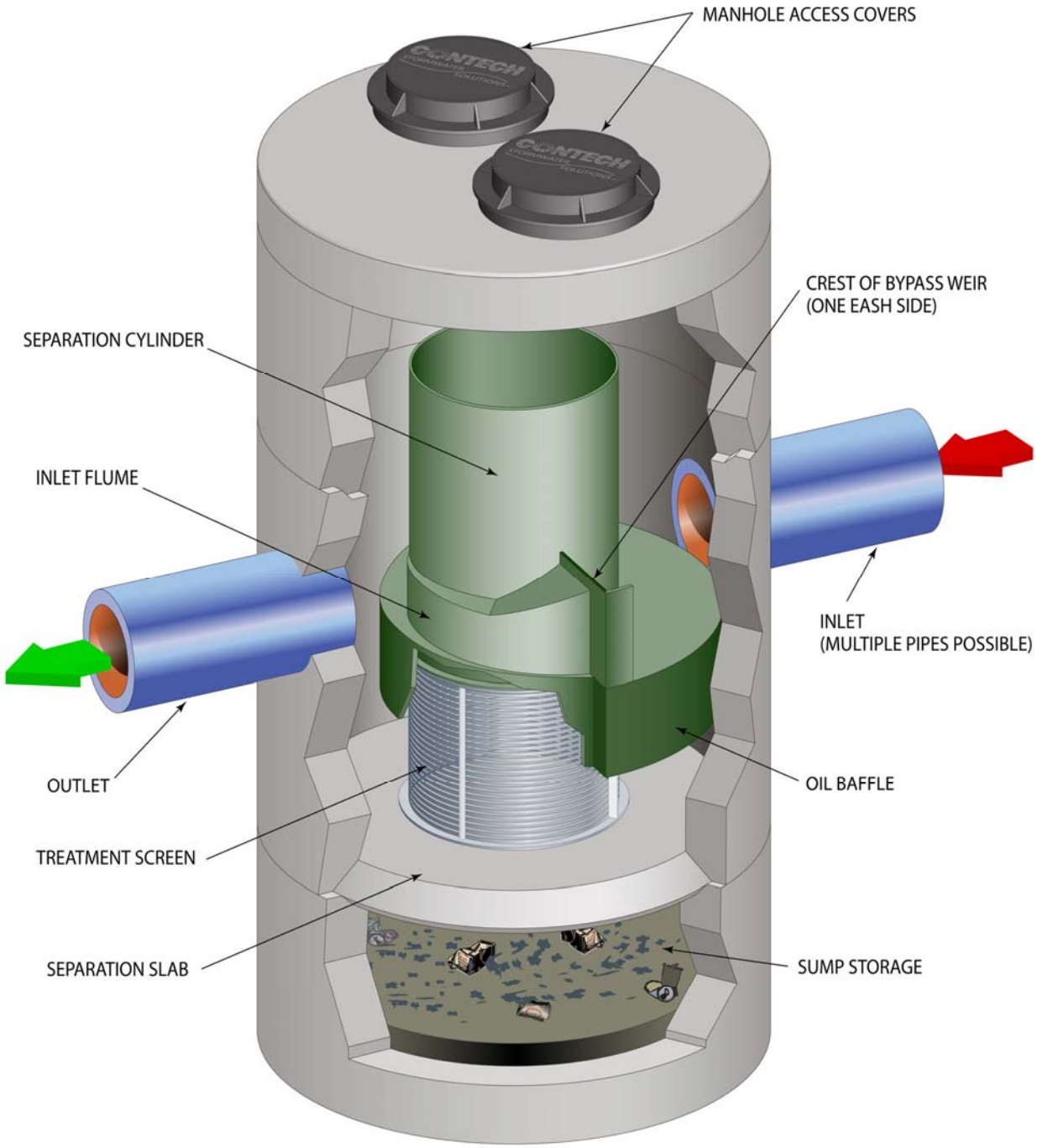
The CDS® unit is a non-mechanical hydraulically driven technology that will function any time there is flow in the storm drainage system. Stormwater enters the CDS® System (Figure 1) where the bypass weir guides the flow into the unit's separation chamber and pollutants are removed from the flow. All flows up to the system's treatment design capacity enter the separation chamber and are treated. Flows in excess of the treatment capacity spill over the bypass weir and exit the system through the outlet pipe.

Stormwater entering the CDS® System circulates in a torriodial flow path. This flow pattern helps to maintain the non-blocking attributes of the treatment screen as well as creating a hydraulic condition at the screen surface that effects pollutant separation. Treated stormwater passes through the screen into the outer volute area where it moves toward the outlet pipe and out of the system.

The separation chamber is shrouded by an integral oil baffle that traps free oil and grease that floats to the water surface during treatment.

During normal operation captured grit will fall by gravity into the lower storage sump located beneath the treatment chamber. Floatables will be captured at the water surface inside the separation chamber and oil, if present, will be located at the water surface underneath the integral oil baffle.

Figure One: In-Line CDS® Systems



3. INSPECTION OVERVIEW

The frequency of cleaning for the CDS® unit will depend upon the generation of trash and debris and sediments in each application. Cleanout and preventive maintenance schedules will be determined based on operating experience unless precise pollutant loadings have been determined. The unit should be periodically inspected to determine the amount of accumulated pollutants and to ensure that the cleanout frequency is adequate to handle the predicted pollutant load being processed by the CDS® unit. The recommended cleanout of solids within the CDS® unit's sump should occur at 85% of the sump capacity. Note that the sump may be completely full with no impact on the CDS® unit's performance.

Access to the CDS® unit is typically achieved through two manhole access covers – one allows inspection and cleanout of the separation chamber (screen/cylinder) & sump and another allows inspection and cleanout of sediment captured and retained behind the screen. The PSW & PSWC off-line models have an additional access cover over the weir of the diversion vault. Inspections of the internal components and cleanout maintenance can, in most cases, be accomplished from the ground surface without requiring entry into the unit.

IMPORTANT - CONFINED SPACE

The CDS® unit is a confined space environment and only properly trained personnel possessing the necessary safety equipment should enter the unit to perform maintenance and/or inspection. Personnel inspecting the system or performing maintenance must have proper training certification in Fall Protection and Confined Space entry as a minimum.

4. MAINTENANCE

Contech Engineered Solutions recommends the following:

NEW INSTALLATIONS – Check the condition of the unit after every runoff event for the first 30 days. The visual inspection should ascertain that the unit is functioning properly (no blockages or obstructions to inlet and/or separation screen), and should measure the amount of solid materials that have accumulated in the sump, the amount of fine sediment accumulated behind the screen, and determining the amount of floating trash and debris in the separation chamber. This can be done with a calibrated "dip stick" so that the depth of deposition can be tracked. Refer to the "Inspection Schematic" **(Appendix C)** for allowable deposition depths and critical distances. Schedules for inspections and cleanout should be based on storm events and pollutant accumulation.

ONGOING OPERATION – Once the site is established, the inspection frequency should be based on historical pollutant loading. In general, CDS sumps are sized for a cleanout frequency in the order of 12 to 24 months. If floatables accumulate more rapidly than the settleable solids, the floatables should be removed using a vactor truck or dip net before the layer thickness exceeds one to two feet.

Cleanout of the CDS® unit at the end of a rainfall season is recommended because of the nature of pollutants collected and the potential for odor generation from the decomposition of material collected and retained. This end of season cleanout will assist in preventing the discharge of pore water from the CDS® unit during summer months.

It is recommended to pump down the CDS® unit and remove pollutants at least one time per year. (This may be extended for fully developed sites that generate small pollutant loadings.) During cleanout, the internal components normally below the water line should be inspected. If any parts appear to be damage please contact Contech Engineered Solutions or Echelon Environmental to make arrangements to have the damaged items repaired or replaced:

CONTECH ENGINEERED SOLUTIONS
200 Enterprise Drive
Scarborough, ME 04074
Phone: 877-907-8676
www.conteches.com

ECHELON ENVIRONMENTAL
505 Hood Road, Unit #26
Markham, ON L3R 5V6
Phone: 905-948-0000
Email: info@echelonenvironmental.ca

CLEANOUT AND DISPOSAL

A vactor truck is recommended for cleanout of the CDS® unit and can be easily accomplished in less than 30-40 minutes for most installations. Cleanout should be conducted by a licensed waste management company. Disposal of material from the CDS® unit should be in accordance with the local municipality's requirements. During cleanout the vactor truck will evacuate all stormwater and pollutants from the CDS® unit. (Local waste receiving stations may require the solids to have minimal water content. If decanting of stormwater from the vactor truck is required then the local permitting and regulatory authority should be contacted to determine if this is permissible.) Vactor trucks are typically equipped with a power wash system that may be used to wash the screen if required.

If oil is present in the CDS® unit it should be removed separately by a licensed liquid waste hauler. The CDS® unit should be cleaned immediately if a hydrocarbon spill has occurred. CDS® Technologies only recommends the addition of sorbents to the separation chamber if there are specific land use activities in the catchment watershed that could produce exceptionally large concentrations of hydrocarbons. Alternatively, the local regulator may allow the use of sorbents to capture and remove hydrocarbons from the CDS® system. Disposal of sorbents may be less costly and disposing of an oily-water mixture creating by vacuum removal.

5. OPTIONAL FEATURES

USE OF SORBENTS FOR ENHANCED OIL CAPTURE

It should be emphasized that the addition of sorbents is not a requirement for CDS® units to effectively capture oil and grease from storm water runoff. The CDS® unit separation chamber effectively captures free oil and grease and CDS® units are also equipped with a conventional oil baffle for the capture of gross quantities. However, the addition of sorbents is a unique capability of CDS® units that enables enhanced oil and grease capture efficiencies beyond that obtainable by conventional oil baffle systems as well as permanent retention of captured oil and grease in solid form that prevents emulsification and conveyance.

Under normal operations, CDS® units will provide effluent concentrations of oil and grease that are less than 15 parts per million (ppm) for all dry weather spills where the volume is less than or equal to the spill capture volume of the CDS® unit. During wet weather flows, the oil baffle system can be expected to remove between 40 and 70% of the free oil and grease from the storm water runoff.

Contech Engineered Solutions only recommends the addition of sorbents to the separation chamber if there are specific land use activities in the catchment watershed that could produce exceptionally large concentrations of oil and grease in the runoff, or for large amounts that may be subjected to extended periods of inattention. If site evaluations merit an increased control of free oil and grease then oil sorbents can be added to the CDS® unit to thoroughly address these particular pollutants of concern.

Recommended Oil Sorbents - Rubberizer® Particulate 8-4 mesh or OARS™ Particulate for Filtration, HPT4100, or equal, available from Haz-Mat Response Technologies, Inc. 4626 Santa Fe Street, San Diego, CA 92109 (800) 542-3036. OARS™ is supplied by AbTech Industries, 4110 N. Scottsdale Road, Suite 235, Scottsdale, AZ 85251 (800) 545-8999.

The amount of sorbent to be added to the CDS® separation chamber can be determined if sufficient information is known about the concentration of oil and grease in the runoff. Frequently the actual concentrations of oil and grease are too variable and the amount to be added and frequency of cleaning will be determined by periodic observation of the sorbent. As an initial application, CDS® recommends that approximately 4 to 8 pounds of sorbent material be added to the separation chamber of the CDS® units per acre of parking lot or road surface per year. Typically this amount of sorbent results in a ½ inch to one (1") inch depth of sorbent material on the liquid surface of the separation chamber. The oil and grease loading of the sorbent material should be observed after major storm events. Oil Sorbent material may also be furnished in pillow or boom configurations.

The sorbent material should be replaced when it is fully discolored by skimming the sorbent from the surface. The sorbent may require disposal as a special or hazardous waste, but will depend on local and state regulatory requirements.

VECTOR CONTROL

Most CDS® units do not readily facilitate vector infestation. However, for CDS® units that may experience extended periods of non-operation (stagnant flow conditions for more than approximately one week) there may be the potential for vector infestation. In the event that these conditions exist, the CDS® unit may be designed to minimize potential vector habitation through the use of physical barriers (such as seals, plugs and/or netting) to seal out potential vectors. The CDS® unit may also be configured to allow drain-down under favorable soil conditions where infiltration of storm water runoff is permissible. For standard CDS® units that show evidence of mosquito infestation, the application of larvicide is one control strategy that is recommended. Typical larvicide applications are as follows:

SOLID B.t.i. LARVICIDE: ½ to 1 briquet (typically treats 50-100 sq. ft.) one time per month (30-days) or as directed by manufacturer.

SOLID METHOPRENE LARVICIDE (not recommended for some locations): ½ to 1 briquet (typically treats 50-100 sq. ft.) one time per month (30-days) to once every 4-½ to 5-months (150-days) or as directed by manufacturer.

6. RECORDS OF OPERATION AND MAINTENANCE

Contech Engineered Solutions recommends that the owner maintain annual records of the operation and maintenance of the CDS® unit to document the effective maintenance of this important component of your storm water management program. The attached **Annual Record of Operations and Maintenance** form (see **Appendix A**) is suggested and should be retained for a minimum period of three years.

APPENDIX A

CDS® UNIT RECORD OF

OPERATIONS & MAINTENANCE

CDS® UNIT RECORD OF OPERATION & MAINTENANCE

OWNER _____

ADDRESS _____

OWNER REPRESENTATIVE _____ **PHONE** _____

CDS® INSTALLATION:

MODEL DESIGNATION _____ DATE _____
SITE LOCATION _____
DEPTH FROM COVER TO BOTTOM OF SUMP (SUMP INVERT) _____
VOLUME OF SUMP _____ CUBIC METERS

INSPECTIONS:

DATE/INSPECTOR	SCREEN/INLET INTEGRITY	FLOATABLES DEPTH	DEPTH TO SEDIMENT (meters)	SEDIMENT VOLUME* (cubic meters)	SORBENT DISCOLORATION

***Calculate Sediment Volume = (Depth to Sump Invert – Depth to Sediment)*(Volume/meter)**

OBSERVATIONS OF FUNCTION: _____

_____

_____

_____

CLEANOUT:

DATE	VOLUME FLOATABLES	VOLUME SEDIMENTS	METHOD OF DISPOSAL OF FLOATABLES, SEDIMENTS, DECANT AND SORBENTS

SCREEN MAINTENANCE:
Note is Power Washing Performed: _____

CERTIFICATION: _____ **TITLE:** _____

DATE: _____

APPENDIX B

CDS® UNIT

INSPECTION CHECKLIST

Date: _____

INSPECTION CHECKLIST

1. During initial rainfall season, inspect and check condition of unit once every 30 days (as needed, thereafter) ☐

2. Ascertain that unit is functioning properly (no blockages or obstructions to inlet and/or separation screen) ☐

3. Measure amount of solid materials that have accumulated in sump ☐

4. Measure amount of fine sediment accumulated behind screen ☐

5. Measure amount of floating trash and debris in separation chamber ☐

MAINTENANCE CHECKLIST

1. Cleanout unit at beginning and end of rainfall season ☐

2. Pump down unit (at least once a year) and thoroughly inspect separation chamber, separation screen and oil baffle ☐

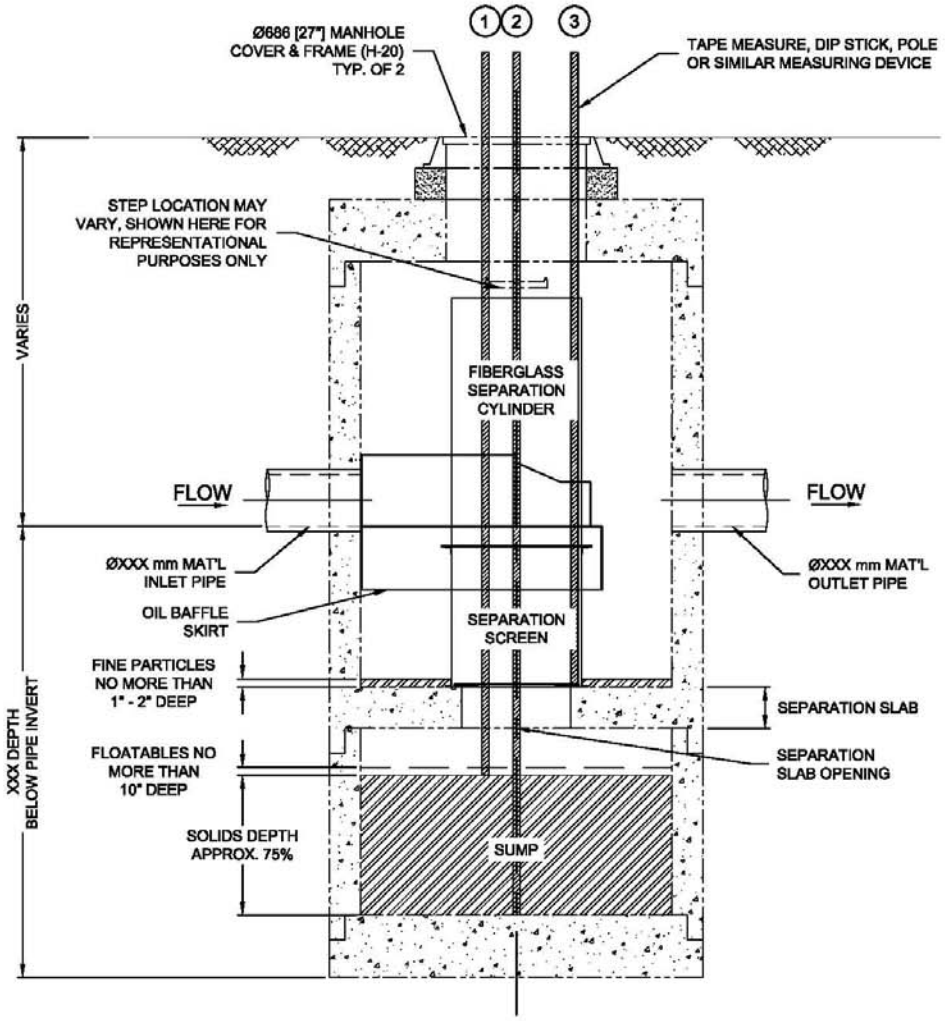
3. No visible signs of damage to internal components observed ☐

APPENDIX C

INSPECTION SCHEMATIC

THIS PRODUCT MAY BE PROTECTED BY ONE OR MORE OF THE FOLLOWING U.S. PATENTS: 5,759,849; 6,641,720; 6,511,593; 6,361,793; RELATED FOREIGN PATENTS, OR OTHER PATENTS PENDING.

ELEVATION VIEW



CDS MODEL
STORM WATER TREATMENT UNIT
INSPECTION SCHEMATIC

ALL UNITS IN mm UNLESS NOTED OTHERWISE.

CONTECH ENGINEERED SOLUTIONS LLC
www.contechES.com
200 Enterprise Drive, Scarborough, ME 04074
877-907-8676 207-885-9830 207-885-9825 FAX

PROJECT NAME
CITY, PROVINCE
SITE DESIGNATION: OGS ID

JOB No.: ###-#####-###	SCALE: 1:30
DATE: XX/XX/XXXX	SHEET: 1
DRAWN: —	
APPROV.:	

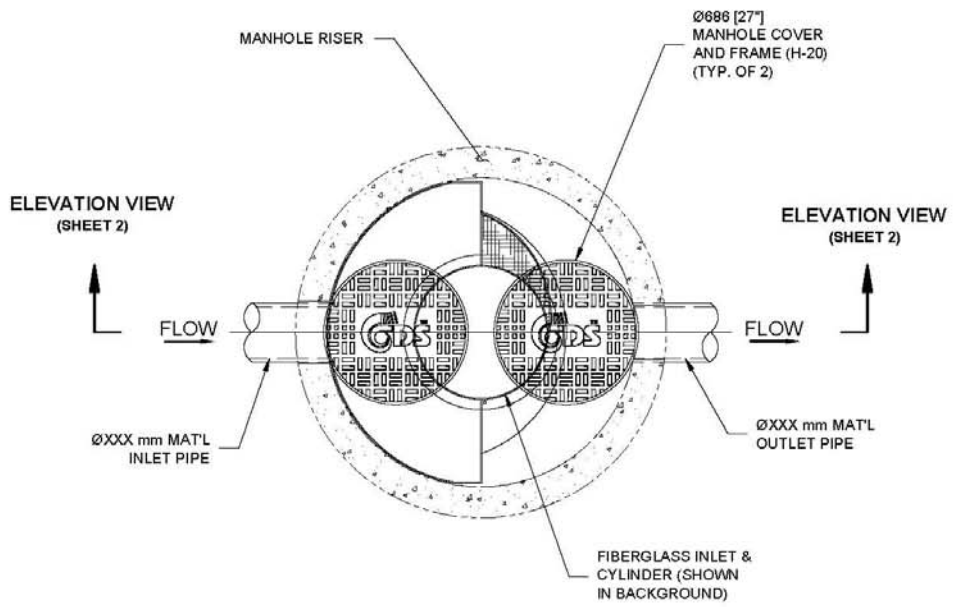
Echelon Environmental, 505 Hood Road, Unit 26, Markham, Ontario L3R 5V6 Tel: (905) 948-0000 Fax: (905) 948-0577

APPENDIX D

CLEANOUT SCHEMATIC

THIS PRODUCT MAY BE PROTECTED BY ONE OR MORE OF THE FOLLOWING U.S. PATENTS: 5,759,940; 6,641,720; 6,511,595; 6,561,733; RELATED FOREIGN PATENTS, OR OTHER PATENTS PENDING.

PLAN VIEW



CDS MODEL
STORM WATER TREATMENT UNIT
CLEANOUT SCHEMATIC

ALL UNITS IN mm UNLESS NOTED OTHERWISE.

CONTECH ENGINEERED SOLUTIONS LLC
www.contechES.com
200 Enterprise Drive, Scarborough, ME 04074
877-907-8676 207-885-9830 207-885-9825 FAX

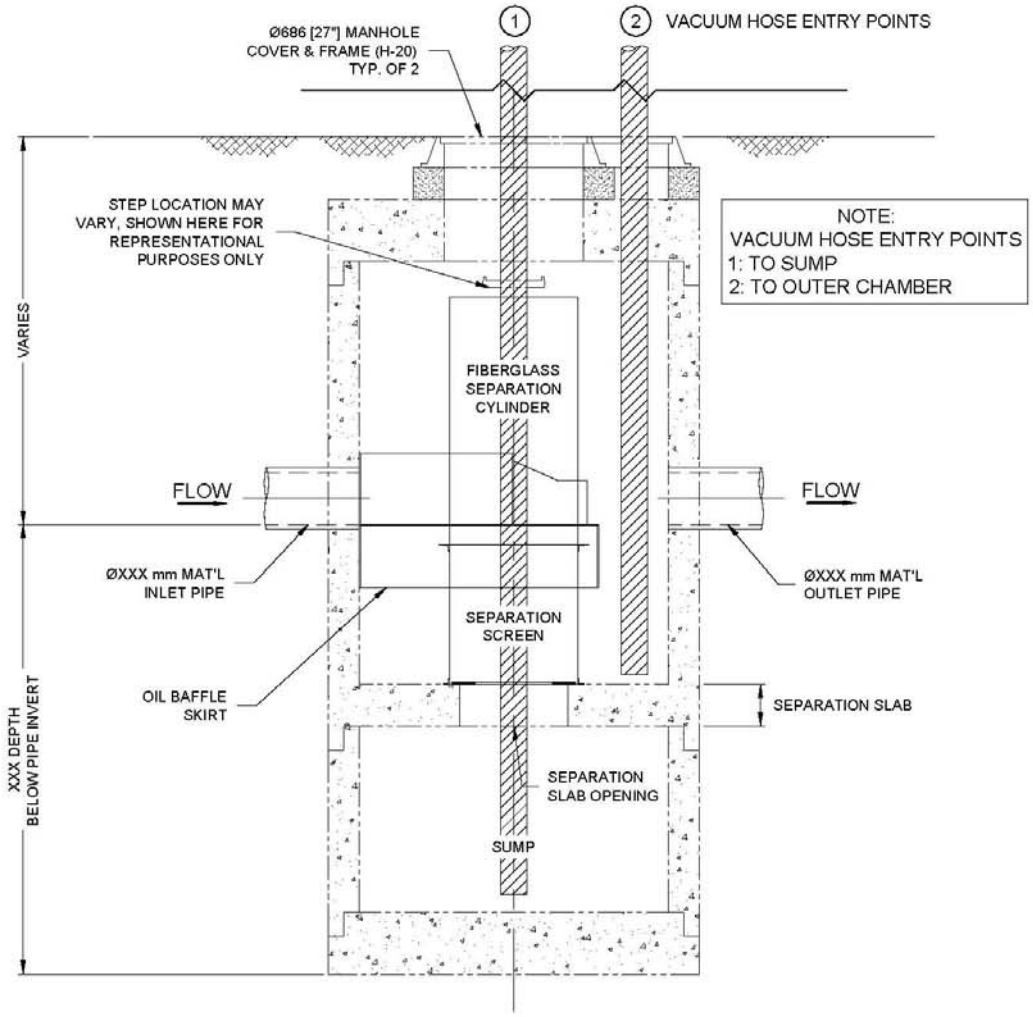
PROJECT NAME
CITY, PROVINCE
SITE DESIGNATION: OGS ID

JOB No. : ###-####-###	SCALE : 1:30
DATE : XX/XX/XXXX	SHEET : 1
DRAWN : ---	
APPROV. :	

Echelon Environmental, 505 Hood Road, Unit 26, Markham, Ontario L3R 5V6 Tel: (905) 948-0000 Fax: (905) 948-0577

THIS PRODUCT MAY BE PROTECTED BY ONE OR MORE OF THE FOLLOWING U.S. PATENTS: 6,290,840; 6,641,720; 6,511,595; 6,551,793; RELATED FOREIGN PATENTS, OR OTHER PATENTS PENDING.

ELEVATION VIEW



CDS MODEL
STORM WATER TREATMENT UNIT
CLEANOUT SCHEMATIC

ALL UNITS IN mm UNLESS NOTED OTHERWISE.

CONTECH ENGINEERED SOLUTIONS LLC
www.contechES.com
200 Enterprise Drive, Scarborough, ME 04074
877-907-8676 207-885-9830 207-885-9825 FAX

PROJECT NAME
CITY, PROVINCE
SITE DESIGNATION: OGS ID

JOB No.: ###-####-###	SCALE: 1:30
DATE: XX/XX/XXXX	SHEET: 2
DRAWN: ---	
APPROV.:	

Echelon Environmental, 505 Hood Road, Unit 26, Markham, Ontario L3R 5V6 Tel: (905) 948-0000 Fax: (905) 948-0577

APPENDIX E

AS-BUILT CDS® UNIT

PLAN & PROFILE

DRAWINGS