Amherst Island Wind Energy Project
Mainland Laydown Area Erosion and Sediment Control Plan and Stormwater Management Report

Prepared for:
Windlectric Inc.
c/o Algonquin Power Co.
354 Davis Road, Suite 100
Oakville, ON L6J 2X1

Prepared by:
Stantec Consulting Ltd.
100-300 Hagey Blvd
Waterloo, ON N2H 6M7

July 24, 2017

Sign-off Sheet

This document entitled Amherst Island Wind Energy Project Mainland Laydown Area Erosion and Sediment Control Plan and Stormwater Management Report was prepared by Stantec Consulting Ltd. ("Stantec") for the account of Windlectric Inc. (the "Client"). Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec's professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

Prepared by _____
(signature)

Nick Emery, P.Eng.

Reviewed by _____
(signature)

Hanna Daniels, EIT

Stantec

Table of Contents

1.0 INTRODUCTION

Stantec Consulting Ltd. (Stantec) was retained by Windlectric Inc. (the Proponent) to assess and review the need for erosion and sediment control (ESC) and stormwater management (SWM) measures associated with the proposed development of the Amherst Island Wind Energy Project (herein referred to as the "Project"). This report is intended to address the requirements for SWM measures as described in Section H of the project's Renewable Energy Approval (REA #7123-9W9NH2) and supplement the information included as part of the application for a REA.

The Project includes the construction of a temporary laydown area, referred to herein as the Mainland Laydown Area (MLA) for stockpiling wind project components and construction materials, and a SWM facility.

This ESC and SWM Report summarizes the assessment of potential hydrologic impacts associated with the construction phase (i.e., ESC) and operational phase (i.e., SWM) of the Project. Assessed potential hydrologic impacts include changes to the stormwater runoff quality and/or quantity discharged to the surface or sub-surface receiving systems. The objective of this report is to demonstrate that the Project design and proposed mitigation measures associated with the construction and operation phases of the Project, as described in the REA Application, detailed engineering design, and herein, are sufficient to minimize any potential impacts to environmental features within the Project area, and to provide details on the mitigation and control measures that will be implemented.

1.1 STUDY APPROACH

The study approach involves the following components:

- A qualitative assessment of existing hydrologic conditions of the Project area and receiving systems;
- A review of the proposed Project activities as described in the REA with an emphasis on assessing potential impacts associated with changes in hydrologic characteristics of the Project area;
- Complete final design of SWM measures to control site runoff in a manner consistent with Ministry of Environment and Climate Change (MOECC) and Ministry of Transportation (MTO) requirements; and
- Development of an erosion and sediment control (ESC) strategy outlining the anticipated approach to minimize impacts related to construction.

1.2 BACKGROUND INFORMATION

A variety of sources have been referenced during the preparation of this ESC and SWM Report, including project-specific documentation, such as the various reports submitted in support of the REA application, and general industry-standard design guidance documentation and/or literature references, as follows:

General Guidance Documentation / Literature

- *Drainage Management Manual (Ministry of Transportation, Ontario, 1997)*
- *Highway Drainage Design Standards (Ministry of Transportation, Ontario, 2008)*
- *Low Impact Development Stormwater Management Planning and Design Guide*, Credit Valley Conservation and Toronto and Region Conservation, 2011
- *Erosion and Sediment Control Guideline for Urban Construction (ESC Guidelines)*, Greater Golden Horseshoe Conservation Authorities, Dec. 2006
- *Stormwater Management Planning and Design Manual (SWMPD Manual)*, Ontario Ministry of the Environment, March 2003
- *Guidelines for Evaluating Construction Activities on Water Resources*, Ontario Ministry of the Environment, January 1995

Project-Specific Consultation / Documentation

- *Hydrogeological Investigation – Proposed Amherst Island Wind Farm*, Stantec Consulting Ltd., January 2016
- *Supplementary Geotechnical Investigation – Proposed Amherst Island Wind Farm,* Stantec Consulting Ltd., September 2015
- *Geophysical Investigation to Map bedrock in Amherst Island, Ontario,* Geophysics GPR International Inc., June 2015
- *Amherst Island Wind Energy Project: Water Assessment and Waterbody Report (WA/WR),* Stantec Consulting Ltd., April 2013
- *Amherst Island Wind Energy Project: Design and Operations Report (DOR),* Stantec Consulting Ltd., December 2013
- *Amherst Island Wind Energy Project: Construction Plan Report,* Stantec Consulting Ltd., December 2013

2.0 ASSESSMENT OF HYDROLOGIC IMPACTS AND MITIGATION – OPERATIONAL PHASE (SWM)

2.1 EXISTING CONDITIONS

The location of the proposed MLA is a former industrial property. As shown in Figure 1, surface runoff drains southerly to the north Bath Road roadside ditch, which conveys it to an existing open footing concrete box culvert. The culvert discharges directly to Lake Ontario.

The subject site topography generally slopes from north to south at an average grade of approximately 3%. The information presented in the Lennox and Addington Soil Survey suggests that the site soil is Farmington loam, which is typically located over shallow bedrock.

The existing drainage catchments are delineated on Figure 1, and are summarized as follows:

Catchment EXT1 – This external drainage area is a former industrial property. All buildings have been demolished. Any on-site storm sewers were likely abandoned and capped as part of the demolition works. Consequently, all runoff travels southward as shallow surface flow.

Catchment 101 – This portion of the site is comprised of grassed area and parking lots. The available site survey information shows that there are catch basins within the proposed project limits, but the alignment and outlet locations of the on-site storm sewers are unknown. However, based on the site location topography, any storm sewers in this area likely discharge near the upstream side of the Bath Road culvert.

2.2 PROPOSED CONDITIONS

The grassed portions of the Mainland Laydown Area will be stripped of topsoil, graded, proof rolled, and a granular layer will be applied. The MLA is a temporary construction feature and is scheduled to be rehabilitated to existing conditions following the completion of the construction of the Project. The MLA will drain by sheet flow to a dry SWM pond, located near the southeast site corner, to provide water quality and quantity treatment prior to discharging to the Bath Road ditch. A topsoil berm surrounding the gravel portion of the laydown area will divert external runoff around the disturbed area to the Bath Road ditch.

The proposed drainage catchments are delineated on Figure 2, and are summarized as follows:

Catchment EXT1 – This external drainage area is a former industrial property. All buildings have been demolished. Any on-site storm sewers were likely abandoned and capped as part of the demolition works. All runoff travels southward as shallow surface flow across the western portion of the MLA to the Bath Road ditch.

Catchment EXT2 – This external drainage area is a former industrial property. All buildings have been demolished. Any on-site storm sewers were likely abandoned and capped as part of the demolition works. All runoff travels southward as shallow surface flow and is diverted eastward by the MLA topsoil berms to the Bath Road ditch.

Catchment 201 – This area is comprised of existing parking lots and undisturbed grass. All runoff travels as sheet flow to the Bath Road ditch.

Catchment 202 – This area is comprised of existing parking lots. All runoff is diverted eastward by the proposed topsoil berms and travels as shallow concentrated flow to the Bath Road ditch.

Catchment 203 – This area will be stripped of topsoil, graded, and proof rolled and a gravel layer will be applied. All runoff is directed to a temporary dry SWM pond that, along with a grassed swale and vegetated filter strip, acts as a treatment train to provide all necessary stormwater treatment. Any existing catch basins in this area will be temporarily capped.

2.3 HYDROLOGIC MODELING

Hydrologic models were prepared to simulate drainage conditions for the subject development using the SWMHYMO (Stormwater Management Hydrologic Model) software package, which is an MTO accepted hydrologic modeling software. The models were used to estimate flows for the existing and proposed development conditions and to design SWM systems to reduce the proposed development peak flow rates at the Bath Road culvert to existing condition magnitudes. Flows were calculated using the 2, 5, 10 and 100-year SCS Type II storm distribution and the 25 mm, 4-hour Chicago storm event. Schematics of the SWMHYMO model and all input and output files are provided in Appendices A and B.

2.4 STORMWATER MANAGEMENT STRATEGY

Stormwater runoff from the proposed MLA is treated by a temporary dry stormwater management pond located near the southeast site corner (Drawing C104). A dry facility was selected due to the shallow local bedrock depths and because the proposed drainage area is less than 5 hectares, which is the minimum MOECC guideline to sustain a permanent pool in a wet facility.

Runoff from the proposed MLA is conveyed to the pond both as shallow sheet flow and as concentrated flow by a proposed grassed swale. The combination of vegetated filter strip, vegetated swale conveyance, and dry facility attenuation will provide water quality controls for the MLA, while the dry facility will provide the water quantity controls for the site.

Water quality benefits of the proposed vegetated filter strip, vegetated swale, and vegetated dry pond facility are achieved by the runoff / vegetation interaction which reduces the velocity of runoff, as compared to a piped system, thereby promoting the sedimentation of particulate

matter. The vegetation also provides nutrient uptake benefits to help reduce biological pollutants such as nitrogen and phosphorous.

2.4.1 Vegetated Filter Strip

The vegetated filter strip provides pretreatment to the MLA runoff upstream of the vegetated swale and dry SWM pond. The vegetated filter strip is comprised of a 2 m wide swath of undisturbed grass. While the guidance presented in the *Low Impact Development (LID) Stormwater Management Planning and Design Guide (LID Design Guide)* (Credit Valley Conservation (CVC), 2010) recommends a minimum width of 5 m, the guide also notes that narrower filter strips can be used when they are employed as pretreatment devices for other water quality best management practices. A wider filter strip is not feasible since it would encroach into the proposed MLA, reducing the area available to stockpile material.

2.4.2 Vegetated Swale

The vegetated swale is sized to convey the 4-hour, 25-mm storm event at a velocity of 0.5 m/s at a depth of 150 mm. *The Low Impact Development (LID) Stormwater Management Planning and Design Guide (LID Design Guide)* (Credit Valley Conservation (CVC), 2010) and the *Stormwater Management Planning and Design Manual* (Ministry of Environment and Climate Change (MOECC), 2003), suggest that a design depth of 100 mm be used. Upon further investigation of the criteria, it was confirmed that the maximum flow depth of 100 mm is based on the assumption that it is 2/3 the height of the vegetation, which was limited to 150 mm. This is true for turf grass type vegetation, however the seed bank mix vegetation for the site swale is proposed to be a naturalization mix that reaches heights over 1 m. Since the design flow depth is less than 2/3 of the vegetation height, the proposed vegetated swale will filter the MLA runoff and reduce the peak flow velocities. The proposed vegetated swale will provide approximately 76% total suspended solids (TSS) removal, per the LID Design Guide (CVC, 2010).

2.4.3 Dry Pond

The dry, extended detention SWM facility has been designed per the guidance of the SWMPD Manual (MOE, 2003) to provide the MOE Basic treatment level, or 60% TSS removal efficiency, and includes 482 m^3 of extended detention storage to be drawn-down over approximately 27 hours, satisfying the recommended draw-down time of 24-48 hours.

The combination of vegetated filter strip, vegetated swale, and dry extended detention SWM facility, will provide an Enhanced level of water quality control (80% long term average suspended solids removal), as required by the MOECC.

The facility will be drained by a single 100 mm diameter PVC outlet that discharges to a level spreader on the south side of the proposed pond. Similar to existing conditions, the pond discharges travel as shallow surface flow from the level spreader to the Bath Road roadside

ditch. Stage-storage discharge characteristics for the pond were calculated using spreadsheet analysis and incorporated into the hydrologic model presented in Appendix B. Tables highlighting the details regarding the parameters and results are presented below.

Table 1 – SWM Facility Design Characteristics

Parameter	SWM Characteristic
Total Contributing Area	1.72 ha
Total Percent Impervious	100%
Pond Elevations (Bottom/Top)	78.05 m / 79.35 m
Water Quality Control	
TSS Removal Efficiency Required	80%
Grassed Swale / Dry Facility	76% / 60%
Extended Detention Volume Required / Provided	482 m³ / 482 m³
Extended Detention Drawdown Time	27 hours
Outlet Details	
Outlet Pipe Elevation / Diameter	78.05 m / 100 mm
Overflow Weir Invert Elevation / Length	79.05 m / 5 m

Table 2 – Stormwater Management Facility Operating Characteristics

Storm Event	25 mm	2-year	5-year	10-year	100-year
Existing Flows to Bath Road Culvert (m³/s)	0.81	1.47	2.04	2.43	3.68
Proposed Flows to Bath Road Culvert (m³/s)	0.81	1.43	1.97	2.33	3.47
Proposed Flows to SWM Facility (m³/s)	0.09	0.19	0.28	0.34	0.53
Proposed Flows from SWM Facility (m³/s)	0.01	0.01	0.02	0.02	0.02
Maximum Storage Used (m³)	110	300	460	580	980
Maximum Ponding Elevation (m)	78.25	78.46	78.61	78.71	79.02
Maximum Ponding Depth (m)	0.20	0.41	0.56	0.66	0.97
Drawdown Time (hrs)	5	15	26	35	70

As shown in Table 2, water quantity control targets have been met as the post-development peak flow rates are less than the target discharges established using existing conditions modeling.

2.4.4 Design Considerations

As the dry pond facility is proposed to be constructed in summer 2017, additional measures have been included in the design of the MLA to minimize the potential for sediment to migrate

offsite, prior to site vegetation becoming fully established. The perimeter berms around the MLA are covered by straw matting and seeded, the vegetated swale upstream of the dry pond is covered by Anti-Wash Geojute to minimize erosion potential of designed features.

The outlet of the dry pond facility will be protected by light duty silt fencing. Light duty silt fencing was chosen for ease of installation and maintenance, as it can be manipulated without the assistance of machinery due to limited access to the outlet structure.

Due to the temporary nature of the MLA and to maximize the amount of working area, the dry pond facility has been sized to contain the 10-year rainfall event. Under larger storm events, shallow ponding will occur within the limits of the graveled area on the site. The 100-year ponding limit will be identified on site. Ponding depths on the graveled area of the site will not exceed 0.09 meters, which still allows for vehicle passage.

3.0 ASSESSMENT OF POTENTIAL HYDROLOGIC IMPACTS AND MITIGATION – DURING-CONSTRUCTION PHASE (ESC)

An assessment of the erosion potential of the construction area was completed following the methodology outlined in the Environmental Guide for Erosion and Sediment Control During Construction of Highway Projects (MTO, 2015). The erosion potential is based on an assessment of three primary factors, namely slope gradient, slope length and soil texture (erodibility), with the resultant designation of either "low", "moderate", or "high" erosion potential. The relative level of erosion potential dictates, to some extent, the comprehensiveness of the resultant ESC system design, monitoring, and maintenance program.

The existing and proposed (post-construction) condition gradients on the Project site can be classified as low (0 – 10% - Overland flow paths), with predominantly long slopes (greater than 70 m). Site soils are comprised primarily of silt clay tills and clays, which are considered to represent a medium erodibility potential (Table 5.1, Environmental Guide). Therefore, based on this classification, the site has a "moderate" erosion potential.

3.1 DURING CONSTRUCTION DEWATERING

Since no significant excavation is proposed within the MLA, the proposed construction activities are not expected to intercept the local water table. Pumping rates are not anticipated to exceed 50,000 litres per day or the requirements of an Environmental Activity Sector Registration application approval. However, if groundwater is encountered during excavation, it should be removed using a conventional sump drainage system and pumped into a holding tank situated onsite. Groundwater within the holding tank should be tested for the contaminants of concern, manifested and trucked offsite to a disposal facility, in accordance with the guidance presented in the Soil/Groundwater Management Program and Health & Safety Plan – North Parcel (Stantec, 2017).

Detailed pumping records will be kept on site to demonstrate that maximum pumping rates are not exceeded.

3.2 EROSION AND SEDIMENT CONTROL PLAN

The various construction activities required to construct the MLA include topsoil removal, minor grading activities, and general construction traffic. If left unmitigated, these activities will result in impacts ranging from disturbance of at-surface soils and exposure of the native sub-soils to potential erosion and sediment transport to offsite locations.

Erosion control will be achieved primarily through the excavation-and-backfill methods of construction and by limiting the duration of exposure of disturbed soils inherent in the construction process. For example, laydown area construction includes the removal of topsoil and sub-soils as necessary to achieve a competent base, followed by the placement of granular material back to proposed grade elevations (or marginally above); hence, the work areas are generally protected from erosion and sediment transport since they are lower than the surrounding ground surface. Further, at any given location, these works will be completed in short order, providing little opportunity for sub-soils to be disturbed and entrained in storm runoff.

In addition to limiting the potential for erosion, sediment control measures will be implemented prior to any grading or servicing works commencing as shown on the accompanying plan (Drawing C104), and include, but not necessarily be limited to, the following items:

- Sediment and erosion control measures should be implemented prior to construction and maintained during the construction phase to prevent entry of sediment into the water:
    - Erect silt fence (per OPSD 219.110) on the downstream sides of disturbed areas within 30 m of the buffers to environmental features and around entirety of temporarily stockpiled soils;
    - Temporarily stockpiled excavated native materials and imported materials with a D_{50} less than 4.75 mm (typical D_{50} of Granular A) will be covered with rolled erosion control products when the material is expected to be left in place in excess of 10 days, while imported materials with a D_{50} of 4.75 mm or greater can remain uncovered. Granular A and B (Type II) gradation requirements allow up to 55% percent passing a 4.75 mm sieve (#4 sieve), and may be stockpiled without covering with rolled erosion control products. Uncovered stockpiles will be surrounded with a double layer of light duty silt fence (1 m separation between layers) to provide a secondary layer of protection from sediment migration;
    - Topsoil stockpiles expected to be left in place in excess of 30 days may be stabilized with vegetation, i.e. Hydroseeding as referenced in the GGHA ESC Guidelines (GGHCA, 2006) instead of a rolled erosion control product;
    - In the event of inclement weather or unfavourable terrain for construction, construction best practices, such as temporary rig-mats may be used to prevent disruption of surface soils and vegetative cover by construction vehicles and equipment. As these measures are within the constructible areas of the project, it is not anticipated that offsite flows will increase from proposed conditions;
    - Topsoil stockpiles should be sufficiently distant from watercourses to preclude sediment inputs due to erosion of stored soil materials;
    - Topsoil berms are to be stabilized with straw matting;
    - Grassed swales and stormwater management vegetated swales are to be stabilized with Antiwash Geojute or approved equivalent;

  - Additional erosion and sediment controls may be required due to unforeseen circumstances, changing site conditions or if the proposed controls do not achieve their anticipated result. In these circumstances, additional controls may be installed consistent with GGHCA ESC Guidelines and MOECC SWMPD Manual. The locations and application of the controls will be approved by a qualified erosion and sediment control inspector prior to their installation; and
  - If the sediment and erosion control measures are not functioning properly and there is immediate risk of sediment discharges to the downstream environment, no further work should occur until the sediment and/or erosion problem is addressed.

- All materials and equipment used for the purpose of site preparation and Project construction should be operated and stored in a manner that prevents any deleterious substance (e.g., petroleum products, silt, etc.) from entering nearby watercourses:
  - Any stockpiled materials should be stored and stabilized away from watercourses;
  - Refuelling and maintenance of construction equipment should occur in designated areas, a minimum of 100 m from a water body;
  - As appropriate, spills should be reported to the MOECC Spills Action Centre;
  - Any part of equipment entering water should be free of fluid leaks and externally cleaned/degreased to prevent any deleterious substance from entering the water;
  - Only clean material, free of fine particulate matter should be placed in the water: and
  - A 100 mm PVC end cap will be stored on-site to plug the upstream end of the SWM facility outlet pipe in the event of a spill.
- Revegetate all disturbed areas where construction is not expected for 30 days with a minimum 50 mm of topsoil and hydro-seeding or other stabilizing vegetation / erosion protection measures (per OPSS 804). If, given seasonal restriction or other revegetation limiting factors, the disturbed area should be stabilized against erosion impacts by non-vegetated means such as erosion control blankets.

The ESC measures shall be maintained in good repair during the entire construction period, and removed as contributing drainage areas are restored and stabilized. ESC measures shall not be removed until a qualified inspector determines that the measures are no longer required and the risk of surface water and environmental impacts from construction activities are negligible. In addition, the condition of erosion control works, their overall performance, and any repairs, replacement, or modifications to the installed item shall be noted in logbooks to be kept on-site.

3.3 EROSION AND SEDIMENTATION CONTROL MONITORING PLAN

To ensure the effectiveness of the various erosion and sediment control measures, a routine program should be implemented which includes the inspection of the erosion and sediment controls daily and after each significant rainfall event (10 mm), and immediate repair of any

deficiencies. The program will be compliant with REA condition H7. Non-urgent repairs (i.e., no immediate risk of sediment discharges to the downstream environment) will be completed within 48 hours of identifying the deficiency, or prior to the next anticipated rainfall event, whichever is less. This program will consist of the following activities:

- Visual inspection of the ESC measures to ensure discharged flows are generally free of sediment and turbidity;
- Inspection of vegetation protection and silt fencing to ensure that they are maintained in good repair;
- Removal of construction debris that may accumulate; and
- Implementation of remedial measures including erosion stabilization, repair of damaged fencing and any other remediation, where required.

If the monitoring program outlined above indicates a persistent problem, then the following steps should be undertaken to determine appropriate mitigative measures (if step 1 does not resolve the issue, proceed to step 2):

1. Analysis of the monitoring information and field visits as required, determine the cause of the problem, and develop a mitigation plan to address the issue in consultation with a certified ESC inspector.
   a. Implement additional mitigation measures and monitor the results.
2. Convene a meeting with the appropriate review agencies to discuss the problem.
   a. Develop a consensus on a proposed plan of action to resolve the problem in consultation with agency staff.
   b. Implement additional mitigation measures and monitor the results

3.4 LONG TERM EROSION AND SEDIMENT CONTROL

Upon restoration of the MLA with native topsoil, replanting with a grass seed mix will be undertaken. Approximately, one year after construction a survey will be undertaken to ensure that long-term erosion control measures have been effective. Seeded or replanted areas will be inspected to ensure that revegetation measures were successful and reseeding or replanting will occur where necessary.

If erosion control measures are found to be less than fully effective during this survey, reseeding or replanting of problem areas will take place. Should there be residual effects noted during post-construction monitoring, advice on contingency measures will be sought out and applied.

4.0 CONCLUSIONS AND RECOMMENDATIONS

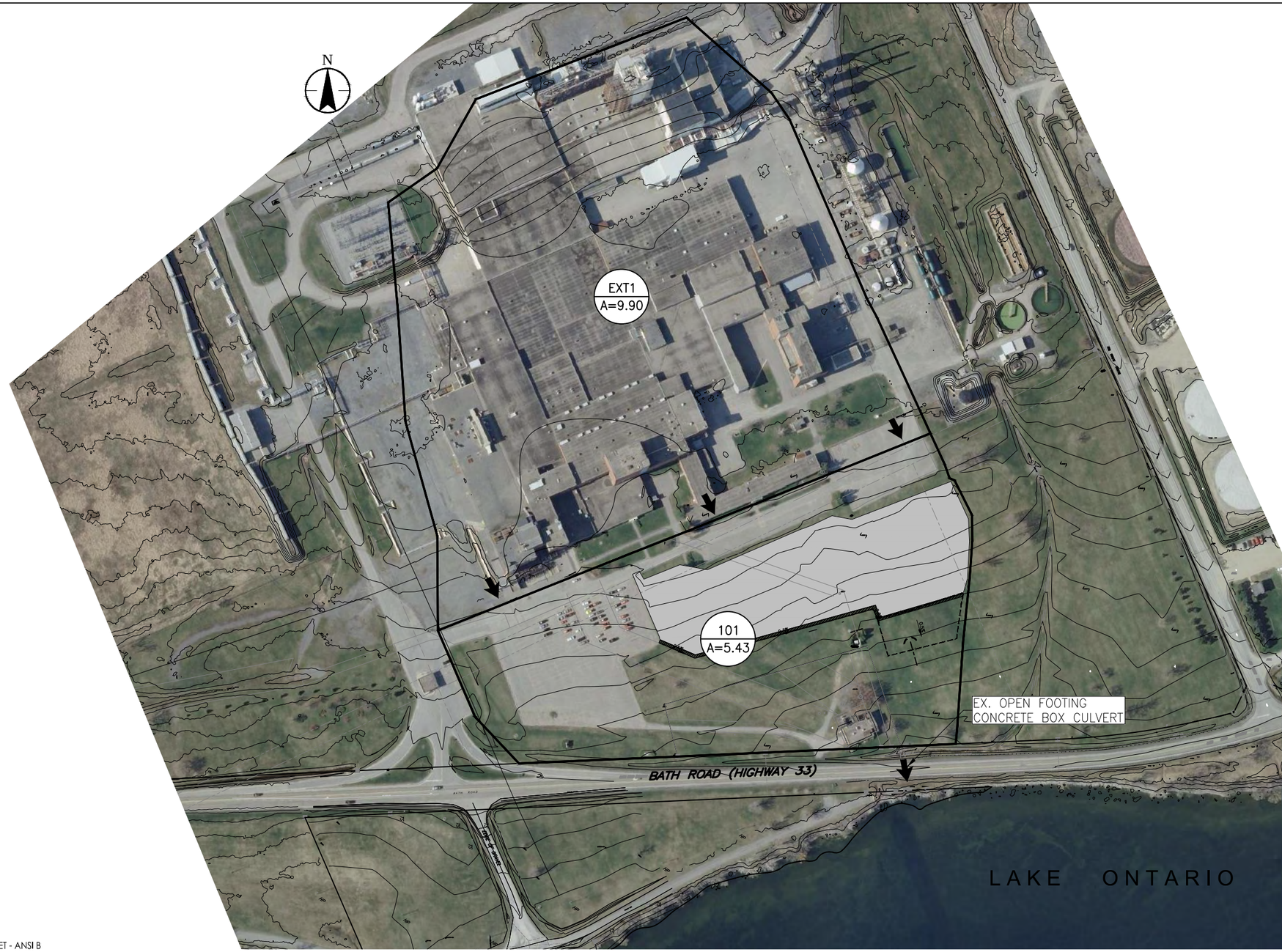
Based on the preceding design report the following conclusions can be drawn:

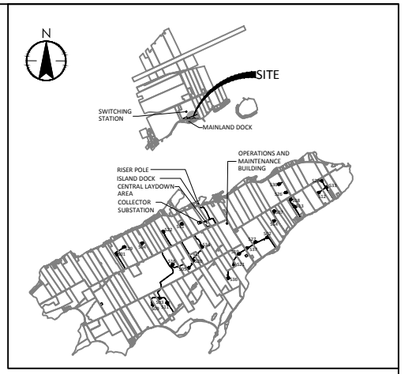
- Water quality and quantity control for the MLA is provided using a vegetated filter strip, grassed swale, and dry pond facility.
- The proposed SWM measures act as a treatment train to provide the necessary water quality control.

Based on the findings of this report, the following recommendations are provided:

- The proposed SWM and ESC measures be implemented for the subject site.
- The Monitoring and Maintenance Program be undertaken to ensure that the proposed measures function appropriately.

FIGURES





KEY PLAN

N.T.S

V:\01614\active\133560100\design\drawing\civil\sheet_files\SWM\133560100C-FIG-PRE-Mainland_Laydown_Area.dwg
2017/07/13 4:36 PM By: Robb, Brad

ORIGINAL SHEET - ANSI B

April, 2017
160960595

Stantec
300 Hagey Blvd. Suite 100
Waterloo, ON, N2L 0A4
Tel. 519.579.4410
www.stantec.com

Legend

100
A=31.72 — AREA NUMBER, CONTRIBUTING AREA (ha)

OVERLAND FLOW ROUTE

DRAINAGE BOUNDARY

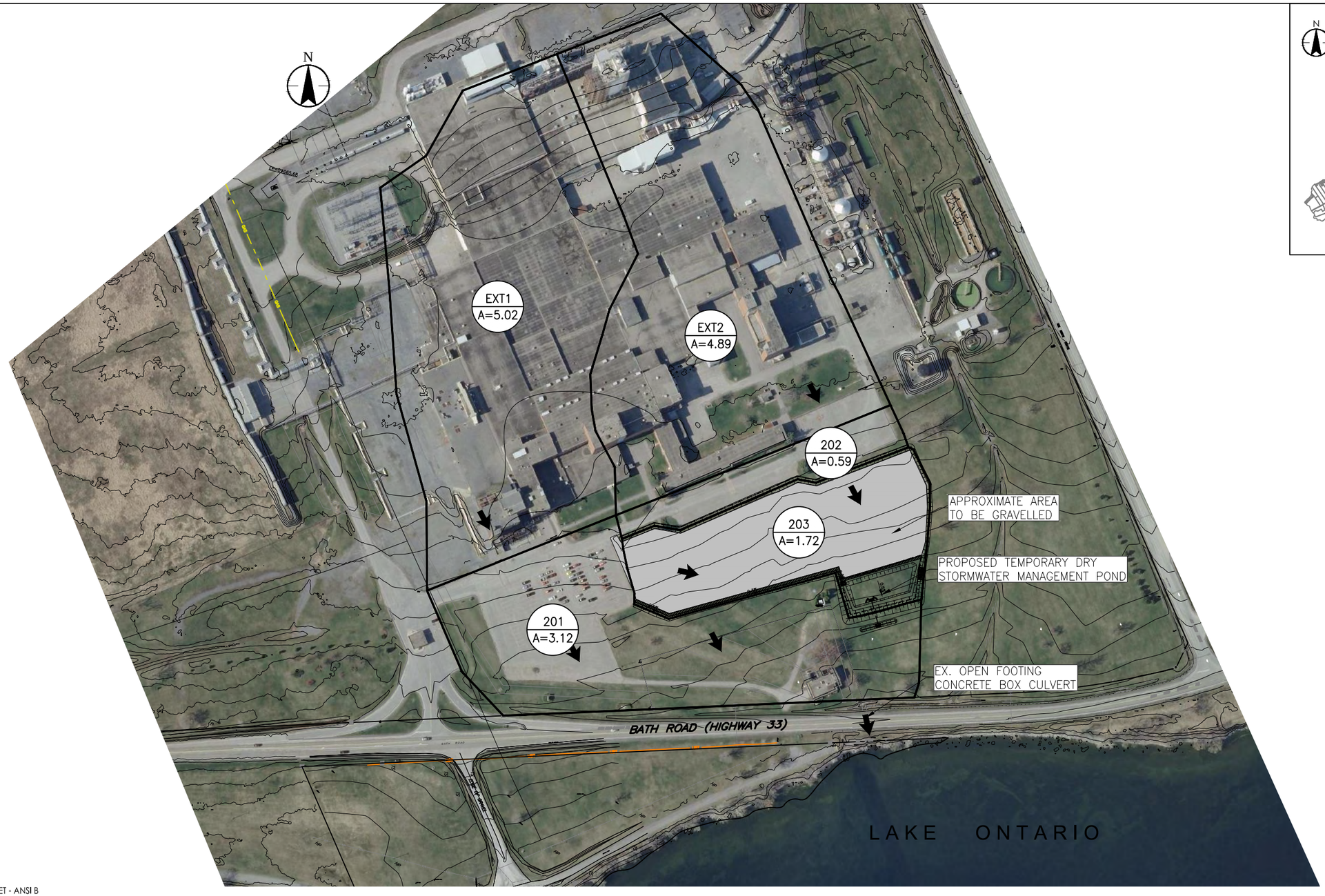
Scale

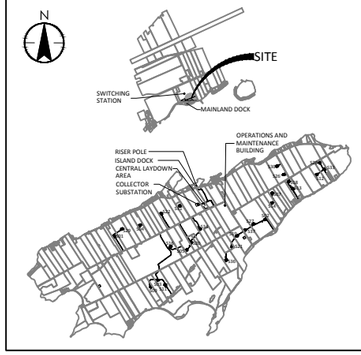
1:3000 — 0 30 90 150m

Client/Project
ALGONQUIN POWER CO.
AMHERST ISLAND WIND ENERGY PROJECT

Figure No.
FIGURE 1

Title
MAINLAND LAYDOWN AREA
PRE-DEVELOPMENT CATCHMENT PLAN





KEY PLAN

N.T.S

V:\0161\active\133560100\design\drawing\civil\sheet_files\SWM\133560100C-FIG-POST-Mainland_Laydown_Area.dwg
2017/07/13 4:42 PM By: Robb, Brad

ORIGINAL SHEET - ANSI B

April, 2017
160960595

Stantec
300 Hagey Blvd. Suite 100
Waterloo, ON, N2L 0A4
Tel. 519.579.4410
www.stantec.com

Legend

100 / A=31.72	AREA NUMBER
	CONTRIBUTING AREA (ha)
→	OVERLAND FLOW ROUTE
———	DRAINAGE BOUNDARY

Scale

1:3000 — 0 30 90 150m

Client/Project
ALGONQUIN POWER CO.
AMHERST ISLAND WIND ENERGY PROJECT

Figure No.
FIGURE 2

Title
MAINLAND LAYDOWN AREA
POST-DEVELOPMENT CATCHMENT PLAN

APPENDIX A
EXISTING CONDITIONS HYDROLOGY

Subject: CN Calculation - Existing
Project: Amherst Island Wind Energy Project - Mainland Laydown Area
Project No.: 1609-60595
Client: Windlectric
Date: July 5, 2017

TABLE OF CURVE NUMBERS (CN's)								
Land Use		Hydrologic Soil Type							Source
		A	AB	B	BC	C	CD	D	
Meadow	"Good"	30	44	58	65	71	75	78	MTO
Woodlot	"Fair"	36	48	60	67	73	76	79	MTO
Lawns	"Good"	39	50	61	68	74	77	80	USDA
Pasture/Range		58	62	65	71	76	79	81	MTO
Crop		66	70	74	78	82	84	86	MTO
Gravel		76	81	85	87	89	90	91	Chin
Bare Soil (Fallow)		77	82	86	89	91	93	94	MTO
Impervious		98	98	98	98	98	98	98	MTO

MTO - Ministry of Transportation Ontario Drainage Manual (1997), Design Chart 1.09-Soil/Land Use Curve Numbers
USDA - United States Department of Agriculture (2004), National Engineering Handbook, Part 630 Hydrology, Chapter 9 Hydrologic Soil Cover Complexes

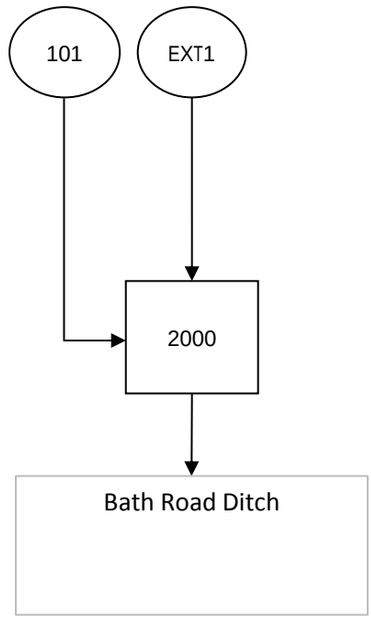
HYDROLOGIC SOIL TYPE (%) - Existing Conditions								
Catchment	Hydrologic Soil Type							TOTAL
	A	AB	B	BC	C	CD	D	
EXT1					100			100
101					100			100
								0
								0
								0
								0

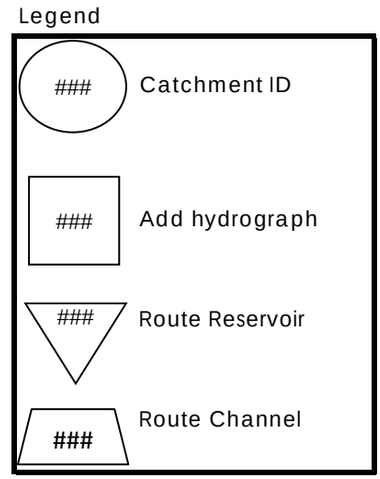
LAND USE (%) - Existing Conditions									
Catchment	Meadow	Woodlot	Lawns	Pasture Range	Crop	Bare Soil	Gravel	Impervious	Total
EXT1			5					95	100
101			66					34	100

CURVE NUMBER (CN) - Existing Conditions										
Catchment	Meadow	Woodlot	Lawns	Pasture Range	Crop	Bare Soil	Gravel	Impervious	Weighted CN w/ imp area	Weighted CN w/o imp area
EXT1			4					93	97	74
101			49					33	82	74

Notes:
AMC II assumed
Hydrological Soil Groups taken from MTO Drainage Manual

Subject: Pre-Development SWMHYMO Schematic
Project: Amherst Island Wind Energy Project - Mainland Laydown Area
Project No.: 1609-60595
Client: Windlectric
Date: July 5, 2017





```
================================================================================

   SSSSS  W   W  M   M  H   H  Y   Y  M   M   OOO        999    999    =========
   S      W W W  MM MM  H   H   Y Y   MM MM  O   O      9   9  9   9
   SSSSS  W W W  M M M  HHHHH    Y    M M M  O   O  ##  9   9  9   9   Ver  4.05
       S   W W   M   M  H   H    Y    M   M  O   O       9999   9999   Sept 2011
   SSSSS   W W   M   M  H   H    Y    M   M   OOO           9      9    =========
                                                        9   9  9   9   # 4730904
         StormWater Management HYdrologic Model          999    999    =========

 ********************************************************************************
 ***************************** SWMHYMO Ver/4.05  ********************************
 *********  A single event and continuous hydrologic simulation model  *********
 *********     based on the principles of HYMO and its successors      *********
 *********                  OTTHYMO-83 and OTTHYMO-89.                  *********
 ********************************************************************************
 ********* Distributed by:  J.F. Sabourin and Associates Inc.          *********
 *********                  Ottawa,  Ontario: (613) 836-3884           *********
 *********                  Gatineau, Quebec: (819) 243-6858           *********
 *********                  E-Mail: swmhymo@jfsa.Com                   *********
 ********************************************************************************

 +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
 +++++++++ Licensed user: Stantec Consulting Ltd. (Kitchener)          +++++++++
 +++++++++                Kitchener             SERIAL#:4730904       +++++++++
 +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

 ********************************************************************************
 *********           ++++++ PROGRAM ARRAY DIMENSIONS ++++++            *********
 *********           Maximum value for ID numbers  :     10           *********
 *********           Max. number of rainfall points: 105408           *********
 *********           Max. number of flow points    : 105408           *********
 ********************************************************************************


 *********************   D E T A I L E D   O U T P U T   **********************
 ********************************************************************************
 *         DATE: 2017-07-05     TIME: 10:27:02     RUN COUNTER: 000617         *
 ********************************************************************************
 * Input   filename: Z:\Temp\Amherst\0595EX1.dat                                 *
 * Output  filename: Z:\Temp\Amherst\0595EX1.out                                 *
 * Summary filename: Z:\Temp\Amherst\0595EX1.sum                                 *
 * User comments:                                                               *
 * 1:_____________________________________________________________________________*
 * 2:_____________________________________________________________________________*
 * 3:_____________________________________________________________________________*
 ********************************************************************************

--------------------------------------------------------------------------------
-
001:0001----------------------------------------------------------------------------
-
*#*****************************************************************************
*#  Project Name: [Amherst Island MLA] Project Number: [1609-60595]
*#  Date        : 07-05-2017
*#  Modeller    : [NE]
*#  Company     : Stantec Consulting Ltd. (London)
*#  License #   :  4730904
*#*****************************************************************************
*#
*#  EXISTING CONDITIONS
*#  25 mm Water Quality Event
*#  2, 5, 10, 100-year 24-hour SCS Design Storm
*#
*#*****************************************************************************
*#
--------------------
| START            |  Project  dir.: Z:\Temp\Amherst\
--------------------  Rainfall dir.: Z:\Temp\Amherst\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 001
    NSTORM=   1
          #  1=25mm.4hr
--------------------------------------------------------------------------------
-
001:0002----------------------------------------------------------------------------
-
--------------------
| READ STORM       |    Filename: 25 mm, 4hr Chicago Storm - Kitchener IDF
| Ptotal=  25.00 mm|    Comments: 25 mm, 4hr Chicago Storm - Kitchener IDF
--------------------
              TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
               hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
               .08   1.465 |   1.08   4.024 |   2.08   5.764 |   3.08   2.074
               .17   1.540 |   1.17   4.814 |   2.17   4.969 |   3.17   1.977
               .25   1.625 |   1.25   6.025 |   2.25   4.374 |   3.25   1.889
               .33   1.720 |   1.33   8.114 |   2.33   3.913 |   3.33   1.810
               .42   1.829 |   1.42  12.526 |   2.42   3.545 |   3.42   1.737
               .50   1.955 |   1.50  27.198 |   2.50   3.245 |   3.50   1.671
               .58   2.101 |   1.58  74.855 |   2.58   2.994 |   3.58   1.610
               .67   2.274 |   1.67  31.410 |   2.67   2.782 |   3.67   1.553
               .75   2.482 |   1.75  16.819 |   2.75   2.601 |   3.75   1.501
               .83   2.736 |   1.83  11.357 |   2.83   2.443 |   3.83   1.453
               .92   3.055 |   1.92   8.563 |   2.92   2.305 |   3.92   1.408
              1.00   3.468 |   2.00   6.882 |   3.00   2.183 |   4.00   1.366

--------------------------------------------------------------------------------
-
001:0003----------------------------------------------------------------------------
-
*#*****************************************************************************
*# External Drainage Area - Former Invista Site
*#*****************************************************************************
----------------------
| DESIGN NASHYD      |   Area    (ha)=    9.90   Curve Number   (CN)=97.00
| 01:EXT1   DT= 2.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .180

     Unit Hyd Qpeak  (cms)=    2.101

     PEAK FLOW       (cms)=     .702 (i)
     TIME TO PEAK    (hrs)=    1.750
     RUNOFF VOLUME    (mm)=   17.613
     TOTAL RAINFALL   (mm)=   25.000
     RUNOFF COEFFICIENT   =     .705

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-
001:0004----------------------------------------------------------------------------
-
*#*****************************************************************************
*# Area of Interest - lawns and parking areas
*#*****************************************************************************
----------------------
| DESIGN NASHYD      |   Area    (ha)=    5.34   Curve Number   (CN)=82.00
| 02:101    DT= 2.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .220

     Unit Hyd Qpeak  (cms)=     .927

     PEAK FLOW       (cms)=     .117 (i)
```

```
     TIME TO PEAK    (hrs)=    1.833
     RUNOFF VOLUME    (mm)=    6.968
     TOTAL RAINFALL   (mm)=   25.000
     RUNOFF COEFFICIENT   =     .279

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-
001:0005--------------------------------------------------------------------------
-
*#*************************************************************************
*# Total Flow to Bath Road Culvert
*#*************************************************************************
------------------------
| ADD HYD (      2000) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
                     ID1 01:EXT1           9.90     .702    1.75  17.61    .000
                    +ID2 02:101            5.34     .117    1.83   6.97    .000
                     ============================================================
                     SUM 03:      2000     15.24     .810    1.75  13.88    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
-
001:0006--------------------------------------------------------------------------
-
  ** END OF RUN :   1

*************************************************************************




--------------------
| START            |  Project  dir.: Z:\Temp\Amherst\
--------------------  Rainfall dir.: Z:\Temp\Amherst\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 002
    NSTORM=   1
           #  1=AI2SCS.24H
--------------------------------------------------------------------------------
-
002:0002--------------------------------------------------------------------------
-
*#*************************************************************************
*#  Project Name: [Amherst Island MLA] Project Number: [1609-60595]
*#  Date        : 07-05-2017
*#  Modeller    : [NE]
*#  Company     : Stantec Consulting Ltd. (London)
*#  License #   :  4730904
*#*************************************************************************
*#
*#  EXISTING CONDITIONS
*#  25 mm Water Quality Event
*#  2, 5, 10, 100-year 24-hour SCS Design Storm
*#
*#*************************************************************************
*#
--------------------------------------------------------------------------------
-
002:0002--------------------------------------------------------------------------
-
--------------------
| READ STORM       |    Filename: Amherst Island MTO IDF (44 9' 15"N, 76 4
| Ptotal=  54.10 mm|    Comments: Amherst Island MTO IDF (44 9' 15"N, 76 4
--------------------
               TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
               hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
               .25    .595 |   6.25   1.082 |  12.25   7.790 |  18.25    .974
               .50    .595 |   6.50   1.082 |  12.50   7.790 |  18.50    .974
               .75    .595 |   6.75   1.082 |  12.75   4.003 |  18.75    .974
              1.00    .595 |   7.00   1.082 |  13.00   4.003 |  19.00    .974
              1.25    .595 |   7.25   1.082 |  13.25    .757 |  19.25    .974
              1.50    .595 |   7.50   1.082 |  13.50    .757 |  19.50    .974
              1.75    .595 |   7.75   1.082 |  13.75   4.436 |  19.75    .974
              2.00    .595 |   8.00   1.082 |  14.00   4.436 |  20.00    .974
              2.25    .703 |   8.25   1.461 |  14.25   1.623 |  20.25    .649
              2.50    .703 |   8.50   1.461 |  14.50   1.623 |  20.50    .649
              2.75    .703 |   8.75   1.461 |  14.75   1.623 |  20.75    .649
              3.00    .703 |   9.00   1.461 |  15.00   1.623 |  21.00    .649
              3.25    .703 |   9.25   1.731 |  15.25   1.623 |  21.25    .649
              3.50    .703 |   9.50   1.731 |  15.50   1.623 |  21.50    .649
              3.75    .703 |   9.75   1.948 |  15.75   1.623 |  21.75    .649
              4.00    .703 |  10.00   1.948 |  16.00   1.623 |  22.00    .649
              4.25    .866 |  10.25   2.489 |  16.25    .974 |  22.25    .649
              4.50    .866 |  10.50   2.489 |  16.50    .974 |  22.50    .649
              4.75    .866 |  10.75   3.354 |  16.75    .974 |  22.75    .649
              5.00    .866 |  11.00   3.354 |  17.00    .974 |  23.00    .649
              5.25    .866 |  11.25   5.194 |  17.25    .974 |  23.25    .649
              5.50    .866 |  11.50   5.194 |  17.50    .974 |  23.50    .649
              5.75    .866 |  11.75  22.506 |  17.75    .974 |  23.75    .649
              6.00    .866 |  12.00  59.726 |  18.00    .974 |  24.00    .649

--------------------------------------------------------------------------------
-
002:0003--------------------------------------------------------------------------
-
*#*************************************************************************
*# External Drainage Area - Former Invista Site
*#*************************************************************************
----------------------
| DESIGN NASHYD      |   Area    (ha)=    9.90   Curve Number   (CN)=97.00
| 01:EXT1   DT= 2.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .180

     Unit Hyd Qpeak  (cms)=    2.101

     PEAK FLOW       (cms)=    1.162 (i)
     TIME TO PEAK    (hrs)=   12.072
     RUNOFF VOLUME    (mm)=   45.765
     TOTAL RAINFALL   (mm)=   54.100
     RUNOFF COEFFICIENT   =     .846

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-
002:0004--------------------------------------------------------------------------
-
*#*************************************************************************
*# Area of Interest - lawns and parking areas
*#*************************************************************************
----------------------
| DESIGN NASHYD      |   Area    (ha)=    5.34   Curve Number   (CN)=82.00
| 02:101    DT= 2.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .220

     Unit Hyd Qpeak  (cms)=     .927

     PEAK FLOW       (cms)=     .314 (i)
```

```
     TIME TO PEAK    (hrs)=   12.108
     RUNOFF VOLUME    (mm)=   25.534
     TOTAL RAINFALL   (mm)=   54.100
     RUNOFF COEFFICIENT   =     .472

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-
002:0005--------------------------------------------------------------------------
-
*#*************************************************************************
*# Total Flow to Bath Road Culvert
*#*************************************************************************
------------------------
| ADD HYD (      2000) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
                     ID1 01:EXT1           9.90    1.162   12.07  45.76    .000
                    +ID2 02:101            5.34     .314   12.11  25.53    .000
                     ============================================================
                     SUM 03:      2000     15.24    1.472   12.07  38.68    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
-
002:0006--------------------------------------------------------------------------
-
--------------------------------------------------------------------------------
-
002:0002--------------------------------------------------------------------------
-
  ** END OF RUN :   4

*************************************************************************




--------------------
| START            |  Project  dir.: Z:\Temp\Amherst\
--------------------  Rainfall dir.: Z:\Temp\Amherst\
    TZERO =   .00 hrs on       0
    METOUT=   2 (output = METRIC)
    NRUN  = 005
    NSTORM=   1
          #  1=AI5SCS.24H
--------------------------------------------------------------------------------
-
005:0002--------------------------------------------------------------------------
-
*#*************************************************************************
*#  Project Name: [Amherst Island MLA] Project Number: [1609-60595]
*#  Date        : 07-05-2017
*#  Modeller    : [NE]
*#  Company     : Stantec Consulting Ltd. (London)
*#  License #   :  4730904
*#*************************************************************************
*#
*#  EXISTING CONDITIONS
*#  25 mm Water Quality Event
*#  2, 5, 10, 100-year 24-hour SCS Design Storm
*#
*#*************************************************************************
*#
--------------------------------------------------------------------------------
-
005:0002--------------------------------------------------------------------------
-
--------------------
| READ STORM       |    Filename: Amherst Island MTO IDF (44 9' 15"N, 76 4
| Ptotal=  71.40 mm|    Comments: Amherst Island MTO IDF (44 9' 15"N, 76 4
--------------------
              TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
               hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
               .25    .785 |   6.25   1.428 |  12.25  10.282 |  18.25   1.285
               .50    .785 |   6.50   1.428 |  12.50  10.282 |  18.50   1.285
               .75    .785 |   6.75   1.428 |  12.75   5.284 |  18.75   1.285
              1.00    .785 |   7.00   1.428 |  13.00   5.284 |  19.00   1.285
              1.25    .785 |   7.25   1.428 |  13.25   3.713 |  19.25   1.285
              1.50    .785 |   7.50   1.428 |  13.50   3.998 |  19.50   1.285
              1.75    .785 |   7.75   1.428 |  13.75   2.999 |  19.75   1.285
              2.00    .785 |   8.00   1.428 |  14.00   2.999 |  20.00   1.285
              2.25    .928 |   8.25   1.928 |  14.25   2.142 |  20.25    .857
              2.50    .928 |   8.50   1.928 |  14.50   2.142 |  20.50    .857
              2.75    .928 |   8.75   1.928 |  14.75   2.142 |  20.75    .857
              3.00    .928 |   9.00   1.928 |  15.00   2.142 |  21.00    .857
              3.25    .928 |   9.25   2.285 |  15.25   2.142 |  21.25    .857
              3.50    .928 |   9.50   2.285 |  15.50   2.142 |  21.50    .857
              3.75    .928 |   9.75   2.570 |  15.75   2.142 |  21.75    .857
              4.00    .928 |  10.00   2.570 |  16.00   2.142 |  22.00    .857
              4.25   1.142 |  10.25   3.284 |  16.25   1.285 |  22.25    .857
              4.50   1.142 |  10.50   3.284 |  16.50   1.285 |  22.50    .857
              4.75   1.142 |  10.75   4.427 |  16.75   1.285 |  22.75    .857
              5.00   1.142 |  11.00   4.427 |  17.00   1.285 |  23.00    .857
              5.25   1.142 |  11.25   6.854 |  17.25   1.285 |  23.25    .857
              5.50   1.142 |  11.50   6.854 |  17.50   1.285 |  23.50    .857
              5.75   1.142 |  11.75  29.702 |  17.75   1.285 |  23.75    .857
              6.00   1.142 |  12.00  78.826 |  18.00   1.285 |  24.00    .857

--------------------------------------------------------------------------------
-
005:0003--------------------------------------------------------------------------
-
*#*************************************************************************
*# External Drainage Area - Former Invista Site
*#*************************************************************************
----------------------
| DESIGN NASHYD      |   Area    (ha)=    9.90   Curve Number   (CN)=97.00
| 01:EXT1   DT= 2.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .180

     Unit Hyd Qpeak  (cms)=    2.101

     PEAK FLOW       (cms)=    1.567 (i)
     TIME TO PEAK    (hrs)=   12.072
     RUNOFF VOLUME    (mm)=   62.836
     TOTAL RAINFALL   (mm)=   71.398
     RUNOFF COEFFICIENT   =     .880

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-
005:0004--------------------------------------------------------------------------
-
*#*************************************************************************
*# Area of Interest - lawns and parking areas
*#*************************************************************************
----------------------
| DESIGN NASHYD      |   Area    (ha)=    5.34   Curve Number   (CN)=82.00
| 02:101    DT= 2.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
```

```
----------------------   U.H. Tp(hrs)=    .220

     Unit Hyd Qpeak  (cms)=     .927

     PEAK FLOW       (cms)=     .481 (i)
     TIME TO PEAK    (hrs)=   12.108
     RUNOFF VOLUME    (mm)=   38.882
     TOTAL RAINFALL   (mm)=   71.398
     RUNOFF COEFFICIENT   =     .545

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
-
005:0005---------------------------------------------------------------------
-
*#*************************************************************************
*# Total Flow to Bath Road Culvert
*#*************************************************************************
-----------------------
| ADD HYD (      2000) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
-----------------------                   (ha)     (cms)   (hrs)   (mm)   (cms)
                     ID1 01:EXT1           9.90    1.567   12.07  62.84    .000
                    +ID2 02:101            5.34     .481   12.11  38.88    .000
                     ============================================================
                     SUM 03:      2000     15.24    2.044   12.07  54.44    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
-
005:0006---------------------------------------------------------------------
-
-------------------------------------------------------------------------------
-
005:0002---------------------------------------------------------------------
-
-------------------------------------------------------------------------------
-
005:0002---------------------------------------------------------------------
-
  ** END OF RUN :   9

*************************************************************************
```

```
--------------------
| START            |  Project  dir.: Z:\Temp\Amherst\
--------------------  Rainfall dir.: Z:\Temp\Amherst\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 010
    NSTORM=   1
           #  1=AI10SCS.24H
-------------------------------------------------------------------------------
-
010:0002---------------------------------------------------------------------
-
*#*************************************************************************
*#  Project Name: [Amherst Island MLA] Project Number: [1609-60595]
*#  Date        : 07-05-2017
*#  Modeller    : [NE]
*#  Company     : Stantec Consulting Ltd. (London)
*#  License #   :  4730904
*#*************************************************************************
*#
*#  EXISTING CONDITIONS
*#  25 mm Water Quality Event
*#  2, 5, 10, 100-year 24-hour SCS Design Storm
*#
*#*************************************************************************
*#
-------------------------------------------------------------------------------
-
010:0002---------------------------------------------------------------------
-
--------------------
| READ STORM       |    Filename: Amherst Island MTO IDF (44 9' 15"N, 76 4
| Ptotal=  83.00 mm|    Comments: Amherst Island MTO IDF (44 9' 15"N, 76 4
--------------------
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.25	.913	6.25	1.660	12.25	11.952	18.25	1.494
.50	.913	6.50	1.660	12.50	11.952	18.50	1.494
.75	.913	6.75	1.660	12.75	6.142	18.75	1.494
1.00	.913	7.00	1.660	13.00	6.142	19.00	1.494
1.25	.913	7.25	1.660	13.25	1.162	19.25	1.494
1.50	.913	7.50	1.660	13.50	1.162	19.50	1.494
1.75	.913	7.75	1.660	13.75	6.806	19.75	1.494
2.00	.913	8.00	1.660	14.00	6.806	20.00	1.494
2.25	1.079	8.25	2.241	14.25	2.490	20.25	.996
2.50	1.079	8.50	2.241	14.50	2.490	20.50	.996
2.75	1.079	8.75	2.241	14.75	2.490	20.75	.996
3.00	1.079	9.00	2.241	15.00	2.490	21.00	.996
3.25	1.079	9.25	2.656	15.25	2.490	21.25	.996
3.50	1.079	9.50	2.656	15.50	2.490	21.50	.996
3.75	1.079	9.75	2.988	15.75	2.490	21.75	.996
4.00	1.079	10.00	2.988	16.00	2.490	22.00	.996
4.25	1.328	10.25	3.818	16.25	1.494	22.25	.996
4.50	1.328	10.50	3.818	16.50	1.494	22.50	.996
4.75	1.328	10.75	5.146	16.75	1.494	22.75	.996
5.00	1.328	11.00	5.146	17.00	1.494	23.00	.996
5.25	1.328	11.25	7.968	17.25	1.494	23.25	.996
5.50	1.328	11.50	7.968	17.50	1.494	23.50	.996
5.75	1.328	11.75	34.528	17.75	1.494	23.75	.996
6.00	1.328	12.00	91.632	18.00	1.494	24.00	.996

```
-------------------------------------------------------------------------------
-
010:0003---------------------------------------------------------------------
-
*#*************************************************************************
*# External Drainage Area - Former Invista Site
*#*************************************************************************
----------------------
| DESIGN NASHYD      |   Area    (ha)=    9.90   Curve Number   (CN)=97.00
| 01:EXT1   DT= 2.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .180

     Unit Hyd Qpeak  (cms)=    2.101

     PEAK FLOW       (cms)=    1.838 (i)
     TIME TO PEAK    (hrs)=   12.072
     RUNOFF VOLUME    (mm)=   74.335
     TOTAL RAINFALL   (mm)=   83.000
     RUNOFF COEFFICIENT   =     .896

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
-
```

```
010:0004-------------------------------------------------------------------------------
-
*#*************************************************************************
*# Area of Interest - lawns and parking areas
*#*************************************************************************
----------------------
| DESIGN NASHYD      |   Area    (ha)=    5.34   Curve Number   (CN)=82.00
| 02:101    DT= 2.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .220

     Unit Hyd Qpeak  (cms)=     .927

     PEAK FLOW       (cms)=     .600 (i)
     TIME TO PEAK    (hrs)=   12.108
     RUNOFF VOLUME    (mm)=   48.393
     TOTAL RAINFALL   (mm)=   83.000
     RUNOFF COEFFICIENT   =     .583

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
-
010:0005-------------------------------------------------------------------------------
-
*#*************************************************************************
*# Total Flow to Bath Road Culvert
*#*************************************************************************
------------------------
| ADD HYD (      2000) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
                     ID1 01:EXT1           9.90    1.838   12.07  74.34    .000
                    +ID2 02:101            5.34     .600   12.11  48.39    .000
                     ============================================================
                     SUM 03:      2000     15.24    2.433   12.07  65.25    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
-
010:0006-------------------------------------------------------------------------------
-
-------------------------------------------------------------------------------
-
010:0002-------------------------------------------------------------------------------
-
-------------------------------------------------------------------------------
-
010:0002-------------------------------------------------------------------------------
-
-------------------------------------------------------------------------------
-
010:0002-------------------------------------------------------------------------------
-
  ** END OF RUN :  99

*************************************************************************




--------------------
| START            |  Project  dir.: Z:\Temp\Amherst\
--------------------  Rainfall dir.: Z:\Temp\Amherst\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 100
    NSTORM=   1
           #  1=AI100SCS.24H
-------------------------------------------------------------------------------
-
100:0002-------------------------------------------------------------------------
-
*#*************************************************************************
*#  Project Name: [Amherst Island MLA] Project Number: [1609-60595]
*#  Date        : 07-05-2017
*#  Modeller    : [NE]
*#  Company     : Stantec Consulting Ltd. (London)
*#  License #   :  4730904
*#*************************************************************************
*#
*#  EXISTING CONDITIONS
*#  25 mm Water Quality Event
*#  2, 5, 10, 100-year 24-hour SCS Design Storm
*#
*#*************************************************************************
*#
-------------------------------------------------------------------------------
-
100:0002-------------------------------------------------------------------------
-
--------------------
| READ STORM       |    Filename: Amherst Island MTO IDF (44 9' 15"N, 76 4
| Ptotal= 119.80 mm|    Comments: Amherst Island MTO IDF (44 9' 15"N, 76 4
--------------------
              TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
               hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
               .25   1.318 |   6.25   2.396 |  12.25  17.251 |  18.25   2.156
               .50   1.318 |   6.50   2.396 |  12.50  17.251 |  18.50   2.156
               .75   1.318 |   6.75   2.396 |  12.75   8.865 |  18.75   2.156
              1.00   1.318 |   7.00   2.396 |  13.00   8.865 |  19.00   2.156
              1.25   1.318 |   7.25   2.396 |  13.25   1.677 |  19.25   2.156
              1.50   1.318 |   7.50   2.396 |  13.50   1.677 |  19.50   2.156
              1.75   1.318 |   7.75   2.396 |  13.75   9.824 |  19.75   2.156
              2.00   1.318 |   8.00   2.396 |  14.00   9.824 |  20.00   2.156
              2.25   1.557 |   8.25   3.235 |  14.25   3.594 |  20.25   1.438
              2.50   1.557 |   8.50   3.235 |  14.50   3.594 |  20.50   1.438
              2.75   1.557 |   8.75   3.235 |  14.75   3.594 |  20.75   1.438
              3.00   1.557 |   9.00   3.235 |  15.00   3.594 |  21.00   1.438
              3.25   1.557 |   9.25   3.834 |  15.25   3.594 |  21.25   1.438
              3.50   1.557 |   9.50   3.834 |  15.50   3.594 |  21.50   1.438
              3.75   1.557 |   9.75   4.313 |  15.75   3.594 |  21.75   1.438
              4.00   1.557 |  10.00   4.313 |  16.00   3.594 |  22.00   1.438
              4.25   1.917 |  10.25   5.511 |  16.25   2.156 |  22.25   1.438
              4.50   1.917 |  10.50   5.511 |  16.50   2.156 |  22.50   1.438
              4.75   1.917 |  10.75   7.428 |  16.75   2.156 |  22.75   1.438
              5.00   1.917 |  11.00   7.428 |  17.00   2.156 |  23.00   1.438
              5.25   1.917 |  11.25  11.501 |  17.25   2.156 |  23.25   1.438
              5.50   1.917 |  11.50  11.501 |  17.50   2.156 |  23.50   1.438
              5.75   1.917 |  11.75  49.837 |  17.75   2.156 |  23.75   1.438
              6.00   1.917 |  12.00 132.259 |  18.00   2.156 |  24.00   1.438

-------------------------------------------------------------------------------
-
100:0003-------------------------------------------------------------------------
-
*#*************************************************************************
*# External Drainage Area - Former Invista Site
*#*************************************************************************
----------------------
| DESIGN NASHYD      |   Area    (ha)=    9.90   Curve Number   (CN)=97.00
| 01:EXT1   DT= 2.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .180
```

```
     Unit Hyd Qpeak  (cms)=    2.101

     PEAK FLOW       (cms)=    2.690 (i)
     TIME TO PEAK    (hrs)=   12.037
     RUNOFF VOLUME    (mm)=  110.935
     TOTAL RAINFALL   (mm)=  119.801
     RUNOFF COEFFICIENT   =     .926

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-
100:0004--------------------------------------------------------------------------
-
*#**************************************************************************
*# Area of Interest - lawns and parking areas
*#**************************************************************************
---------------------
| DESIGN NASHYD      |   Area    (ha)=    5.34   Curve Number   (CN)=82.00
| 02:101    DT= 2.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=    .220

     Unit Hyd Qpeak  (cms)=     .927

     PEAK FLOW       (cms)=     .998 (i)
     TIME TO PEAK    (hrs)=   12.108
     RUNOFF VOLUME    (mm)=   80.406
     TOTAL RAINFALL   (mm)=  119.801
     RUNOFF COEFFICIENT   =     .671

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-
100:0005--------------------------------------------------------------------------
-
*#**************************************************************************
*# Total Flow to Bath Road Culvert
*#**************************************************************************
-----------------------
| ADD HYD (      2000) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
-----------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
                       ID1 01:EXT1         9.90    2.690   12.04 110.93    .000
                      +ID2 02:101          5.34     .998   12.11  80.41    .000
                       ============================================================
                       SUM 03:      2000   15.24    3.683   12.07 100.24    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
-
100:0006--------------------------------------------------------------------------
-
--------------------------------------------------------------------------------
-
100:0002--------------------------------------------------------------------------
-
--------------------------------------------------------------------------------
-
100:0002--------------------------------------------------------------------------
-
--------------------------------------------------------------------------------
-
100:0002--------------------------------------------------------------------------
-
--------------------------------------------------------------------------------
-

100:0002--------------------------------------------------------------------------
-
      FINISH
--------------------------------------------------------------------------------
-
********************************************************************************
*
     WARNINGS / ERRORS / NOTES
     -------------------------
   Simulation ended on 2017-07-05     at 10:27:04
================================================================================
=
```

APPENDIX B
PROPOSED CONDITIONS HYDROLOGY

Subject: CN Calculation - Proposed
Project: Amherst Island Wind Energy Project - Mainland Laydown Area
Project No.: 1609-60595
Client: Windlectric
Date: July 5, 2017

TABLE OF CURVE NUMBERS (CN's)								
Land Use		Hydrologic Soil Type						Source
		A	AB	B	BC	C	CD	D	
Meadow	"Good"	30	44	58	65	71	75	78	MTO
Woodlot	"Fair"	36	48	60	67	73	76	79	MTO
Lawns	"Good"	39	50	61	68	74	77	80	USDA
Pasture/Range		58	62	65	71	76	79	81	MTO
Crop		66	70	74	78	82	84	86	MTO
Gravel		76	81	85	87	89	90	91	Chin
Bare Soil (Fallow)		77	82	86	89	91	93	94	MTO
Impervious		98	98	98	98	98	98	98	MTO

MTO - Ministry of Transportation Ontario Drainage Manual (1997), Design Chart 1.09-Soil/Land Use Curve Numbers
USDA - United States Department of Agriculture (2004), National Engineering Handbook, Part 630 Hydrology, Chapter 9 Hydrologic Soil Cover Complexes

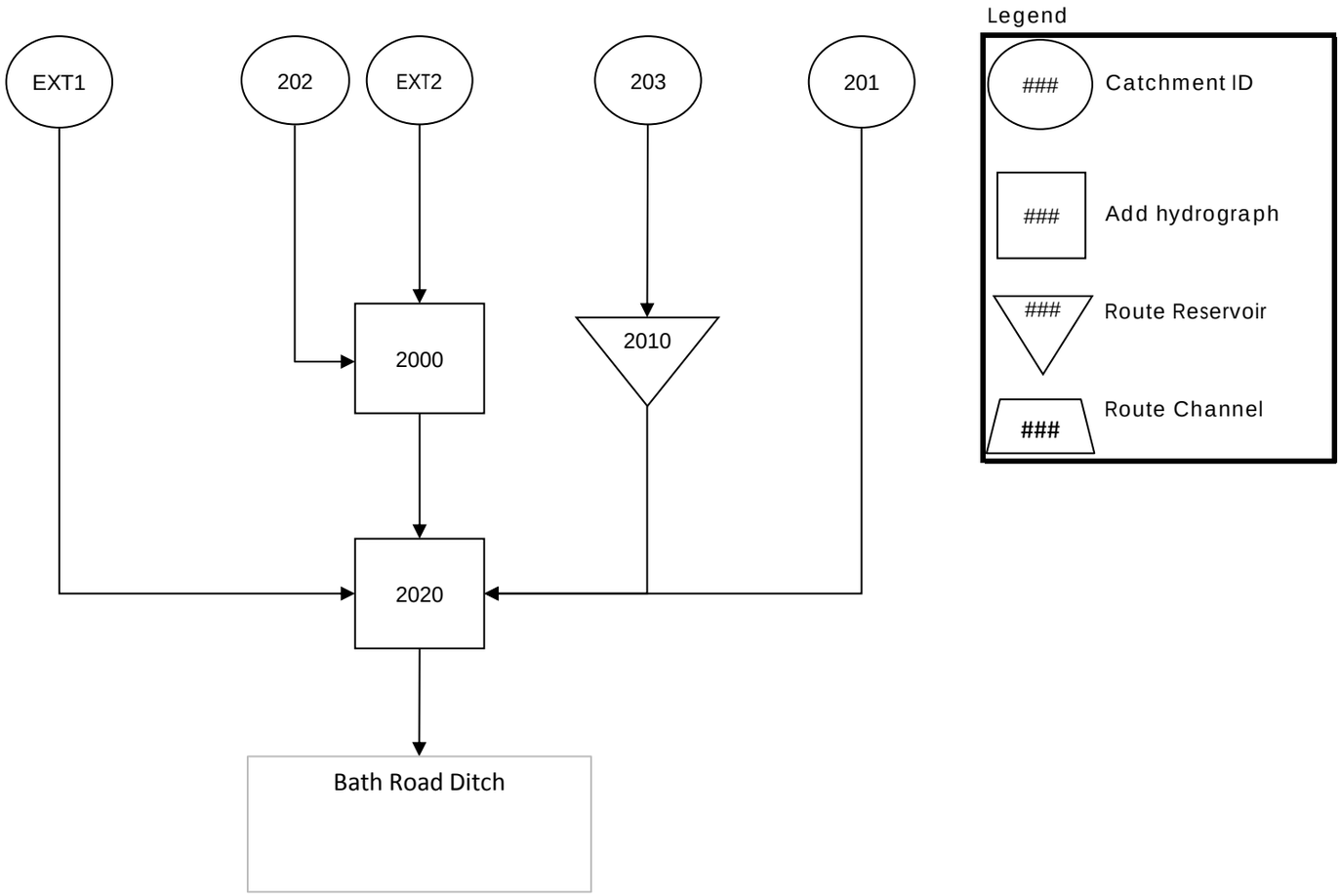
HYDROLOGIC SOIL TYPE (%) - Existing Conditions								
Catchment	Hydrologic Soil Type							TOTAL
	A	AB	B	BC	C	CD	D	
EXT1					100			100
EXT2					100			100
201					100			100
202					100			100
203					100			100

LAND USE (%) - Existing Conditions									
Catchment	Meadow	Woodlot	Lawns	Pasture Range	Crop	Bare Soil	Gravel	Impervious	Total
EXT1			5					95	100
EXT2			5					95	100
201			60					40	100
202			5					95	100
203							100		100

CURVE NUMBER (CN) - Existing Conditions										
Catchment	Meadow	Woodlot	Lawns	Pasture Range	Crop	Bare Soil	Gravel	Impervious	Weighted CN w/ imp area	Weighted CN w/o imp area
EXT1			4					93	97	74
EXT2			4					93	97	74
201			44					39	84	74
202			4					93	97	79
203							89		89	89

Notes:
AMC II assumed
Hydrological Soil Groups taken from MTO Drainage Manual

Subject: Post-Development SWMHYMO Schematic
Project: Amherst Island Wind Energy Project - Mainland Laydown Area
Project No.: 1609-60595
Client: Windlectric
Date: July 5, 2017



```
================================================================================

   SSSSS  W   W  M   M  H   H  Y   Y  M   M   OOO        999    999    =========
   S      W W W  MM MM  H   H   Y Y   MM MM  O   O      9   9  9   9
   SSSSS  W W W  M M M  HHHHH    Y    M M M  O   O  ##  9   9  9   9   Ver  4.05
       S   W W   M   M  H   H    Y    M   M  O   O       9999   9999   Sept 2011
   SSSSS   W W   M   M  H   H    Y    M   M   OOO           9      9   =========
                                                        9   9  9   9   # 4730904
         StormWater Management HYdrologic Model          999    999    =========

 ********************************************************************************
 ***************************** SWMHYMO Ver/4.05  ********************************
 *********  A single event and continuous hydrologic simulation model  *********
 *********     based on the principles of HYMO and its successors      *********
 *********                  OTTHYMO-83 and OTTHYMO-89.                  *********
 ********************************************************************************
 ********* Distributed by:  J.F. Sabourin and Associates Inc.          *********
 *********                   Ottawa,  Ontario: (613) 836-3884          *********
 *********                   Gatineau, Quebec: (819) 243-6858          *********
 *********                   E-Mail: swmhymo@jfsa.Com                  *********
 ********************************************************************************

 +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
 +++++++++ Licensed user: Stantec Consulting Ltd. (Kitchener)          +++++++++
 +++++++++                Kitchener             SERIAL#:4730904       +++++++++
 +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

 ********************************************************************************
 *********           ++++++ PROGRAM ARRAY DIMENSIONS ++++++            *********
 *********           Maximum value for ID numbers  :     10           *********
 *********           Max. number of rainfall points: 105408           *********
 *********           Max. number of flow points    : 105408           *********
 ********************************************************************************


 *********************   D E T A I L E D   O U T P U T   **********************
 ********************************************************************************
 *         DATE: 2017-07-10     TIME: 14:18:31     RUN COUNTER: 000629         *
 ********************************************************************************
 * Input   filename: Z:\Temp\Amherst\0595PR5.dat                                 *
 * Output  filename: Z:\Temp\Amherst\0595PR5.out                                 *
 * Summary filename: Z:\Temp\Amherst\0595PR5.sum                                 *
 * User comments:                                                               *
 * 1:_____________________________________________________________________________*
 * 2:_____________________________________________________________________________*
 * 3:_____________________________________________________________________________*
 ********************************************************************************

--------------------------------------------------------------------------------
-
001:0001----------------------------------------------------------------------------
-
*#*****************************************************************************
*#  Project Name: [Amherst Island MLA] Project Number: [1609-60595]
*#  Date        : 07-05-2017
*#  Modeller    : [NE]
*#  Company     : Stantec Consulting Ltd. (London)
*#  License #   :  4730904
*#*****************************************************************************
*#
*#  PROPOSED CONDITIONS
*#  25 mm Water Quality Event
*#  2, 5, 10, 100-year 24-hour SCS Design Storm
*#
*#*****************************************************************************
*#
--------------------
| START            |  Project  dir.: Z:\Temp\Amherst\
--------------------  Rainfall dir.: Z:\Temp\Amherst\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 001
    NSTORM=   1
          #  1=25mm.4hr
--------------------------------------------------------------------------------
-
001:0002----------------------------------------------------------------------------
-
--------------------
| READ STORM       |    Filename: 25 mm, 4hr Chicago Storm - Kitchener IDF
| Ptotal=  25.00 mm|    Comments: 25 mm, 4hr Chicago Storm - Kitchener IDF
--------------------
              TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
               hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
               .08   1.465 |   1.08   4.024 |   2.08   5.764 |   3.08   2.074
               .17   1.540 |   1.17   4.814 |   2.17   4.969 |   3.17   1.977
               .25   1.625 |   1.25   6.025 |   2.25   4.374 |   3.25   1.889
               .33   1.720 |   1.33   8.114 |   2.33   3.913 |   3.33   1.810
               .42   1.829 |   1.42  12.526 |   2.42   3.545 |   3.42   1.737
               .50   1.955 |   1.50  27.198 |   2.50   3.245 |   3.50   1.671
               .58   2.101 |   1.58  74.855 |   2.58   2.994 |   3.58   1.610
               .67   2.274 |   1.67  31.410 |   2.67   2.782 |   3.67   1.553
               .75   2.482 |   1.75  16.819 |   2.75   2.601 |   3.75   1.501
               .83   2.736 |   1.83  11.357 |   2.83   2.443 |   3.83   1.453
               .92   3.055 |   1.92   8.563 |   2.92   2.305 |   3.92   1.408
              1.00   3.468 |   2.00   6.882 |   3.00   2.183 |   4.00   1.366

--------------------------------------------------------------------------------
-
001:0003----------------------------------------------------------------------------
-
*#*****************************************************************************
*# External Drainage Area - Former Invista Site
*#*****************************************************************************
----------------------
| DESIGN NASHYD      |   Area    (ha)=    5.02   Curve Number   (CN)=97.00
| 01:EXT1   DT= 2.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .190

     Unit Hyd Qpeak  (cms)=    1.009

     PEAK FLOW       (cms)=     .344 (i)
     TIME TO PEAK    (hrs)=    1.750
     RUNOFF VOLUME    (mm)=   17.613
     TOTAL RAINFALL   (mm)=   25.000
     RUNOFF COEFFICIENT   =     .704

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-
001:0004----------------------------------------------------------------------------
-
----------------------
| DESIGN NASHYD      |   Area    (ha)=    4.89   Curve Number   (CN)=97.00
| 02:EXT2   DT= 2.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .190

     Unit Hyd Qpeak  (cms)=     .983

     PEAK FLOW       (cms)=     .335 (i)
     TIME TO PEAK    (hrs)=    1.750
     RUNOFF VOLUME    (mm)=   17.613
     TOTAL RAINFALL   (mm)=   25.000
```

```
     RUNOFF COEFFICIENT   =     .704

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---------------------------------------------------------------------------------------
-
001:0005-----------------------------------------------------------------------------
-
*#**************************************************************************
*# Area of Interest - lawns and parking areas
*#**************************************************************************
----------------------
| DESIGN NASHYD      |   Area    (ha)=    3.12   Curve Number   (CN)=84.00
| 03:201    DT= 2.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .190

     Unit Hyd Qpeak  (cms)=     .627

     PEAK FLOW       (cms)=     .083 (i)
     TIME TO PEAK    (hrs)=    1.792
     RUNOFF VOLUME    (mm)=    7.683
     TOTAL RAINFALL   (mm)=   25.000
     RUNOFF COEFFICIENT   =     .307

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---------------------------------------------------------------------------------------
-
001:0006-----------------------------------------------------------------------------
-
*#**************************************************************************
*# Area of Interest - parking area
*#**************************************************************************
----------------------
| DESIGN NASHYD      |   Area    (ha)=     .59   Curve Number   (CN)=97.00
| 04:202    DT= 2.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .100

     Unit Hyd Qpeak  (cms)=     .225

     PEAK FLOW       (cms)=     .058 (i)
     TIME TO PEAK    (hrs)=    1.667
     RUNOFF VOLUME    (mm)=   17.613
     TOTAL RAINFALL   (mm)=   25.000
     RUNOFF COEFFICIENT   =     .705

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---------------------------------------------------------------------------------------
-
001:0007-----------------------------------------------------------------------------
-
*#**************************************************************************
*# Flow Diverted Around Laydown Area
*#**************************************************************************
------------------------
| ADD HYD (      2000) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
                     ID1 02:EXT2           4.89     .335    1.75  17.61    .000
                    +ID2 04:202             .59     .058    1.67  17.61    .000
                     ============================================================
                     SUM 05:      2000     5.48     .380    1.75  17.61    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

---------------------------------------------------------------------------------------
-
001:0008-----------------------------------------------------------------------------
-
*#**************************************************************************
*# Laydown Area
*#**************************************************************************
----------------------
| DESIGN NASHYD      |   Area    (ha)=    1.72   Curve Number   (CN)=89.00
| 07:203    DT= 2.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .100

     Unit Hyd Qpeak  (cms)=     .657

     PEAK FLOW       (cms)=     .087 (i)
     TIME TO PEAK    (hrs)=    1.667
     RUNOFF VOLUME    (mm)=   10.061
     TOTAL RAINFALL   (mm)=   25.000
     RUNOFF COEFFICIENT   =     .402

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---------------------------------------------------------------------------------------
-
001:0009-----------------------------------------------------------------------------
-
--------------------
| ROUTE RESERVOIR  |    Requested routing time step =  2.0 min.
|  IN>07:(203   )  |
| OUT<04:(002010)  |    =========  OUTLFOW STORAGE TABLE  =========
--------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                          (cms)    (ha.m.)   |    (cms)    (ha.m.)
                           .000  .0000E+00   |     .017  .6200E-01
                           .005  .4000E-02   |     .018  .7500E-01
                           .008  .1100E-01   |     .019  .8800E-01
                           .010  .2000E-01   |     .020  .1020E+00
                           .012  .2900E-01   |     .303  .1190E+00
                           .014  .4000E-01   |     .852  .1390E+00
                           .015  .5100E-01   |     .000  .0000E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     --------------------       (ha)     (cms)     (hrs)       (mm)
     INFLOW >07: (203   )       1.72      .087     1.667     10.061
     OUTFLOW<04: (002010)       1.72      .008     2.833     10.061

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=    9.250
                  TIME SHIFT OF PEAK FLOW         (min)=    70.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=.1129E-01

---------------------------------------------------------------------------------------
-
001:0010-----------------------------------------------------------------------------
-
*#**************************************************************************
*# Total Flow to Bath Road Culvert
*#**************************************************************************
------------------------
| ADD HYD (      2020) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
                     ID1 01:EXT1           5.02     .344    1.75  17.61    .000
                    +ID2 03:201            3.12     .083    1.79   7.68    .000
                    +ID3 04:      2010     1.72     .008    2.83  10.06    .000
                    +ID4 05:      2000     5.48     .380    1.75  17.61    .000
                     ============================================================
                     SUM 06:      2020    15.34     .810    1.75  14.75    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
```

```
--------------------------------------------------------------------------------
-
001:0011--------------------------------------------------------------------------
-
  ** END OF RUN :   1

********************************************************************************




--------------------
| START            |  Project  dir.: Z:\Temp\Amherst\
--------------------  Rainfall dir.: Z:\Temp\Amherst\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 002
    NSTORM=   1
           #  1=AI2SCS.24H
--------------------------------------------------------------------------------
-
002:0002--------------------------------------------------------------------------
-
*#*****************************************************************************
*#  Project Name: [Amherst Island MLA] Project Number: [1609-60595]
*#  Date        : 07-05-2017
*#  Modeller    : [NE]
*#  Company     : Stantec Consulting Ltd. (London)
*#  License #   :  4730904
*#*****************************************************************************
*#
*#  PROPOSED CONDITIONS
*#  25 mm Water Quality Event
*#  2, 5, 10, 100-year 24-hour SCS Design Storm
*#
*#*****************************************************************************
*#
--------------------------------------------------------------------------------
-
002:0002--------------------------------------------------------------------------
-
--------------------
| READ STORM       |    Filename: Amherst Island MTO IDF (44 9' 15"N, 76 4
| Ptotal=  54.10 mm|    Comments: Amherst Island MTO IDF (44 9' 15"N, 76 4
--------------------
             TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
              hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
              .25    .595 |   6.25   1.082 |  12.25   7.790 |  18.25    .974
              .50    .595 |   6.50   1.082 |  12.50   7.790 |  18.50    .974
              .75    .595 |   6.75   1.082 |  12.75   4.003 |  18.75    .974
             1.00    .595 |   7.00   1.082 |  13.00   4.003 |  19.00    .974
             1.25    .595 |   7.25   1.082 |  13.25    .757 |  19.25    .974
             1.50    .595 |   7.50   1.082 |  13.50    .757 |  19.50    .974
             1.75    .595 |   7.75   1.082 |  13.75   4.436 |  19.75    .974
             2.00    .595 |   8.00   1.082 |  14.00   4.436 |  20.00    .974
             2.25    .703 |   8.25   1.461 |  14.25   1.623 |  20.25    .649
             2.50    .703 |   8.50   1.461 |  14.50   1.623 |  20.50    .649
             2.75    .703 |   8.75   1.461 |  14.75   1.623 |  20.75    .649
             3.00    .703 |   9.00   1.461 |  15.00   1.623 |  21.00    .649
             3.25    .703 |   9.25   1.731 |  15.25   1.623 |  21.25    .649
             3.50    .703 |   9.50   1.731 |  15.50   1.623 |  21.50    .649
             3.75    .703 |   9.75   1.948 |  15.75   1.623 |  21.75    .649
             4.00    .703 |  10.00   1.948 |  16.00   1.623 |  22.00    .649
             4.25    .866 |  10.25   2.489 |  16.25    .974 |  22.25    .649
             4.50    .866 |  10.50   2.489 |  16.50    .974 |  22.50    .649
             4.75    .866 |  10.75   3.354 |  16.75    .974 |  22.75    .649
             5.00    .866 |  11.00   3.354 |  17.00    .974 |  23.00    .649
             5.25    .866 |  11.25   5.194 |  17.25    .974 |  23.25    .649
             5.50    .866 |  11.50   5.194 |  17.50    .974 |  23.50    .649
             5.75    .866 |  11.75  22.506 |  17.75    .974 |  23.75    .649
             6.00    .866 |  12.00  59.726 |  18.00    .974 |  24.00    .649

--------------------------------------------------------------------------------
-
002:0003--------------------------------------------------------------------------
-
*#*****************************************************************************
*# External Drainage Area - Former Invista Site
*#*****************************************************************************
----------------------
| DESIGN NASHYD      |   Area    (ha)=    5.02   Curve Number   (CN)=97.00
| 01:EXT1   DT= 2.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .190

     Unit Hyd Qpeak  (cms)=    1.009

     PEAK FLOW       (cms)=     .575 (i)
     TIME TO PEAK    (hrs)=   12.072
     RUNOFF VOLUME    (mm)=   45.765
     TOTAL RAINFALL   (mm)=   54.100
     RUNOFF COEFFICIENT   =     .846

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-
002:0004--------------------------------------------------------------------------
-
----------------------
| DESIGN NASHYD      |   Area    (ha)=    4.89   Curve Number   (CN)=97.00
| 02:EXT2   DT= 2.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .190

     Unit Hyd Qpeak  (cms)=     .983

     PEAK FLOW       (cms)=     .560 (i)
     TIME TO PEAK    (hrs)=   12.072
     RUNOFF VOLUME    (mm)=   45.765
     TOTAL RAINFALL   (mm)=   54.100
     RUNOFF COEFFICIENT   =     .846

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-
002:0005--------------------------------------------------------------------------
-
*#*****************************************************************************
*# Area of Interest - lawns and parking areas
*#*****************************************************************************
----------------------
| DESIGN NASHYD      |   Area    (ha)=    3.12   Curve Number   (CN)=84.00
| 03:201    DT= 2.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .190

     Unit Hyd Qpeak  (cms)=     .627

     PEAK FLOW       (cms)=     .216 (i)
     TIME TO PEAK    (hrs)=   12.072
     RUNOFF VOLUME    (mm)=   27.399
     TOTAL RAINFALL   (mm)=   54.100
     RUNOFF COEFFICIENT   =     .506
```

```
     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-
002:0006--------------------------------------------------------------------------
-
*#*************************************************************************
*# Area of Interest - parking area
*#*************************************************************************
---------------------
| DESIGN NASHYD      |   Area    (ha)=     .59   Curve Number   (CN)=97.00
| 04:202    DT= 2.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=    .100

     Unit Hyd Qpeak  (cms)=     .225

     PEAK FLOW       (cms)=     .087 (i)
     TIME TO PEAK    (hrs)=   12.001
     RUNOFF VOLUME    (mm)=   45.765
     TOTAL RAINFALL   (mm)=   54.100
     RUNOFF COEFFICIENT   =     .846

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-
002:0007--------------------------------------------------------------------------
-
*#*************************************************************************
*# Flow Diverted Around Laydown Area
*#*************************************************************************
------------------------
| ADD HYD (      2000) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
                     ID1 02:EXT2           4.89     .560   12.07  45.76    .000
                    +ID2 04:202             .59     .087   12.00  45.76    .000
                     ============================================================
                     SUM 05:      2000     5.48     .636   12.04  45.76    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
-
002:0008--------------------------------------------------------------------------
-
*#*************************************************************************
*# Laydown Area
*#*************************************************************************
---------------------
| DESIGN NASHYD      |   Area    (ha)=    1.72   Curve Number   (CN)=89.00
| 07:203    DT= 2.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=    .100

     Unit Hyd Qpeak  (cms)=     .657

     PEAK FLOW       (cms)=     .190 (i)
     TIME TO PEAK    (hrs)=   12.001
     RUNOFF VOLUME    (mm)=   32.940
     TOTAL RAINFALL   (mm)=   54.100
     RUNOFF COEFFICIENT   =     .609

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-
002:0009--------------------------------------------------------------------------
-
---------------------
| ROUTE RESERVOIR   |    Requested routing time step =  2.0 min.
|  IN>07:(203   )   |
| OUT<04:(002010)   |    =========  OUTFLOW STORAGE TABLE  =========
---------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                           (cms)    (ha.m.)   |    (cms)    (ha.m.)
                            .000  .0000E+00   |     .017  .6200E-01
                            .005  .4000E-02   |     .018  .7500E-01
                            .008  .1100E-01   |     .019  .8800E-01
                            .010  .2000E-01   |     .020  .1020E+00
                            .012  .2900E-01   |     .303  .1190E+00
                            .014  .4000E-01   |     .852  .1390E+00
                            .015  .5100E-01   |     .000  .0000E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     --------------------       (ha)     (cms)     (hrs)       (mm)
     INFLOW >07: (203   )       1.72      .190    12.001     32.940
     OUTFLOW<04: (002010)       1.72      .012    13.072     32.940

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=    6.403
                  TIME SHIFT OF PEAK FLOW         (min)=    64.29
                  MAXIMUM  STORAGE   USED       (ha.m.)=.2995E-01

--------------------------------------------------------------------------------
-
002:0010--------------------------------------------------------------------------
-
*#*************************************************************************
*# Total Flow to Bath Road Culvert
*#*************************************************************************
------------------------
| ADD HYD (      2020) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
                     ID1 01:EXT1           5.02     .575   12.07  45.76    .000
                    +ID2 03:201            3.12     .216   12.07  27.40    .000
                    +ID3 04:      2010     1.72     .012   13.07  32.94    .000
                    +ID4 05:      2000     5.48     .636   12.04  45.76    .000
                     ============================================================
                     SUM 06:      2020    15.34    1.431   12.07  40.59    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
-
002:0011--------------------------------------------------------------------------
-
--------------------------------------------------------------------------------
-
002:0002--------------------------------------------------------------------------
-
  ** END OF RUN :   4

*************************************************************************



--------------------
| START            |  Project  dir.: Z:\Temp\Amherst\
--------------------  Rainfall dir.: Z:\Temp\Amherst\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 005
    NSTORM=   1
           #  1=AI5SCS.24H
```

```
--------------------------------------------------------------------------------
-
005:0002----------------------------------------------------------------------
-
*#**************************************************************************
*#  Project Name: [Amherst Island MLA] Project Number: [1609-60595]
*#  Date        : 07-05-2017
*#  Modeller    : [NE]
*#  Company     : Stantec Consulting Ltd. (London)
*#  License #   :  4730904
*#**************************************************************************
*#
*#  PROPOSED CONDITIONS
*#  25 mm Water Quality Event
*#  2, 5, 10, 100-year 24-hour SCS Design Storm
*#
*#**************************************************************************
*#
--------------------------------------------------------------------------------
-
005:0002----------------------------------------------------------------------
-
--------------------
| READ STORM       |    Filename: Amherst Island MTO IDF (44 9' 15"N, 76 4
| Ptotal=  71.40 mm|    Comments: Amherst Island MTO IDF (44 9' 15"N, 76 4
--------------------
              TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
               hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
               .25    .785 |   6.25   1.428 |  12.25  10.282 |  18.25   1.285
               .50    .785 |   6.50   1.428 |  12.50  10.282 |  18.50   1.285
               .75    .785 |   6.75   1.428 |  12.75   5.284 |  18.75   1.285
              1.00    .785 |   7.00   1.428 |  13.00   5.284 |  19.00   1.285
              1.25    .785 |   7.25   1.428 |  13.25   3.713 |  19.25   1.285
              1.50    .785 |   7.50   1.428 |  13.50   3.998 |  19.50   1.285
              1.75    .785 |   7.75   1.428 |  13.75   2.999 |  19.75   1.285
              2.00    .785 |   8.00   1.428 |  14.00   2.999 |  20.00   1.285
              2.25    .928 |   8.25   1.928 |  14.25   2.142 |  20.25    .857
              2.50    .928 |   8.50   1.928 |  14.50   2.142 |  20.50    .857
              2.75    .928 |   8.75   1.928 |  14.75   2.142 |  20.75    .857
              3.00    .928 |   9.00   1.928 |  15.00   2.142 |  21.00    .857
              3.25    .928 |   9.25   2.285 |  15.25   2.142 |  21.25    .857
              3.50    .928 |   9.50   2.285 |  15.50   2.142 |  21.50    .857
              3.75    .928 |   9.75   2.570 |  15.75   2.142 |  21.75    .857
              4.00    .928 |  10.00   2.570 |  16.00   2.142 |  22.00    .857
              4.25   1.142 |  10.25   3.284 |  16.25   1.285 |  22.25    .857
              4.50   1.142 |  10.50   3.284 |  16.50   1.285 |  22.50    .857
              4.75   1.142 |  10.75   4.427 |  16.75   1.285 |  22.75    .857
              5.00   1.142 |  11.00   4.427 |  17.00   1.285 |  23.00    .857
              5.25   1.142 |  11.25   6.854 |  17.25   1.285 |  23.25    .857
              5.50   1.142 |  11.50   6.854 |  17.50   1.285 |  23.50    .857
              5.75   1.142 |  11.75  29.702 |  17.75   1.285 |  23.75    .857
              6.00   1.142 |  12.00  78.826 |  18.00   1.285 |  24.00    .857

--------------------------------------------------------------------------------
-
005:0003----------------------------------------------------------------------
-
*#**************************************************************************
*# External Drainage Area - Former Invista Site
*#**************************************************************************
----------------------
| DESIGN NASHYD      |   Area    (ha)=    5.02   Curve Number   (CN)=97.00
| 01:EXT1   DT= 2.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .190

     Unit Hyd Qpeak  (cms)=    1.009

     PEAK FLOW       (cms)=     .777 (i)
     TIME TO PEAK    (hrs)=   12.072
     RUNOFF VOLUME    (mm)=   62.836
     TOTAL RAINFALL   (mm)=   71.398
     RUNOFF COEFFICIENT   =     .880

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-
005:0004----------------------------------------------------------------------
-
----------------------
| DESIGN NASHYD      |   Area    (ha)=    4.89   Curve Number   (CN)=97.00
| 02:EXT2   DT= 2.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .190

     Unit Hyd Qpeak  (cms)=     .983

     PEAK FLOW       (cms)=     .756 (i)
     TIME TO PEAK    (hrs)=   12.072
     RUNOFF VOLUME    (mm)=   62.836
     TOTAL RAINFALL   (mm)=   71.398
     RUNOFF COEFFICIENT   =     .880

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-
005:0005----------------------------------------------------------------------
-
*#**************************************************************************
*# Area of Interest - lawns and parking areas
*#**************************************************************************
----------------------
| DESIGN NASHYD      |   Area    (ha)=    3.12   Curve Number   (CN)=84.00
| 03:201    DT= 2.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .190

     Unit Hyd Qpeak  (cms)=     .627

     PEAK FLOW       (cms)=     .327 (i)
     TIME TO PEAK    (hrs)=   12.072
     RUNOFF VOLUME    (mm)=   41.307
     TOTAL RAINFALL   (mm)=   71.398
     RUNOFF COEFFICIENT   =     .579

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-
005:0006----------------------------------------------------------------------
-
*#**************************************************************************
*# Area of Interest - parking area
*#**************************************************************************
----------------------
| DESIGN NASHYD      |   Area    (ha)=     .59   Curve Number   (CN)=97.00
| 04:202    DT= 2.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .100

     Unit Hyd Qpeak  (cms)=     .225

     PEAK FLOW       (cms)=     .117 (i)
     TIME TO PEAK    (hrs)=   12.001
     RUNOFF VOLUME    (mm)=   62.836
     TOTAL RAINFALL   (mm)=   71.398
```

```
     RUNOFF COEFFICIENT   =     .880

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
-
005:0007---------------------------------------------------------------------
-
*#*************************************************************************
*# Flow Diverted Around Laydown Area
*#*************************************************************************
------------------------
| ADD HYD (      2000) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
                     ID1 02:EXT2           4.89     .756   12.07  62.84    .000
                    +ID2 04:202             .59     .117   12.00  62.84    .000
                     ==========================================================
                     SUM 05:      2000     5.48     .859   12.04  62.84    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
-
005:0008---------------------------------------------------------------------
-
*#*************************************************************************
*# Laydown Area
*#*************************************************************************
----------------------
| DESIGN NASHYD      |   Area    (ha)=    1.72   Curve Number   (CN)=89.00
| 07:203    DT= 2.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .100

     Unit Hyd Qpeak  (cms)=     .657

     PEAK FLOW       (cms)=     .277 (i)
     TIME TO PEAK    (hrs)=   12.001
     RUNOFF VOLUME    (mm)=   48.234
     TOTAL RAINFALL   (mm)=   71.398
     RUNOFF COEFFICIENT   =     .676

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
-
005:0009---------------------------------------------------------------------
-
--------------------
| ROUTE RESERVOIR  |    Requested routing time step =  2.0 min.
|  IN>07:(203   )  |
| OUT<04:(002010)  |    =========  OUTLFOW STORAGE TABLE  =========
--------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                          (cms)    (ha.m.)   |    (cms)    (ha.m.)
                          .000  .0000E+00   |     .017  .6200E-01
                          .005  .4000E-02   |     .018  .7500E-01
                          .008  .1100E-01   |     .019  .8800E-01
                          .010  .2000E-01   |     .020  .1020E+00
                          .012  .2900E-01   |     .303  .1190E+00
                          .014  .4000E-01   |     .852  .1390E+00
                          .015  .5100E-01   |     .000  .0000E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     --------------------       (ha)     (cms)     (hrs)       (mm)
     INFLOW >07: (203   )       1.72      .277    12.001     48.234
     OUTFLOW<04: (002010)       1.72      .015    13.608     48.234

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=    5.268

                   TIME SHIFT OF PEAK FLOW         (min)=    96.43
                   MAXIMUM  STORAGE   USED       (ha.m.)=.4625E-01

-------------------------------------------------------------------------------
-
005:0010---------------------------------------------------------------------
-
*#*************************************************************************
*# Total Flow to Bath Road Culvert
*#*************************************************************************
------------------------
| ADD HYD (      2020) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
                     ID1 01:EXT1           5.02     .777   12.07  62.84    .000
                    +ID2 03:201            3.12     .327   12.07  41.31    .000
                    +ID3 04:      2010     1.72     .015   13.61  48.23    .000
                    +ID4 05:      2000     5.48     .859   12.04  62.84    .000
                     ==========================================================
                     SUM 06:      2020    15.34    1.966   12.07  56.82    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
-
005:0011---------------------------------------------------------------------
-
-------------------------------------------------------------------------------
-
005:0002---------------------------------------------------------------------
-
-------------------------------------------------------------------------------
-
005:0002---------------------------------------------------------------------
-
  ** END OF RUN :   9

*************************************************************************



--------------------
| START            |  Project  dir.: Z:\Temp\Amherst\
--------------------  Rainfall dir.: Z:\Temp\Amherst\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 010
    NSTORM=   1
           #  1=AI10SCS.24H
-------------------------------------------------------------------------------
-
010:0002---------------------------------------------------------------------
-
*#*************************************************************************
*#  Project Name: [Amherst Island MLA] Project Number: [1609-60595]
*#  Date        : 07-05-2017
*#  Modeller    : [NE]
*#  Company     : Stantec Consulting Ltd. (London)
*#  License #   :  4730904
*#*************************************************************************
*#
*#  PROPOSED CONDITIONS
*#  25 mm Water Quality Event
*#  2, 5, 10, 100-year 24-hour SCS Design Storm
*#
*#*************************************************************************
```

```
*#
------------------------------------------------------------------------------
-
010:0002----------------------------------------------------------------------
-
--------------------
| READ STORM       |    Filename: Amherst Island MTO IDF (44 9' 15"N, 76 4
| Ptotal=  83.00 mm|    Comments: Amherst Island MTO IDF (44 9' 15"N, 76 4
--------------------
              TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
               hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
               .25    .913 |   6.25   1.660 |  12.25  11.952 |  18.25   1.494
               .50    .913 |   6.50   1.660 |  12.50  11.952 |  18.50   1.494
               .75    .913 |   6.75   1.660 |  12.75   6.142 |  18.75   1.494
              1.00    .913 |   7.00   1.660 |  13.00   6.142 |  19.00   1.494
              1.25    .913 |   7.25   1.660 |  13.25   1.162 |  19.25   1.494
              1.50    .913 |   7.50   1.660 |  13.50   1.162 |  19.50   1.494
              1.75    .913 |   7.75   1.660 |  13.75   6.806 |  19.75   1.494
              2.00    .913 |   8.00   1.660 |  14.00   6.806 |  20.00   1.494
              2.25   1.079 |   8.25   2.241 |  14.25   2.490 |  20.25    .996
              2.50   1.079 |   8.50   2.241 |  14.50   2.490 |  20.50    .996
              2.75   1.079 |   8.75   2.241 |  14.75   2.490 |  20.75    .996
              3.00   1.079 |   9.00   2.241 |  15.00   2.490 |  21.00    .996
              3.25   1.079 |   9.25   2.656 |  15.25   2.490 |  21.25    .996
              3.50   1.079 |   9.50   2.656 |  15.50   2.490 |  21.50    .996
              3.75   1.079 |   9.75   2.988 |  15.75   2.490 |  21.75    .996
              4.00   1.079 |  10.00   2.988 |  16.00   2.490 |  22.00    .996
              4.25   1.328 |  10.25   3.818 |  16.25   1.494 |  22.25    .996
              4.50   1.328 |  10.50   3.818 |  16.50   1.494 |  22.50    .996
              4.75   1.328 |  10.75   5.146 |  16.75   1.494 |  22.75    .996
              5.00   1.328 |  11.00   5.146 |  17.00   1.494 |  23.00    .996
              5.25   1.328 |  11.25   7.968 |  17.25   1.494 |  23.25    .996
              5.50   1.328 |  11.50   7.968 |  17.50   1.494 |  23.50    .996
              5.75   1.328 |  11.75  34.528 |  17.75   1.494 |  23.75    .996
              6.00   1.328 |  12.00  91.632 |  18.00   1.494 |  24.00    .996

------------------------------------------------------------------------------
-
010:0003----------------------------------------------------------------------
-
*#**************************************************************************
*# External Drainage Area - Former Invista Site
*#**************************************************************************
----------------------
| DESIGN NASHYD      |   Area    (ha)=    5.02   Curve Number   (CN)=97.00
| 01:EXT1   DT= 2.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .190

     Unit Hyd Qpeak  (cms)=    1.009

     PEAK FLOW       (cms)=     .911 (i)
     TIME TO PEAK    (hrs)=   12.072
     RUNOFF VOLUME    (mm)=   74.335
     TOTAL RAINFALL   (mm)=   83.000
     RUNOFF COEFFICIENT   =     .896

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
-
010:0004----------------------------------------------------------------------
-
----------------------
| DESIGN NASHYD      |   Area    (ha)=    4.89   Curve Number   (CN)=97.00
| 02:EXT2   DT= 2.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .190

     Unit Hyd Qpeak  (cms)=     .983

     PEAK FLOW       (cms)=     .887 (i)
     TIME TO PEAK    (hrs)=   12.072
     RUNOFF VOLUME    (mm)=   74.335
     TOTAL RAINFALL   (mm)=   83.000
     RUNOFF COEFFICIENT   =     .896

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
-
010:0005----------------------------------------------------------------------
-
*#**************************************************************************
*# Area of Interest - lawns and parking areas
*#**************************************************************************
----------------------
| DESIGN NASHYD      |   Area    (ha)=    3.12   Curve Number   (CN)=84.00
| 03:201    DT= 2.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .190

     Unit Hyd Qpeak  (cms)=     .627

     PEAK FLOW       (cms)=     .405 (i)
     TIME TO PEAK    (hrs)=   12.072
     RUNOFF VOLUME    (mm)=   51.141
     TOTAL RAINFALL   (mm)=   83.000
     RUNOFF COEFFICIENT   =     .616

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
-
010:0006----------------------------------------------------------------------
-
*#**************************************************************************
*# Area of Interest - parking area
*#**************************************************************************
----------------------
| DESIGN NASHYD      |   Area    (ha)=     .59   Curve Number   (CN)=97.00
| 04:202    DT= 2.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .100

     Unit Hyd Qpeak  (cms)=     .225

     PEAK FLOW       (cms)=     .137 (i)
     TIME TO PEAK    (hrs)=   12.001
     RUNOFF VOLUME    (mm)=   74.335
     TOTAL RAINFALL   (mm)=   83.000
     RUNOFF COEFFICIENT   =     .896

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
-
010:0007----------------------------------------------------------------------
-
*#**************************************************************************
*# Flow Diverted Around Laydown Area
*#**************************************************************************
------------------------
| ADD HYD (      2000) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
                       ID1 02:EXT2         4.89     .887   12.07  74.34    .000
                      +ID2 04:202           .59     .137   12.00  74.34    .000
                       ================================================================
```

```
                  SUM 05:      2000     5.48    1.007   12.04  74.34    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
-
010:0008----------------------------------------------------------------------------
-
*#*****************************************************************************
*# Laydown Area
*#*****************************************************************************
----------------------
| DESIGN NASHYD      |   Area    (ha)=    1.72   Curve Number   (CN)=89.00
| 07:203    DT= 2.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .100

     Unit Hyd Qpeak  (cms)=     .657

     PEAK FLOW       (cms)=     .336 (i)
     TIME TO PEAK    (hrs)=   12.001
     RUNOFF VOLUME    (mm)=   58.837
     TOTAL RAINFALL   (mm)=   83.000
     RUNOFF COEFFICIENT   =     .709

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-
010:0009----------------------------------------------------------------------------
-
---------------------
| ROUTE RESERVOIR   |    Requested routing time step =  2.0 min.
|  IN>07:(203   )   |
| OUT<04:(002010)   |    =========  OUTLFOW STORAGE TABLE  =========
---------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                           (cms)    (ha.m.)   |    (cms)    (ha.m.)
                           .000  .0000E+00   |     .017  .6200E-01
                           .005  .4000E-02   |     .018  .7500E-01
                           .008  .1100E-01   |     .019  .8800E-01
                           .010  .2000E-01   |     .020  .1020E+00
                           .012  .2900E-01   |     .303  .1190E+00
                           .014  .4000E-01   |     .852  .1390E+00
                           .015  .5100E-01   |     .000  .0000E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     --------------------       (ha)     (cms)     (hrs)       (mm)
     INFLOW >07: (203   )       1.72      .336    12.001     58.837
     OUTFLOW<04: (002010)       1.72      .016    14.180     58.837

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=    4.827
                  TIME SHIFT OF PEAK FLOW         (min)=   130.71
                  MAXIMUM  STORAGE   USED       (ha.m.)=.5760E-01

--------------------------------------------------------------------------------
-
010:0010----------------------------------------------------------------------------
-
*#*****************************************************************************
*# Total Flow to Bath Road Culvert
*#*****************************************************************************
-----------------------
| ADD HYD (      2020) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
-----------------------                   (ha)     (cms)   (hrs)   (mm)   (cms)
                        ID1 01:EXT1          5.02     .911   12.07  74.34    .000
                       +ID2 03:201           3.12     .405   12.07  51.14    .000
                       +ID3 04:      2010    1.72     .016   14.18  58.84    .000
                       +ID4 05:      2000    5.48    1.007   12.04  74.34    .000
                  ==========================================================
                  SUM 06:      2020    15.34    2.327   12.07  67.88    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
-
010:0011----------------------------------------------------------------------------
-
--------------------------------------------------------------------------------
-
010:0002----------------------------------------------------------------------------
-
--------------------------------------------------------------------------------
-
010:0002----------------------------------------------------------------------------
-
--------------------------------------------------------------------------------
-
010:0002----------------------------------------------------------------------------
-
  ** END OF RUN :  99

*****************************************************************************




--------------------
| START            |  Project  dir.: Z:\Temp\Amherst\
--------------------  Rainfall dir.: Z:\Temp\Amherst\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 100
    NSTORM=   1
           #  1=AI100SCS.24H
--------------------------------------------------------------------------------
-
100:0002----------------------------------------------------------------------------
-
*#*****************************************************************************
*#  Project Name: [Amherst Island MLA] Project Number: [1609-60595]
*#  Date        : 07-05-2017
*#  Modeller    : [NE]
*#  Company     : Stantec Consulting Ltd. (London)
*#  License #   :  4730904
*#*****************************************************************************
*#
*#  PROPOSED CONDITIONS
*#  25 mm Water Quality Event
*#  2, 5, 10, 100-year 24-hour SCS Design Storm
*#
*#*****************************************************************************
*#
--------------------------------------------------------------------------------
-
100:0002----------------------------------------------------------------------------
-
--------------------
| READ STORM       |    Filename: Amherst Island MTO IDF (44 9' 15"N, 76 4
| Ptotal= 119.80 mm|    Comments: Amherst Island MTO IDF (44 9' 15"N, 76 4
--------------------
             TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
              hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
              .25   1.318 |   6.25   2.396 |  12.25  17.251 |  18.25   2.156
              .50   1.318 |   6.50   2.396 |  12.50  17.251 |  18.50   2.156
```

```
              .75   1.318 |   6.75   2.396 |  12.75   8.865 |  18.75   2.156
             1.00   1.318 |   7.00   2.396 |  13.00   8.865 |  19.00   2.156
             1.25   1.318 |   7.25   2.396 |  13.25   1.677 |  19.25   2.156
             1.50   1.318 |   7.50   2.396 |  13.50   1.677 |  19.50   2.156
             1.75   1.318 |   7.75   2.396 |  13.75   9.824 |  19.75   2.156
             2.00   1.318 |   8.00   2.396 |  14.00   9.824 |  20.00   2.156
             2.25   1.557 |   8.25   3.235 |  14.25   3.594 |  20.25   1.438
             2.50   1.557 |   8.50   3.235 |  14.50   3.594 |  20.50   1.438
             2.75   1.557 |   8.75   3.235 |  14.75   3.594 |  20.75   1.438
             3.00   1.557 |   9.00   3.235 |  15.00   3.594 |  21.00   1.438
             3.25   1.557 |   9.25   3.834 |  15.25   3.594 |  21.25   1.438
             3.50   1.557 |   9.50   3.834 |  15.50   3.594 |  21.50   1.438
             3.75   1.557 |   9.75   4.313 |  15.75   3.594 |  21.75   1.438
             4.00   1.557 |  10.00   4.313 |  16.00   3.594 |  22.00   1.438
             4.25   1.917 |  10.25   5.511 |  16.25   2.156 |  22.25   1.438
             4.50   1.917 |  10.50   5.511 |  16.50   2.156 |  22.50   1.438
             4.75   1.917 |  10.75   7.428 |  16.75   2.156 |  22.75   1.438
             5.00   1.917 |  11.00   7.428 |  17.00   2.156 |  23.00   1.438
             5.25   1.917 |  11.25  11.501 |  17.25   2.156 |  23.25   1.438
             5.50   1.917 |  11.50  11.501 |  17.50   2.156 |  23.50   1.438
             5.75   1.917 |  11.75  49.837 |  17.75   2.156 |  23.75   1.438
             6.00   1.917 |  12.00 132.259 |  18.00   2.156 |  24.00   1.438

--------------------------------------------------------------------------------
-
100:0003--------------------------------------------------------------------------
-
*#*************************************************************************
*# External Drainage Area - Former Invista Site
*#*************************************************************************
----------------------
| DESIGN NASHYD      |   Area    (ha)=    5.02   Curve Number   (CN)=97.00
| 01:EXT1   DT= 2.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .190

     Unit Hyd Qpeak  (cms)=    1.009

     PEAK FLOW       (cms)=    1.333 (i)
     TIME TO PEAK    (hrs)=   12.072
     RUNOFF VOLUME    (mm)=  110.935
     TOTAL RAINFALL   (mm)=  119.801
     RUNOFF COEFFICIENT   =     .926

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-
100:0004--------------------------------------------------------------------------
-
----------------------
| DESIGN NASHYD      |   Area    (ha)=    4.89   Curve Number   (CN)=97.00
| 02:EXT2   DT= 2.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .190

     Unit Hyd Qpeak  (cms)=     .983

     PEAK FLOW       (cms)=    1.299 (i)
     TIME TO PEAK    (hrs)=   12.072
     RUNOFF VOLUME    (mm)=  110.935
     TOTAL RAINFALL   (mm)=  119.801
     RUNOFF COEFFICIENT   =     .926

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-
100:0005--------------------------------------------------------------------------
-
*#*************************************************************************
*# Area of Interest - lawns and parking areas
*#*************************************************************************
----------------------
| DESIGN NASHYD      |   Area    (ha)=    3.12   Curve Number   (CN)=84.00
| 03:201    DT= 2.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .190

     Unit Hyd Qpeak  (cms)=     .627

     PEAK FLOW       (cms)=     .664 (i)
     TIME TO PEAK    (hrs)=   12.072
     RUNOFF VOLUME    (mm)=   83.963
     TOTAL RAINFALL   (mm)=  119.801
     RUNOFF COEFFICIENT   =     .701

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-
100:0006--------------------------------------------------------------------------
-
*#*************************************************************************
*# Area of Interest - parking area
*#*************************************************************************
----------------------
| DESIGN NASHYD      |   Area    (ha)=     .59   Curve Number   (CN)=97.00
| 04:202    DT= 2.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .100

     Unit Hyd Qpeak  (cms)=     .225

     PEAK FLOW       (cms)=     .201 (i)
     TIME TO PEAK    (hrs)=   12.001
     RUNOFF VOLUME    (mm)=  110.935
     TOTAL RAINFALL   (mm)=  119.801
     RUNOFF COEFFICIENT   =     .926

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-
100:0007--------------------------------------------------------------------------
-
*#*************************************************************************
*# Flow Diverted Around Laydown Area
*#*************************************************************************
-----------------------
| ADD HYD (      2000) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
-----------------------                   (ha)     (cms)   (hrs)   (mm)   (cms)
                       ID1 02:EXT2          4.89    1.299   12.07 110.93    .000
                      +ID2 04:202            .59     .201   12.00 110.93    .000
                       ==========================================================
                       SUM 05:      2000     5.48    1.475   12.04 110.93    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
-
100:0008--------------------------------------------------------------------------
-
*#*************************************************************************
*# Laydown Area
*#*************************************************************************
----------------------
```

```
| DESIGN NASHYD      |   Area    (ha)=    1.72   Curve Number   (CN)=89.00
| 07:203    DT= 2.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .100

     Unit Hyd Qpeak  (cms)=     .657

     PEAK FLOW       (cms)=     .525 (i)
     TIME TO PEAK    (hrs)=   12.001
     RUNOFF VOLUME    (mm)=   93.492
     TOTAL RAINFALL   (mm)=  119.801
     RUNOFF COEFFICIENT   =     .780

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-
100:0009--------------------------------------------------------------------------
-
--------------------
| ROUTE RESERVOIR   |    Requested routing time step =  2.0 min.
|  IN>07:(203   )   |
| OUT<04:(002010)   |    =========  OUTLFOW STORAGE TABLE  =========
--------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                          (cms)    (ha.m.)   |    (cms)    (ha.m.)
                           .000  .0000E+00   |     .017  .6200E-01
                           .005  .4000E-02   |     .018  .7500E-01
                           .008  .1100E-01   |     .019  .8800E-01
                           .010  .2000E-01   |     .020  .1020E+00
                           .012  .2900E-01   |     .303  .1190E+00
                           .014  .4000E-01   |     .852  .1390E+00
                           .015  .5100E-01   |     .000  .0000E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     --------------------       (ha)     (cms)     (hrs)       (mm)
     INFLOW >07: (203   )       1.72      .525    12.001     93.492
     OUTFLOW<04: (002010)       1.72      .020    14.215     93.491

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=    3.755
                  TIME SHIFT OF PEAK FLOW         (min)=   132.86
                  MAXIMUM  STORAGE   USED       (ha.m.)=.9786E-01

--------------------------------------------------------------------------------
-
100:0010--------------------------------------------------------------------------
-
*#*************************************************************************
*# Total Flow to Bath Road Culvert
*#*************************************************************************
------------------------
| ADD HYD (      2020) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                   (ha)     (cms)   (hrs)   (mm)   (cms)
                     ID1 01:EXT1           5.02    1.333   12.07 110.93    .000
                    +ID2 03:201            3.12     .664   12.07  83.96    .000
                    +ID3 04:      2010     1.72     .020   14.22  93.49    .000
                    +ID4 05:      2000     5.48    1.475   12.04 110.93    .000
                     ============================================================
                     SUM 06:      2020    15.34    3.473   12.07 103.49    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
-
100:0011--------------------------------------------------------------------------
-
--------------------------------------------------------------------------------
-
100:0002--------------------------------------------------------------------------
-
--------------------------------------------------------------------------------
-
100:0002--------------------------------------------------------------------------
-
--------------------------------------------------------------------------------
-
100:0002--------------------------------------------------------------------------
-
--------------------------------------------------------------------------------
-
100:0002--------------------------------------------------------------------------
-
      FINISH
--------------------------------------------------------------------------------
-
********************************************************************************
*
     WARNINGS / ERRORS / NOTES
     -------------------------
   Simulation ended on 2017-07-10     at 14:18:34
================================================================================
=
```

APPENDIX C
DESIGN CALCULATIONS

Subject: SWMHYMO Parameters
Project: Amherst Island Wind Energy Project - Mainland Laydown Area
Project No.: 1609-60595
Client: Windlectric
Date: July 10, 2017

Pre-development Conditions

Area Description	Catchment Number	SWMHYMO Command	Area (ha)	CN	TIMP	XIMP	Slope (%)	Length (m)	Tc (hrs)	Tp (hrs)
External Drainage Area - Former Invista Site	EXT1	DESIGN NASHYD	9.90	97	-	-	0.4	330	0.30	0.18
Parking Lot, Driveways, Lawn	101	DESIGN NASHYD	5.43	82	-	-	2.9	190	0.37	0.22
Total			15.33							

Pre-development Conditions

Area Description	Catchment Number	SWMHYMO Command	Area (ha)	CN	TIMP	XIMP	Slope (%)	Length (m)	Tc (hrs)	Tp (hrs)
External Drainage Area - Former Invista Site	**EXT1**	DESIGN NASHYD	5.02	97	-	-	0.4	330	0.32	0.19
External Drainage Area - Former Invista Site	**EXT2**	DESIGN NASHYD	4.89	97	-	-	0.4	330	0.32	0.19
Parking Lot, Driveways, Lawn	**201**	DESIGN NASHYD	3.12	84	-	-	2.9	140	0.32	0.19
Parking Lot	**202**	DESIGN NASHYD	0.59	97	-	-	2.9	30	0.02	0.01
Gravel Laydown Area	**203**	DESIGN NASHYD	1.72	89	-	-	2.9	80	0.06	0.03
Total			15.34							

Notes:

TIMP ..... *Total percent impervious*

XIMP ..... *Percent impervious directly connected*

Time of Concentration calculated using the Airport Method ..... $Tc = [\ 3.26\ (1.1-C)\ L^{0.5}\ ] / S^{0.33}$

Where: *C = Runoff Coefficient = 0.4 for undeveloped areas*
L = Length of Overland Flow (m)
S = Slope (%)

Time of Concentration calculated using the Bransby-Williams Method ..... $Tc = 0.057\ L / [S_W^{0.2} \times A^{0.1}]$

Where: *L = Length of Overland Flow (m)*
S_W *= Watershed Slope (%)*
A = Watershed Area (ha)

Time to Peak ..... *Tp = 0.6Tc*

Minimum Tp = 0.1 hours used for all hydrologic calculations.

Amherst Island Wind Energy Project - Mainland Staging Area - 1609-60595

Stormwater Quality Volumetric Requirements

Facility	Drainage Area (ha)[2]	Total % Imp.	Level	Water Quality Unit Volume Requirements [1]	
				Total Unit Volume (m^3/ha)	Total MOE Volume (m^3/ha)
Dry Pond	1.72	100	Basic	280	482

[1] Water quality unit volume requirements based on Table 3.2, Stormwater Management Planning & Design Manual (MOE 2003), Protection Level "Basic"

[2] Drainage Area for Quality control represents total storm drainage area to SWM Facility and includes the area of the SWM facility itself

Amherst Island Wind Energy Project - Mainland Staging Area - 1609-60595
Stormwater Management Facility Design Calculations

Rating Curve			Estimated	Volume Estimation				Outlet Structure Controls			
		Storage	Detention		Active Storage						
Elevation (m)	Discharge (m^3/s)	Active (m^3)	Time (hrs)	Elevation (m)	Volume (m^3)	Depth (m)	Elevation (m)	Quality Outlet # 1 (m^3/s)	Quantity Outlet #2 (m^3/s)	Overflow Weir (m^3/s)	Parameters
78.05				78.05			78.05				Quality Outlet
78.15	0.005	36	4.3	78.15	36	0.1	78.15	0.005			Outlet #1 Elev (m) 78.05 / Orifice Coeff. 0.60
78.25	0.008	110	9.1	78.25	110	0.2	78.25	0.008			Outlet #1-Midpoint (mm) 78.10 / Perimeter (m) 0.31
78.35	0.010	196	15.0	78.35	196	0.3	78.35	0.010			Outlet Diameter (mm) 100 / Area (m^2) 0.008
78.45	0.012	293	22.1	78.45	293	0.4	78.45	0.012			Weir Coeff. (semi-circular) 1.62 / Orientation Vertical
78.55	0.014	397	30.5	78.55	397	0.5	78.55	0.014			
78.65	0.015	507	40.1	78.65	507	0.6	78.65	0.015			
78.75	0.017	623	50.8	78.75	623	0.7	78.75	0.017			
78.85	0.018	746	62.6	78.85	746	0.8	78.85	0.018			
78.95	0.019	876	75.7	78.95	876	0.9	78.95	0.019			Quantiy Outlet
79.05	0.020	1,023	90.0	79.05	1,023	1.0	79.05	0.020			Outlet #2 Elev (m) / Orifice Coeff. 0.60
79.15	0.303	1,194	92.1	79.15	1,194	1.1	79.15	0.021		0.281	Outlet #2-Midpoint (mm) / Perimeter (m)
79.25	0.852	1,390	92.8	79.25	1,390	1.2	79.25	0.022		0.830	Outlet Diameter (mm) / Area (m^2)
											Weir Coeff. (semi-circular) 1.62 / Orientation Vertical
											Overflow Weir
											Spillway Invert (m) 79.05 / Top of Berm (m) 79.35
											Spillway Length @ Invert (m) 5 / Max. Flow Depth (m) 0.30
											Left Side Slope 3 / Right Side Slope 3
											Weir Coefficient (Rectangle) 1.7 / Topwidth 6.8
											Weir Coefficient (Triangle) 1.3

Drawdown Time Calculations

Greater than 0.1 m above the permanent pool

$T=[v_2-v_1]/[(Q_2+Q_1)/2]/3600$

where

T=drawdown time in hours

v_2=starting pond volume

v_2=ending pond volume

Q_2=starting flow

Q_1=ending flow

From 0.0 to 0.1 m above the permanent pool

$T=[v_2-v_1]/[(Q_2)]/3600$

where

T=drawdown time in hours

v_2=starting pond volume

v_2=ending pond volume

Q_2=starting flow

Broad Crested Weir Equation:

$Q = C_{wb}*L*H^{1.5} + C_{wt}*S*H^{2.5}$

where

L = bottom width of spillway

H = head above weir invert

S = side slopes (ratio of H:V)

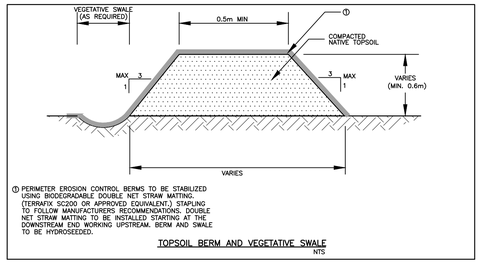
C_{wt} = broad-crested triangular weir coefficient

C_{wb} = broad-crested rectangular weir coefficient

Subject: Grassed Swale
Project: Amherst Island Wind Energy Project - Mainland Laydown Area
Project No.: 1609-60595
Client: Windlectric
Date: July 5, 2017

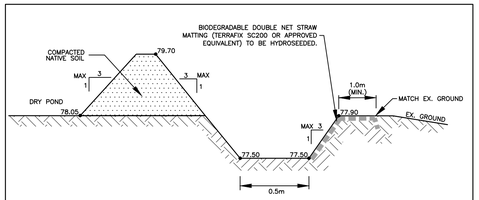
Target Discharge (cms):	0.27
Bottom Width (m):	1
Side Slope (__:V):	3
Bottom Slope (m/m):	0.005
Hydraulic Roughness:	0.04

Depth (m)	Area (m2)	Perimeter (m)	Velocity (m/s)	Flow (cms)
0.00	0.000	0.00	0.00	0.00
0.01	0.010	1.06	0.08	0.00
0.02	0.021	1.13	0.13	0.00
0.03	0.033	1.19	0.16	0.01
0.04	0.045	1.25	0.19	0.01
0.05	0.058	1.32	0.22	0.01
0.06	0.071	1.38	0.24	0.02
0.07	0.085	1.44	0.27	0.02
0.08	0.099	1.51	0.29	0.03
0.09	0.114	1.57	0.31	0.04
0.10	0.130	1.63	0.33	0.04
0.11	0.146	1.70	0.35	0.05
0.12	0.163	1.76	0.36	0.06
0.13	0.181	1.82	0.38	0.07
0.14	0.199	1.89	0.39	0.08
0.15	0.218	1.95	0.41	0.09
0.16	0.237	2.01	0.42	0.10
0.17	0.257	2.08	0.44	0.11
0.18	0.277	2.14	0.45	0.13
0.19	0.298	2.20	0.47	0.14
0.20	0.320	2.26	0.48	0.15
0.21	0.342	2.33	0.49	0.17
0.22	0.365	2.39	0.51	0.18
0.23	0.389	2.45	0.52	0.20
0.24	0.413	2.52	0.53	0.22
0.25	0.438	2.58	0.54	0.24
0.26	0.463	2.64	0.55	0.26
0.27	0.489	2.71	0.56	0.28
0.28	0.515	2.77	0.58	0.30
0.29	0.542	2.83	0.59	0.32
0.30	0.570	2.90	0.60	0.34

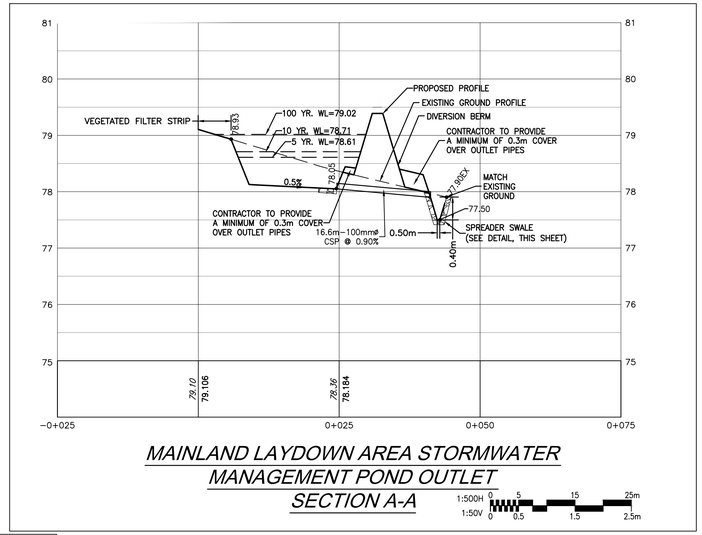


① PERIMETER EROSION CONTROL BERMS TO BE STABILIZED USING BIODEGRADABLE DOUBLE NET STRAW MATTING. (TERRAFIX SC200 OR APPROVED EQUIVALENT.) STAPLING TO FOLLOW MANUFACTURERS RECOMMENDATIONS. DOUBLE NET STRAW MATTING TO BE INSTALLED STARTING AT THE DOWNSTREAM END WORKING UPSTREAM. BERM AND SWALE TO BE HYDROSEEDED.

TOPSOIL BERM AND VEGETATIVE SWALE
NTS

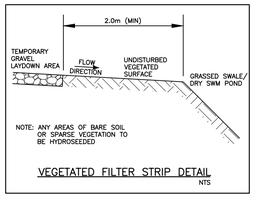


LEVEL SPREADER DETAIL
NTS



MAINLAND LAYDOWN AREA STORMWATER MANAGEMENT POND OUTLET SECTION A-A

1:500H 0 5 15 25m
1:50V 0 0.5 1.5 2.5m



NOTE: ANY AREAS OF BARE SOIL OR SPARSE VEGETATION TO BE HYDROSEEDED

VEGETATED FILTER STRIP DETAIL
NTS

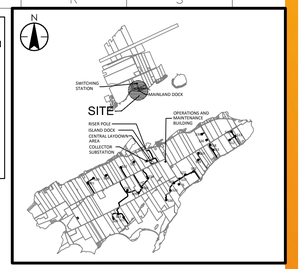
OSC SEED MIX #8215 – CREEK BANK SEED MIXTURE

LATIN NAME	COMMON NAME	%
ANDROPOGON GERARRDI	BIG BLUESTEM	30%
RUDBECKIA HIRTA	BLACK EYED SUSAN	6%
ELYMUS HYSTRIX	BOTTLEBRUSH GRASS	5%
PAA PALUSTRIS	FOWL BLUEGRASS/ FOWL MEADOWGRASS	30%
GLYCERIA STRIATA	FOWL MANNAGRASS	2%
CAREX VULPINOIDEA	FOX SEDGE	25%
ASTER NOVAE–ANGLAIE	NEW ENGLAND ASTER	2%

APPLICATION:
SOW AT 22–25 KG/HA (21–23 LBS/ACRE)

AVAILABLE FROM:
ONTARIO SEED COMPANY (OSC)
330 PHILLIP STREET
P.O. BOX 7
WATERLOO ON N2J 3Z6
PHONE: 519–886–0557
FAX: 519–866–0605

NOTES:
1. ALL CONSTRUCTION ACTIVITIES ARE TO ADHERE TO THE SOIL/GROUNDWATER MANAGEMENT PROGRAM AND HEALTH & SAFETY PLAN, PREPARED BY STANTEC CONSULTING LTD. THESE PLANS ARE TO BE USED AS A REFERENCE TO FINAL CONSTRUCTION REQUIREMENTS, HOWEVER THE SOIL/GROUNDWATER MANAGEMENT PROGRAM AND HEALTH & SAFETY PLAN IS TO BE REVIEWED PRIOR TO BREAKING GROUND AND TO BE USED AS A REFERENCE FOR CONSTRUCTION ACTIVITIES AND PHASING.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH DRAWING C303 FOR ADDITIONAL DETAILS AND NOTES
3. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE AMHERST ISLAND WIND ENERGY PROJECT MAINLAND LAYDOWN AREA EROSION AND SEDIMENT CONTROL PLAN AND STORMWATER MANAGEMENT REPORT
4. ONE 100mmø END CAP TO BE ON SITE AT ALL TIMES TO BE AVAILABLE FOR EMERGENCY SPILL CONTAINMENT.
5. LIGHT DUTY SILT FENCE TO BE INSTALLED AROUND PERIMETER OF ALL TEMPORARY STOCKPILED SOILS (AS REQUIRED)
6. ALL RIPRAP SPILLWAYS TO BE MIN. 450mm THICK



KEY PLAN
N.T.S

OVERFLOW WEIR DETAIL
NTS

BIODEGRADABLE DOUBLE NET STRAW MATTING (TERRAFIX SC200 OR APPROVED EQUIVALENT) TO BE HYDROSEEDED

*****For PHCL and Windlectric Use Only*****

Review and/or accepted does not constitute approval of design details, calculations or methods. It is the responsibility of the consultant to ensure all information contained within the drawings are in full compliance with contractual obligations

☐ Reviewed - Accepted and no comments
☐ Reviewed - Incorporate comments and resubmit
☐ Reviewed - Not accepted

Reviewed By	Date (dd-mmm-yyyy)
Project Manager - PHCL	Date (dd-mmm-yyyy)
Project Manager - Windlectric	Date (dd-mmm-yyyy)

Owner:

Stantec

Stantec Consulting Ltd.
300 Hagey Blvd. Suite 100
Waterloo ON Canada
Tel. 519.579.4410
www.stantec.com

Notes
1. TOPOGRAPHIC SURVEY COMPLETED BY McINTOSH PERRY CONSULTING ENGINEERS DATED 2015 (UTM ZONE 18 NAD83 (CRSR)1997.0). GEOTECHNICAL INFORMATION PROVIDED BY STANTEC MEMO, DATED JUNE 2015.
2. THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL OTHER DRAWINGS IN THIS SET PREPARED BY STANTEC CONSULTING LTD.
3. THE CONTRACTOR MUST CHECK AND VERIFY DIMENSIONS; OBTAIN ALL UTILITY LOCATES AND OBTAIN ALL REQUIRED PERMITS/LICENSES AND VERIFY ELEVATIONS OF EXISTING SERVICES BEFORE PROCEEDING WITH ANY WORK.
4. ALL CONSTRUCTION WORK SHALL BE CARRIED OUT IN ACCORDANCE WITH THE REQUIREMENTS OF THE OCCUPATIONAL HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS (LATEST EDITION).
5. THE CONTRACTOR IS TO BE RESPONSIBLE FOR ALL DRAINAGE AND MEASURES TO CONTROL WATER. THE SITE IS TO BE FINE GRADED/ LEVELLED LEAVING THE SITE IN A NEAT APPEARANCE SUCH THAT POSITIVE DRAINAGE IS ACHIEVED.
6. CONTRACTOR MUST COMPLY WITH INVISTA CPU REQUIREMENTS.
7. ALL DISTURBED AREAS WITHIN THE PROPOSED WORKS ARE TO BE RE–VEGETATED USING NATIVE TOPSOIL AND SEED AS PER REA. MIX AND APPLICATION RATE/METHOD TO BE APPROVED PRIOR TO IMPLEMENTATION;
8. CLEARING AND GRUBBING AND REMOVALS TO BE COMPLETED IN ACCORDANCE WITH OPSS 201. TEMPORARY EROSION CONTROL TO BE COMPLETED IN ACCORDANCE WITH OPSS. 805.
9. GRADING TO BE COMPLETED IN ACCORDANCE WITH OPSS 206.
10. GRANULAR MATERIAL TO BE USED IN ACCORDANCE WITH OPSS 1010.
11. ALL CULVERTS TO BE CONSTRUCTED IN ACCORDANCE WITH OPSS 421 AND AS PER OPSD 802.010.

Legend

PROPOSED		EXISTING
	FENCE	
	CULVERT	
	SLOPE (3:1 UNLESS NOTED OTHERWISE)	
• 84.01	ELEVATION	×81.85 (EX)
84.5	CONTOUR	
	SWALE	
3.2%	GRADE	
	LIGHT DUTY SILT FENCE	
	RIP RAP	
	100 YEAR FLOOD ELEVATION	
	LIMIT OF LAYDOWN	
	LOT LINE	
	GRAVELLED AREA	
	2.0m WIDE VEGETATIVE BUFFER	
	STEEL PLATES	

F.	ISSUED FOR MOECC APPROVAL	DMS	DKS	17.07.10
E.	CRCA LIMIT OVERLAY	DMS	DKS	17.04.27
D.	PRELIMINARY - FOR CLIENT REVIEW	DMS	DKS	17.04.26
C.	ISSUED FOR TENDER	JBM	DKS	17.02.10
B.	UPDATED LAYDOWN CONFIGURATION	SJM	DKS	16.09.20
A.	FOR CLIENT REVIEW	KDB	DKS	16.01.22
Revision		By	Appd.	YY.MM.DD

File Name: 133560100C-GP.dwg		DS	DKS	DS 16.01.20
		Dwn.	Chkd.	Dsgn. YY.MM.DD

Permit-Seal

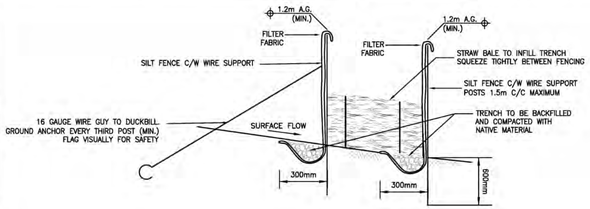
Client/Project
PENNECON HEAVY CIVIL
AMHERST ISLAND WIND PROJECT
75MW WIND FARM
Amherst Island, Loyalist Township, Ontario

Title
MAINLAND LAYDOWN AREA GRADING AND SEDIMENT AND EROSION CONTROL PLAN

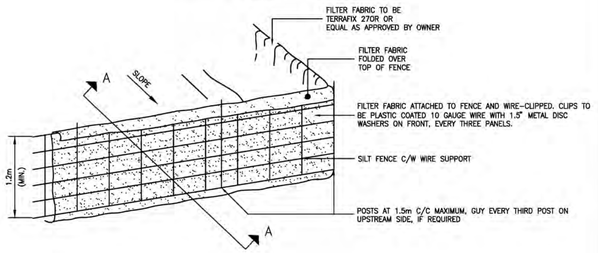
Project No.	Scale	Revision
133560100	1:750 (0 7.5 22.5 37.5m)	
Drawing No.	Sheet	
C104	1 of 1	F

V:\01614\active\133560100\design\drawing\civil\sheet_files\133560100C-GP.dwg
2017/07/14 4:03:14 PM By: Kristin Braid

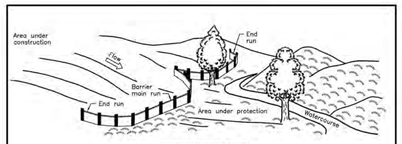
ORIGINAL SHEET - ARCH D



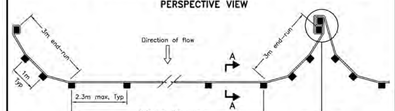
SECTION A-A
N.T.S



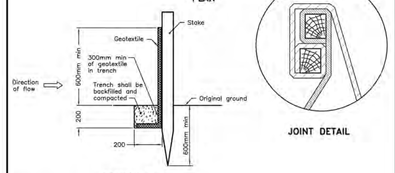
DOUBLE WALLED HEAVY DUTY SILT FENCE WITH STRAW BALE
N.T.S



PERSPECTIVE VIEW



PLAN

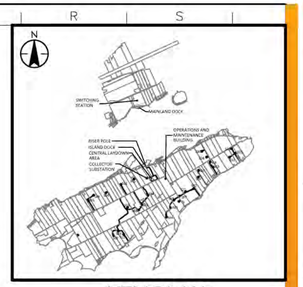


SECTION A-A

JOINT DETAIL

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

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2015	Rev 2
LIGHT–DUTY SILT FENCE BARRIER		
	OPSD 219.110	



KEY PLAN
N.T.S

EROSION AND SEDIMENT CONTROL NOTES: (SEE DETAILS THIS SHEET)

1. THE CONTRACTOR SHALL IMPLEMENT BEST MANAGEMENT PRACTICES TO PROVIDE FOR PROTECTION OF THE AREA DRAINAGE SYSTEM DURING CONSTRUCTION ACTIVITIES. THIS INCLUDES LIMITING THE AMOUNT AND DURATION OF EXPOSED SOIL AND INSTALLING SILT FENCES AND OTHER SEDIMENT TRAPS/FILTERS SIMILAR TO THOSE ILLUSTRATED HEREIN.
2. EROSION AND SEDIMENT CONTROL WORKS SHALL BE INSTALLED AND IN WORKING CONDITION PRIOR TO COMMENCEMENT OF CONSTRUCTION RELATED ACITVITIES.
3. SEDIMENT CONTROL MEASURES ADJACENT TO CONSTRUCTION AREAS MAY REQUIRE REMOVAL / RELOCATION IN ORDER TO COMPLETE SPECIFIC CONSTRUCTION ACTIVITIES. THE CONTRACTOR SHALL ENSURE THAT ADEQUATE SEDIMENT CONTROL MEASURES ARE IN PLACE AT ALL TIMES.
4. AT THE DISCRETION OF THE OWNER OR OWNER'S CONSULTANT, ADDITIONAL SILT CONTROL DEVICES SHALL BE INSTALLED AT DESIGNATED LOCATIONS.
5. SEDIMENT THAT IS ACCUMULATED BY THE TEMPORARY SEDIMENT AND EROSION CONTROL MEASURES SHALL BE REMOVED IN A MANNER THAT AVOIDS ESCAPE OF THE SEDIMENT TO THE DOWNSTREAM SIDE OF THE CONTROL MEASURE AND AVOIDS DAMAGE TO THE CONTROL MEASURE. ALL SEDIMENT SHALL BE REMOVED AND TOPSOIL WITH SEED TO BE ADDED IF NECESSARY.
   A) ACCUMULATED SEDIMENT IS TO BE REMOVED AND DISPOSED OF AS PER OPSS 180, PRIOR TO THE REMOVAL OF ANY CONTROL MEASURE.
6. SILT FENCE AND EROSION CONTROL STRUCTURES TO BE CHECKED DAILY AND AFTER EACH RAINFALL>10mm FOR UNDERMINING OR DETERIORATION OF THE FABRIC. SEDIMENT SHALL BE REMOVED WHEN THE LEVEL OF SEDIMENT DEPOSITION REACHES ONE THIRD OF THE WAY TO THE TOP OF THE BARRIER.
7. ALL AREAS WHERE ACTIVE CONSTRUCTION IS NOT EXPECTED FOR 2 WEEKS SHALL BE STABILIZED THROUGH SEEDING WITH NATIVE PLANT SPECIES AND APPLICATION OF HYDRAULIC MULCH.
8. STOCKPILED MATERIAL IS TO BE STORED AWAY FROM POTENTIAL RECEIVERS (E.G. WATERCOURSES), AND LOCATED AT LEAST 8m INSIDE THE BOUNDARY OF THE LAYDOWN AREA. WHERE STOCKPILED EXCAVATED NATIVE MATERIALS AND IMPORTED MATERIALS WITH A D50 LESS THAN 4.75mm ARE TO BE LEFT IN PLACE UNDISTURBED IN EXCESS OF 10 DAYS, STOCKPILES ARE TO BE COVERED WITH A ROLLED EROSION CONTROL PRODUCT (RECP) SUCH AS A TARP, SINGLE NET STRAW MAT OR DOUBLE NET STRAW MAT. IMPORTED MATERIALS WITH A D50 OF 4.75mm OR GREATER CAN REMAIN UNCOVERED. GRANULAR A AND B (TYPE II) GRADATION REQUIREMENTS ALLOW UP TO 55% PERCENT PASSING A 4.75mm SIEVE (#4 SIEVE), AND MAY BE STOCKPILED WITHOUT COVERING WITH AN RECP.
9. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO MAINTAIN AND IMPROVE EROSION AND SEDIMENT CONTROL MEASURES AS NECESSARY TO KEEP THEM EFFECTIVE AND MINIMIZE THE POTENTIAL FOR MIGRATION OF SEDIMENT TO THE DOWNSTREAM NATURAL ENVIRONMENT.
10. IN ADDITION TO BEING RESPONSIBLE FOR ENSURING THAT THE PRESCRIBED MEASURES ARE INSTITUTED AND FUNCTIONING AS INTENDED, THE CONTRACTOR IS ALSO RESPONSIBLE FOR IMPLEMENTING ANY INTERIM OR EMERGENCY MEASURES REQUIRED, TO ENSURE THAT NO SEDIMENT IS DISCHARGED TO THE NATURAL ENVIRONMENT. THE FOLLOWING EXTRA EQUIPMENT/MATERIALS ARE TO BE KEPT ON SITE AS A CONTINGENCY, IN CASE THE PROPOSED CONTROL MEASURES ARE BREACHED.
    - SILT FENCE
    - FILTER CLOTH
    - PUMPS
    - CLEAN RIP-RAP (FREE OF FINES) FOR ROCK CHECK DAMS
    - SAND BAGS
    - ANY ADDITIONAL MATERIAL DEEMED NECESSARY TO REPAIR/ CONSTRUCT PROPOSED MEASURES OR TO ADEQUATELY DEAL WITH UNEXPECTED HIGH FLOWS
11. ADDITIONAL EROSION AND SEDIMENT CONTROLS MAY BE REQUIRED DUE TO UNFORSEEN CIRCUMSTANCES, CHANGING SITE CONDITIONS OR IF THE PROPOSED CONTROLS DO NOT ACHIEVE THEIR ANTICIPATED RESULT. IN THESE CIRCUMSTANCES, ADDITIONAL CONTROLS MAY BE INSTALLED CONSISTENT WITH GGHCA ESC GUIDELINES AND MOECC SWMPD MANUAL. THE LOCATIONS AND APPLICATION OF THE CONTROLS WILL BE APPROVED BY A QUALIFIED EROSION AND SEDIMENT CONTROL INSPECTOR PRIOR TO THEIR INSTALLATION.
12. IN THE EVENT OF INCLEMENT WEATHER OR UNFAVOURABLE TERRAIN FOR CONSTRUCTION, CONSTRUCTION BEST PRACTICES SUCH AS TEMPORARY RIG-MATS MAY BE USED TO PREVENT DISRUPTION OF SURFACE SOILS AND VEGETATIVE COVER BY CONSTRUCTION VEHICLES AND EQUIPMENT. AS THESE MEASURES ARE WITHIN THE CONSTRUCTIBLE AREAS OF THE PROJECT, IT IS NOT ANTICIPATED THAT OFFSITE FLOWS WILL INCREASE FROM PROPOSED CONDITIONS.

CULVERT NOTES:

1. CULVERT SLOPE TO MATCH EXISTING DITCH GRADE UNLESS OTHERWISE NOTED.
2. CULVERT TO BE EMBEDDED 10% OF PIPE DIAMETER BELOW DITCH INVERT.
3. CULVERTS TO BE CORRUGATED STEEL PIPE (CSP). PIPE MATERIAL TO BE GALVANIZED STEEL AND HAVE A 68mm x 13mm CORRUGATION WITH 1.6mm METAL THICKNESS.
4. PIPE TO BE INSTALLED IN ACCORDANCE WITH OPSD 802.010.
5. CULVERT ELEVATIONS ARE APPROXIMATE AND ARE TO BE FINALIZED IN THE FIELD.

SILT FENCE NOTES (AS PER OPSD 219.110):

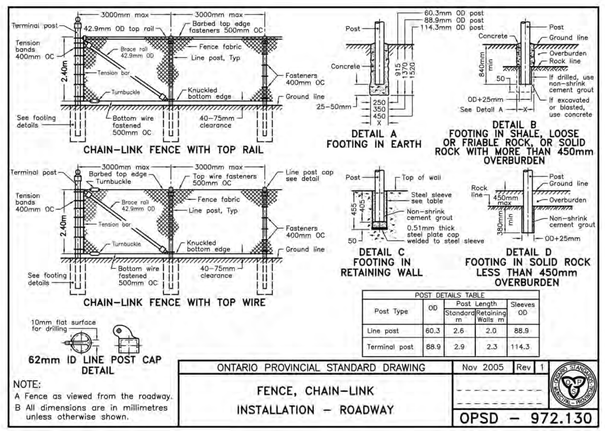
1. STAKES ARE TO BE INSTALLED ON THE DOWNSTREAM SIDE OF THE BARRIER.
2. CONTRACTOR TO MONITOR SILT FENCE FOR UV DEGRADATION.
3. SILT FENCE IS TO BE CLEANED OUT ONCE SEDIMENT REACHES MAXIMUM 1/3 OF THE FENCE HEIGHT.

HYDRAULIC MULCH NOTES:

1. COORDINATE/CONSULT WITH OWNER PRIOR TO UTILIZING ANY HYDRAULIC MULCH. TIMELINES AND SEEDING METHODS NEED TO BE CAREFULLY CONSIDERED PRIOR TO IMPLEMENTATION.
2. ENSURE THAT A TACKIFIER IS USED TO KEEP PRODUCT IN PLACE.
3. APPLY SEED MIX PRIOR TO MULCH WITH TACKIFIER.
4. HYDRAULIC MULCH IS TO BE APPLIED AS SOON AS GRADING AND SEEDING WORK IS COMPLETE TO ENSURE STABILIZATION OF SOILS.
5. RE-APPLY HYDRAULIC MULCH IF THE SUBJECT AREA IS DAMAGED OR ERODED BY WIND OR WATER. SURFACE COVERAGE MUST BE AT LEAST 80% AT ALL TIMES.

ROLLED EROSION CONTROL PRODUCT (RECP) NOTES:

1. RECP SHALL CONSIST OF STRAW, STRAW–COCONUT, OR COCONUT FIBER WHICH ARE HELD IN PLACE BY NETTING SEWN ON BOTH SIDES OF THE MATERIAL.
2. RECP MUST BE SECURED ON STOCK PILE BY STAPLING AT THE BOTTOM OF THE SLOPE AND UPHILL TRENCHES ON THE STOCKPILE/SLOPED SURFACE.



CHAIN–LINK FENCE WITH TOP RAIL

CHAIN–LINK FENCE WITH TOP WIRE

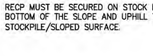
DETAIL A
FOOTING IN EARTH

DETAIL B
FOOTING IN SHALE, LOOSE OR FRIABLE ROCK, OR SOLID ROCK WITH MORE THAN 450mm OVERBURDEN

DETAIL C
FOOTING IN RETAINING WALL

DETAIL D
FOOTING IN SOLID ROCK LESS THAN 450mm OVERBURDEN

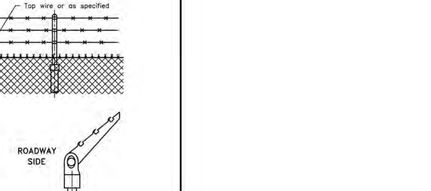
POST DETAILS TABLE				
Post Type	OD	Post Length		Sleeves OD
		Standard m	Retaining Walls m	
Line post	60.3	2.6	2.0	88.9
Terminal post	88.9	2.9	2.3	114.3



62mm ID LINE POST CAP DETAIL

NOTE:
A Fence as viewed from the roadway.
B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2005	Rev 1
FENCE, CHAIN–LINK INSTALLATION – ROADWAY		
	OPSD – 972.130	

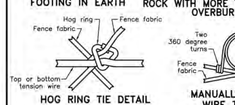


DOUBLE SWING GATE OPENING

SINGLE SWING GATE OPENING

NOTES:
1 For footing details and Gate and Gatepost Details Table refer to OPSD 972.132.
A Gates as viewed from the roadway.
B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2012	Rev 2
FENCE, CHAIN–LINK COMPONENT – GATE		
	OPSD 972.102	



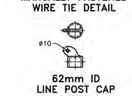
DETAIL A
FOOTING IN EARTH

DETAIL B
FOOTING IN SHALE, LOOSE OR FRIABLE ROCK, OR SOLID ROCK WITH MORE THAN 450mm OVERBURDEN

DETAIL C
FOOTING IN SOLID ROCK LESS THAN 450mm OVERBURDEN

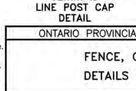
DETAIL D
FOOTING IN RETAINING WALL

HOG RING TIE DETAIL



MANUALLY FASTENED WIRE TIE DETAIL

POWER FASTENED WIRE TIE DETAIL

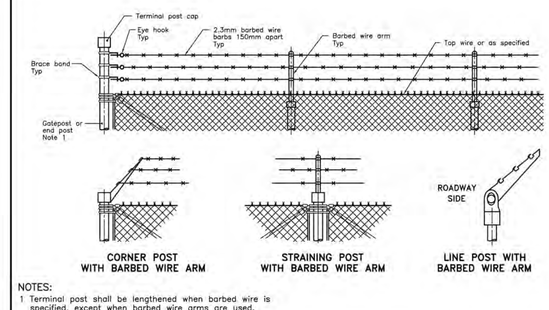


62mm ID LINE POST CAP DETAIL

POST DETAILS TABLE (Note 1)						
Post/Frame Member Type		OD	Post Length		Wall Thickness	Nominal Weight kg/m (Note 2)
			Standard m	Retaining Walls m		
Line post		60.3	2.6	2.0	3.91	5.4
Terminal Post		88.9	2.9	2.3	5.49	11.3
Gates (Single 3.0m, Double 6.0m)	Gatepost	88.9	2.6	n/a	5.49	11.3
	Frame Members	42.2	n/a	n/a	3.56	3.4
Gates (Single 4.5m, Double 9.0m)	Gatepost	114.3	2.9	n/a	6.02	16.1
	Frame Members	48.3	n/a	n/a	3.68	4.0
Post Sleeves	Line Post	88.9	n/a	0.455	5.49	11.3
	Terminal Post	114.3	n/a	0.455	6.02	16.1

NOTES:
1 All posts and frame members are Schedule 40, Regular Grade, steel pipe.
2 The actual weight shall not vary by more than 10% of the nominal weight.
A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2012	Rev 0
FENCE, CHAIN–LINK DETAILS AND TABLE		
	OPSD 972.132	



CORNER POST WITH BARBED WIRE ARM

STRAINING POST WITH BARBED WIRE ARM

LINE POST WITH BARBED WIRE ARM

NOTES:
1 Terminal post shall be lengthened when barbed wire is specified, except when barbed wire arms are used.
A Installation as viewed from the roadway.
B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2012	Rev 2
FENCE, CHAIN–LINK COMPONENT – BARBED WIRE		
	OPSD 972.101	

Stantec

Stantec Consulting Ltd.
300 Hagey Blvd. Suite 100
Waterloo ON Canada
Tel. 519.579.4410
www.stantec.com

Notes

1. TOPOGRAPHIC SURVEY COMPLETED BY McINTOSH PERRY CONSULTING ENGINEERS DATED 2015 (UTM ZONE 18 NAD83 (CRSR)1997.0). GEOTECHNICAL INFORMATION PROVIDED BY STANTEC MEMO, DATED JUNE 2015.
2. THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL OTHER DRAWINGS IN THIS SET PREPARED BY STANTEC CONSULTING LTD.
3. THE CONTRACTOR MUST VERIFY DIMENSIONS; OBTAIN ALL UTILITY LOCATES AND OBTAIN ALL REQUIRED PERMITS/LICENSES AND VERIFY ELEVATIONS OF EXISTING SERVICES BEFORE PROCEEDING WITH ANY WORK.
4. ALL CONSTRUCTION WORK SHALL BE CARRIED OUT IN ACCORDANCE WITH THE REQUIREMENTS OF THE OCCUPATIONAL HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS (LATEST EDITION).
5. ENCROACHMENT ON NON–PARTICIPATING PROPERTIES IS STRICTLY PROHIBITED. THE CONTRACTOR AND/OR THEIR REPRESENTAITVES ARE TO BE AWARE OF ALL PARTICIPATING LAND OWNERS ON THE PROJECT AND THE PROJECTS CONSTRUCTIBLE LIMITS. ALL CONSTRUCTION ACTIVITY BEYOND THE CONSTRUCTIBLE LIMITS IS STRICTLY PROHIBITED.
6. THE CONTRACTOR IS RESPONSIBLE FOR RESTORATION OF ALL DAMAGED AND/OR DISTURBED PROPERTY WITHIN THE MUNICIPAL RIGHT–OF–WAY TO THE CURRENT MUNICIPAL STANDARDS AND SHALL CONFORM TO ROAD USE AGREEMENT.
7. THE CONTRACTOR IS TO BE RESPONSIBLE FOR ALL DRAINAGE AND MEASURES TO CONTROL STORM WATER. THE SITE IS TO BE FINE GRADED/LEVELLED LEAVING THE SITE IN A NEAT APPEARANCE SUCH THAT POSITIVE DRAINAGE IS ACHIEVED.
8. CONSTRUCTION TURNING RADIUS LIMITS IDENTIFY AREAS WHERE ADDITIONAL ROAD WIDTH IS REQUIRED TO ALLOW FOR ADEQUATE CLEARANCE FOR CONSTRUCTION VEHICLES.
9. ALL DISTURBED AREAS ARE TO BE RE–VEGETATED USING NATIVE TOPSOIL AND SEED AS PER REA APPROVAL. MIX AND APPLICATION RATE/METHOD TO BE APPROVED PRIOR TO IMPLEMENTATION.
10. CLEARING AND GRUBBING AND REMOVALS TO BE COMPLETED IN ACCORDANCE WITH OPSS 201. TEMPORARY EROSION CONTROL TO BE COMPLETED IN ACCORDANCE WITH OPSS 805.
11. GRADING TO BE COMPLETED IN ACCORDANCE WITH OPSS 206.
12. GRANULAR MATERIAL TO BE USED IN ACCORDANCE WITH OPSS 1010.
13. ALL CULVERTS TO BE CONSTRUCTED IN ACCORDANCE WITH OPSS 421 AND AS PER OPSD 802.010.

Legend

2	RE-ISSUED FOR CONSTRUCTION	DMS	TN	17.07.14
1	RE-ISSUED FOR CONSTRUCTION	DMS	DKS	17.04.13
0	ISSUED FOR CONSTRUCTION	JBM	DKS	17.01.20
Revision		By	Appd.	YY.MM.DD

File Name: 133560100C-DT.dwg	DS	DKS	DS	16.12.12
	Dwn.	Chkd.	Dsgn.	YY.MM.DD

Permit-Seal

Client/Project

PENNECON HEAVY CIVIL

AMHERST ISLAND WIND PROJECT
75MW WIND FARM
Amherst Island, Loyalist Township, Ontario

Title

SITE DETAIL SHEET

Project No.	Scale	
133560100		
Drawing No.	Sheet	Revision
C303	1 of 1	2

V:\01614\active\133560100\design\drawing\civil\sheet_files\133560100C-DT.dwg
2017/07/14 11:34 AM by Robb, Brad

ORIGINAL SHEET - ARCH D