

**Amherst Island Wind Energy
Project
Erosion and Sediment Control
and Stormwater Management
Plan Report - Phase 5**



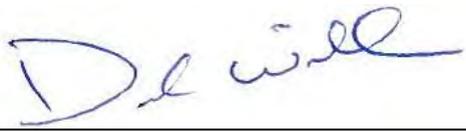
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Sign-off Sheet

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Table of Contents

1.0	INTRODUCTION	1.1
1.1	STUDY APPROACH.....	1.2
1.2	BACKGROUND INFORMATION	1.2
2.0	ASSESSMENT OF POTENTIAL HYDROLOGIC IMPACTS AND MITIGATION – OPERATIONAL PHASE (SWM)	2.5
2.1	EXISTING CONDITIONS	2.5
2.2	PROPOSED CONDITIONS.....	2.7
2.3	DURING CONSTRUCTION CONDITIONS.....	2.9
2.4	ASSESSMENT OF HYDROLOGIC IMPACTS AND NEED FOR STORMWATER CONTROLS	2.11
3.0	ASSESSMENT OF POTENTIAL HYDROLOGIC IMPACTS AND MITIGATION – DURING-CONSTRUCTION PHASE (ESC).....	3.14
3.1	ASSESSMENT OF EROSION POTENTIAL.....	3.14
3.2	DURING CONSTRUCTION DEWATERING.....	3.14
3.3	EROSION AND SEDIMENTATION CONTROL PLAN	3.15
3.4	EROSION AND SEDIMENTATION CONTROL MONITORING PLAN.....	3.18
3.5	LONG TERM EROSION AND SEDIMENT CONTROL	3.20
4.0	CONCLUSIONS.....	4.21

LIST OF TABLES

Table 1: Existing Conditions Impervious Coverage.....	2.6
Table 2: Proposed Conditions Impervious Coverage	2.8
Table 3: During Construction Impervious Coverage	2.10
Table 4: Impervious Coverage Summary	2.11

AMHERST ISLAND WIND ENERGY PROJECT EROSION AND SEDIMENT CONTROL AND STORMWATER MANAGEMENT PLAN REPORT - PHASE 5

Introduction
July 14, 2017

1.0 INTRODUCTION

Stantec Consulting Ltd. (Stantec) was retained by Windlectric Inc. (the Proponent or Windlectric) to assess the need for and, if necessary, provide a plan detailing 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 REA Approval (#7123-9W9NH2) and supplement the information included as part of the application for a Renewable Energy Approval (the REA Application).

The Project was originally proposed as a 56 - 75 MW Class 4 Wind Energy Generation Facility consisting of 36 Siemens turbines. The layout included 24 Siemens SWT-2.3-113 2300 kW and twelve Siemens SWT-2.3-113 2221 kW model wind turbines. Within the REA Approval, ten turbines were removed from the Project and the Siemens turbine models were changed. The Project will now consist of 26 Siemens wind turbines; 12 Siemens SWT-3.2-113 2.942 MW and 14 Siemens SWT-3.2-1132.772 MW model wind turbines.

The proposed Project is a 56 - 75 MW Class 4 Wind Energy Generation Facility within Loyalist Township (the Township) in the County of Lennox and Addington (the County) in eastern Ontario.

The proposed Project will also include a 34.5 kilovolt (kV) underground electrical power line collector system, fibre optic data lines from each turbine and/or wireless technology for the communication of data, a transmission line, truck turnaround areas, a submarine cable, an operations and maintenance building, permanent dock, a substation, a switching station, an unserviced storage shed, one connection point to the existing electrical system, cable vault areas, meteorological tower(s) (met tower(s)), access road(s) to the met tower site(s), and turbine access roads with culvert installations, as required, at associated watercourse crossings.

This ESC/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 (i.e., the turbine locations, crane pads and associated access roads). Previous documentation relating to the hydrologic impacts of infrastructure in previous phases are listed in the project specific documentation below. For the purposes of this assessment, all project infrastructure on the island, and potential hydrologic impacts have been included. Potential hydrologic impacts assessed include changes to the quality and/or quantity discharged to the surface or sub-surface receiving systems. The objective of the 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



AMHERST ISLAND WIND ENERGY PROJECT

EROSION AND SEDIMENT CONTROL AND STORMWATER MANAGEMENT PLAN REPORT - PHASE 5

Introduction
July 14, 2017

sufficient to minimize any potential impacts to environmental features within the Project area and, further, to provide details on the mitigation measures and control measures that will be implemented.

1.1 STUDY APPROACH

The study approach involved the following components:

- A qualitative assessment of existing hydrologic conditions of the area and receiving systems.
- A review of the proposed Project activities as described in the REA Application with an emphasis on assessing potential for impacts associated with changes in hydrology.
- A semi-quantitative analysis of existing and proposed conditions to determine potential for short-term or long-term effects on receiving systems and mitigative approaches, if necessary.
- Development of an erosion and sediment control (ESC) strategy outlining the anticipated approach to minimize of impacts related to construction.

1.2 BACKGROUND INFORMATION

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

General Guidance Documentation / Literature

- *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

Discussions and conclusions reached herein related to the relevance/significance of impervious coverage and its relative impact on the hydrology of receiving systems are based upon widely available literature, readily obtained in any Internet search for related terms such as "impervious coverage and aquatic systems". Two excellent examples include:



AMHERST ISLAND WIND ENERGY PROJECT EROSION AND SEDIMENT CONTROL AND STORMWATER MANAGEMENT PLAN REPORT - PHASE 5

Introduction
July 14, 2017

- *Impacts of Impervious Cover on Aquatic System, Watershed Protection Research Monograph No. 1*, Schueler, T., Center for Watershed Protection, March 2003.
- *The Importance of Imperviousness, from Watershed Protection Techniques, Vol.1, No.3 – Fall 1994*, Schueler, T., Centre for Watershed Protection, 1994

Project-Specific Consultation / Documentation

- *Amherst Island Wind Energy Project, Erosion and Sediment Control and Stormwater Management Plan Report, Phase 4*, Stantec Consulting Ltd. (July 2017)
- *Amherst Island Wind Energy Project, Erosion and Sediment Control and Stormwater Management Plan Report, Phase 3*, Stantec Consulting Ltd. (June 2017)
- *Amherst Island Wind Energy Project, Temporary Stockpiling on Native Vegetated Ground Surface, Erosion and Sediment Control Brief*, Stantec Consulting Ltd., March 2017
- *Amherst Island Wind Energy Project, Erosion and Sediment Control and Stormwater Management Plan Report, Phase 2*, Stantec Consulting Ltd., February 2017
- *Amherst Island Wind Energy Project, Erosion and Sediment Control and Stormwater Management Plan Report, Phase 1*, Stantec Consulting Ltd., October 2016
- *Hydrogeological Investigation – Proposed Amherst Island Wind Farm*, Stantec Consulting Ltd., January 2016
- *Amherst Island Wind Energy Project: Dock Construction Stormwater Management Brief*, Stantec Consulting Ltd., December 2015
- *Amherst Island Wind Energy Project: Culvert Sizing Design Brief*, Stantec Consulting Ltd., October 2015
- *Supplementary Geotechnical Investigation – Proposed Amherst Island Wind Farm*, Stantec Consulting Ltd., September 2015
- *Amherst Island Wind Energy Project: Invista Dock – Drainage Assessment*, Stantec Consulting Ltd., August 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
EROSION AND SEDIMENT CONTROL AND STORMWATER MANAGEMENT PLAN REPORT - PHASE 5**

Introduction
July 14, 2017

- *Amherst Island Wind Energy Project: Construction Plan Report*, Stantec Consulting Ltd., December 2013



**AMHERST ISLAND WIND ENERGY PROJECT
EROSION AND SEDIMENT CONTROL AND STORMWATER MANAGEMENT PLAN REPORT - PHASE 5**

Assessment of Potential Hydrologic Impacts and Mitigation – Operational Phase (SWM)
July 14, 2017

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

2.1 EXISTING CONDITIONS

As illustrated in the attached Figure Series 1 and 2, attached, and summarized in Table 1, the proposed Project is situated on predominantly agricultural lands with very low existing impervious coverage. Runoff drains overland to local drainage draws, small watercourses, and/or wetland features, ultimately discharging to Lake Ontario. Drainage patterns are to be maintained through the use of limited grading, maintenance of surrounding land uses (e.g., agricultural operations, and the provision of conveyance infrastructure (e.g., culverts). As such, impervious coverage represents the primary parameter of potential impact to the hydrology of the Project area.

A series of 32 catchment areas were delineated so as to encompass all proposed infrastructure and, therefore, any hydrologic impacts associated with proposed impervious coverage increases, allowing for a comparison between existing and proposed conditions. Owing to the dispersed characteristic of the proposed wind farm, with infrastructure distributed at very low density across a large area, deriving a reasonable comparison point at which to compare pre- and post-development conditions is somewhat subjective. For the purposes of the analysis described herein, comparison points have been set at the closest downstream road crossing of a given catchment within which development (i.e., the creation of new impervious surfaces) is proposed. These locations have been selected since, should a hydrologic impact occur as a result of development, this is the location at which it would be most noticeable and of most concern to the public. A summary of catchment IDs and areas and existing conditions impervious coverage statistics is provided in Table 1.



**AMHERST ISLAND WIND ENERGY PROJECT
EROSION AND SEDIMENT CONTROL AND STORMWATER MANAGEMENT PLAN REPORT - PHASE 5**

Assessment of Potential Hydrologic Impacts and Mitigation – Operational Phase (SWM)
July 14, 2017

Table 1: Existing Conditions Impervious Coverage

Receivers / Catchment	Drainage Area (ha)	Impervious Coverage	
		(ha)	(%)
1	20.48	0.01	0.05
2	30.42	0.00	0.01
3	46.38	0.02	0.04
4	81.16	0.18	0.23
5	7.15	0.04	0.59
6	112.95	0.40	0.36
7	29.13	0.32	1.11
8	4.39	0.06	1.30
9	4.69	0.01	0.12
10	78.68	0.00	0.00
11	63.10	0.01	0.01
12	17.31	-	-
13	35.88	-	-
14	35.59	0.47	1.32
15	76.53	0.60	0.78
16	21.29	0.01	0.06
17	67.38	0.02	0.03
18	96.87	0.03	0.03
19	13.49	-	-
20	20.11	0.00	0.01
21	822.94	2.28	0.28
22	14.55	0.14	0.99
23	888.36	5.86	0.66
24	167.51	0.29	0.17
25	398.60	0.47	0.12
26	22.95	0.27	1.18
27	48.72	0.06	0.12
28	13.86	0.05	0.36
29	14.75	0.07	0.46
30	20.56	0.01	0.03



**AMHERST ISLAND WIND ENERGY PROJECT
EROSION AND SEDIMENT CONTROL AND STORMWATER MANAGEMENT PLAN REPORT - PHASE 5**

Assessment of Potential Hydrologic Impacts and Mitigation – Operational Phase (SWM)
July 14, 2017

31	17.62	0.03	0.14
32	10.21	0.00	0.05
Grand Totals	3303.61	11.73	0.38

2.2 PROPOSED CONDITIONS

As described previously, the Project includes the construction of 26 wind turbines and associated infrastructure including access roads, an operations and maintenance building, a permanent dock, a substation, a switching station, and 1 - 3 meteorological towers (met towers), all of which represent changes in the impervious coverage of the general catchment area.

As described in the *Construction Plan Report*, permanent access roads will be approximately 6 m wide and will not require resizing for the operation phase, with the exception of the entrances off Township or County roads that require wider turning radii, of approximately 50 m, during construction. The access roads will be constructed of engineered compacted fill and/or soil stabilization material. The depth of the roadbed will be approximately 200 - 350 mm; however, local conditions will ultimately dictate roadbed depth. Alternatively, soil stabilizer will be utilized with a reduced granular material depth. Typical construction details for the access road and temporary widenings can be found appended in Figure Series 3.

The construction of roads will include the excavation and removal of topsoil, placing of geotextile fabrics where necessary, placement of aggregate and gravel materials as a road base, and further grading and compaction as necessary. From a hydrologic impact perspective, the access roads are considered generally equivalent to a typical farm access (i.e., driveway). Photographs of a typical wind project access road construction have been appended as Figures 4 to 8, for reference.

Additional long-term impervious coverage is proposed in the form of a switching station (2,500 m²), substation (8,000 m²), an operations and maintenance building (4,900 m²), 1 - 3 met towers (75 m²), and associated access roads/driveways totalling 1.55 ha (15,507 m²).

Lastly, the permanent footprint areas associated with the requisite crane pads (25 m x 60 m = 1,500 m²) and turbine foundations (19 m diam. = 283.5 m²) represents an additional 46,371 m² (4.64 ha) of impervious coverage.

For the purposes of conservative analysis, all areas proposed for granular surface treatment (e.g., access roads, substation area, and crane pads) have been conservatively considered as 100% impervious within the current analysis. The drainage catchments previously delineated and described under the existing conditions analysis were subsequently analyzed for impervious coverage under proposed conditions, with the results summarized in Table 2.



**AMHERST ISLAND WIND ENERGY PROJECT
EROSION AND SEDIMENT CONTROL AND STORMWATER MANAGEMENT PLAN REPORT - PHASE 5**

Assessment of Potential Hydrologic Impacts and Mitigation – Operational Phase (SWM)
July 14, 2017

Table 2: Proposed Conditions Impervious Coverage

Receivers / Catchment	Drainage Area (ha)	Impervious Coverage	
		(ha)	(%)
1	20.48	0.35	1.69
2	30.42	0.17	0.57
3	46.38	0.23	0.50
4	81.16	0.51	0.63
5	7.15	0.19	2.67
6	112.95	0.60	0.53
7	29.13	0.47	1.60
8	4.39	0.06	1.30
9	4.69	0.10	2.14
10	78.68	0.31	0.39
11	63.10	0.38	0.61
12	17.31	-	-
13	35.88	0.25	0.70
14	35.59	0.67	1.88
15	76.53	2.48	3.24
16	21.29	0.42	1.95
17	67.38	0.35	0.52
18	96.87	0.75	0.77
19	13.49	0.22	1.61
20	20.11	0.14	0.69
21	822.94	4.26	0.52
22	14.55	0.37	2.54
23	888.36	11.20	1.26
24	167.51	1.47	0.88
25	398.60	1.35	0.34
26	22.95	0.40	1.75
27	48.72	0.52	1.07
28	13.86	0.20	1.46
29	14.75	0.29	1.96
30	20.56	0.19	0.92



**AMHERST ISLAND WIND ENERGY PROJECT
EROSION AND SEDIMENT CONTROL AND STORMWATER MANAGEMENT PLAN REPORT - PHASE 5**

Assessment of Potential Hydrologic Impacts and Mitigation – Operational Phase (SWM)
July 14, 2017

31	17.62	0.21	1.17
32	10.21	0.00	0.05
Grand Totals	3303.61	29.10	0.88

2.3 DURING CONSTRUCTION CONDITIONS

During construction, temporary access roads and laydown areas are required to facilitate turbine construction. Turbine components will be delivered directly to a gravel surfaced laydown area located at each individual turbine location, running adjacent to the access roads and connecting to the crane pads. Each of the 26 proposed laydown areas is approximately 10,000 m², inclusive of each respective associated crane pad (approximately 1,500 m²) already considered, representing an additional 221,000 m² (22.1 ha) (8,500 m²/turbine x 26 turbines) of temporary impervious coverage.

The movement of the cranes between turbine sites (i.e. crane paths) will take place along the access and municipal roads. In the event that cross field crossings are utilized, the crossings will be restricted to follow the underground collector line routes, and have a constructible width of 10 m. Timber or construction crane mats and/or steel plates may be used where required to facilitate the crane or other vehicles moving through soft or wet areas. Crane paths not located on roads will be rehabilitated to pre-construction conditions.

As described above, temporary road access will be required to accommodate the wider turning radii of the turbine blade transport vehicles.

Permanent met towers will be installed during the construction stage of the Project and will require temporary staging areas. Access to met tower construction will be provided through the use of an existing farm lane and rig mats. Any excavations will be back filled and compacted with select fill and native subsoil.

Two temporary staging areas will be required for the construction phase of the project. One is adjacent to the island dock access road and the second is the Central Laydown area. The *Amherst Island Wind Energy Project, Erosion and Sediment Control and Stormwater Management Plan Report Phase 1* (Stantec, 2016) and *Amherst Island Wind Energy Project, Erosion and Sediment Control and Stormwater Management Plan Report Phase 2* (Stantec, 2017) document Erosion and Sediment Control and Stormwater management plans for each of these staging areas, respectively.

The previously delineated drainage catchments were analyzed for impervious coverage during construction, with the results summarized in Table 3.



**AMHERST ISLAND WIND ENERGY PROJECT
EROSION AND SEDIMENT CONTROL AND STORMWATER MANAGEMENT PLAN REPORT - PHASE 5**

Assessment of Potential Hydrologic Impacts and Mitigation – Operational Phase (SWM)
July 14, 2017

Table 3: During Construction Impervious Coverage

Receivers / Catchment	Drainage Area (ha)	Impervious Coverage	
		(ha)	(%)
1	20.48	1.96	9.59
2	30.42	1.45	4.78
3	46.38	1.74	3.75
4	82.69	1.13	1.39
5	7.15	0.44	6.13
6	112.95	2.59	2.30
7	29.13	1.17	4.03
8	4.39	0.07	1.55
9	4.69	0.32	6.76
10	78.68	0.81	1.03
11	63.12	1.04	1.65
12	17.31	-	0.00
13	35.88	1.67	4.64
14	35.59	2.41	6.76
15	89.96	18.27	23.87
16	54.68	0.42	1.95
17	67.38	1.24	1.84
18	96.87	4.49	4.63
19	13.49	1.52	11.28
20	20.11	0.53	2.62
21	825.15	10.14	1.23
22	14.55	0.81	5.54
23	888.36	39.19	4.41
24	167.51	6.80	4.06
25	393.41	6.80	1.71
26	22.95	1.97	8.58
27	47.16	2.23	4.57
28	20.61	1.09	7.86
29	14.75	1.16	7.89
30	20.56	0.49	2.39



**AMHERST ISLAND WIND ENERGY PROJECT
EROSION AND SEDIMENT CONTROL AND STORMWATER MANAGEMENT PLAN REPORT - PHASE 5**

Assessment of Potential Hydrologic Impacts and Mitigation – Operational Phase (SWM)
July 14, 2017

31	17.62	0.51	2.88
32	10.21	0.00	0.05
Grand Totals	3303.61	114.46	3.46

Note: Stormwater management controls for proposed infrastructure within Catchment 15 have been documented in *Amherst Island Wind Energy Project, Erosion and Sediment Control and Stormwater Management Plan Report Phase 2* (Stantec, 2017)

2.4 ASSESSMENT OF HYDROLOGIC IMPACTS AND NEED FOR STORMWATER CONTROLS

Industry-standard approaches to assessing the potential for hydrologic impacts related to changes in the amount of urban impervious coverage, as supported by literature (see references in Section 1.2), generally conclude that watersheds typically maintain pre-development hydrology characteristics until they exceed 10-15% impervious coverage.

As illustrated in the calculations above and summary table below, the impervious coverage in 31 of the 32 catchments identified as part of this study remains below 11.28% under the during construction scenario and below 3.24% over the life of the Project. The impervious coverage in catchment 15 increases from the existing 0.78% to 23.87% during construction and then drops to 3.24% post construction. Stormwater management controls for catchment 15, are to be installed in the during construction phase and are documented in *Amherst Island Wind Energy Project, Erosion and Sediment Control and Stormwater Management Plan Report Phase 2* (Stantec, 2017), which was approved on March 13, 2017 by the MOECC and on April 19, 2017 by the CRCA. It is concluded, therefore, that the development of the Project will have negligible impact on the hydrology of the area and receiving systems.

Table 4: Impervious Coverage Summary

Receivers / Catchment	Drainage Area (ha)	Impervious Coverage (%)		
		Existing	During Construction	Post Construction
1	20.48	0.05	9.59	1.69
2	30.42	0.01	4.78	0.57
3	46.38	0.04	3.75	0.50
4	82.69	0.23	1.39	0.63
5	7.15	0.59	6.13	2.67
6	112.95	0.36	2.30	0.53
7	29.13	1.11	4.03	1.60



**AMHERST ISLAND WIND ENERGY PROJECT
EROSION AND SEDIMENT CONTROL AND STORMWATER MANAGEMENT PLAN REPORT - PHASE 5**

Assessment of Potential Hydrologic Impacts and Mitigation – Operational Phase (SWM)
July 14, 2017

8	4.39	1.30	1.55	1.30
9	4.69	0.12	6.76	2.14
10	78.68	0.00	1.03	0.39
11	63.12	0.01	1.65	0.61
12	17.31	-	0.00	-
13	35.88	-	4.64	0.70
14	35.59	1.32	6.76	1.88
15	89.96	0.78	23.87	3.24
16	54.68	0.06	1.95	1.95
17	67.38	0.03	1.84	0.52
18	96.87	0.03	4.63	0.77
19	13.49	-	11.28	1.61
20	20.11	0.01	2.62	0.69
21	825.15	0.28	1.23	0.52
22	14.55	0.99	5.54	2.54
23	888.36	0.66	4.41	1.26
24	167.51	0.17	4.06	0.88
25	393.41	0.12	1.71	0.34
26	22.95	1.18	8.58	1.75
27	47.16	0.12	4.57	1.07
28	20.61	0.36	7.86	1.46
29	14.75	0.46	7.89	1.96
30	20.56	0.03	2.39	0.92
31	17.62	0.14	2.88	1.17
32	10.21	0.05	0.05	0.05
Grand Totals	3303.61	0.38	3.46	0.88

Note: Stormwater management controls for proposed infrastructure within Catchment 15 have been documented in *Amherst Island Wind Energy Project, Erosion and Sediment Control and Stormwater Management Plan Report Phase 2* (Stantec, 2017)

Regarding the potential for flow re-direction or obstruction, the REA documents include commitments to minimizing grading and the implementation of drainage infrastructure (e.g., culverts or overland flow routes) as necessary to maintain drainage patterns per existing conditions. Care will be taken where construction is proposed in areas of known tile drainage systems to minimize damage to these systems and to repair any inadvertent damage that may



**AMHERST ISLAND WIND ENERGY PROJECT
EROSION AND SEDIMENT CONTROL AND STORMWATER MANAGEMENT PLAN REPORT - PHASE 5**

Assessment of Potential Hydrologic Impacts and Mitigation – Operational Phase (SWM)
July 14, 2017

occur, maintaining existing conditions drainage characteristics. On-going landowner liaison will occur as any impacts may only become noticeable at a later date.

Given the general maintenance of at-surface drainage conditions (i.e., no substantive grading or re-direction of surface water away from existing features) and vegetative conditions across the majority of the site, and the minimal introduction of impervious coverage, a formal stormwater management system, in addition to what has previously been documented is not required or proposed.



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

3.1 ASSESSMENT OF EROSION POTENTIAL

An assessment of the erosion potential of the construction area was completed following the methodology outlined in the *ESC Guidelines* (GGHACA, 2006). 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”, “medium”, 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.

Beyond the three-parameter approach described by the *ESC Guidelines*, it is often also appropriate to account for the relative sensitivity of the receiving systems as it relates to potential sediment transport offsite during construction. While never leading to a *reduction* in the assessed erosion potential, such an assessment could result in a conclusion that diligence in excess of that already assessed is warranted. If we assume, for example, that the receiving system included a Provincially Significant Wetland, a coldwater fishery, or perhaps an area where body-contact exposure to surface waters might be expected (e.g., a beach), it would be incumbent upon the proponent and contractor to elevate the level of attention paid to protecting the receiver against construction related impacts.

The existing and proposed (post-construction) condition gradients on the Project site can be classified as moderate (2 – 10% - Overland flow paths) to steep (>10% - Access road embankments), with predominantly long slopes (greater than 30 m). Site soils are comprised primarily of sand and silt tills, which are considered to represent a high erodibility potential (Table A1, *ESC Guidelines*). Therefore, based on this classification, the site has a “high” erosion potential.

The setbacks provided between the proposed project infrastructure and the surface water receiving features and the existing agricultural land uses surrounding the proposed infrastructure and the features, are such that the derivation of an ESC strategy in accordance with the “high” erosion potential assessment should satisfactorily address the potential impacts to the water features.

3.2 DURING CONSTRUCTION DEWATERING

As per the Construction Plan Report, it is not expected that the water table will be intercepted by any construction activities. Should dewatering be required, such activity would affect the



AMHERST ISLAND WIND ENERGY PROJECT
EROSION AND SEDIMENT CONTROL AND STORMWATER MANAGEMENT PLAN REPORT - PHASE 5

Assessment of Potential Hydrologic Impacts and Mitigation – During-Construction Phase (ESC)
July 14, 2017

local near-surface water table only for the period for construction (until concrete is hardened). Post-construction, the water table would return to pre-construction levels and the relatively small 'footprint' of the turbine base would not affect flow volumes or patterns, or the deep groundwater regime. Pumping rates are not anticipated to exceed 50,000 litres per day or the requirements of an Environmental Activity Sector Registration application approval.

Although culvert installation works are proposed to be completed in the dry, culvert installation may require minor dewatering during construction. The construction of watercourse crossings are understood to require approximately 1-3 days per crossing including the installation of minor water diversion infrastructure (if necessary), site excavation/preparation, culvert installation, backfilling, and removal of diversion measures. It is anticipated that the headwater features will be crossed using standard passive diversion or "dam and pump" dry crossing techniques. Prior to commencing crossing construction, weather forecasts will be reviewed to assess the potential for significant precipitation. In-stream activities will be delayed if foul weather is forecast and/or flows are elevated beyond available pump capacity.

Any required dewatering operations will be completed such that discharge rates will not cause any flooding and erosion concerns for the downstream natural areas. In order to prevent sediment migration to the downstream areas dewatering discharges may be treated with a variety of measures including but not limited to filter socks, sediment traps, and "frog's foot" dissipaters at the discretion of the contractor. Dewatering discharges will be directed through the sediment control measures to a gently sloped vegetated area greater than 30 m from any watercourse or wetland feature. If a vegetated area is not available alternative measures such as splash pads or infiltration basins may be considered.

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

3.3 EROSION AND SEDIMENTATION CONTROL PLAN

As described in the *Construction Plan Report*, the various construction activities required to develop the site include topsoil removal, minor grading activities, infrastructure installation, creation of granular access roads and crane pads, and general construction traffic. If left unmitigated, these activities will result in the 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 sub-soils inherent in the construction process. For example, access roads and crane pads construction includes the - removal of topsoil and sub-soils as necessary to achieve a competent base, followed by the



**AMHERST ISLAND WIND ENERGY PROJECT
EROSION AND SEDIMENT CONTROL AND STORMWATER MANAGEMENT PLAN REPORT - PHASE 5**

Assessment of Potential Hydrologic Impacts and Mitigation – During-Construction Phase (ESC)
July 14, 2017

placement of granular material back to existing grade elevations (or marginally above); hence, the work areas are generally “self-contained” and protected from erosion and sediment transport by definition. Further, at any given location, these works will be completed in short order (1-2 days expected), 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 Plans, and will 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;
 - Install temporary straw bale check dams (per OPSD 219.180) within 15 m downstream of new culvert construction
 - No equipment should be permitted to enter any natural areas beyond the silt fencing during construction;
 - 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;
 - Stockpiles should be sufficiently far from watercourses to preclude sediment inputs due to erosion of stored soil materials;
 - In the event of inclement weather or unfavourable terrain for construction, construction best management practices such as temporary rig-mats may be used to prevent disruption of surface soils and vegetative cover by construction vehicles and



AMHERST ISLAND WIND ENERGY PROJECT EROSION AND SEDIMENT CONTROL AND STORMWATER MANAGEMENT PLAN REPORT - PHASE 5

Assessment of Potential Hydrologic Impacts and Mitigation – During-Construction Phase (ESC)
July 14, 2017

equipment. As these measures are within the constructible areas of the project, it is not anticipated that offsite flows will increase from proposed conditions.

- 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.
- If the sediment and erosion control measures are not functioning properly, no further work should occur until the sediment and/or erosion problem is addressed;
- When possible, complete work in and around watercourses when the features are at their driest, i.e., during the summer. All in-water work should be completed within MNR timing windows to protect local fish populations during their spawning and egg incubation periods. A typical construction timing window for warmwater streams in the Peterborough District is July 1st to March 31st.
- 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 the water:
 - Any stockpiled materials should be stored and stabilized away from the water;
 - Refuelling and maintenance of construction equipment should occur a minimum of 100 m from a water body;
 - As appropriate, spills should be reported to the MOE Spills Action Centre;
 - Any part of equipment entering the water should be free of fluid leaks and externally cleaned/degreased to prevent any deleterious substance from entering the water; and
 - Only clean material, free of fine particulate matter should be placed in the water.
- 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.



**AMHERST ISLAND WIND ENERGY PROJECT
EROSION AND SEDIMENT CONTROL AND STORMWATER MANAGEMENT PLAN REPORT - PHASE 5**

Assessment of Potential Hydrologic Impacts and Mitigation – During-Construction Phase (ESC)
July 14, 2017

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.

The proposed erosion and sediment control plan focuses on the access roads, culvert crossings and turbine pads; however does not include details on the Operation and Maintenance building, as detailed design has not been completed for the Operation and Maintenance building site. Erosion and sediment control details for the Operation and Maintenance building site will be provided upon completion of the design.

3.4 EROSION AND SEDIMENTATION CONTROL MONITORING PLAN

In order 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 resulting in sediment discharges to the downstream environment. 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
- 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.



**AMHERST ISLAND WIND ENERGY PROJECT
EROSION AND SEDIMENT CONTROL AND STORMWATER MANAGEMENT PLAN REPORT - PHASE 5**

Assessment of Potential Hydrologic Impacts and Mitigation – During-Construction Phase (ESC)
July 14, 2017

- 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



**AMHERST ISLAND WIND ENERGY PROJECT
EROSION AND SEDIMENT CONTROL AND STORMWATER MANAGEMENT PLAN REPORT - PHASE 5**

Assessment of Potential Hydrologic Impacts and Mitigation – During-Construction Phase (ESC)
July 14, 2017

3.5 LONG TERM EROSION AND SEDIMENT CONTROL

Per the *Construction Plan Report*, upon the completion of backfilling and the subsequent disposition of excess soil elsewhere within the properties by the property owners, replanting with native vegetation will be undertaken in areas where active agricultural is not anticipated.

Approximately one year after construction a survey will be undertaken to ensure that long-term erosion control measures have been effective. This will include an inspection of drainage facilities associated with the Project construction (e.g., culverts) for structural integrity and any excessive amount of silt collection. Seeded or replanted areas will be inspected to ensure that revegetation measures were successful and reseeded or replanting will occur where necessary.



**AMHERST ISLAND WIND ENERGY PROJECT
EROSION AND SEDIMENT CONTROL AND STORMWATER MANAGEMENT PLAN REPORT - PHASE 5**

Conclusions
July 14, 2017

4.0 CONCLUSIONS

It is concluded that both the relative lack of change in impervious coverage associated with the proposed development and the resultant total impervious coverage within the local drainage catchments are sufficiently limited as to not impact the pre-development hydrologic characteristics of the area during construction or long-term operation of the facility. There should be negligible change/impact on the quality and/or quantity of surface water runoff and/or groundwater recharge and, therefore, no requirement for the implementation of formal stormwater quality or quantity controls.

While the site assessment yields a “high” erosion potential classification, a number of factors combine to limit the potential for impact on the receiving systems. Specifically, the relatively small area proposed to be disturbed, the short-term nature of the disturbance prior to stabilization whether through granular placement or re-vegetation, and the existing land use of the surrounding area as agricultural operations all combine to create a condition where a “standard” approach to erosion and sediment control will suffice to minimize potential for off-site impacts. The proposed erosion and sediment control plan accompanied by a monitoring and maintenance program will be implemented to prevent migration of sediment to downstream features during the construction phase of the Project



ATTACHMENTS

- Legend
-  Point of Interest
 -  Surface Water Catchment Area
- Project Components
-  Turbine
 -  Access Road
 -  Laydown Area and Crane Pad
 -  Turbine Blade Tip
- Existing Features
-  Road
 -  Topographic Contour (metres AMSL)
 -  Watercourse
 -  Property Line



- Notes
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 Amherst Island Wind Energy Project

Figure No.
 2.1

Title
 SWM Drainage Catchments -
 Drainage Area #1

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 Revised: 2017-07-14 By: pworthell

- Legend
-  Point of Interest
 -  Surface Water Catchment Area
- Project Components
-  Turbine
 -  Access Road
 -  Laydown Area and Crane Pad
 -  Turbine Blade Tip
- Existing Features
-  Road
 -  Topographic Contour (metres AMSL)
 -  Watercourse
 -  Property Line



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Figure No.
 2.2

Title
 SWM Drainage Catchments -
 Drainage Area #2

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 Revised: 2017-07-14 By: pwnorsell

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- Legend
- Point of Interest
 - Surface Water Catchment Area
 - Project Components**
 - Turbine
 - Access Road
 - Laydown Area and Crane Pad
 - Turbine Blade Tip
 - Existing Features**
 - Road
 - Topographic Contour (metres AMSL)
 - Watercourse
 - Property Line



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Figure No.
 2.3

Title
 SWM Drainage Catchments -
 Drainage Area #3



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 Revised: 2017-07-14 By: pwnorsell

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Legend

- Point of Interest
- Surface Water Catchment Area
- Project Components**
- Turbine
- Access Road
- Laydown Area and Crane Pad
- Constructible Area
- Turbine Blade Tip
- Batch Plant
- Central Staging Area
- Island Dock
- Substation
- Existing Features**
- Road
- Topographic Contour (metres AMSL)
- Watercourse
- Property Line



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Figure No.

2.4

Title

SWM Drainage Catchments -
Drainage Area #4

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 Revised: 2017-07-14 By: pworsell

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Revised: 2017-07-14 By: pworthell



- Legend
- Point of Interest
 - ▭ Surface Water Catchment Area
 - ▬ Access Road
 - ▭ Constructible Area
 - ▨ Central Staging Area
- Existing Features
- ▬ Road
 - Topographic Contour (metres AMSL)
 - Watercourse
 - ▭ Property Line

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Figure No.
2.5

Title
SWM Drainage Catchments -
Drainage Area #5

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Legend

- Point of Interest
- Surface Water Catchment Area
- Project Components**
- Turbine
- Access Road
- Laydown Area and Crane Pad
- Turbine Blade Tip
- Existing Features**
- Road
- Unopened Road Allowance
- Topographic Contour (metres AMSL)
- Watercourse
- Property Line



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Figure No.

2.6

Title

SWM Drainage Catchments -
Drainage Area #6

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 Revised: 2017-07-14 By: pworsell

- Legend
- Point of Interest
 - Surface Water Catchment Area
- Project Components
- Turbine
 - Access Road
 - Laydown Area and Crane Pad
 - Turbine Blade Tip
- Existing Features
- Road
 - Topographic Contour (metres AMSL)
 - Watercourse
 - Property Line



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Figure No.
 2.7

Title
 SWM Drainage Catchments -
 Drainage Area #7

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 Revised: 2017-07-14 By: pworsell

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Legend

- Point of Interest
- Surface Water Catchment Area
- Access Road
- Existing Features
- Road
- Topographic Contour (metres AMSL)
- Property Line



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Figure No.

2.8

Title

SWM Drainage Catchments -
Drainage Area #8

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Revised: 2017-07-14 By: p.worsell



- Legend
- Point of Interest
 - ▭ Surface Water Catchment Area
 - ▬ Access Road
 - Existing Features
 - ▬ Road
 - Topographic Contour (metres AMSL)
 - Watercourse
 - ▭ Property Line

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Figure No.
2.9

Title
SWM Drainage Catchments -
Drainage Area #9



- Legend
- Point of Interest
 - Surface Water Catchment Area
- Project Components
- Turbine
 - Access Road
 - Laydown Area and Crane Pad
 - Turbine Blade Tip
- Existing Features
- Road
 - Topographic Contour (metres AMSL)
 - Watercourse
 - Property Line



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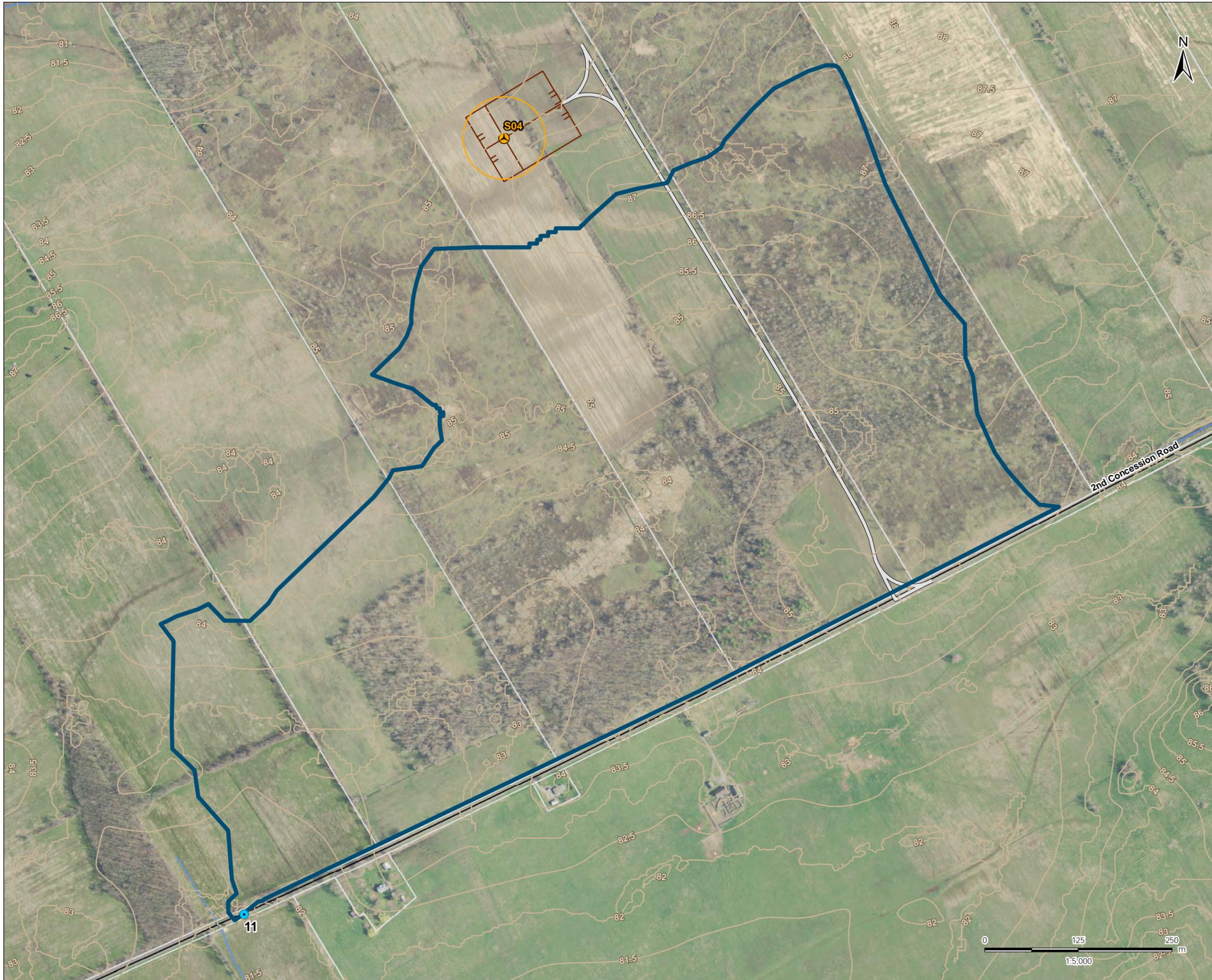
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 SWM Drainage Catchments -
 Drainage Area #10

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- Legend
- Point of Interest
 - Surface Water Catchment Area
- Project Components
- Turbine
 - Access Road
 - Laydown Area and Crane Pad
 - Turbine Blade Tip
- Existing Features
- Road
 - Topographic Contour (metres AMSL)
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 - Property Line



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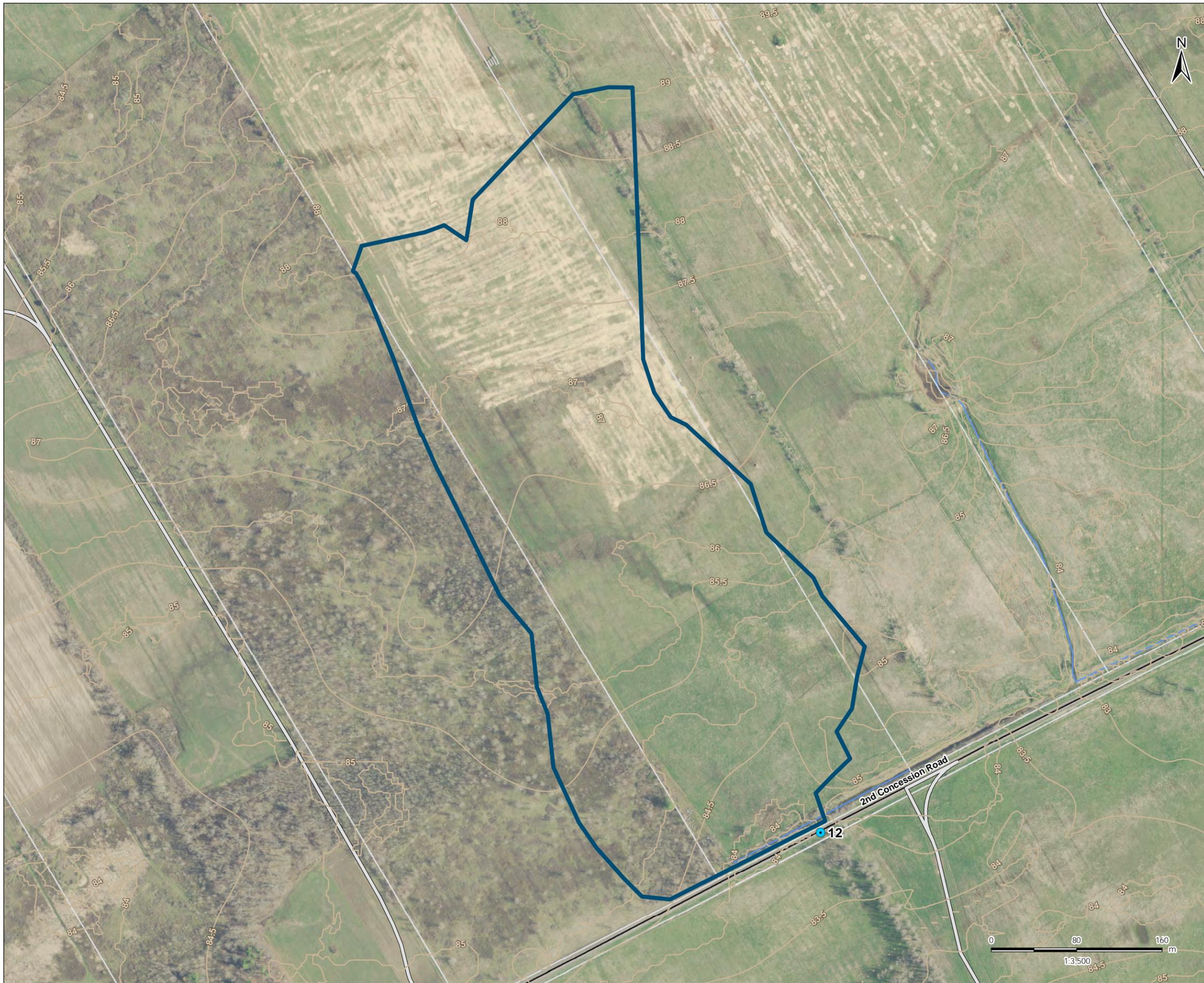
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Figure No.
2.11

Title
SWM Drainage Catchments -
Drainage Area #11

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 Revised: 2017-07-14 By: pwnorsell

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Revised: 2017-07-14 By: pworsell



Legend

-  Point of Interest
-  Surface Water Catchment Area
-  Access Road
- Existing Features**
-  Road
-  Topographic Contour (metres AMSL)
-  Watercourse
-  Property Line

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Figure No.
2.12

Title

SWM Drainage Catchments -
Drainage Area #12

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- Legend
- Point of Interest
 - Surface Water Catchment Area
- Project Components
- Turbine
 - Access Road
 - Laydown Area and Crane Pad
 - Turbine Blade Tip
- Existing Features
- Road
 - Unopened Road Allowance
 - Topographic Contour (metres AMSL)
 - Watercourse
 - Property Line

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Figure No.
2.13

Title
SWM Drainage Catchments -
Drainage Area #13



Legend

- Point of Interest
- Surface Water Catchment Area
- Project Components**
- Turbine
- Access Road
- Laydown Area and Crane Pad
- Constructible Area
- Turbine Blade Tip
- Central Staging Area
- Existing Features**
- Road
- Topographic Contour (metres AMSL)
- Watercourse
- Property Line



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Figure No.
 2.14

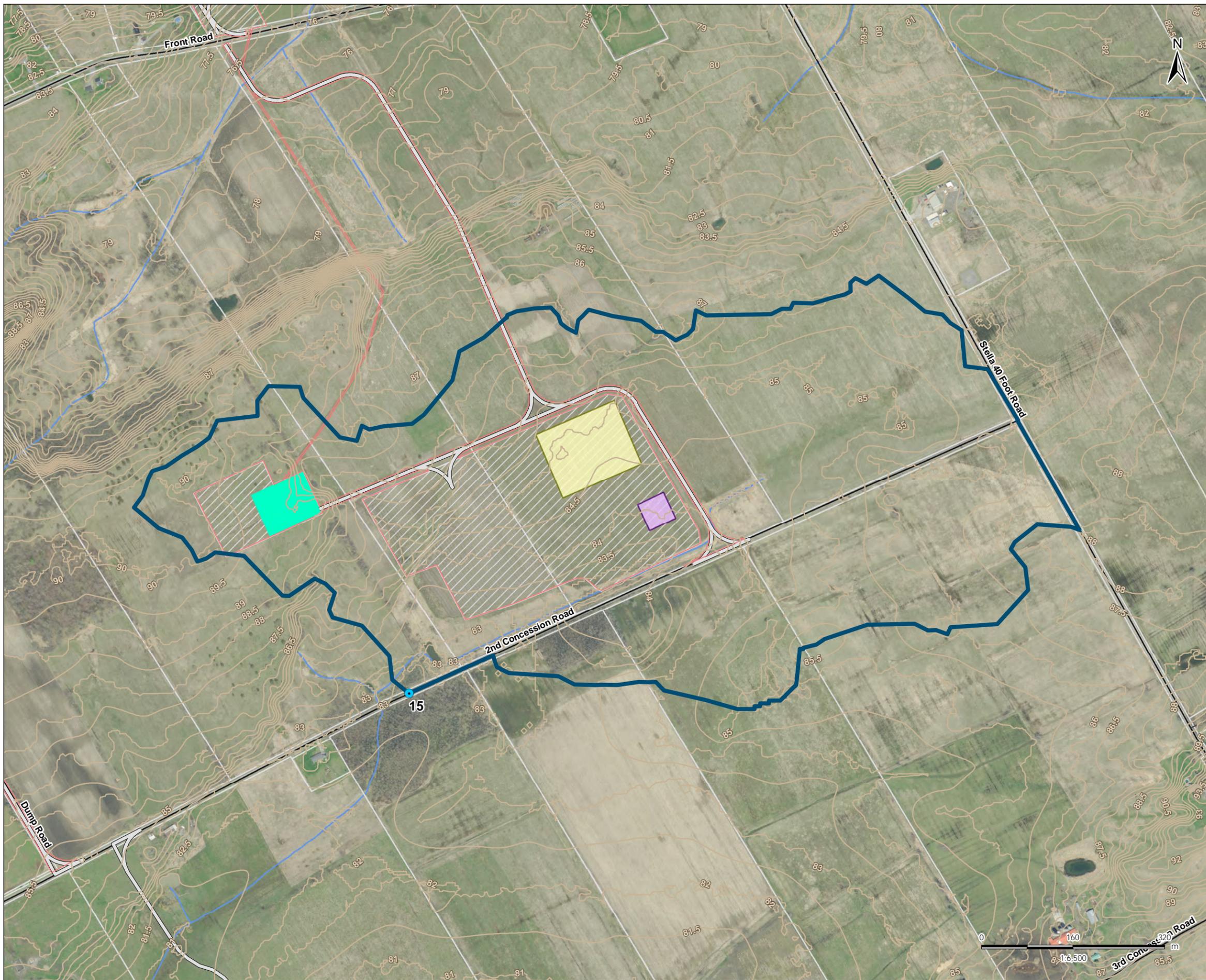
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 Drainage Area #14

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 Revised: 2017-07-14 By: pworsell

July 2017
 160960595

Legend

- Point of Interest
 - Surface Water Catchment Area
 - Access Road
 - Constructible Area
 - Batch Plant
 - Site Office
 - Central Staging Area
 - Substation
- Existing Features
- Road
 - Unopened Road Allowance
 - Topographic Contour (metres AMSL)
 - Watercourse
 - Property Line



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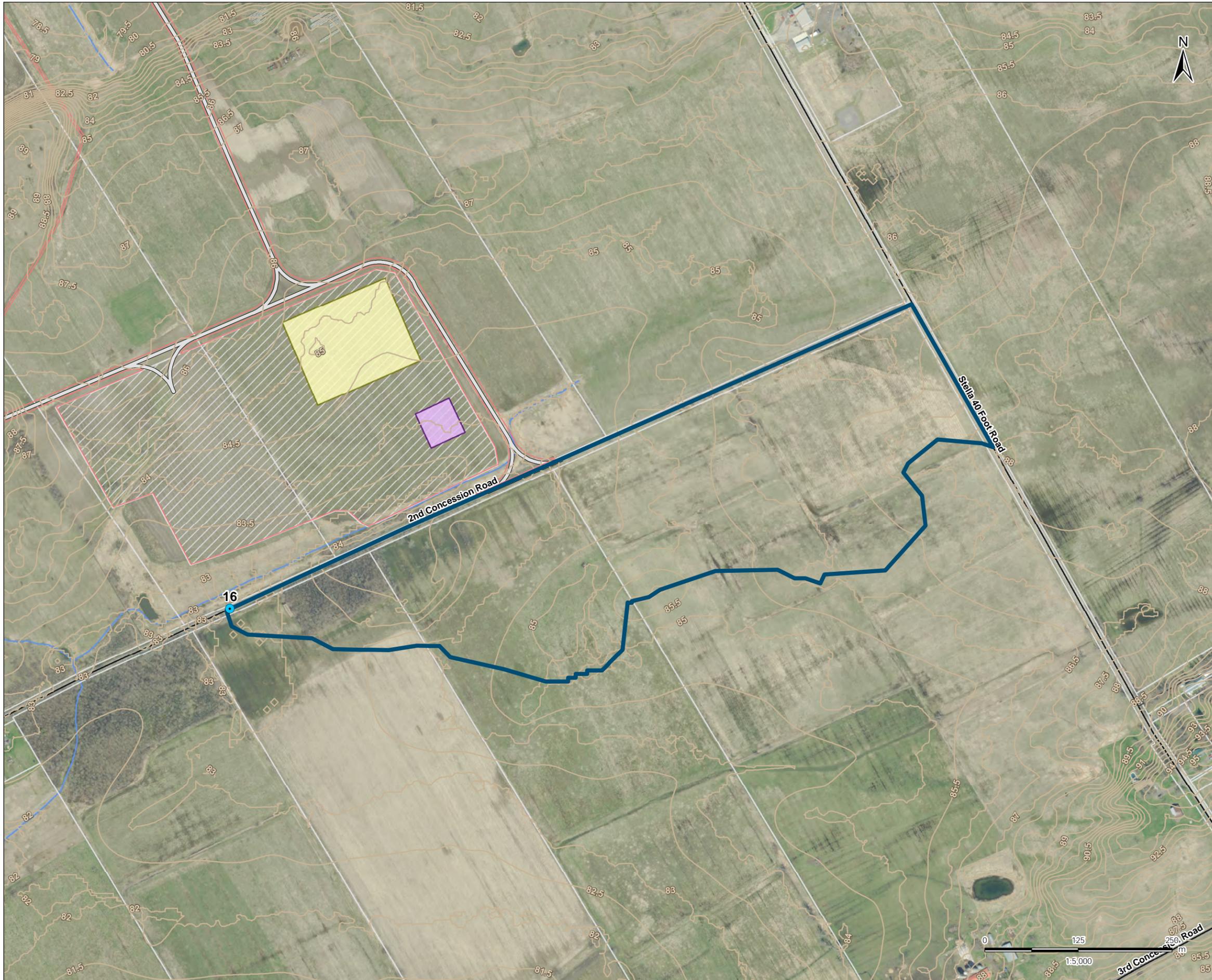
Figure No.

2.15

Title

SWM Drainage Catchments -
Drainage Area #15

- Legend
- Point of Interest
 - Surface Water Catchment Area
 - Access Road
 - Constructible Area
 - Batch Plant
 - Site Office
 - Central Staging Area
- Existing Features
- Road
 - Unopened Road Allowance
 - Topographic Contour (metres AMSL)
 - Watercourse
 - Property Line



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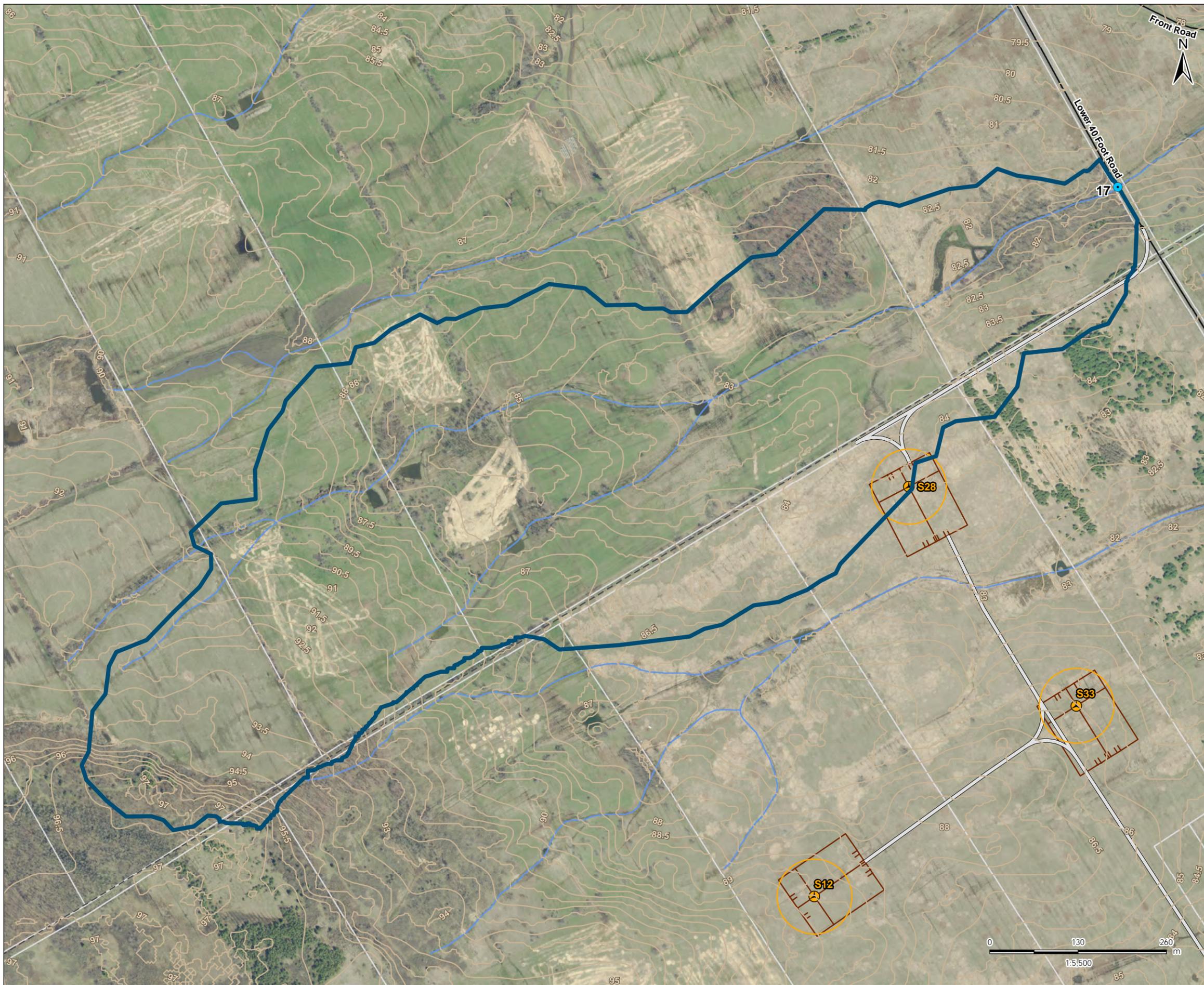
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2.16

Title
SWM Drainage Catchments -
Drainage Area #16

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Legend

- Point of Interest
- Surface Water Catchment Area
- Project Components**
 - Turbine
 - Access Road
 - Laydown Area and Crane Pad
 - Turbine Blade Tip
- Existing Features**
 - Road
 - Unopened Road Allowance
 - Topographic Contour (metres AMSL)
 - Watercourse
 - Property Line

Notes

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Client/Project

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Amherst Island Wind Energy Project

Figure No.
2.17

Title

SWM Drainage Catchments -
Drainage Area #17

Legend

- Point of Interest
- Surface Water Catchment Area
- Project Components**
- Turbine
- Access Road
- Laydown Area and Crane Pad
- Turbine Blade Tip
- Existing Features**
- Road
- Unopened Road Allowance
- Topographic Contour (metres AMSL)
- Watercourse
- Property Line



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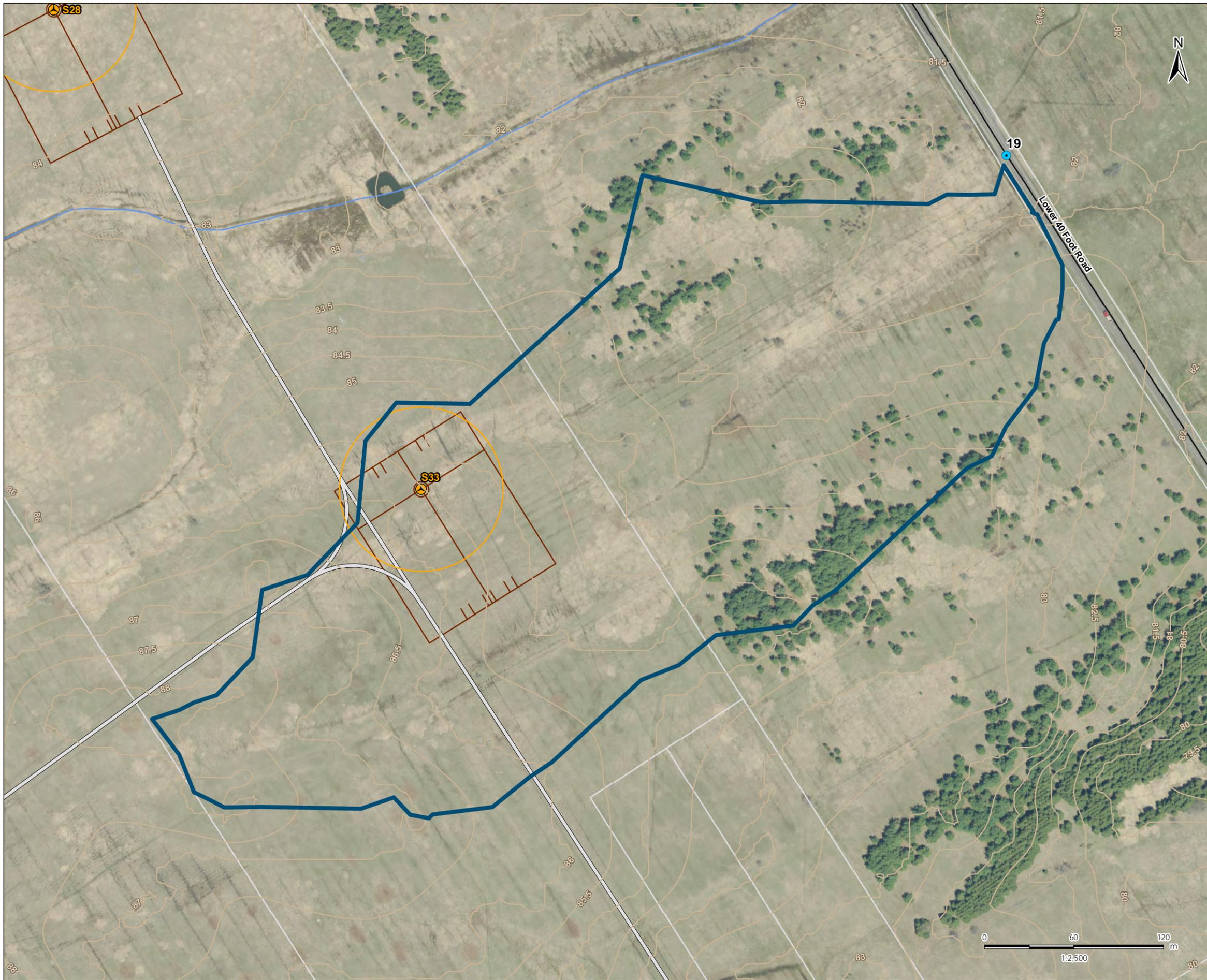
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Client/Project

Windlectric Inc.
Amherst Island Wind Energy Project

Figure No.
2.18

Title
SWM Drainage Catchments -
Drainage Area #18



- Legend**
- Point of Interest
 - Surface Water Catchment Area
 - Project Components**
 - Turbine
 - Access Road
 - Laydown Area and Crane Pad
 - Turbine Blade Tip
 - Existing Features**
 - Road
 - Topographic Contour (metres AMSL)
 - Watercourse
 - Property Line

- Notes**
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Client/Project
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 Amherst Island Wind Energy Project

Figure No.
 2.19

Title
 SWM Drainage Catchments -
 Drainage Area #19

\\C01220-102\01609A\active\60960595\drawing\MXD\Surface_Water\Ph5_SWM\160960595_ESC_Ph5_Fig02_Drainage_Catchments_mapbook.mxd
 Revised: 2017-07-14 By: pworthell

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Revised: 2017-07-14 By: pwnorsell



- Legend
- Point of Interest
 - Surface Water Catchment Area
 - Project Components**
 - Turbine
 - Access Road
 - Laydown Area and Crane Pad
 - Turbine Blade Tip
 - Existing Features**
 - Road
 - Unopened Road Allowance
 - Topographic Contour (metres AMSL)
 - Watercourse
 - Property Line

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Client/Project
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Amherst Island Wind Energy Project

Figure No.
2.20

Title
SWM Drainage Catchments -
Drainage Area #20



Legend

- Point of Interest
- Surface Water Catchment Area
- Project Components**
- ⊙ Turbine
- Access Road
- Laydown Area and Crane Pad
- Constructible Area
- Turbine Blade Tip
- Existing Features**
- Road
- Unopened Road Allowance
- Watercourse
- Property Line



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Amherst Island Wind Energy Project

Figure No.
2.21

Title

SWM Drainage Catchments -
Drainage Area #21



\\C01220-102-011609\active\60960595\drawing\MXD\Surface_Water\PH5_SWM\160960595_ESC_PHS_Fig02_Drainage_Catchments_mapbook.mxd
 Revised: 2017-07-14 By: pwnorsell



- Legend**
- Point of Interest
 - Surface Water Catchment Area
- Project Components**
- Turbine
 - Access Road
 - Laydown Area and Crane Pad
 - Turbine Blade Tip
- Existing Features**
- Road
 - Topographic Contour (metres AMSL)
 - Watercourse
 - Property Line

- Notes**
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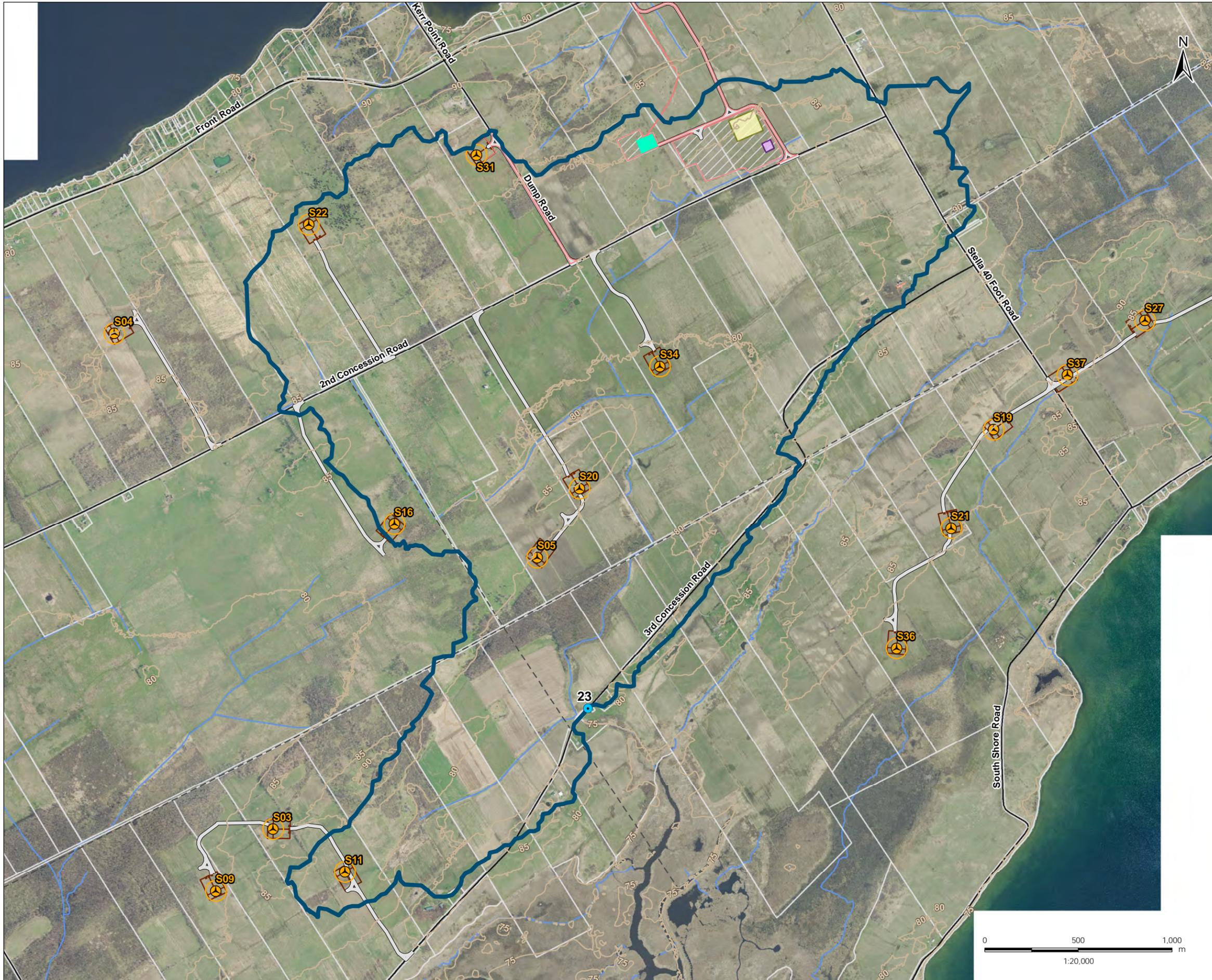
Client/Project
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 Amherst Island Wind Energy Project

Figure No.
 2.22

Title
 SWM Drainage Catchments -
 Drainage Area #22

\\C01220-102\01609A\active\60960595\drawing\MXD\Surface_Water\Phs_SWM\160960595_ESC_Ph5_Fig02_Drainage_Catchments_mapbook.mxd
 Revised: 2017-07-14 By: pworthell

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- Legend**
- Point of Interest
 - Surface Water Catchment Area
 - Project Components**
 - Turbine
 - Access Road
 - Laydown Area and Crane Pad
 - Constructible Area
 - Turbine Blade Tip
 - Batch Plant
 - Site Office
 - Central Staging Area
 - Substation
 - Existing Features**
 - Road
 - Unopened Road Allowance
 - Watercourse
 - Property Line

Notes

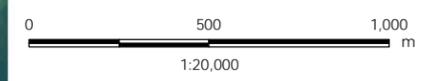
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Figure No.
2.23

Title
**SWM Drainage Catchments -
Drainage Area #23**



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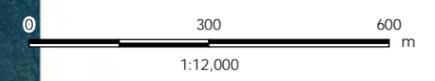
- Legend**
- Point of Interest
 - Surface Water Catchment Area
 - Project Components**
 - Turbine
 - Access Road
 - Laydown Area and Crane Pad
 - Turbine Blade Tip
 - Existing Features**
 - Road
 - Unopened Road Allowance
 - Watercourse
 - Property Line

- Notes**
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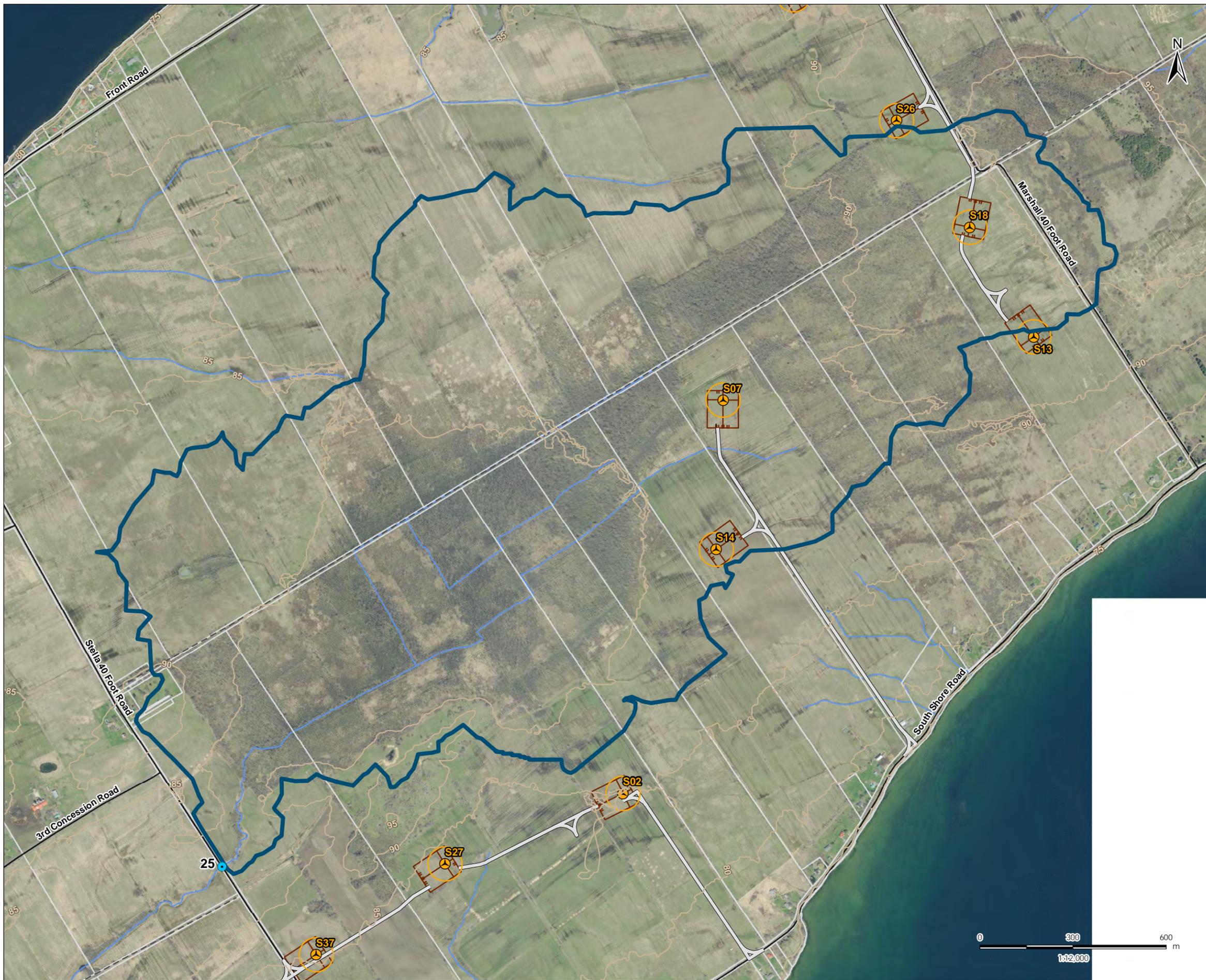
Figure No.
 2.24

Title
 SWM Drainage Catchments -
 Drainage Area #24



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 Revised: 2017-07-14 By: pworsell

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- Legend
- Point of Interest
 - Surface Water Catchment Area
 - Project Components**
 - Turbine
 - Access Road
 - Laydown Area and Crane Pad
 - Turbine Blade Tip
 - Existing Features**
 - Road
 - Unopened Road Allowance
 - Watercourse
 - Property Line

Notes

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Figure No.
 2.25

Title
 SWM Drainage Catchments -
 Drainage Area #25

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 Revised: 2017-07-14 By: pworthell

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- Legend
- Point of Interest
 - Surface Water Catchment Area
 - Project Components
 - Turbine
 - Access Road
 - Laydown Area and Crane Pad
 - Turbine Blade Tip
 - Existing Features
 - Road
 - Topographic Contour (metres AMSL)
 - Watercourse
 - Property Line



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Amherst Island Wind Energy Project

Figure No.
2.26

Title
SWM Drainage Catchments -
Drainage Area #26

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 Revised: 2017-07-14 By: pwnorsell

- Legend
- Point of Interest
 - Surface Water Catchment Area
 - Project Components**
 - Turbine
 - Access Road
 - Laydown Area and Crane Pad
 - Turbine Blade Tip
 - Existing Features**
 - Road
 - Unopened Road Allowance
 - Topographic Contour (metres AMSL)
 - Watercourse
 - Property Line



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Amherst Island Wind Energy Project

Figure No.
2.27

Title
SWM Drainage Catchments -
Drainage Area #27

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 Revised: 2017-07-14 By: pworsell

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- Legend
- Point of Interest
 - Surface Water Catchment Area
- Project Components
- Turbine
 - Access Road
 - Laydown Area and Crane Pad
 - Turbine Blade Tip
- Existing Features
- Road
 - Topographic Contour (metres AMSL)
 - Watercourse
 - Property Line

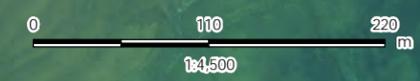


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 Amherst Island Wind Energy Project

Figure No.
 2.28

Title
 SWM Drainage Catchments -
 Drainage Area #28



\\C01220-102-011609\active\60960595\drawing\MXD\Surface_Water\Phs_SWM\160960595_ESC_Ph5_Fig02_Drainage_Catchments_mapbook.mxd
 Revised: 2017-07-14 By: pwnorsell

July 2017
 160960595

- Legend
- Point of Interest
 - Surface Water Catchment Area
 - Project Components**
 - Turbine
 - Access Road
 - Laydown Area and Crane Pad
 - Turbine Blade Tip
 - Existing Features**
 - Road
 - Topographic Contour (metres AMSL)
 - Watercourse
 - Property Line



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Figure No.
2.29

Title
SWM Drainage Catchments -
Drainage Area #29

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 Revised: 2017-07-14 By: pworthell

- Legend
- Point of Interest
 - Surface Water Catchment Area
- Project Components
- Turbine
 - Access Road
 - Laydown Area and Crane Pad
 - Turbine Blade Tip
- Existing Features
- Road
 - Topographic Contour (metres AMSL)
 - Watercourse
 - Property Line



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Figure No.
2.30

Title
SWM Drainage Catchments -
Drainage Area #30

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 Revised: 2017-07-14 By: pwnorsell

Legend

- Point of Interest
- Surface Water Catchment Area
- Project Components**
- Turbine
- Access Road
- Laydown Area and Crane Pad
- Turbine Blade Tip
- Existing Features**
- Road
- Topographic Contour (metres AMSL)
- Watercourse
- Property Line



Notes

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Client/Project

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Amherst Island Wind Energy Project

Figure No.

2.31

Title

SWM Drainage Catchments -
Drainage Area #31



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 Revised: 2017-07-14 By: pwnorsell

Legend

- Point of Interest
- Surface Water Catchment Area
- Access Road
- Laydown Area and Crane Pad
- Turbine Blade Tip
- Existing Features**
- Road
- Topographic Contour (metres AMSL)
- Watercourse
- Property Line



Notes

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Client/Project

Windlectric Inc.
Amherst Island Wind Energy Project

Figure No.
2.32

Title
SWM Drainage Catchments -
Drainage Area #32





NOTES:

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 ACTIVITIES.
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. EROSION AND SEDIMENT CONTROL MEASURES ARE TO BE MAINTAINED AND IMPROVED UPON AS NECESSARY TO KEEP THEM EFFECTIVE AND MINIMIZE THE POTENTIAL FOR EROSION AND MIGRATION OF SEDIMENT TO THE DOWNSTREAM NATURAL ENVIRONMENT.
5. AT THE DISCRETION OF THE OWNER OR OWNER'S CONSULTANT, ADDITIONAL SILT CONTROL DEVICES SHALL BE INSTALLED AT DESIGNATED LOCATIONS.
6. 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.
7. STOCKPILED MATERIAL IS TO BE STORED AWAY FROM POTENTIAL RECEIVERS (E.G. WATERCOURSES), AND BE SURROUNDED BY EROSION CONTROL MEASURES WHERE MATERIAL IS TO BE LEFT IN PLACE IN EXCESS OF 10 DAYS OR PRIOR TO A RAIN EVENT, WHICHEVER OCCURS SOONER.
8. REMOVAL OF SEDIMENT CONTROL MEASURES AND COLLECTION OF ACCUMULATED SEDIMENT SHALL OCCUR FOLLOWING SUBSTANTIAL COMPLETION OF CONSTRUCTION (90%-100%) AND SITE STABILIZATION TO 90%.
9. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO MAINTAIN AND BOLSTER EROSION AND SEDIMENT CONTROL MEASURES AS NECESSARY TO KEEP THEM EFFECTIVE AND MINIMIZE THE POTENTIAL FOR EROSION.
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 AS NECESSARY, 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 AND CLEAN (FREE OF FINES) GRAVEL

ANY ADDITIONAL MATERIAL DEEMED NECESSARY TO REPAIR/REMEDiate PROPOSED MEASURES, OR TO ADEQUATELY DEAL WITH UNEXPECTED HIGH FLOWS

11. EROSION AND SEDIMENT CONTROL MONITORING RECORDS SHALL BE KEPT AND MADE AVAILABLE TO THE MINISTRY OF ENVIRONMENT AND CLIMATE CHANGE AND CATARAQUI REGION CONSERVATION AUTHORITY UPON REQUEST.
12. IN THE EVENT OF INCLEMENT WEATHER OR UNFAVOURABLE TERRAIN FOR CONSTRUCTION, CONSTRUCTION BEST PRACTICES, SUCH TEMPORARY RIG-MATS MAY BE USED TO PREVENT DISRUPTION OF SURFACE SOILS AND VEGETATIVE COVER BY CONSTRUCTION VEHICLES AND EQUIPMENT.

13. ADDITIONAL 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 THE "EROSION AND SEDIMENT CONTROL GUIDELINE FOR URBAN CONSTRUCTION - GREATER GOLDEN HORSESHOE AREA CONSERVATION AUTHORITIES." THE LOCATIONS AND APPLICATION OF THE CONTROLS WILL BE APPROVED BY THE INSPECTOR PRIOR TO THEIR INSTALLATION.

AREA GRADING NOTES

PRIOR TO SITE WORKS

1. INSTALL ALL SILT FENCE AND PROTECTIVE FENCING AS SHOWN ON THE PLANS AND MAINTAIN DURING CONSTRUCTION.

DURING AREA GRADING

1. TOPSOIL IS TO BE STRIPPED ONLY IN AREAS REQUIRING EARTHWORKS AND PLACED IN STOCK PILES AT THE LOCATIONS SHOWN ON THE PLANS OR AS APPROVED BY THE QUALIFIED ENVIRONMENTAL SITE INSPECTOR.
2. TEMPORARY TOPSOIL STOCKPILES ARE TO HAVE CONTINUOUS SILT FENCE PLACED IMMEDIATELY AROUND THE ENTIRE PERIMETER.
3. ROADWAYS AND LAY DOWN YARDS ARE TO BE PLACED ON NATIVE GROUND AFTER TOPSOIL HAS BEEN STRIPPED.
4. ALL TOPSOIL IS TO BE RE-SPREAD ON CONSTRUCTION IMPACTED AREAS AFTER FINAL GRADING IS COMPLETE TO A MINIMUM DEPTH OF 150MM.
5. 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.

AFTER AREA GRADING

1. ALL AREAS WHERE ACTIVE CONSTRUCTION IS NOT EXPECTED FOR 2 WEEKS SHALL BE RE-SEED WITH NATIVE PLANT SPECIES.
2. REMOVAL OF SEDIMENT CONTROL MEASURES AND COLLECTION OF ACCUMULATED SEDIMENT SHALL OCCUR FOLLOWING SUBSTANTIAL COMPLETION OF CONSTRUCTION (90%-100%) AND SITE STABILIZATION TO 90%.

SLOPE PROTECTION NOTES

1. EITHER ROLLED EROSION CONTROL PRODUCTS (RECP) OR MULCHMAX ULTRA AT 500 KG/HA ARE TO BE USED ON 3:1 SLOPES OR GREATER.
2. RECP PRODUCTS ARE TO BE BIODEGRADABLE. STRAW, COIR, WOOD EXCELSIOR ARE SAMPLE MATERIALS THAT CAN BE USED.
3. RECP PRODUCTS ARE TO BE INSTALLED PER MANUFACTURER SPECIFICATIONS. INSTALLATION TO BE INSPECTED AND REPAIRED AS NEEDED.
4. RECP ARE TO BE APPLIED AS SOON AS POSSIBLE FOLLOWING GRADING AND SEEDING OF SUBJECT AREAS.
5. SURFACES ARE TO BE SMOOTH AND FREE OF STONES AND DEBRIS OR OTHER WEED CLUMPS PRIOR TO RECP PRODUCTS BEING INSTALLED.

6. CONTRACTOR TO ENSURE THAT RILLING/GULLYING IS RECTIFIED PRIOR TO RECP OR MULCHMAX ULTRA INSTALLATION. CONTRACTOR TO MONITOR RUNOFF UNDER THE RECP FOLLOWING INSTALLATION.

7. CONTRACTOR TO ENSURE THAT RECP IS SECURED AT THE TOP OF THE SLOPE IN A TRENCH AND OVERLAP (SIDE TO SIDE AND BOTTOM TO TOP)

8. CONTRACTOR TO INSPECT THE SITE DAILY OR AFTER SIGNIFICANT RAINFALL EVENTS (10MM) AND IDENTIFY AREAS OF EROSION OR POTENTIAL EROSION. BEST MANAGEMENT PRACTICES ARE TO BE USED TO CONTROL THE EROSION. METHODS OF CONTROL MAY INCLUDE THE USE OF EROSION CONTROL BLANKETS C/W SEEDING, HYDRAULIC MULCH OR STRAW MULCH, OR SOIL BINDER. SOILS ARE TO BE STABILIZED AS SOON AS AREAS ARE IDENTIFIED TO PREVENT FURTHER EROSION.

SILT FENCE NOTES (SEE DETAIL 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

GENERAL

1. EQUIPMENT AND CONSTRUCTION MATERIAL SHALL BE STORED AWAY FROM THE WATER IN A MANNER THAT PREVENTS ANY DELETERIOUS SUBSTANCE FROM ENTERING THE WATER. REFUELING OF MACHINERY AND GENERATORS SHALL NOT BE CONDUCTED WITHIN 30 M OF A WATERCOURSE AND SHALL BE COMPLETED IN A CONTROLLED MANNER WITH ADEQUATE SPILL PROTECTION ON SITE.

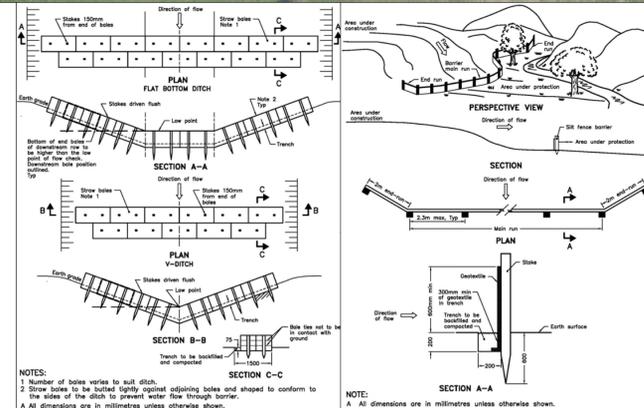
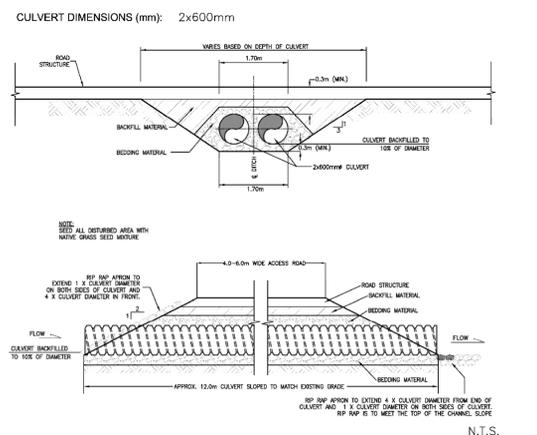
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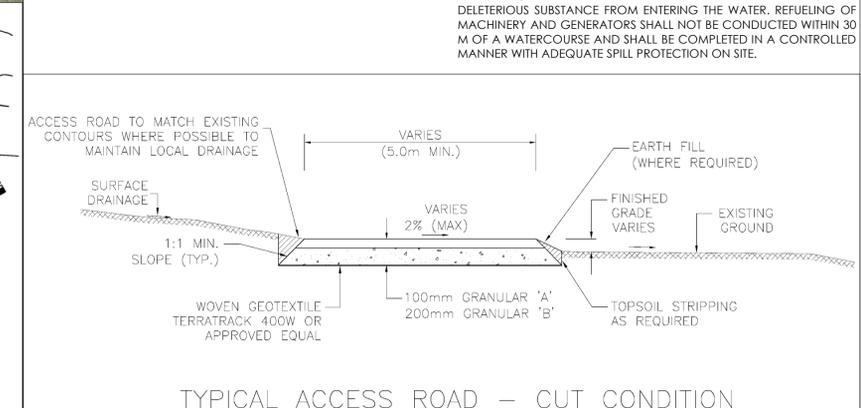
Consultants

Legend

- Silt Fence
- Regulated Watercourse Culvert Location
- Straw Bale
- Turbine Location
- Access Road
- Collector Line
- Laydown Area and Crane Pad
- Turbine Blade Tip
- Constructible Area
- Property Line
- CA Regulation Limit
- Fill: 75m³ (assumed)
- Top Soil: 150m³ (assumed)

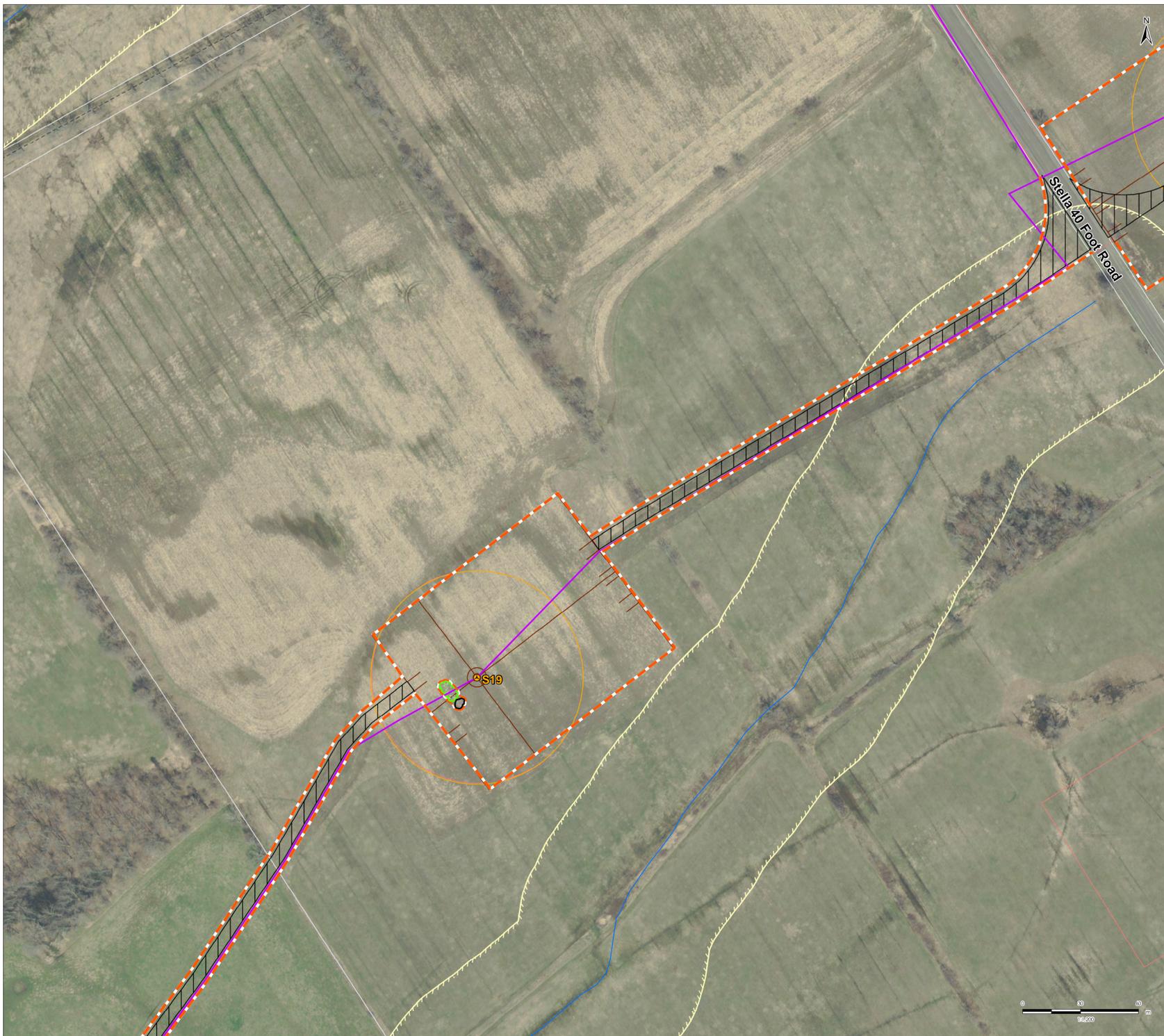


NOTES:
1. Number of bales varies to suit ditch.
2. Straw bales to be banded tightly against adjoining bales and shaped to conform to the sides of the ditch to prevent water flow through barrier.
A All dimensions are in millimetres unless otherwise shown.



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

Notes:
1. Coordinate System: NAD 1983 UTM Zone 18N
2. Base features procured under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2017.
3. Orthomosaic © Cataraqui Region Conservation Authority, 2017. Imagery taken in 2014.



NOTES:

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 ACTIVITIES.
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. EROSION AND SEDIMENT CONTROL MEASURES ARE TO BE MAINTAINED AND IMPROVED UPON AS NECESSARY TO KEEP THEM EFFECTIVE AND MINIMIZE THE POTENTIAL FOR EROSION AND MIGRATION OF SEDIMENT TO THE DOWNSTREAM NATURAL ENVIRONMENT.
5. AT THE DISCRETION OF THE OWNER OR OWNER'S CONSULTANT, ADDITIONAL SILT CONTROL DEVICES SHALL BE INSTALLED AT DESIGNATED LOCATIONS.
6. 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.
7. STOCKPILED MATERIAL IS TO BE STORED AWAY FROM POTENTIAL RECEIVERS (E.G. WATERCOURSES), AND BE SURROUNDED BY EROSION CONTROL MEASURES WHERE MATERIAL IS TO BE LEFT IN PLACE IN EXCESS OF 10 DAYS OR PRIOR TO A RAIN EVENT, WHICHEVER OCCURS SOONER.
8. REMOVAL OF SEDIMENT CONTROL MEASURES AND COLLECTION OF ACCUMULATED SEDIMENT SHALL OCCUR FOLLOWING SUBSTANTIAL COMPLETION OF CONSTRUCTION (90%-100%) AND SITE STABILIZATION TO 90%.
9. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO MAINTAIN AND BOLSTER EROSION AND SEDIMENT CONTROL MEASURES AS NECESSARY TO KEEP THEM EFFECTIVE AND MINIMIZE THE POTENTIAL FOR EROSION.
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 AS NECESSARY, 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 AND CLEAN (FREE OF FINES) GRAVEL

ANY ADDITIONAL MATERIAL DEEMED NECESSARY TO REPAIR/REMEDiate PROPOSED MEASURES, OR TO ADEQUATELY DEAL WITH UNEXPECTED HIGH FLOWS

11. EROSION AND SEDIMENT CONTROL MONITORING RECORDS SHALL BE KEPT AND MADE AVAILABLE TO THE MINISTRY OF ENVIRONMENT AND CLIMATE CHANGE AND CATARAQUI REGION CONSERVATION AUTHORITY UPON REQUEST.

12. IN THE EVENT OF INCLEMENT WEATHER OR UNFAVOURABLE TERRAIN FOR CONSTRUCTION, CONSTRUCTION BEST PRACTICES, SUCH TEMPORARY RIG-MATS MAY BE USED TO PREVENT DISRUPTION OF SURFACE SOILS AND VEGETATIVE COVER BY CONSTRUCTION VEHICLES AND EQUIPMENT.

13. ADDITIONAL 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 THE "EROSION AND SEDIMENT CONTROL GUIDELINE FOR URBAN CONSTRUCTION - GREATER GOLDEN HORSESHOE AREA CONSERVATION AUTHORITIES." THE LOCATIONS AND APPLICATION OF THE CONTROLS WILL BE APPROVED BY THE INSPECTOR PRIOR TO THEIR INSTALLATION.

AREA GRADING NOTES

PRIOR TO SITE WORKS

1. INSTALL ALL SILT FENCE AND PROTECTIVE FENCING AS SHOWN ON THE PLANS AND MAINTAIN DURING CONSTRUCTION.

DURING AREA GRADING

1. TOPSOIL IS TO BE STRIPPED ONLY IN AREAS REQUIRING EARTHWORKS AND PLACED IN STOCK PILES AT THE LOCATIONS SHOWN ON THE PLANS OR AS APPROVED BY THE QUALIFIED ENVIRONMENTAL SITE INSPECTOR.
2. TEMPORARY TOPSOIL STOCKPILES ARE TO HAVE CONTINUOUS SILT FENCE PLACED IMMEDIATELY AROUND THE ENTIRE PERIMETER.
3. ROADWAYS AND LAY DOWN YARDS ARE TO BE PLACED ON NATIVE GROUND AFTER TOPSOIL HAS BEEN STRIPPED.
4. ALL TOPSOIL IS TO BE RE-SPREAD ON CONSTRUCTION IMPACTED AREAS AFTER FINAL GRADING IS COMPLETE TO A MINIMUM DEPTH OF 150MM.
5. 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.

AFTER AREA GRADING

1. ALL AREAS WHERE ACTIVE CONSTRUCTION IS NOT EXPECTED FOR 2 WEEKS SHALL BE RE-SEEDED WITH NATIVE PLANT SPECIES.
2. REMOVAL OF SEDIMENT CONTROL MEASURES AND COLLECTION OF ACCUMULATED SEDIMENT SHALL OCCUR FOLLOWING SUBSTANTIAL COMPLETION OF CONSTRUCTION (90%-100%) AND SITE STABILIZATION TO 90%.

SLOPE PROTECTION NOTES

1. EITHER ROLLED EROSION CONTROL PRODUCTS (RECP) OR MULCHMAX ULTRA AT 500 KG/HA ARE TO BE USED ON 3:1 SLOPES OR GREATER.
2. RECP PRODUCTS ARE TO BE BIODEGRADABLE. STRAW, COIR, WOOD EXCELSDOR ARE SAMPLE MATERIALS THAT CAN BE USED.
3. RECP PRODUCTS ARE TO BE INSTALLED PER MANUFACTURER SPECIFICATIONS. INSTALLATION TO BE INSPECTED AND REPAIRED AS NEEDED.
4. RECP ARE TO BE APPLIED AS SOON AS POSSIBLE FOLLOWING GRADING AND SEEDING OF SUBJECT AREAS.
5. SURFACES ARE TO BE SMOOTH AND FREE OF STONES AND DEBRIS OR OTHER WEED CLUMPS PRIOR TO RECP PRODUCTS BEING INSTALLED.

6. CONTRACTOR TO ENSURE THAT RILLING/GULLYING IS RECTIFIED PRIOR TO RECP OR MULCHMAX ULTRA INSTALLATION. CONTRACTOR TO MONITOR RUNOFF UNDER THE RECP FOLLOWING INSTALLATION.

7. CONTRACTOR TO ENSURE THAT RECP IS SECURED AT THE TOP OF THE SLOPE IN A TRENCH AND OVERLAP (SIDE TO SIDE AND BOTTOM TO TOP)

8. CONTRACTOR TO INSPECT THE SITE DAILY OR AFTER SIGNIFICANT RAINFALL EVENTS (10MM) AND IDENTIFY AREAS OF EROSION OR POTENTIAL EROSION. BEST MANAGEMENT PRACTICES ARE TO BE USED TO CONTROL THE EROSION. METHODS OF CONTROL MAY INCLUDE THE USE OF EROSION CONTROL BLANKETS C/W SEEDING, HYDRAULIC MULCH OR STRAW MULCH, OR SOIL BINDER. SOILS ARE TO BE STABILIZED AS SOON AS AREAS ARE IDENTIFIED TO PREVENT FURTHER EROSION.

SILT FENCE NOTES (SEE DETAIL 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

GENERAL

1. EQUIPMENT AND CONSTRUCTION MATERIAL SHALL BE STORED AWAY FROM THE WATER IN A MANNER THAT PREVENTS ANY DELETERIOUS SUBSTANCE FROM ENTERING THE WATER. REFUELING OF MACHINERY AND GENERATORS SHALL NOT BE CONDUCTED WITHIN 30 M OF A WATERCOURSE AND SHALL BE COMPLETED IN A CONTROLLED MANNER WITH ADEQUATE SPILL PROTECTION ON SITE.

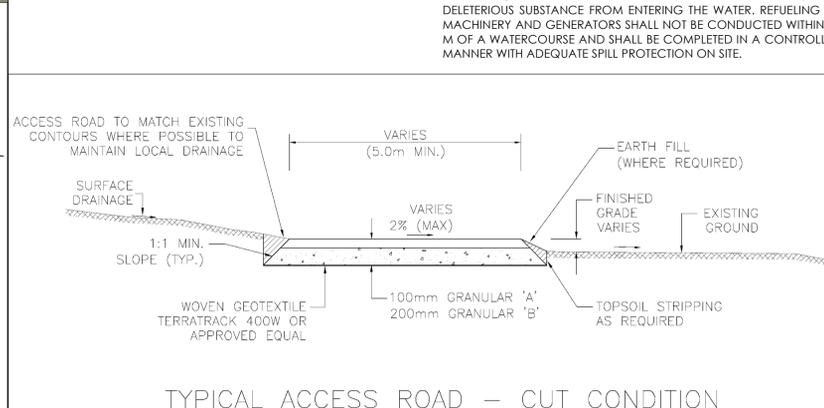
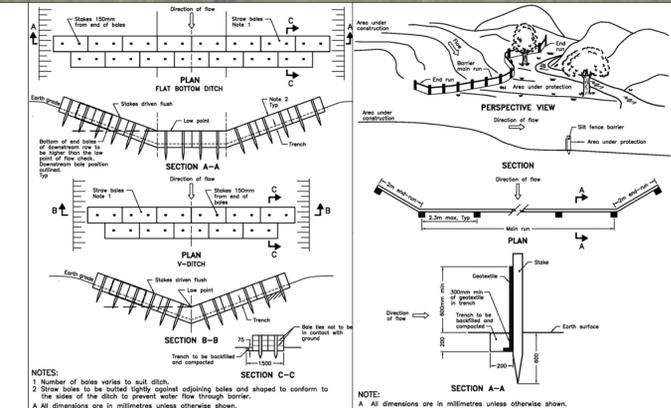
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Consultants

Legend

- Silt Fence
- Regulated Watercourse Culvert Location
- Straw Bale
- Turbine Location
- Access Road
- Collector Line
- Unopened Road Allowance
- Laidown Area and Crane Pad
- Turbine Blade Tip
- Constructible Area
- Property Line
- CA Regulation Limit
- Fill: 75m³ (assumed)
- Top Soil: 150m³ (assumed)



- Notes**
1. Coordinates System: NAD 1983 UTM Zone 18N
 2. Soil features procured under license with the Ontario Ministry of Natural Resources and Forests © Queen's Printer for Ontario, 2017.
 3. Orthomosaic © Cataraqui Region Conservation Authority, 2017. Imagery taken in 2014.

Client/Project
Windtastic Inc.
Amherst Island Wind Energy Project

Figure No.
3.7

Title
Erosion and Sediment Control
Turbine(s): S19
Landowner: Brown



NOTES:

EROSION AND SEDIMENT CONTROL NOTES (SEE DETAILS THIS SHEET)

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- FILTER CLOTH
- PUMPS
- CLEAN RIP-RAP (FREE OF FINES) FOR ROCK CHECK DAMS
- SAND BAGS AND CLEAN (FREE OF FINES) GRAVEL

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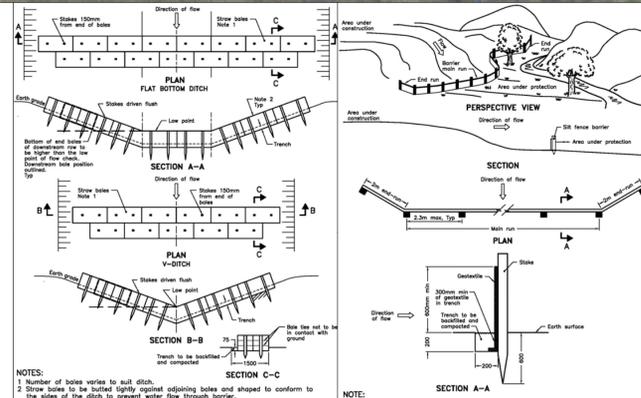
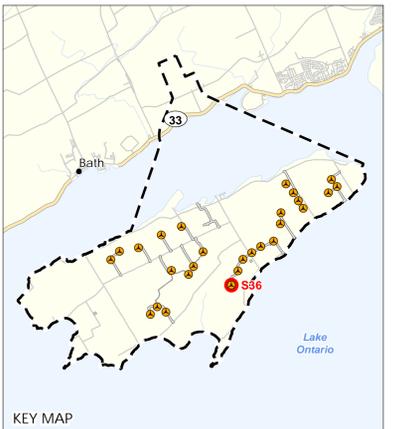
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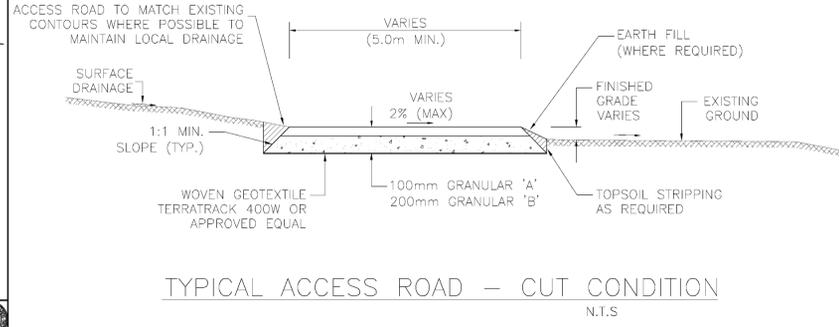
Consultants

Legend

- Silt Fence
- Regulated Watercourse Culvert Location
- Straw Bale
- Turbine Location
- Access Road
- Collector Line
- Laydown Area and Crane Pad
- Turbine Blade Tip
- Constructible Area
- Property Line
- CA Regulation Limit
- Fill: 75m³ (assumed)
- Top Soil: 150m³ (assumed)



ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2008	Rev 1
STRAW BALE FLOW CHECK DAM	OPSD 219.180	
ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2008	Rev 1
LIGHT-DUTY SILT FENCE BARRIER	OPSD 219.110	



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Client/Project
Windtetric Inc.
Amherst Island Wind Energy Project

Figure No.
3.9

Title
Erosion and Sediment Control
Turbine(s): S36
Landowner: Eves

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 Revised: 2017-10-14 By: jmcneil

