Stantec Consulting Ltd.
100-300 Hagey Boulevard, Waterloo ON N2L 0A4

August 1, 2017
File: 1609-60595

Attention: Mr. Sean Fairfield, Director, Project Planning and Permitting
Algonquin Power Co.
354 Davis Road
Suite 100
Oakville, ON L6J 2X1

Dear Mr. Fairfield,

Reference: Amherst Island Wind Energy Project
Collector Line Installation
Stormwater Management and Erosion and Sediment Control Brief

In response to the Government of Ontario's recent promotion of renewable energy development, Algonquin Power Co. (Algonquin), on behalf of Windlectric Inc., is proposing to construct and operate the Amherst Island Wind Energy Project located in Loyalist Township, Ontario.

This technical letter brief ("Brief") focuses on the stormwater management and erosion and sediment controls related to the installation of the collector line required for the project.

COLLECTOR LINE INSTALLATION

The collector line is proposed to be installed using three different methods at various project locations. These methods include plow, open cut trench and directional bore. Installation methodology is summarized below.

Plow

Plow installation of the collector line is a trenchless method used to minimize surface disturbance during installation. A blade, set to a depth of the proposed installation (approximately 1.2 m), is pulled along the proposed cable alignment while the collector line is installed behind the blade cut. Following installation, any rutting from construction vehicles will be rehabilitated with topsoil and a native vegetation mix (or graveled surface within the municipal road right-of-way) suitable to match adjacent conditions. Plowing will be the primary installation method for the collector line.

Open Cut Trench

Open cut trench excavation will be used in areas where subsurface materials and installation depths are unsuitable for plowing. A trenching machine cuts a 300-700 mm wide x approximately 1.2 m deep trench into the subsurface as shown on Drawing E406A attached. Cable is placed in the trench, then the trench is backfilled with engineered material, native backfill and finished with

topsoil and native vegetation mix (or graveled surface within the municipal road right-of-way) suitable to match adjacent conditions. Any additional rutting from construction vehicles will also be rehabilitated with native or imported topsoil (where required) and re-seeded as appropriate.

During construction of the trench, spoils are temporarily windrowed on the upstream (higher elevation) side of the trench. As the windrowed material is on the upstream side of the trench, should runoff contact the material, the material will wash back into the trench (Figure 1, attached).

The duration of subsurface soil exposure at open cut trench locations is dependent on the materials being trenched and collector line installation requirements (i.e., length of installation, backfill and insulating material requirement, etc.). At locations where trenching is required within a road right of way, trenches within the travelled platform will be backfilled at the end of each working day while trenches within the right of way, not within the travelled platform, will be kept open as necessary to facilitate collector line installation.

Directional Bore

Directional boring is a trenchless method of cable installation to be used in areas of road crossings, watercourse crossings, trees and other locations where an installation from the surface could significantly impact the surrounding environment. A pit is dug at either end of the proposed cable location and then a subsurface bore is completed beginning at one pit and terminating at the other. The cable is installed and then installation pits are backfilled and finished with topsoil and native vegetation mix (or graveled surface within the municipal road right-of-way) suitable to match adjacent conditions. The duration of subsurface soil exposure at the installation pits is dependent on the materials that are being bored through as it will take longer to perform the required bore in more difficult materials.

Directional bore excavation pits will be provided with a layer of light duty silt fence on the downstream sides of the pit (Figure 2, attached).

STORMWATER MANAGEMENT

Formal stormwater management (SWM) controls are not recommended as the proposed collector line will have a negligible impact on downstream receivers for the following reasons:

- All collector line infrastructure is subsurface and will not impact water quality or quantity
- Any areas disturbed by construction will be rehabilitated to existing conditions
- Drainage patterns will remain unchanged from existing conditions

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EROSION AND SEDIMENT CONTROL

Erosion control during collector line installation will be accomplished by limiting the duration of exposure of disturbed sub-soils. All disturbed areas where construction is not expected for 30 days must be re-vegetated with topsoil and hydro-seeding or other stabilizing vegetation / erosion protection measures (per OPSS 804). If, seasonal restrictions or other revegetation limiting factors preclude this practice, the disturbed area should be stabilized against erosion impacts by non-vegetated means such as erosion control blankets or as approved by a qualified erosion and sediment control inspector prior to their installation.

As open cut trenches and directional bore installation pits are self contained, it can be expected that runoff contacting exposed soils within the excavation, will remain contained within the excavation and do not require any further mitigation measures provided downstream.

In the absence of ESC measures for other project infrastructure preventing sediment from migrating downstream,(e.g., silt fence lining access roads) a layer of light duty silt fence is proposed to provide a secondary layer of protection when collector line infrastructure is proposed near sensitive downstream areas (e.g., within 30 m upstream of a waterbody or wetland) (Figures 1, attached). In cases where the feature is within 30 m but the flow path to the feature is longer than 30 m (i.e., flow is intercepted by a roadside ditch) silt fence is not required.

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 vegetation cover by construction vehicles and equipment. (Note: rig-mats or similar materials will be used to provide a safe and sturdy surface for equipment used to install the collector system)

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 the Greater Golden Horseshoe Conservation Authority (GGHCA) Erosion and Sediment Control (ESC) Guideline for Urban Construction and Ministry of Environment and Climate Change (MOECC) Stormwater Management Planning and Design Manual. The locations and application of the controls will be approved by a qualified erosion and sediment control inspector prior to their installation.

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

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risk of surface water and environmental impacts from construction activities are negligible. In addition, the condition of ESC works, their overall performance, and any repairs, replacement or modifications to the installed item shall be noted in logbooks to be kept on-site.

Erosion and Sediment Control Monitoring Program

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), pre REA requirements, and immediate repair of any deficiencies 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 stabilization measures 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 completion of field visits as required, to 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

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CONCLUSION

Based on the preceding brief, the following conclusions can be drawn:

- No formal stormwater management facilities providing water quality and/or water quantity control are required
- An erosion and sediment control plan has been developed to mitigate migration of sediments offsite to downstream receivers

Based on the findings of this brief it is recommended that the proposed stormwater management and erosion and sediment control measures be implemented for the proposed collector line installation.

Regards,

STANTEC CONSULTING LTD.

David Williams, P. Eng.
Water Resources Engineer
Phone: (519) 585-7320
David.Williams@stantec.com

Attachment: Drawing E406A – Cable Trench Details
Figure 1 – Typical Trench Within 30 m of Watercourse Erosion and Sediment Control Plan
Figure 2 – Typical Directional Bore Erosion and Sediment Control Plan

c. Mr. Riley Griffin, Algonquin Power Co.
Ms. Kerrie Skillen and Mr. Rob Rowland, Stantec Consulting Ltd.

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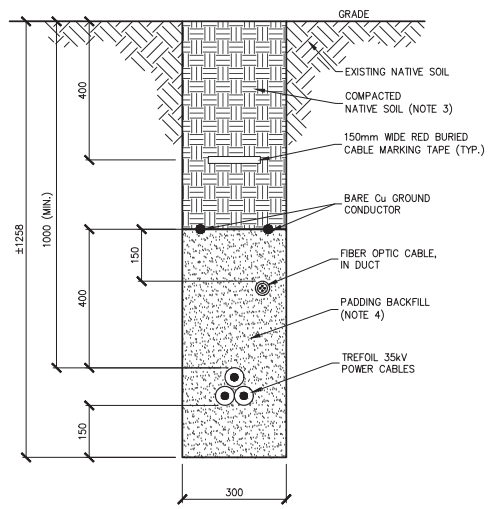
ATTACHMENTS



A ONE CIRCUIT IN GRASS OR SHOULDER TRENCH THROUGH SOIL
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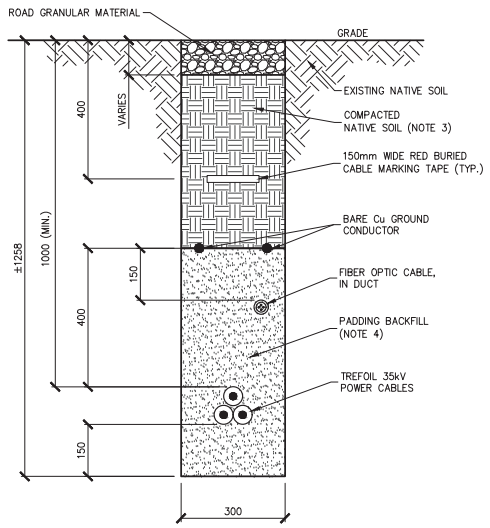

B ONE CIRCUIT UNDER ROADWAY TRENCH THROUGH SOIL
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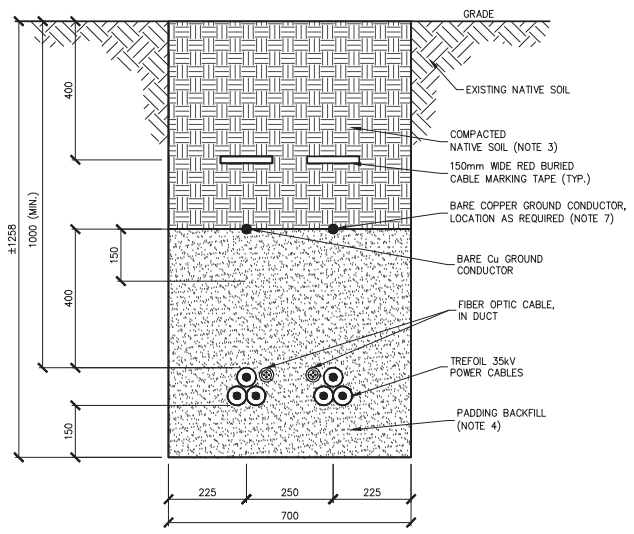

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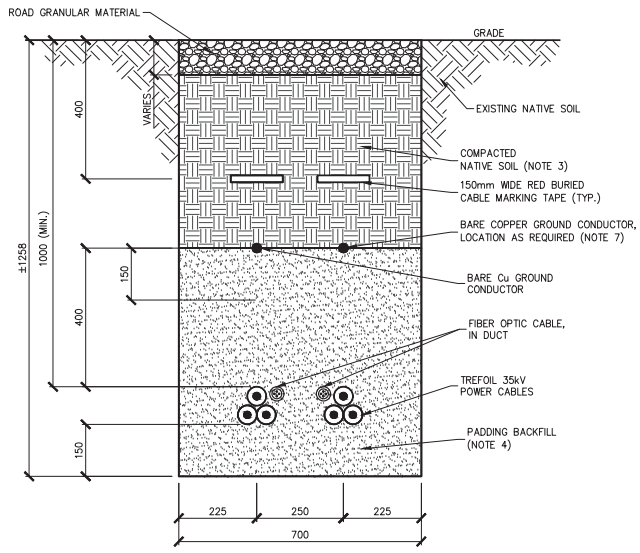

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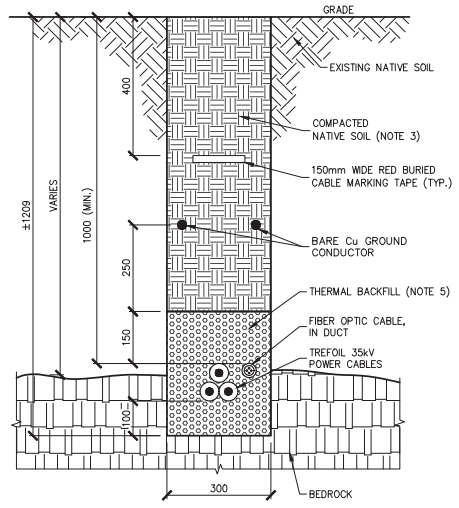

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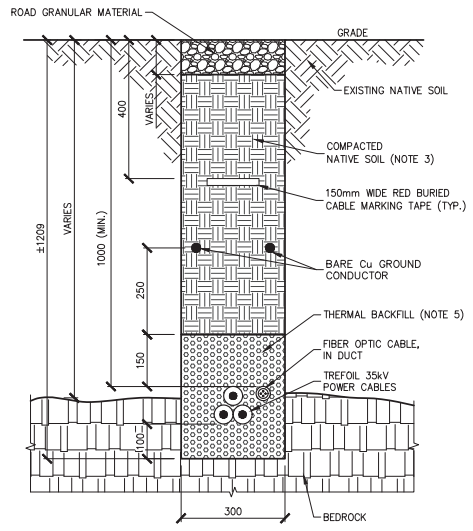

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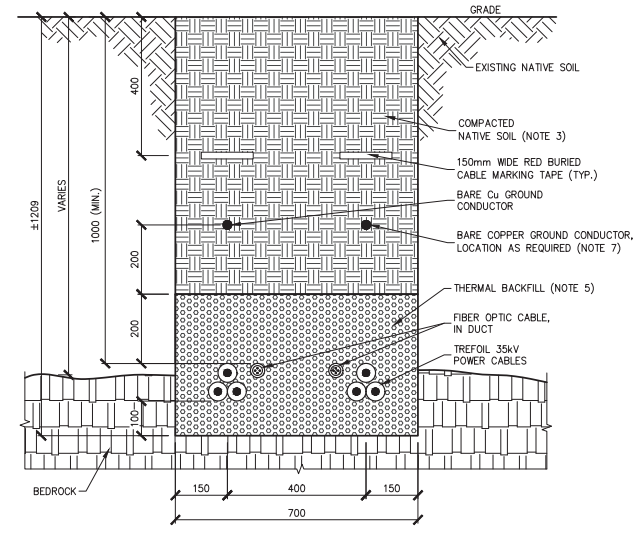

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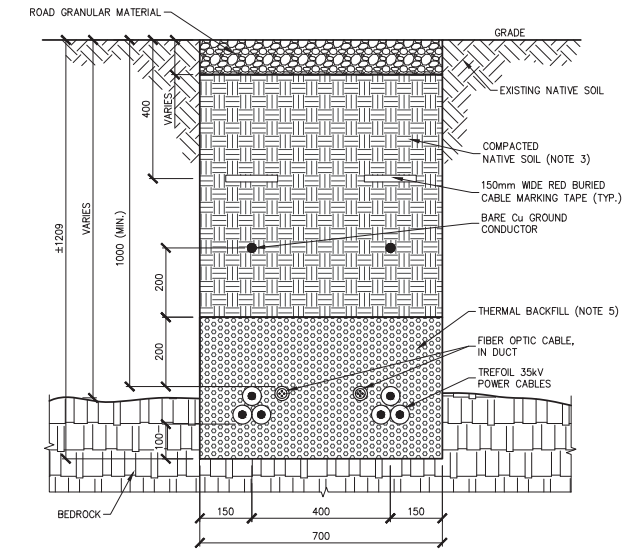

D1 TWO CIRCUIT UNDER ROADWAY TRENCH THROUGH BEDROCK
Scale 1:10

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Notes

1. ALL DIMENSIONS SHOWN ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
2. ALL UNDERGROUND PARALLEL CABLES SHALL BE SEPARATED FROM ALL OTHER EXISTING UTILITIES RUNNING IN PARALLEL BY A MINIMUM OF 1.0m CENTERLINE TO CENTERLINE, UNLESS OTHERWISE INDICATED BY SPECIFIC UTILITY CLEARANCE REQUIREMENTS.
3. SUPPLY, PLACE AND COMPACT NATIVE BACKFILL. NATIVE BACKFILL TO BE FREE OF DEBRIS, SHARP OBJECTS, ORGANIC OR FROZEN MATERIAL AND SCREENED WHERE LARGE PARTICLE SIZE MAY CAUSE DAMAGE TO CABLE. NATIVE BACKFILL TO BE INSTALLED IN LIFTS OF 300mm AND COMPACTED TO 95% SPD.
4. THE PADDING BACKFILL MATERIAL SHALL BE SCREENED NATIVE MATERIAL WITH MAXIMUM PARTICLE SIZE NO LARGER THAN 4.75mm IN DIAMETER. PADDING BACKFILL TO BE INSTALLED IN LIFTS OF 300mm AND COMPACTED TO 95% SPD.
5. THERMAL BACKFILL TO BE IMPORTED SCREENED CRUSHED LIMESTONE WHERE CABLE AMPACITY CONTROL IS REQUIRED WITH NO PARTICLES LARGER THAN 4.75mm. THERMAL RESISTIVITY SHALL NOT EXCEED 1.0°C.m/W IN ITS DRY STATE.
6. INSTALLATION METHODS TO BE IN ACCORDANCE WITH OESC AND MANUFACTURER'S RECOMMENDATIONS TO MAINTAIN TREFOIL CONFIGURATION.
7. FINAL LOCATION AND SIZE OF BARE Cu GROUND CONDUCTOR TO BE CONFIRMED WITH FINAL GROUNDING STUDY.
8. TOPSOIL TO BE SEGREGATED DURING TRENCH EXCAVATION AND RETURNED TO GRADE LEVEL FOLLOWING TRENCH BACKFILL TO ENSURE VEGETATION RE-GROWTH AT CABLE INSTALLATIONS.

Legend

- 35kV POWER CABLE
- FIBER OPTIC CABLE
- Cu GROUND CONDUCTOR
- EXISTING NATIVE SOIL
- COMPACTED NATIVE FILL
- PADDING BACK FILL
- THERMAL BACK FILL

	Revision	By	Appd.	YY.MM.DD
E	ISSUED FOR MUNICIPAL CONSENT	BM	AR	17.07.18
D	ISSUED FOR MUNICIPAL CONSENT	JL	AR	17.07.17
C	ISSUED FOR MUNICIPAL CONSENT	BM	AR	17.05.10
B	ISSUED FOR TENDER	BM	AR	17.01.10
A	INTERNAL REVIEW	JM	JR	16.10.18

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	BM	JR	JM	15.12.07

Permit-Seal

FOR MUNICIPAL CONSENT

Client/Project

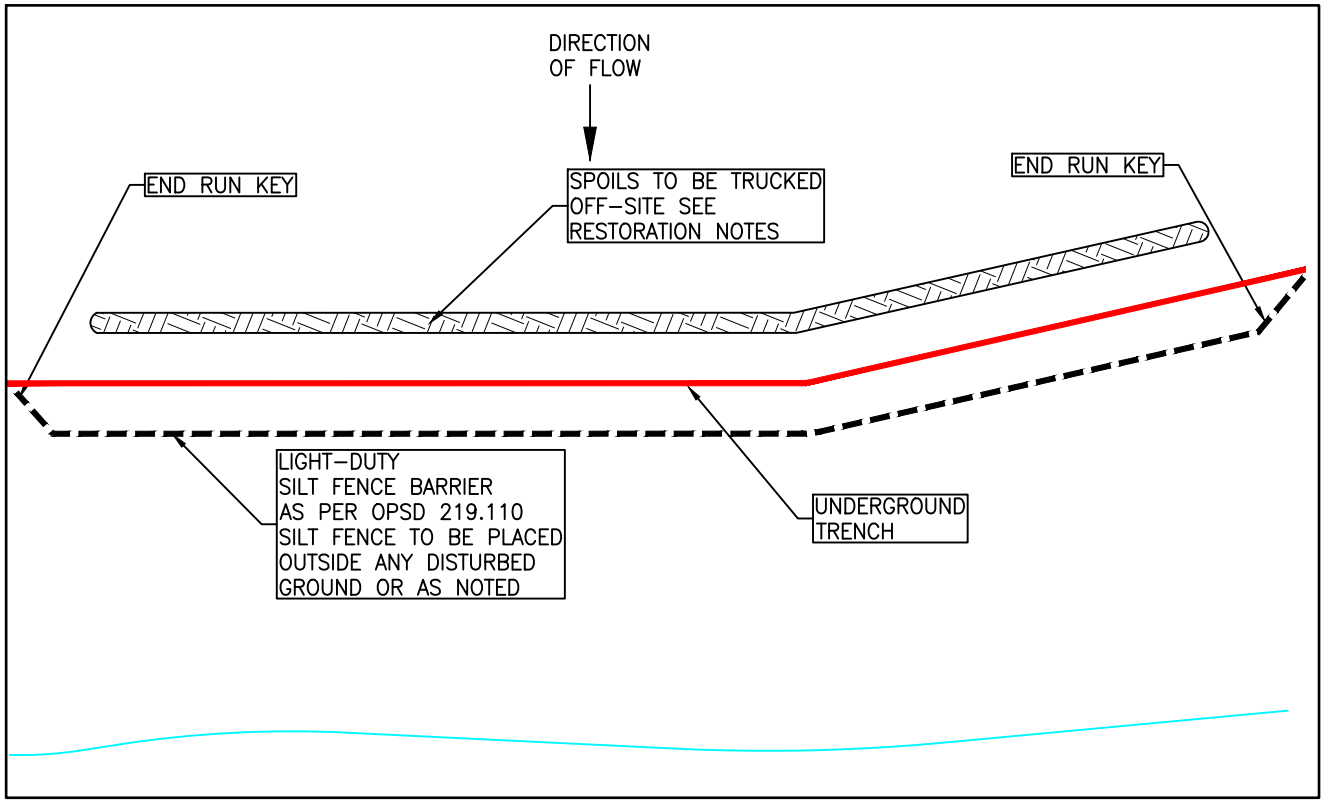
PENNECON HEAVY CIVIL

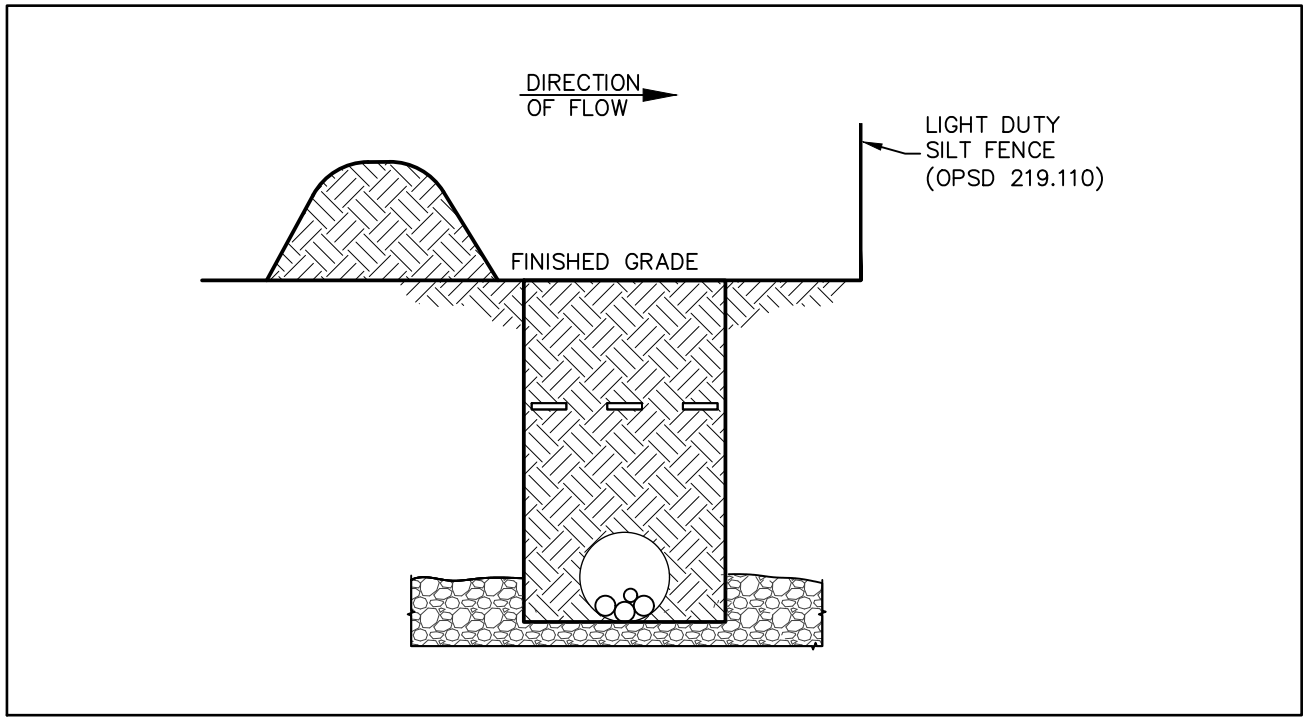
AMHERST ISLAND WIND PROJECT
75MW WIND FARM
Amherst Island, Loyalist Township, Ontario

Title

34.5kV COLLECTOR SYSTEM
CABLE TRENCH DETAILS

Project No.	Scale	
133560104	1:10	
Drawing No.	Sheet	Revision
E406A	1 of 2	E





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July 2017
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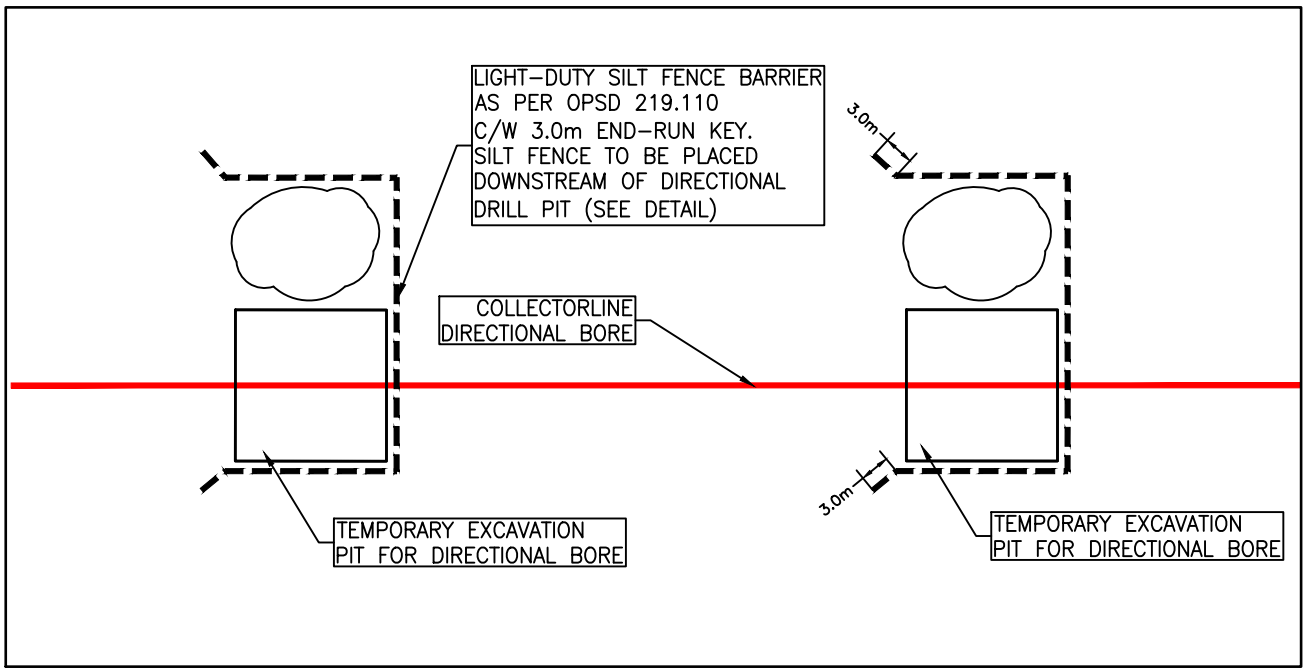
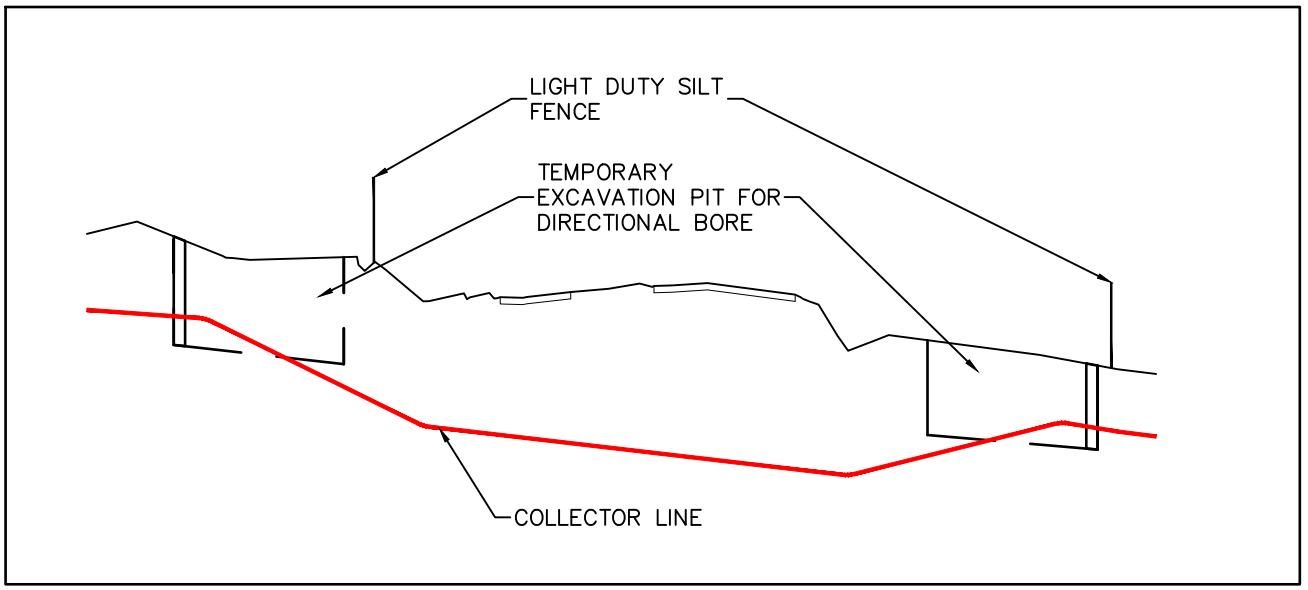
Client/Project
WINDLECTRIC INC.
AMHERST ISLAND WIND ENERGY PROJECT

Figure No.
1

Title
TYPICAL TRENCH WITHIN 30m OF WATERCOURSE EROSION AND SEDIMENT CONTROL PLAN





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Client/Project
WINDLECTRIC INC.
AMHERST ISLAND WIND
ENERGY PROJECT

Figure No.
2

Title
DIRECTIONAL BORE
EROSION AND SEDIMENT CONTROL PLAN