DILLON CONSULTING

LOYALIST SOLAR LP

Water Body Report

Loyalist Solar Project

February 2017 – 16-3674

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1.0 Introduction

Loyalist Solar LP, a limited partnership between the Mohawks of the Bay of Quinte and BluEarth Renewables Inc., (together the "Proponent"), proposes to develop a non-rooftop solar facility with a maximum nameplate capacity of 54 megawatts alternating current ("MW_{AC}"), in the Township of Stone Mills, County of Lennox & Addington, Ontario (**Figure 1**). The renewable energy facility will be known as the Loyalist Solar Project (the "Project").

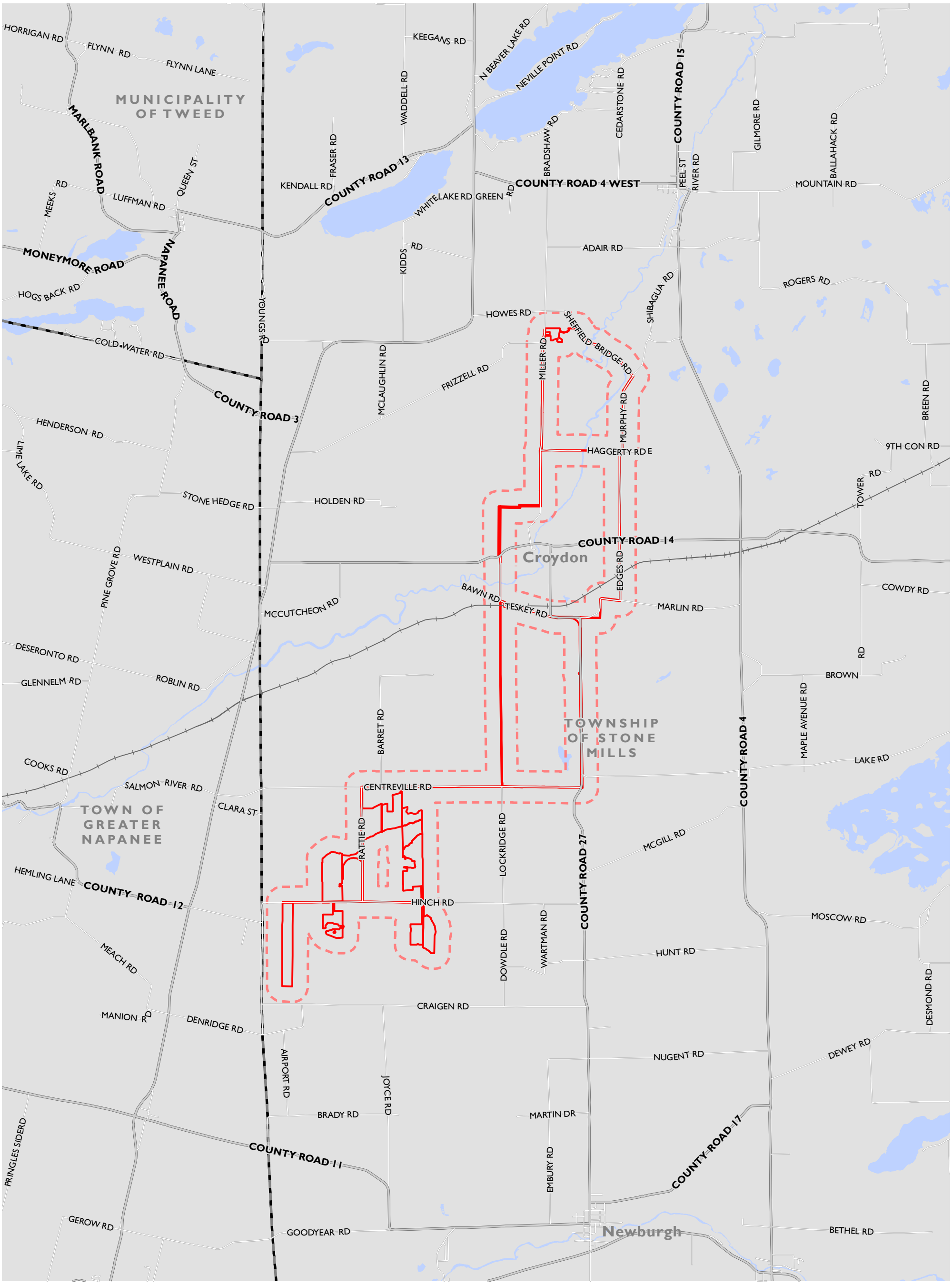
The Proponent submitted a proposal to the Independent Electricity System Operator ("IESO") under the Large Renewable Procurement ("LRP") process and was subsequently awarded a LRP contract by the IESO to generate electricity. The Project will now be subject to a number of approvals including, among others *Ontario Regulation 359/09* – Renewable Energy Approval ("REA") under Part V.0.1 of the Ontario *Environmental Protection Act*.

Ontario Regulation 359/09 requires that all renewable energy projects prepare an Environmental Impact Study (EIS) to address water bodies that have been identified within 120 m of the Project Location (Sections 39 and 40 of the Regulation). This *Water Body Report* was completed to address the regulatory requirements for the REA process and is the second and final report in a series that fulfills the requirements of the water body reporting that is required by *Ontario Regulation 359/09* as detailed in **Table 1**. These reports will be submitted to the Ministry of the Environment and Climate Change ("MOECC") for review and comment, as required in *Ontario Regulation 359/09* and will provide for the protection of water bodies within and adjacent to the Project Location.

Table 1: Checklist for Requirements under *Ontario Regulation 359/09* – Water Body Report

Required Documentation	Location in Report
[1]Prohibitions restricting development in listed significant natural features do not apply if the applicant submits a report that,	
Identifies and assesses any negative environmental effects of the project on a water body and on land within 30 metres of the water body	Section 10, Table 5; Section 11, Table 6
Identifies mitigation measures in respect of any negative environmental effects	Table 5 and Table 6
Describes how the environmental effects monitoring plan set out in paragraph 4 of item 4 of Table 1 (in *Ontario Regulation 359/09*) addresses any negative environmental effects	Section 11, Table 6; Section 12
Describes how the *Construction Plan Report* prepared in accordance with Table 1 (in *Ontario Regulation 359/09*) addresses any negative environmental effects	Section 11, Table 6; Section 13

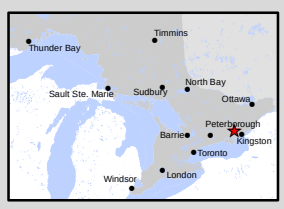
[1] This description has been modified from what is provided in Sections 39 and 40 of *Ontario Regulation 359/09* and outlined in the Technical Guide for Renewable Energy Approvals (MOECC 2013). For a full description, please refer to the regulation.



BluEarth Renewables Inc.
LOYALIST SOLAR LP

General Project Location
FIGURE 1

Railway
Project Location Boundary
Project Location 300 m Setback
Municipal Boundary



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MAP CREATED BY: GM
MAP CHECKED BY: JP
MAP PROJECTION: NAD 1983 UTM Zone 18N

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N W E S

PROJECT: 163674 STATUS: DRAFT DATE: 10/18/2016

FILE LOCATION: I:\GIS\163674 - Loyalist Solar\mxd\PDR\Figure 1 General Project Location.mxd

2.0 The Proponent

The Proponent is coordinating and managing the approvals process for the Project. The contact is:

Full Name of Company:	*Loyalist Solar LP, c/o BluEarth Renewables Inc.*
Prime Contact:	*Tom Bird, Director, Regulatory*
Address:	*34 Harvard Road, Guelph, ON, N1G 4V8*
Telephone:	*1-844-214-2578*
Email:	*projects@bluearth.ca*

Dillon Consulting Limited ("Dillon") has been retained by the Proponent to prepare the REA application for the Project. The contact at Dillon is:

Full Name of Company:	*Dillon Consulting Limited*
Prime Contact:	*Megan Bellamy, Project Manager*
Address:	*235 Yorkland Boulevard, Suite 800, Toronto, ON, M2J 4Y8*
Telephone:	*(416) 229-4646 ext. 2423*
Fax:	*(416) 229-4692*
Email:	*MBellamy@dillon.ca*

3.0 Project Location

The proposed Class 3 Solar Facility is to be located within the Township of Stone Mills, in the County of Lennox & Addington, approximately nine kilometres north of Napanee, Ontario. The proposed Project location consists of approximately 200 hectares (494 acres) and is contained within an area generally bounded on the north by Howes Road, Craigen Road to the south, County Road 27 and Murphy Road to the east, and County Road 41 to the west (described as the Project Location on **Figure 1** and **2**). It has an approximate centroid at the following geographic coordinates:

- Latitude: 44°22'3.382" N
- Longitude: 76°58'19.543" W

Figure 1 shows the general location of the Project in Ontario. **Figure 2** shows the Project Location as defined by *Ontario Regulation 359/09*. The Project Location is defined in *Ontario Regulation 359/09* to be "*a part of land and all or part of any building or structure in, on or over which a person is engaging in or proposes to engage in the Project and any air space in which a person is engaging in or proposes to engage in the Project*". Project components, including solar photovoltaic ("PV") panels and electrical facilities such as inverter stations, transformers, a substation and Project access roads will be located on private land. Some Project components, such as electrical collector lines and the connection line route to the substation will be located in open and un-opened road rights-of-way (ROWs) or on private lands. Locations of Project components on **Figure 2** are to be considered conceptual only and do not represent the final detailed design.

Figure 2 also includes the prescribed 120 m and 300 m setback areas from the Project Location. As per *Ontario Regulation 359/09*, the 120 m setback area was required to be assessed for lakes, permanent and intermittent streams and seepage areas and the 300 m setback area was required to be assessed for Lake Trout lakes. Setback development prohibitions for solar facilities are outlined in Part V, Sections 39 and 40 of *Ontario Regulation 359/09* (last amended May 1, 2016).

For a more comprehensive overview of where Project components are proposed, please refer to the Site Plan – Conceptual Component Layout located in the *Design and Operations Report*.

NAPANEE ROAD
KIDDS RD
HOWES RD
SHIBAGUA RD
COUNTY ROAD 4
YOUNGS RD
SHEFFIELD BRIDGE RD
MCLAUGHLIN RD
FRIZZELL RD
MILLER RD
COUNTY ROAD 3
MURPHY RD
PINE GROVE RD
HAGGERTY RD W
HAGGERTY RD E
STONE HEDGE RD
HOLDEN RD
COUNTY ROAD 41
COUNTY ROAD 14
WESTPLAIN RD
EDGES RD
TESKEY RD
BAWN RD
MARLIN RD
MCCUTCHEON RD
HOMESTEAD RD
TOWNSHIP OF STONE MILLS
ROBLIN RD
TOWN OF GREATER NAPANEE
BARRET RD
COUNTY ROAD 27
CENTREVILLE RD
SALMON RIVER RD
CLARA ST
RATTLE RD
LOCKRIDGE RD
MCGILL RD
HINCH RD
SHARPES CORNERS RD
WARTMAN RD
DOWDLE RD
HUNT RD
CRAIGEN RD

Railway
Fence*
Project Location Boundary
120 m Setback
300 m Setback
Inverter Station*
Access Road*
PV Panel*
Substation*
Parcel Boundary
Municipal Boundary

Note: * indicates the proposed locations for Project components and are subject to change.

Thunder Bay
Timmins
Sault Ste. Marie
Sudbury
North Bay
Ottawa
Peterborough
Barrie
Kingston
Toronto
Windsor
London

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LOYALIST SOLAR LP

PROJECT LOCATION
FIGURE 2

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MAP CREATED BY: GM
MAP CHECKED BY: JP
DATA PROVIDED BY: MNRF
MAP PROJECTION: NAD 1983 UTM Zone 18N

1:40,000
0 0.5 1 2 km

PROJECT: 163674 STATUS: DRAFT DATE: 10/31/2016

FILE LOCATION: I:\GIS\163674 - Loyalist Solar\mxd\Water Body\Figure 2 Project Location.mxd

4.0 Project Summary

As shown on **Figures 3a-3h**, a site investigation was completed according to Section 31 of *Ontario Regulation 359/09*. This work was preceded by a records review as per Section 30 of *Ontario Regulation 359/09*. A summary of the water bodies within the Project Location and surrounding 120 m, as detailed in the previous *Water Assessment Report*, is outlined in **Table 2**.

Table 2: Summary of the Water Assessment

Water Body ID	Does the Project Location overlap the water body?	Is the Project Location within 120 m of the water body?	Minimum Distance to Project Location (m)	EIS required?
Lakes				
Water body 1	No	Yes	105	Yes
Lake Trout Lakes				
None identified within the Project Location or adjacent lands within 300 m				
Permanent and/or Intermittent Streams				
Mud Creek (permanent)	Yes	Yes	Within	Yes
Tributary 2 to Mud Creek (intermittent)	Yes	Yes	Within	Yes
Tributary 2.1 to Mud Creek (permanent)	Yes	Yes	Within	Yes
Salmon River (permanent)	Yes	Yes	Within	Yes
Tributary 1 to Salmon River (intermittent)	Yes	Yes	Within	Yes
Tributary 2 to Salmon River (permanent)	Yes	Yes	Within	Yes
Tributary 2.1 to Salmon River (intermittent)	Yes	Yes	Within	Yes
Tributary 2.2 to Salmon River (intermittent)	Yes	Yes	Within	Yes
Tributary 2.4 to Salmon River (intermittent)	No	Yes	55*	Yes
Tributary 3 to Salmon River (intermittent)	Yes	Yes	Within	Yes
Tributary 3.1 to Salmon River (permanent)	Yes	Yes	Within	Yes
Black Creek (permanent)	Yes	Yes	Within	Yes
Pennell's Creek (permanent)	Yes	Yes	Within	Yes

Water Body ID	Does the Project Location overlap the water body?	Is the Project Location within 120 m of the water body?	Minimum Distance to Project Location (m)	EIS required?
Seepage Areas				
Seep 1	No	Yes	0	Yes
Seep 2	No	Yes	0	Yes
Seep 3	No	Yes	0	Yes
Seep 4	No	Yes	119	Yes
Seep 5	No	Yes	26	Yes

**Distance calculated based on an interpretation of aerial photography*

NAPANEE ROAD
COUNTY ROAD 3
PINE GROVE RD
YOUNGS RD
KIDDS RD
MCLAUGHLIN RD
FRIZZELL RD
HOWES RD
SHEFFIELD BRIDGE RD
SHIBAGUA RD
COUNTY ROAD 4
MILLER RD
MURPHY RD
HAGGERTY RD W
HAGGERTY RD E
3h
STONE HEDGE RD
HOLDEN RD
COUNTY ROAD 41
COUNTY ROAD 14
3f
3g
TESKEY RD
Seep 1
Seep 2
Seep 3
MARLIN RD
WESTPLAIN RD
MCCUTCHEON RD
HOMESTEAD RD
TOWNSHIP OF STONE MILLS
ROBLIN RD
TOWN OF GREATER NAPANEE
3c
BARRET RD
3d
COUNTY ROAD 27
3e
CENTREVILLE RD
SALMON RIVER RD
CLARA ST
Seep 5
RATTIE RD
LOCKRIDGE RD
MCGILL RD
Seep 4
HINCH RD
SHARPES CORNERS RD
3a
3b
DOWDLE RD
WARTMAN RD
HUNT RD
CRAIGEN RD

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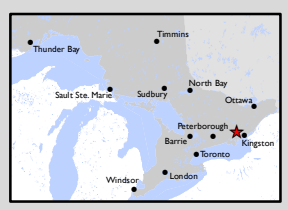
WATER ASSESSMENT SITE INVESTIGATION
FIGURE 3

Seep
Railway
Project Location Boundary
120 m Setback
300 m Setback
Municipal Boundary
Parcel Boundary
Water Body



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PROJECT: 163674 STATUS: DRAFT DATE: 10/25/2016

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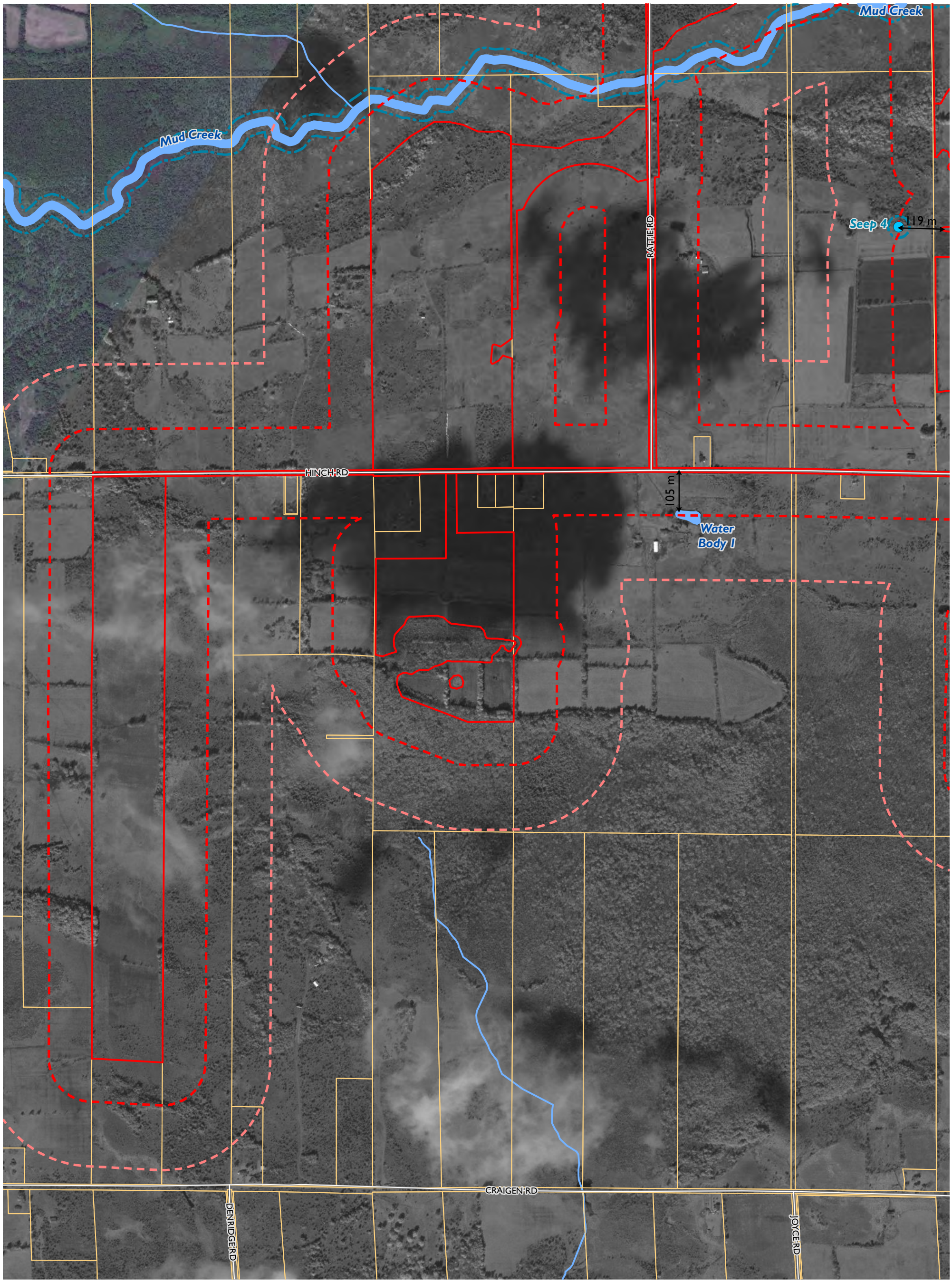

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Water Assessment Site Investigation

FIGURE 3a

- Seep
- Project Location Boundary
- 120 m Setback
- 300 m Setback
- Parcel
- Water Body
- 30 m Setback

3h; 3f 3g; 3c 3d 3e; 3a 3b

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MAP CREATED BY: GM
MAP CHECKED BY: JP
MAP PROJECTION: NAD 1983 UTM Zone 18N

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PROJECT: 163674 STATUS: DRAFT DATE: 10/25/2016

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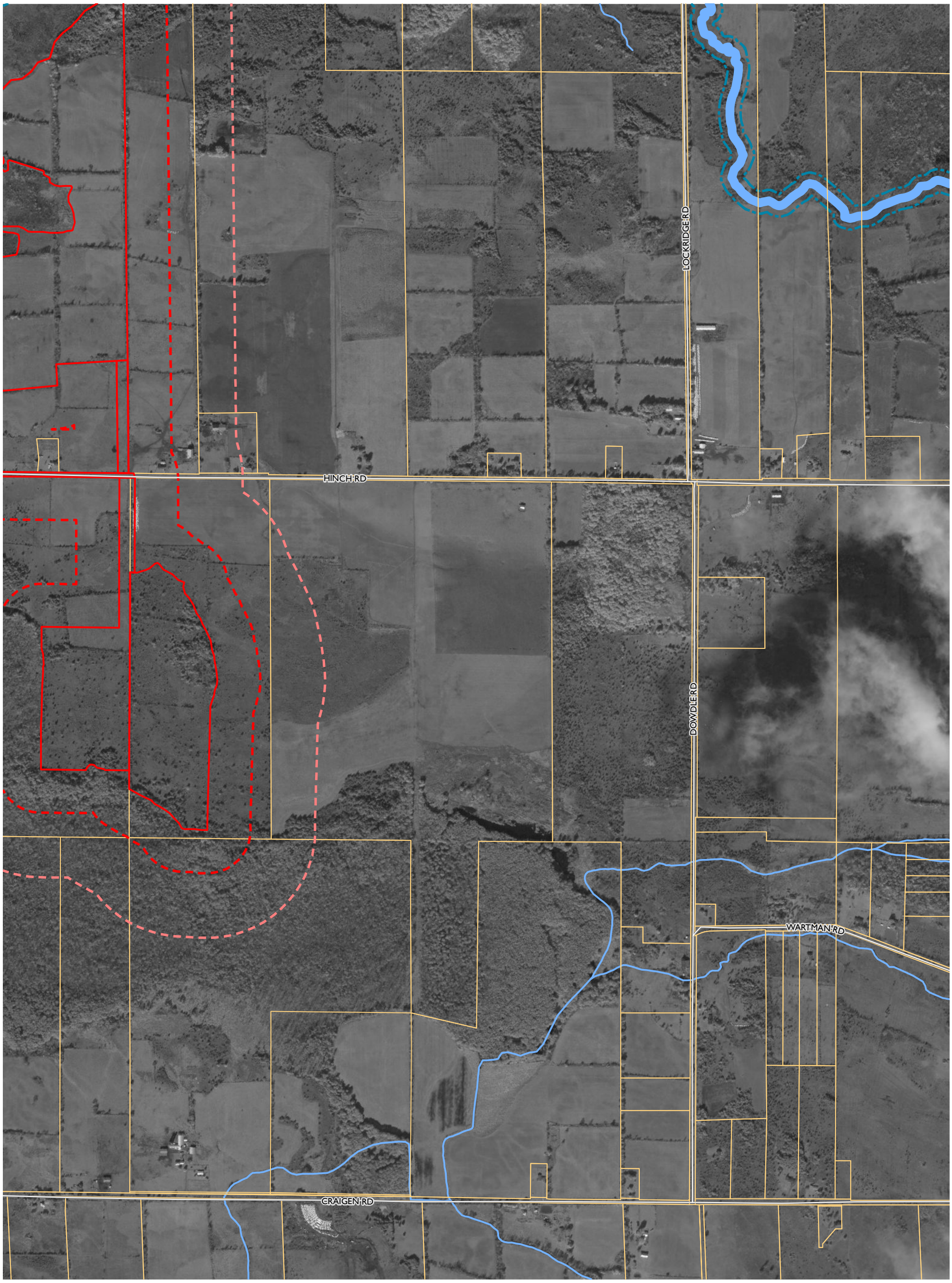
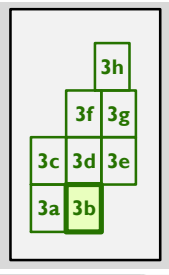


LOYALIST SOLAR PROJECT
LOYALIST SOLAR LP

Water Assessment
Site Investigation
FIGURE 3b

Seep
Project Location Boundary
120 m Setback
300 m Setback
Parcel
Water Body
30 m Setback



DILLON CONSULTING

MAP CREATED BY: GM
MAP CHECKED BY: JP
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PROJECT: 163674 STATUS: DRAFT DATE: 10/25/2016

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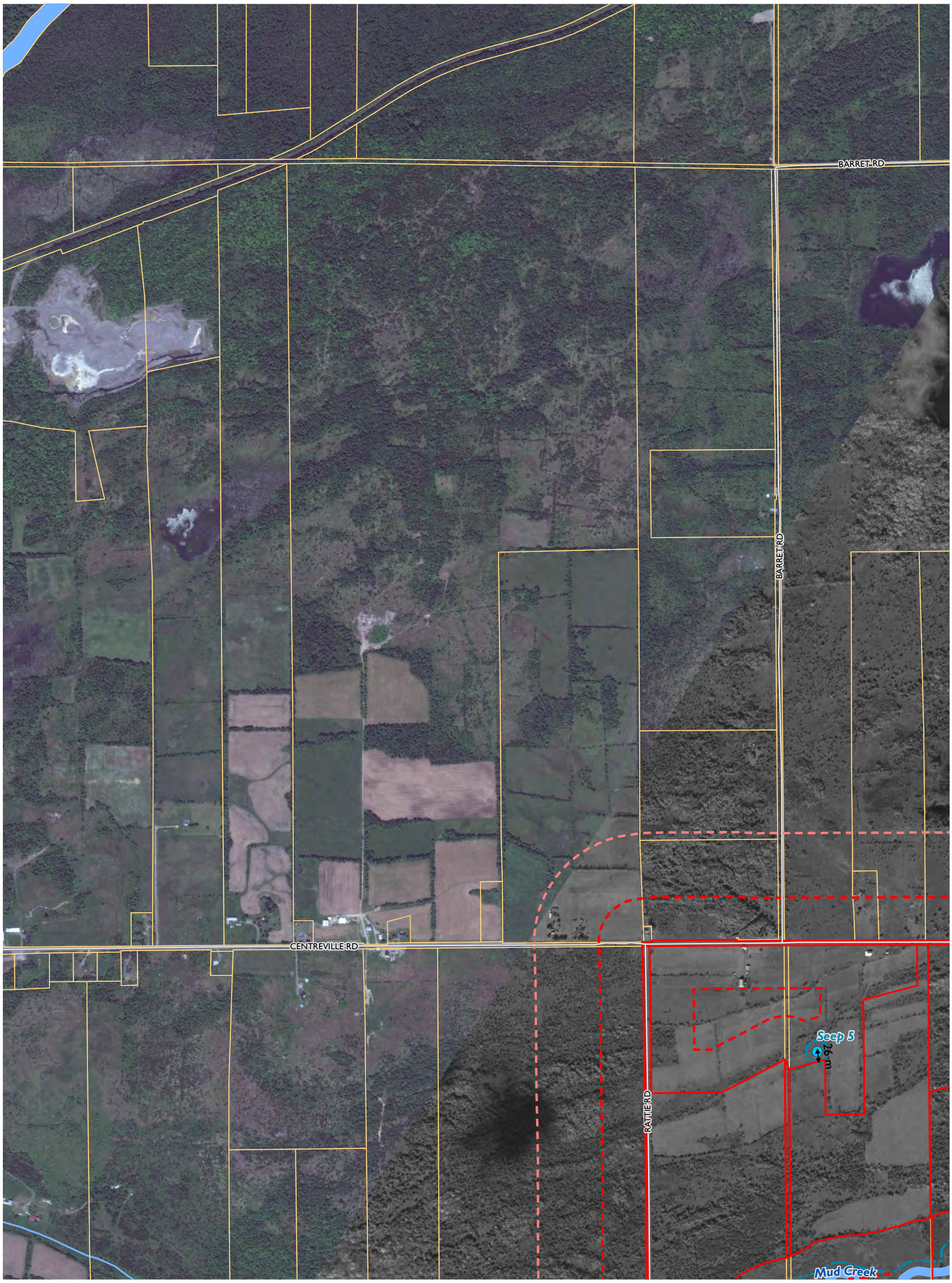

LOYALIST SOLAR PROJECT
LOYALIST SOLAR LP

Water Assessment
Site Investigation
FIGURE 3c

- Seep
- Project Location Boundary
- 120 m Setback
- 300 m Setback
- Parcel
- Water Body
- 30 m Setback

3h
3f 3g
3c 3d 3e
3a 3b

DILLON CONSULTING

MAP CREATED BY: GM
MAP CHECKED BY: JP
MAP PROJECTION: NAD 1983 UTM Zone 18N

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PROJECT: 163674 STATUS: DRAFT DATE: 10/25/2016

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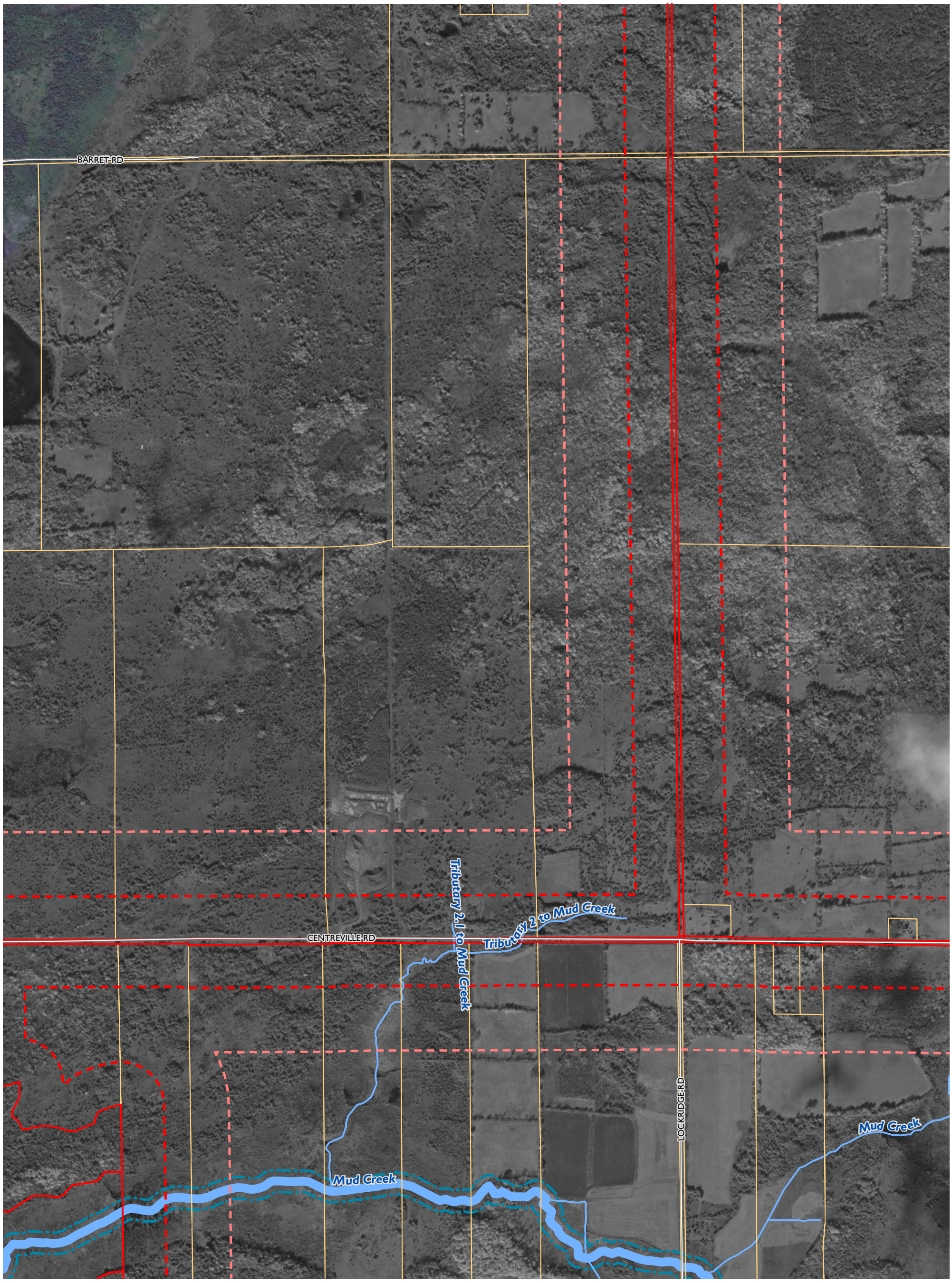

LOYALIST SOLAR PROJECT
LOYALIST SOLAR LP

Water Assessment
Site Investigation
FIGURE 3d

- Seep
- Project Location Boundary
- 120 m Setback
- 300 m Setback
- Parcel
- Water Body
- 30 m Setback

3h
3f 3g
3c 3d 3e
3a 3b

DILLON CONSULTING

MAP CREATED BY: GM
MAP CHECKED BY: JP
MAP PROJECTION: NAD 1983 UTM Zone 18N

1:10,000
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PROJECT: 163674 STATUS: DRAFT DATE: 10/25/2016

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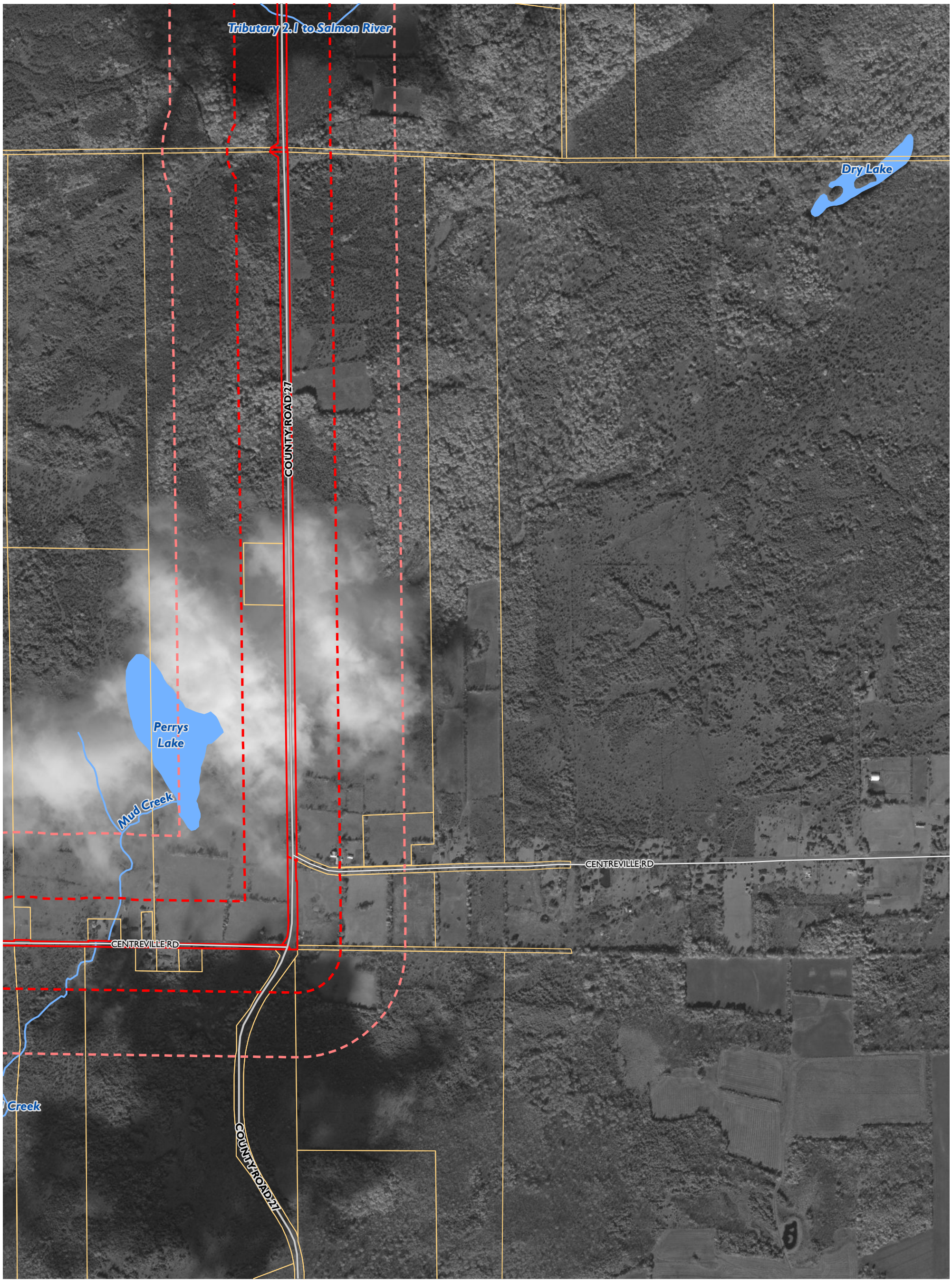

LOYALIST SOLAR PROJECT

LOYALIST SOLAR LP

Water Assessment
Site Investigation

FIGURE 3e

- Seep
- Project Location Boundary
- 120 m Setback
- 300 m Setback
- Parcel
- Water Body
- 30 m Setback

3h
3f 3g
3c 3d 3e
3a 3b

DILLON CONSULTING

MAP CREATED BY: GM
MAP CHECKED BY: JP
MAP PROJECTION: NAD 1983 UTM Zone 18N

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PROJECT: 163674 STATUS: DRAFT DATE: 10/25/2016

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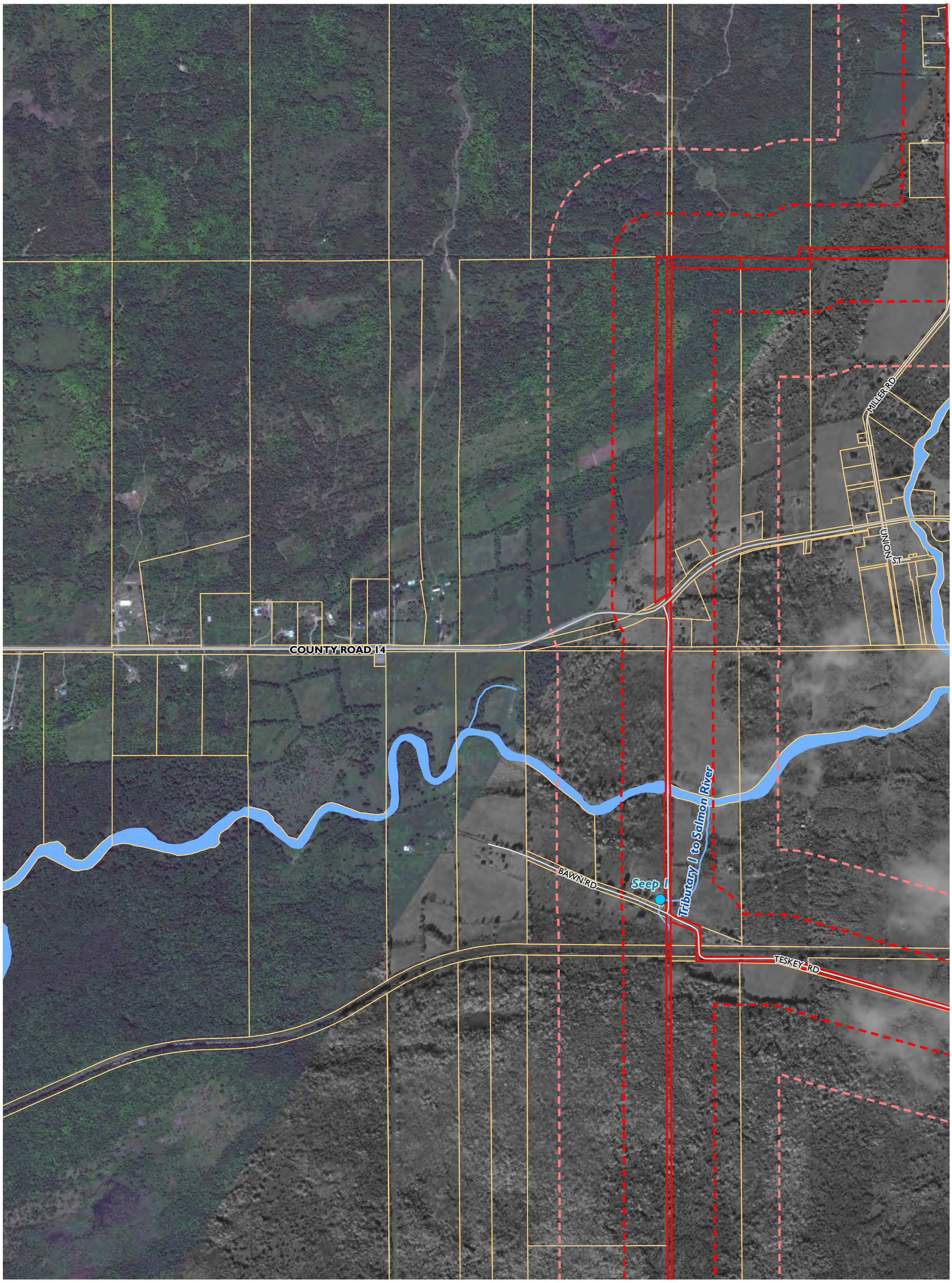
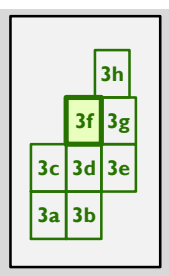


LOYALIST SOLAR PROJECT
LOYALIST SOLAR LP

Water Assessment
Site Investigation
FIGURE 3f

- Seep
- Project Location Boundary
- 120 m Setback
- 300 m Setback
- Parcel
- Water Body
- 30 m Setback



DILLON CONSULTING

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PROJECT: 163674 STATUS: DRAFT DATE: 10/25/2016

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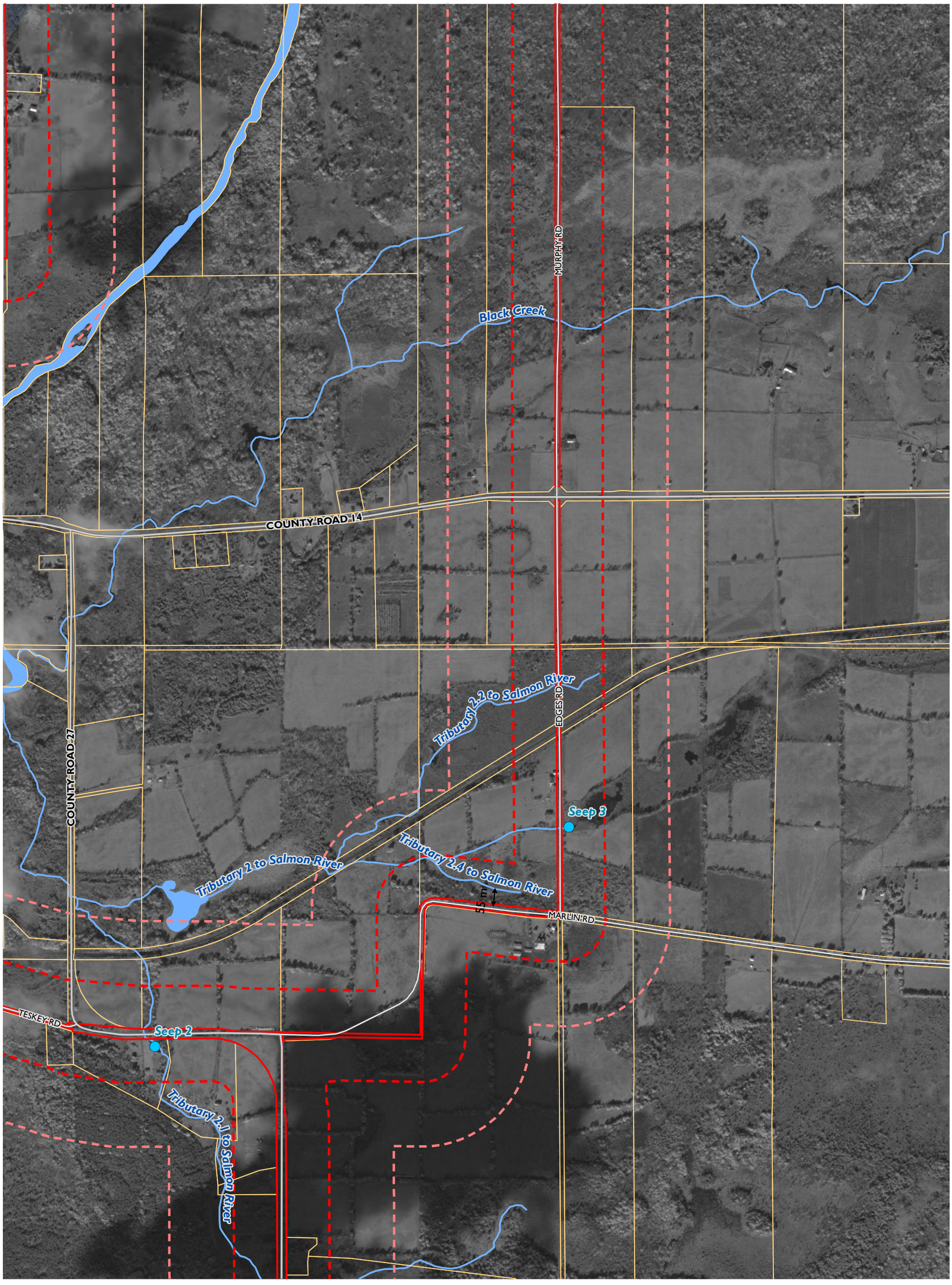


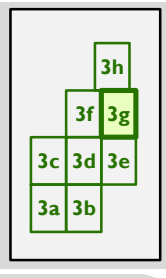
LOYALIST SOLAR PROJECT

LOYALIST SOLAR LP

Water Assessment
Site Investigation

FIGURE 3g

- Seep
- Project Location Boundary
- 120 m Setback
- 300 m Setback
- Parcel
- Water Body
- 30 m Setback



DILLON CONSULTING

MAP CREATED BY: GM
MAP CHECKED BY: JP
MAP PROJECTION: NAD 1983 UTM Zone 18N

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0 50 100 200 m

PROJECT: 163674 STATUS: DRAFT DATE: 10/25/2016

FILE LOCATION: I:\GIS\163674 - Loyalist Solar\mxd\Water Body\Figure 3 Site Investigation.mxd

HOWES RD
SHEFFIELD BRIDGE RD
SHIBAGUA RD
Shibagau Creek
FRIZZELL RD
LOT
Pennells Creek
MILLER RD
Salmon River
MURPHY RD
Tributary 3 to Salmon River
Tributary 3.1 to the Salmon River
HAGGERTY RD W
HAGGERTY RD E

LOYALIST SOLAR PROJECT
LOYALIST SOLAR LP

Water Assessment
Site Investigation
FIGURE 3h

- Seep
- Project Location Boundary
- 120 m Setback
- 300 m Setback
- Parcel
- Water Body
- 30 m Setback

3h
3f 3g
3c 3d 3e
3a 3b

DILLON CONSULTING

MAP CREATED BY: GM
MAP CHECKED BY: JP
MAP PROJECTION: NAD 1983 UTM Zone 18N

1:10,000
0 50 100 200 m

PROJECT: 163674 STATUS: DRAFT DATE: 10/25/2016

FILE LOCATION: I:\GIS\163674 - Loyalist Solar\mxd\Water Body\Figure 3 Site Investigation.mxd

5.0 Environmental Impact Study Purpose

This *Water Body Report* was completed so that Subsection (1) of both Section 39 and Section 40 (*Ontario Regulation 359/09*), which prohibits construction and development of a renewable energy facility within 30 and 120 m, respectively, of the average annual high water mark of a water body, does not apply. By completing a *Water Body Report* in accordance with guidelines established by the MOECC (2013), Project components may be constructed and installed within 120 m of a water body, with the exception that no PV panels or substation transformer can be within 30 m of a water body. This report is consistent with Sections 39 and 40 of *Ontario Regulation 359/09*, which details that a *Water Body Report* must include the following:

- Identification and assessment of any negative environmental effects of the Project on a water body and on land within 30 m of the water body.
- Identification of mitigation measures in respect of any negative environmental effects.
- Description of how the environmental effects monitoring plan in the *Design and Operations Report* addresses any negative environmental effects.
- Description of how the *Construction Plan Report* addresses any negative environmental effects.

The focus of this *Water Body Report* will be to fulfill the requirements of Sections 39 and 40 for the water bodies identified in **Table 2** that meet the definition of "water body" under *Ontario Regulation 359/09* and are within 120 m of the Project Location.

6.0 Rationale for Development within a Water Body or Setback

The location of the Project has been subject to numerous field investigations, and a thorough review of constraints to development was undertaken prior to delineating the Project Location. Based on the water body information collected, the Project Location was refined to avoid impacts to sensitive natural heritage features, where possible. The layout of the Project has been developed to prioritize the protection of sensitive features and minimize environmental effects.

7.0 Access to Adjacent Lands

As outlined in *Ontario Regulation 359/09*, all lands within 120 m of a project component must be assessed by conducting a site investigation of potential water bodies. Often, this can be difficult to achieve when the 120 m setback area is located outside of lands leased for the solar facility. For the Project, some areas of lands near the Project Location were not accessible because permission to access the properties was not granted by the landowners or health and safety considerations prevented the direct assessment of a water body. Water bodies located on adjacent lands where access was not available or safe were assessed from property lines and road rights-of-way, where applicable. This alternative site investigation was conducted in accordance with *Ontario Regulation 359/09.* For more information, please refer to the *Water Assessment Report.*

8.0 Project Activities

The following subsections outline the Project activities during the construction, operations and decommissioning phases. **Table 3** outlines the construction schedule and expected operational date for this Project. It is expected that the Project will remain operational for a period of at least 20 years. However, it is possible that the Project would remain operational for longer period of time due to the lifecycle of facility components along with repowering of the generating equipment and/or receiving a subsequent form of power purchase agreement.

Table 3: Anticipated Duration of Construction Activities

Construction Activity	Estimated Timing
Site Preparation	Q4/2017-Q2/2018
Installation of solar components (structural supports, racking, modules, collection system)	Q1/2018-Q3/2018
Installation of substation and Operations & Maintenance building	Q1/2018-Q4/2018
Commissioning, site clean-up and restoration	Q4/2018

8.1 Construction

It is anticipated that construction would last approximately 10 to 12 months. Pending receipt of all necessary approvals and permits, construction is tentatively scheduled to begin in fall 2017. The sections below provide general descriptions for the various phases of construction for the Project. This information has been summarized from the Project *Construction Plan Report.* Additional details are provided in the *Construction Plan Report.*

Construction activities will be conducted by licensed contractors in accordance with required standards and codes and all activities will abide by local laws and requirements. Construction-related activities will be conducted within the Project Location boundary outlined in **Figure 2**. Testing and commissioning of the facility will occur over the last few weeks of construction. During construction, if hazardous materials, including fuel, oils or grease will be stored on site, these materials will be stored away from sensitive features and secondary containment used. Disposal of hazardous wastes will only be required in the case of accidental spills and will follow the procedures outlined in the Spills Response Plan. Decisions on waste disposal or recycling during, and immediately after, construction will be made by the on-site contractor who will refer to the *Environmental Protection Act*.

8.1.1 Surveying of Project Location

Prior to the construction phase, the site will be surveyed and staked to delineate the Project Location boundary. The survey will identify the location of underground utilities and/or infrastructure as well as the location of Project infrastructure.

Significant or provincially significant environmental features and their applicable setbacks (e.g., water bodies, significant wildlife habitat, etc.) will also be clearly demarcated by the Proponent or their construction contractor. Areas to be avoided will be fenced and/or flagged, as appropriate.

8.1.2 Clearing, Levelling, Compacting and Grading

Clearing activities will take place prior to the start of other major construction works and will consist of vegetation removal, grubbing and large surface rock removal. Following any clearing activities, and as necessary, the Project Location will be graded to facilitate construction activities. As noted in **Table 3**, graders, bulldozers, scrapers, soil compactors, dump trucks, wheel loaders and backhoes, among other equipment, will be used to generally prepare the site. Appropriate grading techniques will be used to prevent increased runoff potential and maintain desired drainage patterns.

Major excavation works or fill placement are not expected for the Project. The primary excavation work is likely to be limited to grading and soil removal and/or replacement for various foundations, access roads, and trenches for underground electrical cables. Topsoil removed for the construction of permanent access roads will be distributed across the Project Location. Excess topsoil may be used to infill low-lying areas, if appropriate. Any temporarily stockpiled topsoil will be stored and will be covered to minimize erosion from wind and precipitation.

8.1.3 Drainage and Erosion Control

An Erosion and Sediment Control ("ESC") plan will be implemented during construction to avoid sedimentation and other deleterious substances from being conveyed to the surrounding landscape. Routine inspections of the ESC installations will be conducted during construction to ensure they remain effective.

While a detailed ESC plan cannot be completed until the final site grading plan, the phasing of construction, and construction methodology have all been confirmed, the following measures will be considered when developing the ESC plan. These measures will then be included/ linked to the Stormwater Management Plan, as appropriate:

- Identifying and protecting all trees and plants not shown for removal that are contained within the construction area.
- Installing silt fences and other necessary erosion control measures prior to commencing construction activities.
- Phasing construction, where possible, to limit areas with exposed soils, and limit duration of soil exposure.
- Implementing proper dewatering techniques to ensure the water within the site is properly managed.

- Using appropriate grading techniques to prevent increased run-off potential and maintain pre-construction drainage patterns.
- Using sedimentation basins or sediment traps to treat relatively large drainage areas.
- Implementing temporary water passage techniques (if required) for proposed in-water works with appropriate approvals confirmed prior to construction.
- Re-vegetation of disturbed areas after construction has been completed (either through natural re-growth or planting, as necessary, where appropriate).

8.1.4 Installation of Perimeter Fence and Security Lighting

For the safety of the public and wildlife, and for security purposes, a perimeter fence will be installed. This will be a chain link fence of standard height (approximately 1.8 m) that will be installed around those areas of the Project Location where PV panels, inverter station sand the substation are located. The fencing is a requirement of the Electrical Safety Authority ("ESA") and will be built to required specifications. Gated entrances will be installed at the site entrances off of Hinch Road, Centreville Road, Rattie Road, and Miller Road. Temporary entrances may be in place during construction.

The perimeter fencing is to have contact with the ground surface to prevent entry of wildlife. Where is not feasible for the fence to contact the ground, other measures will be installed to prevent wildlife access under the fence. During the construction phase, in areas appropriate to protect turtle hatchlings, the spacing in the chain link should be of sufficient size to prevent entry from the ground surface to a height of approximately 0.5 m.

During construction, the site will be monitored by the supervising construction staff. For security and maintenance purposes, lights will be installed near the substation and site entrances to the facility and task-specific lights will be installed where necessary.

8.1.5 Construction of Access Roads

A series of internal gravel access roads will be needed for construction vehicles and equipment transport. They will also provide long-term access to the site for on-going maintenance and will allow a service vehicle to access each inverter station directly. The main entrances to the solar facility will be located off Hinch Road, Centreville Road, Rattie Road, and Miller Road.

Row to row rack spacing will be sufficient such that service vehicles can access modules and wiring for maintenance. The location of the internal access roads and their nature may change during construction, but it is expected that the majority will remain as permanent roads during operations to provide access for maintenance vehicles.

The depth of the roadbed will be constructed as required to transport loads associated with the construction and on-going operation and maintenance needs of the Project. Geo-grid and geotextile fabric may be used, as needed, to improve the structural integrity of the road base and to preserve the granular. As necessary, culverts will be installed beneath the access roads to provide greater stability and at locations where conveyance of surface water drainage is required.

8.1.6 Installation of Water Crossings for Access Roads

It is not anticipated that the design of the Project will require the installation of new water crossings for access roads. Where the Project Location has been determined to occur "within" a water body, this relates to a crossing location where a collector line or connection line is proposed. Where these locations occur, the existing municipal road right-of-way will be used. Upgrades to culvert crossings on municipal roads are not anticipated. Should new or upgraded water crossings be required, permitting or approvals that may be required for work within or adjacent to water bodies will be obtained.

8.1.7 Temporary Storage, Construction Areas and Installation of Temporary Facilities

Temporary laydown and construction staging areas will be located within the Project Location boundary as shown on **Figure 2.** During the construction phase, any part of the Project Location may be used as temporary storage, which will be dependent upon how construction will be staged. Areas will be designated for the use of the construction office trailers, portable washrooms, first aid stations, vehicle parking, construction equipment parking, storage sheds, truck unloading/loading, waste disposal pick-up areas, and equipment and material laydown, among other uses.

After site grading is completed (discussed above), a layer of granular material will be installed to provide an adequate base for construction vehicles, heavy equipment, and material laydown. Temporary facilities will be removed when the construction period is finished, however, as discussed in **Section 5.3**, a portion of the construction laydown area(s) may be maintained after construction for operational and maintenance purposes.

8.1.8 Construction of Foundations

Engineered foundations will be constructed for the solar PV racking systems, inverter stations, substation components, and the Operations & Maintenance building (if located within the Project Location). The substation area and up to 34 inverter stations will be prepared and/or excavated as needed and foundations for the equipment that will be installed. The soil conditions are such that several foundation types may be installed, including:

- Concrete pre-cast pads which are transported to the site by truck and subsequently put into position with a crane.
- Concrete cast-in-place pads constructed on-site by pouring ready-mix concrete into forms. A mixer truck would deliver ready-mix concrete to the site and pour it into forms.

Ground screws, plate-mounted steel beams, or round steel posts which would be either installed using a vibratory pile hammer, driven (screwed) into the ground, or rock drilled and grouted into place. The final foundation selection(s) will occur during the Project's detailed design stage.

8.1.9 Installation of Supports, Racking and PV Modules

Approximately 190,000 to 290,000 PV panels of 320 (or higher) watts (DC) each will be installed for the Project. The PV panels are anticipated to be arranged in lines and strings in parallel. The PV panels will be mounted to a racking system that is aligned in rows approximately 5 to 12 m apart, and will use racking structures that are either fixed in place or track the movement of the sun. Each of the racking structures will be constructed on a support, and will undergo final assembly on site. The final racking and support selection will occur during the Project's detailed design stage, including the exact method of installation, and number of supports and racks required. Additional detail is provided in the *Design and Operations Report*.

8.1.10 Installation of Collector Line and Inverter Stations

Collection lines within the generation portion of the site will either installed above ground on poles and/or placed in excavated trenches. It is anticipated that the majority of electrical collector lines installed in road rights-of-way will be located above ground on poles, anticipated to be between 60 and 70 feet tall. Poles will be equipped with mounting structures and electrical insulators and ancillary equipment such as grounding wire, communications cables, and others as necessary. Some sections of ROWs may require vegetation clearing. Where lines are buried, the lines will be placed on a sand-bedding or similar material and capped with marking tape to serve as a warning for future excavators, as per ESA requirements.

Inverter stations will require support foundations. The type and depth of foundation will vary depending upon geotechnical characteristics of the subsurface area at each location. Typically, inverter station foundations are either pre-cast concrete pads which are transported on site or cast-in-place concrete pads.

8.1.11 Installation of Connection Line System

The connection line will be constructed to connect the Project to the Project substation located adjacent to the existing HONI 230 kV line, as shown in **Figure 2**. This figure depicts four connection line options to connect the Project to the substation. A final route will be selected based upon consultation with the public, HONI, the IESO, and other regulatory agencies. The connection line options have been routed to minimize or avoid sensitive environmental features.

Dependent on the preferred connection line route, it is anticipated that the connection line will be mostly overhead and be located within municipal road ROWs. Poles are anticipated to be between 65 and 80 feet tall and be equipped with mounting structures and electrical insulators and ancillary equipment such as grounding wire, communications cables, and others as necessary. Above ground poles will be supported by anchored guy wires where necessary. Some sections of the ROWs way may require clearing, while other sections may lend themselves to underground installation to avoid impacts to sensitive natural features. The specifications (pole height, material, anchor locations) and construction method will be finalized at the Project's detailed design stage.

Should engineering constraints identify the need for underground installation of either electrical collector or connection line systems due to the potential to negatively affect sensitive environmental features, a directional boring (i.e., horizontal directional drilling (HDD)) construction method may be used. This is a trenchless method of installing piping or cabling that uses a drill rig to bore along a predetermined path below the surface. The creation of temporary jack and bore pits may be required for this operation. The detailed design phase of the Project will determine if this type of installation would be required.

8.1.12 Communications & SCADA

A communications tower and SCADA system including fibre-optic cabling will be constructed to allow for remote communication and transfer of Project operational data (including fibre-optic cable runs). The SCADA system will be housed inside a Control building to be located in the substation area.

Both the communications tower and Control building will be constructed on an appropriate foundation to be determined during detailed design.

8.1.13 Substation

The Project substation will be located within leased lands on private property northeast of the intersection of Miller Road and Frizzell Road, adjacent to the HONI corridor. While the exact make and model of the substation is in the process of being determined, it will be sized appropriately for a 54 MW_{AC} facility. The foundation for the substation will be determined during detailed design and will be compliant with MOECC spill containment requirements.

8.1.14 Operations & Maintenance Building

An Operations and Maintenance building may be constructed within the Project Location. The exact location of this building, if required, will be determined during detailed design, but is anticipated to be east of Rattie Road and north of Hinch Road. The building is anticipated to be pre-fabricated, and will be placed on a concrete foundation.

8.1.15 Remediation and Clean-up of Work Areas

After all major construction activities are completed, and the Project has been commissioned, work areas will be rehabilitated as needed. Construction-related waste and excess materials brought to the site will be removed and reused, recycled, or disposed of in accordance with provincial guidelines.

8.1.16 Site Landscaping and Vegetation

Site restoration and reclamation is planned for the Project Location where necessary, including along access roads. The restoration and reclamation strategy may include re-contouring of the land to suitable drainage patterns (in accordance with the Stormwater Management Plan), management and replacement of subsoil (if applicable), and topsoil and re-vegetation. Disturbed areas may be seeded or allowed to re-vegetate naturally as needed, to help stabilize soil conditions, enhance soil structure,

and/or increase soil fertility. In some locations, vegetation will be retained or planted to provide visual screening from neighbouring properties.

8.1.17 Testing and Commissioning

Prior to connection to the IESO transmission grid, components will be tested to ensure safe and proper operation.

8.2 Operations and Maintenance

The following activities, outlined in **Table 4**, are associated with the operation and maintenance of the solar facility. It will operate year round and generate electricity during daylight hours only. The amount of daily power generated will depend on the available resource. The Project will be monitored and managed remotely; therefore, minimal on-site activity is required.

This information has been summarized from the Project *Design and Operations Report.* For additional details, please refer to that report.

Table 4: Operations and Maintenance Activities

Activity	Description
Monitoring and meter calibrations	The solar facility will be monitored remotely twenty-four hours a day to ensure proper power output and to alert the operations staff to potential issues. Most issues can be remotely diagnosed so that staff can be dispatched to the solar facility to correct any problems.
Routine periodic maintenance and inspection of Project components	Regularly scheduled site visits will occur to inspect the solar facility to ensure all equipment is in proper working order. Activities that will occur during these visits may include data collection, regular maintenance (as described below) and any necessary minor repairs such as replacement of weathered electrical components. Facility security measures (fencing, locks) will also be checked. Transformers, inverters, PV panels, racking and above ground cabling will be inspected during scheduled visits.
Access road maintenance	Routine inspections of access roads may indicate the need for the addition of granular material and/or minor levelling and grading activities. The work is normally accomplished by small-scale equipment such as a skid steer.
Lighting	For security and maintenance purposes, lighting may be installed near the entrances of the solar facility and task-specific lights will be provided as necessary. These will be appropriately shielded or directed to avoid impacts to neighbours and will be inspected for burned/broken bulbs. Perimeter lighting is not anticipated.
Cleaning of PV panels	Rain fall is generally sufficient for cleaning the solar PV panels; however, depending on the quantity and frequency of rain at the Project location, the modules may require periodic cleaning. If required, water trucks may be utilized to bring water to the site. It is not anticipated that chemical detergents will be used to clean PV panels. During the winter, maintenance and operations crews may be dispatched to the site to remove snow from the PV panels using mechanical means (e.g., blowers affixed to mobile equipment).

Activity	Description
Periodic landscape maintenance	Vegetation may be planted once construction activities are complete. It will be necessary to maintain the land in such a way that vegetation does not shade or in other ways impact the PV panels. Regular scheduled maintenance will also occur to manage weed growth as required. Other than in limited targeted applications, it is not anticipated that herbicides will be used to manage vegetation. In most cases, vegetation will be managed by mechanical means.
Major maintenance	Unforeseen, large repairs are not anticipated. Should major maintenance or equipment replacement be required it will be performed using existing roads and site access points.
Third party inspections and testing	Activities will be carried out as required by the local utility and other governing bodies in addition to any regularly scheduled inspections and testing.
Traffic	No major deliveries are anticipated for maintenance. Minimal vehicle traffic is associated with regular maintenance.
Drainage and erosion control	Water drainage from the Project Location will be managed as per a Stormwater Management Plan to be developed at the detailed design stage prior to the start of construction. This will be done with consideration to maintaining pre-construction drainage patterns and fulfilling the recommendations outlined in the *Natural Heritage Assessment* or *Water Reports*.
Waste	The operation of the system does not produce any appreciable waste. All debris as a result of maintenance or cleaning will be removed from the site immediately by the operator. An exception is sewage disposal from the washrooms and kitchen facilities (if an Operations and Maintenance building is located on site), which would be directed to a septic tank, holding tank, or held in portable toilets designed to building code requirements.

During the operation phase, no hazardous materials will be stored on-site with the exception of oil for transformers and small quantities required for facility maintenance. Transformer oil will be adequately contained and accompanied by a Spills Response Plan, which will be developed prior to the start of construction.

8.3 Decommissioning

Through the decommissioning phase of the Project, the site will be returned to a state similar to its pre-construction condition. The installed components will be removed and reused/recycled, where possible.. Any remaining materials will be removed and disposed of off-site at an appropriate location.

The following activities are associated with the decommissioning of the solar facility. These activities will take place approximately 20 years after commissioning, or at the end of the power purchase agreement. Decommissioning activities are expected to take between 10-12 months and will occur in the relative order in which they are presented below:

- Disconnection and removal of above and below-ground wiring. Where safe to do so, below-ground wiring may be left in place.

- Removal of PV modules, steel/aluminum structures and electrical equipment.
- Removal of foundations and any maintenance buildings or other structures.
- Removal of access roads.
- Topsoil replacement as necessary.
- Site grading and rehabilitation as necessary.
- Removal of waste from the Project Location.

The final decision on waste disposal or recycling will be the responsibility of the on-site contractor who will refer to the *Environmental Protection Act*, or the applicable standards of the day before submitting a Generator Registration Report, or other applicable report, for each type of waste produced at the solar facility.

This information has been summarized from the Project *Decommissioning Plan Report.* Additional details are provided in that report related to decommissioning.

8.3.1 Site Restoration

Once the on-site solar equipment is removed, it is expected that the site will be returned to its former use. Some minor site grading may be required. Site restoration activities will be undertaken in consultation of the landowner where applicable. Where appropriate, vegetation will be re-established.

8.3.2 Managing Excess Materials and Waste

During the decommissioning phase, waste materials will be removed in accordance with applicable local requirements, at a minimum; however the goal will be to recycle all Project materials where possible and to work with local subcontractors and waste firms to segregate material to be recycled. For example, since the mounting racks are made of manufactured metal, it is anticipated that nearly 100% of the above grade metal structures are salvageable.

9.0 Existing Environmental Conditions of Applicable Water Bodies

In total, one "lake" water body, 13 streams and five seepage areas (see **Figures 3a-3h**) met the definition of a water body under *Ontario Regulation 359/09* within the Project Location and the 120 m setback. The following notes and observations regarding the applicable water bodies were made during site investigations. For more information, please see the *Water Assessment Report*.

9.1 Water Body 1

Water Body 1 was determined to be a small pond on a residential property at 894 Hinch Road, approximately 105 m south of the Project Location on Hinch Road (see **Figure 3a**). Roughly 65 m x 25 m in area, the pond is located on the edge of a cow pasture/meadow habitat and mown lawn area. The shoreline was well-vegetated with grass and shrub species and sloped gradually (10% grade) towards the pond. Minor erosion around the banks was observed, presumed to be a direct result of cattle grazing and/or cattle accessing the pond. Overall, the shoreline of the pond was well-vegetated. Shoreline substrates were found to be predominantly silt with smaller amounts of muck and detritus, while bottom substrates was found to be predominantly muck and detritus. Along the banks of the pond there were small areas with accumulated woody and organic debris. Underwater cover consisted of predominantly organic debris with sparse cover from vegetation. Vegetation noted comprised of mostly species from the Characeae family and Broad-leaved Cattail (*Typha latifolia*). Contributory water flow appears to originate from a grassed swale adjacent to the pond, flowing southeast across the pasture area from the roadside ditch adjacent to Hinch Road.

9.2 Mud Creek

Mud Creek was found to be a permanent natural stream within an associated wetland complex that intersects the Project Location and falls within the 120 m setback in multiple locations (see **Figure 3a, 3d and 3e**).

Mud Creek originates from Perry's Lake and flows southward into the 120 m setback of the Project Location to the north of Centreville Road. Prior to flowing through a double culvert under Centreville Road, Mud Creek flows in a westerly direction for approximately 35 m in a channel that functions as a vegetated roadside drainage ditch. The riparian area to the north of Centreville Road consists of maintained residential lawn. After flowing through the culvert under Centreville Road, the watercourse continues flowing south into a reed canary grass mineral meadow marsh located on the south side of Centreville.

Upstream of Centreville Road, the aquatic habitat morphology was observed as flat, transitioning into a pool area at the downstream/south end of the culvert. Substrate in this stretch of Mud Creek was predominantly gravel, muck and detritus with a small amount of sand.

Both upstream and downstream of Centreville Road, the mean wetted width was 1.6 m, mean wetted depth was 0.3 m, mean bankfull width was 1.9 m and mean bankfull depth was 0.6 m. Cover within this area of Mud Creek was provided mostly by vegetation composed overhanging terrestrial grasses from the banks, with additional cover provided by woody debris (in-stream and overhanging), organic debris, cobble, undercut banks and overhanging vegetation within the area south of the culvert. Additional in-stream vegetation observed included a mix of submergent, floating and emergent species observed downstream of Centreville Road in the marsh area.

Evidence of groundwater was not observed in this area of Mud Creek. Of note, a concrete "gate" was observed in the watercourse to the north of Centreville Road that could provide limitations to fish migration.

As Mud Creek crosses Lockridge Road, it becomes associated with the Mud Creek Provincially Significant Wetland (within a willow mineral deciduous thicket swamp area). This section of Mud Creek did not occur within the Project Location or within 120 m, but was included in the assessment area to provide additional field observations of the water body. In the area of Lockridge Road, Mud Creek is of varying width and determining the average annual high water mark is difficult due to the wetland association. Where Mud Creek is mapped, the area generally consisted of an open water channel within the wetland. In general, the open water channel had a wetted width of approximately 2.5 m. Immediately downstream of Lockridge Road was a pool habitat and from aerial imagery, it appears that the channel is braided as it becomes associated with the wetland.

As Mud Creek continues to flow in a generally west direction toward the Project Location, the area of associated marsh widens. Mud Creek was again assessed from Rattie Road. Where Mud Creek occurs in association with the wetland in this area, the habitat was observed as flat morphology with limited surface water movement. Substrates were predominantly muck and detritus, with a small amount of gravel observed. Evidence of erosion of the roadside gravel from Rattie Road was observed, which is likely the source of the gravel observed in the creek at the Rattie Road assessment location. Mean wetted width was approximately 23.0 m and mean wetted depth was greater than 1.5 m. Mean bankfull width and mean bankfull depth were unable to be determined at the time of assessment due to the variation of topography and thick vegetative cover found in the associated wetland area adjacent to Mud Creek. It is assumed that the area of open water represented the average annual high water mark for Mud Creek, with the limits of the associated wetland as the approximate floodplain. Based on consultation with QCA, floodplain mapping of this feature is not available.

The riparian vegetation community associated with Mud Creek was identified to be a cattail organic shallow marsh wetland to the north and south of the open water channel. The Creek surface was approximately 1-30% shaded by shore cover. In-stream cover was pre-dominantly from woody debris, organic debris, overhanging shoreline vegetation and vegetation composed of a mix of submergent, floating and emergent vegetation. Large Yellow Pond Lily (*Nuphar advena*) was observed as the dominant species of floating vegetation in the assessment area and is listed as a species of conservation concern. No obstructions to fish migration or evidence of groundwater were observed.

9.2.1 Tributary 2 to Mud Creek

Tributary 2 to Mud Creek was found to be a natural intermittent stream that intersects intersects the Project Location where there is an existing culvert under Centreville Road approximately 440 m west of Lockridge Road (see **Figure 3d**).

Immediately upstream of Centreville Road, an in-line open water area was observed from the road right-of-way and can be viewed via aerial imagery. From the open water area, the stream flows in a westerly direction and then south through an equalization culvert under Centreville Road. This open water area and the stream channel was surrounded by white cedar coniferous forest to the north and south of Centreville Road before becoming associated with a willow mineral deciduous thicket swamp. The habitat type was observed as flat morphology with minimal observable flow at the time of assessment. Substrates were pre-dominantly cobble, gravel and boulders, with a small amount of detritus observed. Mean wetted width was 1.8 m, mean wetted depth was 0.1 m, mean bankfull width was 2.4 m and the mean bankfull depth was 0.5 m. Evidence of erosion was not observed. The watercourse surface was approximately 60-90% shaded by shore cover. In-stream cover was provided mostly by overhanging vegetation, with sparse cover provided by undercut banks, boulders, cobble, overhanging woody debris, organic debris and in-stream vegetation comprised of terrestrial grasses. Obstructions to fish migration were not observed; however, seasonally low water levels may limit access to upstream habitat.

9.2.1.1 Tributary 2.1 to Mud Creek

Tributary 2.1 to Mud Creek intersects the Project Location at a culvert on Centreville Road, approximately 680 m west of Lockridge Road (see **Figure 3d**). The watercourse was observed to be a natural permanent stream (with a defined channel) connecting two willow mineral deciduous thicket swamp units bisected by Centreville Road

Based on an interpretation of aerial photography, the watercourse appears to originate in the swamp habitat located north of Centreville Road, flow southward through the culvert and ultimately join with Tributary 2 to Mud Creek. The habitat was found to be flat morphology with minimal observable flow at the time of assessment. Substrates were a mix of cobble, muck and gravel. Mean wetted width was 1.4 m, mean wetted depth was 0.1 m, mean bankfull width was 1.4 m and mean bankfull depth was 0.3 m. In-stream cover was provided primarily from overhanging vegetation, with sparse cover provided by undercut banks, boulders, organic debris and woody debris (in-stream and overhanging). In-stream vegetation was sparse. No obstructions to fish migration were observed and no evidence of groundwater was noted.

9.3 Salmon River

The Salmon River was observed to be a natural permanent stream watercourse that intersects the Project Location in three locations where connection line routes are proposed and flows within 120 m of the Project Location at a fourth location (see **Figures 3f, 3g, and 3h**). The Salmon River originates to the north of the Project Location and generally flows in a southwest direction towards Napanee and the Bay of Quinte.

The Salmon River was assessed at each of the various points where it intersects with the Project Location. In these areas, the overall habitat was observed as being pre-dominantly flat morphology, with occasional areas of runs and riffles. A range of substrates was observed including silt, muck, boulders, cobble, bedrock, sand, gravel and detritus. Mean wetted width ranged between 22 m and 34 m, mean wetted depth at crossing locations was measured between 0.6 m and 1.0 m, mean bankfull width ranged between 23.7 m and 38.3 m and mean bankfull depth ranged between 0.9 m and 1.9 m (widths and depths are approximate).

Erosion or signs of vulnerability to erosion were observed on both banks for the majority of the assessment locations. In-stream cover was found to be predominantly provided by boulders, cobble, woody and organic debris, and in-stream vegetation. In-stream vegetation included a range of submergent, floating and emergent species that varied in composition and abundance between each assessment area. In-stream impediments or barriers to fish movement were not observed. Potential fish spawning habitat was observed, but may be limited in some reaches of the river due to areas of sediment deposition. Evidence of groundwater was not observed at any of the assessment locations.

Riparian communities varied between assessment locations, but generally included deciduous forest and swamp. The watercourse surface was typically 1-60% shaded by shore cover.

9.3.1 Tributary 1 to the Salmon River

Tributary 1 to the Salmon River is a natural intermittent stream that intersects the Project Location at a culvert location along a proposed connection line route on Teskey Road, approximately 45 m north of Bawn Road (see **Figure 3f**). The habitat type was run morphology transitioning to flat around the culvert location. Substrates were predominantly muck, with lesser amounts of detritus, clay and silt observed. Mean wetted width was 0.8 m, mean wetted depth was 0.3 m, mean bankfull width was 1.6 m and mean bankfull depth was 0.5 m (widths and depths are approximate). Banks showed vulnerability to erosion around the culvert location and signs of erosion were observed on both banks upstream of the culvert. In-stream cover was provided from overhanging vegetation, woody debris (in-stream and overhanging) and organic debris. In-stream vegetation was composed primarily of emergent terrestrial grasses (indicating the streams classification as intermittent) with a small amount of floating duckweed species observed around the culvert location where water was pooled.

The dominant riparian vegetation community upstream of Teskey Road was residential and mixed meadow. Downstream of Teskey Road, the riparian vegetation communities consisted of mixed meadow and some deciduous shrub thicket. The watercourse surface was approximately 1-30% shaded by shore cover.

A conversation held with the landowner during the assessment indicated the potential presence of a nearby groundwater seep. Although no visible evidence of a seep was observed, water temperatures taken at both the culvert location at Teskey Road (20°C) and approximately 50 m upstream (16°C) noted a difference of approximately 4°C in water temperature and was indicative of the seep mentioned by the landowner to the west of Teskey Road (see Seep 1).

9.3.2 Tributary 2 to the Salmon River

Tributary 2 to the Salmon River was observed to be a natural permanent stream that intersects the Project Location along a proposed connection line route on Edges Road, approximately 70 m north of Marlin Road (see **Figure 3g**).

The watercourse appears to run in a westward direction, draining the adjacent cattail graminoid mineral meadow marsh east of Edges Road, through a culvert under the road toward a confluence with other tributaries to the Salmon River west of this location. Downstream of Edges Road the tributary is bordered by a residential property and an agricultural field. Habitat type of the tributary was run morphology upstream of the culvert, transitioning to flat morphology downstream of the culvert. Substrates were observed as being pre-dominantly gravel, with smaller amounts of detritus and sand observed upstream of the culvert, while downstream the substrates were observed as pre-dominantly detritus with small amounts of silt and muck. Mean wetted width was 2.3 m, mean wetted depth was 0.8 m, mean bankfull width was 3.4 m and mean bankfull depth was 1.2 m. Stream cover was provided primarily by vegetation consisting of in-stream aquatic species such as duckweed and overhanging terrestrial grasses. Additional cover was provided by cobble, organic debris and woody debris (in-stream and overhanging). The watercourse surface was approximately 30-60% shaded by shore cover. Potential obstructions to fish movement were not observed, however, a metal gate installed across the culvert could provide potential obstructions to fish migration. Lower water temperature readings taken at the culvert location and within the water draining from the roadside ditch into the tributary (12°C and 9°C respectively) indicate the potential presence of a nearby groundwater input to the south of the tributary (identified as Seep 3).

9.3.2.1 Tributary 2.1 to the Salmon River

Tributary 2.1 to the Salmon River was found to be an intermittent stream that intersects the Project Location where there are proposed connection line routes in two locations (see **Figure 3g**). Based on an interpretation of aerial photography the watercourse appears to originate from a wetland complex east of County Road 27 and flows northwest until it converges with Tributary 2 to the Salmon River. The watercourse was found to have reaches that were dry and is therefore classified as an intermittent natural stream.

The watercourse was assessed where it crosses County Road 27 through a culvert and intersects with the Project Location, approximately 670 m south of Marlin Road. Based on aerial photography, the watercourse appears to originate from a mineral deciduous swamp area east of County Road 27, flowing west to a small pool area adjacent to the road before continuing north for approximately 50 m to the culvert location. The watercourse was observed as dry upstream and downstream of the pool area at the culvert, indicating the watercourse is intermittent. Substrates were muck and detritus. Mean wetted width of the pool was 2.7 m and, mean wetted depth was 0.3 m. For the overall channel, the mean bankfull width was 4.1 m and mean bankfull depth was 0.8 m (widths and depths are approximate). Both banks showed signs of erosion. In-stream cover was predominantly from overhanging shoreline vegetation with sparse cover from undercut banks, organic and woody debris (in-stream and overhanging), and in-stream vegetation consisted of a small amount of emergent Burreed species (*Sparganium spp*). The watercourse surface was approximately 1-30% shaded by shore cover. No obstructions to fish movement or evidence of groundwater were observed, however, the intermittent nature of the watercourse in this location could lead to seasonal migratory impediments for fish.

The watercourse was then assessed where it intersects the Project Location at County Road 27, approximately 210 m east of Teskey Road. The habitat type was observed as run morphology, with minimal but steady water flow observed in a northward direction. Substrates were comprised of a mix of gravel, sand, muck, detritus and cobble. Mean wetted width was 0.8 m, mean wetted depth was 0.4 m, mean bankfull width was 1.3 m and mean bankfull depth was 0.9 m (widths and depths are approximate). The surrounding riparian community consisted of Green Ash-hardwood Lowland Deciduous Forest. The watercourse surface was approximately 60% shaded by shore cover. Upstream and downstream water temperature readings were taken as 13°C and 11°C (respectively) and upwelling water with a slight sheen was observed on the upstream end of the assessment area, indicating the potential presence of groundwater input (Seep 2).

9.3.2.2 Tributary 2.2 to the Salmon River

Tributary 2.2 to the Salmon River was observed to be an intermittent stream that intersects the Project Location where there is a proposed connection line route on Edges Road, approximately 630 m north of Marlin Road (see **Figure 3g**). The watercourse appears to flow between two willow mineral deciduous thicket swamp areas bisected by Edges Road. Habitat type, mean wetted width and mean wetted depth were unable to be determined at the time of the assessment due to a lack of water. Mean bankfull width was 0.7 m and mean bankfull depth was 0.4 m. Signs of erosion or vulnerability to erosion were not observed on either of the banks. Substrates were pre-dominantly muck and detritus.

In-stream cover was provided primarily by vegetation composed of grasses, as well as by undercut banks and organic and woody debris (in-stream and overhanging). The watercourse channel was approximately 60-90% shaded by shore cover. No obstructions to fish movement or evidence of groundwater were observed, however, the dry state of the watercourse during the assessment indicates there may be seasonal impediment to fish migration.

9.3.2.3 Tributary 2.4 to the Salmon River

Tributary 2.4 to the Salmon River falls within the 120 m setback of a proposed connection line route northwest of the intersection of Edges Road and Marlin Road (see **Figure 3g**). At the time of assessment, access to the property Tributary 2.4 is located on was not granted and an alternative area of site investigation was conducted from Marlin Road and using aerial photography. Based on an interpretation of aerial photography, the watercourse appears to be an intermittent tributary to the Salmon River. The stream appears to drain the surrounding cattail graminoid mineral meadow marsh at the streams origin and travels through a lowland deciduous forest community closer to the confluence with Tributary 2 to the Salmon River.

9.3.3 Tributary 3 to the Salmon River

Tributary 3 to the Salmon River was observed to be a natural intermittent stream that intersects the Project Location where there is a proposed connection line route on Haggerty Road, approximately 17 m east of Miller Road (see **Figure 3h**). The stream originates from a willow mineral deciduous thicket swamp and discharges into the Salmon River. Where the stream crosses Haggerty Road, a culvert was observed connecting the two swamp communities north and south of the road. The watercourse was dry at the time of assessment. Substrates were predominantly muck and detritus, with occasional boulders. Mean bankfull width was 14.4 m and mean bankfull depth of the channel was 0.8 m (widths and depths were approximate). The banks showed no evidence of or vulnerability to erosion. In-stream cover was predominantly from organic and woody debris (both in-stream and overhanging) with sparse cover provided by boulders. In-stream vegetation consisted of emergent species such as Broadfruited Burreed (*Sparganium eurycarpum*) and European Common Reed (*Phragmites australis*).

The surface of the watercourse was approximately 1-30% shaded by shore cover. No obstructions to fish movement (other than the seasonal restrictions related to low/no water flow) or evidence of groundwater was observed in the assessment area.

9.3.3.1 Tributary 3.1 to the Salmon River

Tributary 3.1 to the Salmon River was observed to be a natural permanent stream that intersects Project Location approximately 30 m northeast of the intersection of Miller Road and Haggerty Road West (see **Figure 3h**). The watercourse originates in a willow mineral deciduous thicket swamp complex west of Miller Road and flows eastward through a culvert under Miller Road before converging with Tributary 3 to the Salmon River. The habitat type was determined as flat morphology with pool characteristics upstream and downstream of the culvert crossing. Substrates were pre-dominantly detritus with a small amount of muck. In the area east and west of Miller Road, the mean wetted width of the stream was 3.5 m, mean wetted depth was greater than 1.0 m, mean bankfull width was greater than 5.0 m and mean bankfull depth was greater than 1.0 m (widths and depths are approximate). For the purposes of this water assessment, the average annual high water mark was determined to be approximately 3.0 m of each side of the centreline of the stream as mapped on **Figure 3h**.

This was determined based on topography of the area downstream of the culvert, where the road right-of-way was at a higher elevation than the wetland on the west bank and an area of more dense willow vegetation was observed on the east bank. The extent of the wetland area is assumed to be the limits of the floodplain. In-stream cover was predominantly from vegetation, with sparse cover provided by woody and organic debris. No evidence of groundwater was observed in the assessment area.

9.4 Black Creek

Black Creek was found to be a natural permanent stream that intersects the Project Location at a box culvert where there is a proposed connection line route on Murphy Road; approximately 477 m north of County Road 14 (see **Figure 3g**). Where Black Creek crosses Murphy Road, the north and south riparian areas along the stream consisted of green ash-hardwood lowland deciduous forest, with open pasture areas adjacent to that community. The habitat type was pool morphology upstream of the intersection of the Creek with Murphy Road, transitioning into flat morphology around the box culvert and ultimately transitioning into a run downstream of the culvert. Water flow was observed as being slow but steady in a westward direction during the time of assessment. Substrates were found to be primarily boulders, cobble and sand with occasional detritus. Mean wetted width was 8.0 m, mean wetted depth was 0.5 m, mean bankfull width was 8.7 m and mean bankfull depth was 0.8 m (widths and depths are approximate). Both banks had no visible signs of erosion. In-stream cover was provided by a mix of boulders, cobble, undercut banks, woody debris (both in-stream and overhanging), organic debris and vegetation (both in-stream and overhanging). In-stream vegetation as composed of a mix of submergent, floating and emergent vegetation, including Large Yellow Pond Lily. The Creek was observed as being suitable habitat for fish; however, boulders and log jams present in the Creek may be obstructions to fish migration. No evidence of groundwater was observed in the assessment area.

9.5 Pennell's Creek

Pennell's Creek was found to be a natural permanent stream that intersects the Project Location where there is a proposed connection line route on Miller Road, south of Howes Road (see **Figure 3h**).

Based on an interpretation of aerial photography, the watercourse flows through deciduous swamp and forest communities, a residential property and a meadow marsh as it flows eastward and converges with the Salmon River. Habitat type was observed as run morphology throughout the assessment location. Substrates west/upstream of the intersection were primarily composed of silt, clay, gravel and sand. East/downstream of the intersection, substrates were pre-dominantly boulders, gravel and sand, with smaller amounts of muck, cobble and detritus observed. Mean wetted width was 6.5 m, mean wetted depth was 0.4 m, mean bankfull width was 8.2 m and mean bankfull depth was 0.7 m (widths and depths are approximate). Signs of erosion were observed on both banks where the stream crosses Miller Road. In-stream cover was predominantly from overhanging shoreline vegetation, with sparse cover provided by woody and organic debris.

The Creek surface was approximately 30% shaded by shore cover. In-stream vegetation was composed of a mix of submergent, floating and emergent species including Wild Celery, Broad-leaf Arrowhead, Common Cattail and Large Yellow Pond Lily. No obstructions to fish migration were observed and no evidence of groundwater was noted in the assessment area.

9.6 Seepage Area 1

Seep 1 was estimated to occur within the 120 m setback near the intersection of Tributary 1 to the Salmon River with the Project Location on Teskey Road (see **Section 9.3.6**; **Figure 4f**). The potential location of the seep was estimated to be west of Teskey Road based on a conversation held with the landowner and a difference of 4°C between water temperature readings taken at the intersection of the watercourse with the Project Location and readings taken approximately 50 m upstream. The source of the cold water input was not located in the area accessible for investigation. No other indicators of groundwater seepage were observed. The dominant riparian vegetation community upstream of Teskey Road was residential and mixed meadow.

9.7 Seepage Area 2

Seep 2 was estimated to occur within the 120 m setback near the intersection of Tributary 2.1 to the Salmon River with the Project Location on County Road 27 (see **Figure 3g**). The presence of the seep was estimated based on observations of upwelling water with a slight sheen at the intersection of the watercourse with the Project Location. Additionally, a difference in water temperature of 2°C was observed downstream of the estimated location of the seep. The lands surrounding this area included a municipal road, residential property and deciduous forest and hayfield.

9.8 Seepage Area 3

Seep 3 was estimated to occur within the eastern 120 m setback south of the intersection of Tributary 2 to the Salmon River with the Project Location on Edges Road (see **Figure 3g**). The presence and location of the seep was estimated based on a drop in water temperature when measurements were taken upstream of the culvert at the intersection of the watercourse with the Project Location (12°C) and readings taken south of the culvert on the east side of Edges Road from water in the roadside ditch/ marsh wetland area (9°C). As water moved downstream from the wetland, there was a 3°C drop in temperature. It is assumed that the seepage area is associated with the cattail graminoid mineral meadow marsh wetland east of the road right-of-way. This wetland has an area of open water that drains into Tributary 2 to the Salmon River. No other indicators of a groundwater seep were observed.

9.9 Seepage Area 4

Seep 4 was reported to occur at the edge of a fresh-moist mixed meadow community within the 120 m setback (see **Figure 3a**). The presence and location of the seep was provided by the landowner to a third-party, who subsequently forwarded the information to Dillon. When Dillon site investigators returned to the area to document the seep, evidence of the feature was not observed. Given that the landowner has provided the information on the seep, the seep has been mapped and treated as present for the purposes of this report.

9.10 Seepage Area 5

Seep 5 was reported to occur at the edge of a red cedar calcareous treed rock barren community within the 120 m setback (see **Figure 3c**). The presence and location of the seep was provided by the landowner to a third-party, who subsequently forwarded the information to Dillon. When Dillon site investigators returned to the area to document the seep, evidence of the feature was not observed. Given that the landowner has provided the information on the seep, the seep has been mapped and treated as present for the purposes of this report.

10.0 Environmental Effects of the Project

Project activities relating to site preparation, construction, maintenance, operations, and decommissioning have been reviewed to determine potential negative environmental effects, mitigation and residual effects to the water bodies within the Project Location and surrounding 120 m. These have been outlined in **Table 5**. In many cases, the Project activities may overlap (*e.g.,* clearing and equipment laydown). Where activities overlap, the activity that is listed first in the Project activity sequence or that has the broadest potential impact is the activity evaluated in **Table 5**.

As required by Section 39 of *Ontario Regulation 359/09*, PV panels and the substation transformer are prohibited from being constructed, installed or expanded in a Project Location within 30 m of the average annual high water mark of a water body. Other activities, such as perimeter fence construction and installation of collector and connection lines, are permitted if potential negative environmental effects are identified and appropriate mitigation measures are implemented. None of the activities outlined in **Section 8** are expected to have any physical or functional effect on a water body provided the appropriate mitigation measures are implemented and maintained. The distances stated are to be considered minimum setbacks between the Project components and the stated water body. The final setback distance will be determined based on detailed design following receipt of the REA.

To address potential effects related to erosion and sediment affecting applicable water bodies, an ESC plan will be developed and implemented prior to and during construction, to minimize the potential for impairment of the quality of any receiving waters during construction. A detailed ESC plan will not be completed until confirmation of final site grading and layout, phasing of construction, and construction methodology. These items are typically done during detailed design following receipt of the REA.

ESC measures will be designed and implemented in accordance with local guidelines and regulations. Throughout the construction phase of the Project, the ESC plan and individual ESC measures will be evaluated for efficacy and modified as required to meet changing site conditions. Also, proper maintenance and inspection of the temporary erosion and pollution control features will be completed throughout the duration of the construction phase of the Project. Inspection of all temporary erosion controls is recommended after each significant rainfall event (*i.e.,* greater than 10 mm) and at least daily during prolonged rainfall (*i.e*., more than 25 mm in a 24 hour period). While removal of ESC measures will be stipulated in the ESC plan, it is anticipated that ESC measures will be maintained until growth of vegetation is established in disturbed areas.

Table 5: Potential Environmental Effects of the Project on Applicable Water Bodies

Activity	Water Body With Potential to be Affected by Activity	Minimum Separation Distance Between Activity and Water Body	Potential Negative Effect(s)	Magnitude of Effect	Frequency of Effect	Duration of Effect	Summary of Mitigation Measures	Residual Effect
Site Preparation, Servicing and Construction Phase								
Vegetation Removal and Grading	Water Body 1	105 m (minimum distance to collector line)	• Changes in natural surface drainage, including redirection of surface flow and/or increased or decreased surface runoff, which may cause increased or decreased stream flows. • Soil erosion and mobilization resulting in increased sedimentation, turbidity and inputs of nutrients and/or contaminants in adjacent water bodies, which may affect fish habitat (*e.g.*, spawning areas, food sources, benthic composition).	LOW	Single event; temporary during site preparation phase during times of precipitation.	Throughout construction phase until vegetation is established and/or soil is stabilized in the Project Location.	• Appropriate grading techniques will be used to prevent increased run-off potential, and to maintain drainage. Changes to land contours will be minimized; physical land alterations (i.e., grading, cut and fill, etc.) required will be designed to remain consistent with the pre-existing drainage patterns. • An Erosion and Sediment Control (ESC) plan will be developed for the site and appropriate ESC measures will be used as needed to prevent erosion and soil mobilization. See **Section 8.1.3** for a list of recommendations considered for inclusion in the ESC plan. Key ESC measures likely to be used to mitigate the potential negative effects include (but are not limited to): ○ Identifying and protecting vegetation not shown for removal within the construction area. ○ Maintaining existing riparian vegetation buffers around water bodies where possible. Where collector and/or collection line installation requires the removal of vegetation, efforts to maintain a vegetated buffer between the Project activities and the water body should be provided. ○ Installing silt fences (placed at the downslope side of proposed grading activities, proposed stockpile areas, and the site limits) and necessary erosion control measures prior to commencing construction activities.	No residual effect. Physical land alterations will remain consistent with the pre-existing drainage patterns. The Project Location is to be stabilized prior to the removal of ESC measures.
	Mud Creek	Mud Creek is associated with the surrounding wetland area. The average annual high water mark was approximated to be 12 m from the mapped centreline. The associated wetland edge extends a minimum of 30 m from this water body limit. Therefore, all minimum distances provided below are in addition to the 30 m setback from the average annual high water mark. They are identified from the wetland edge as this is a more identifiable feature. • 5 m (minimum distance to edge of Project Location boundary/ perimeter fence from wetland edge) • Within (where collector/collection lines cross Mud Creek)						
	Tributary 2 to Mud Creek	Connection line may cross water body						
	Tributary 2.1 to Mud Creek	Connection line may cross water body						
	Salmon River	Connection line may cross water body						
	Tributary 1 to Salmon River	Connection line may cross water body						
	Tributary 2 to Salmon River	Connection line may cross water body						
	Tributary 2.1 to Salmon River	Connection line may cross water body						
	Tributary 2.2 to Salmon River	Connection line may cross water body						
	Tributary 2.4 to Salmon River	55 m (minimum distance between water body and collection line)						
	Tributary 3 to Salmon River	Connection line may cross water body						

Activity	Water Body With Potential to be Affected by Activity	Minimum Separation Distance Between Activity and Water Body	Potential Negative Effect(s)	Magnitude of Effect	Frequency of Effect	Duration of Effect	Summary of Mitigation Measures	Residual Effect
	Tributary 3.1 to Salmon River	Connection line may cross water body						
	Black Creek	Connection line may cross water body						
	Pennell's Creek	10 m (minimum distance to edge of Project Location boundary / perimeter fence)						
	Seepage Area 1	Connection line may cross water body						
	Seepage Area 2	Connection line may cross water body						
	Seepage Area 3	Connection line may cross water body						
	Seepage Area 4	119 m (minimum distance to edge of Project Location boundary / perimeter fence)						
	Seepage Area 5	26 m (minimum distance to edge of Project Location boundary / perimeter fence)						
Construction of Access Roads	Mud Creek	Mud Creek is associated with the surrounding wetland area. The average annual high water mark was approximated to be 12 m from the mapped centreline. The associated wetland edge extends a minimum of 30 m from this water body limit. Therefore, all minimum distances provided below are in addition to the 30 m setback from the average annual high water mark. They are identified from the wetland edge as this is a more identifiable feature. • 10 m (minimum distance to access road from wetland edge)	• Decreased surface permeability and redirection of runoff. • Soil erosion and mobilization resulting in increased sedimentation, turbidity and inputs of nutrients and/or contaminants into adjacent water bodies, potentially impacting water quality and fish habitat (*e.g.*, spawning areas, food sources, benthic composition).	LOW	• Throughout lifespan of Project. • Intermittently, during and immediately following precipitation events.	Some or all roads will remain in place throughout the lifespan of the facility, while some may be decommissioned following the construction phase of the Project.	• Access roads designed to promote infiltration. • An ESC plan will be developed for the site and appropriate ESC measures will be used as needed to prevent erosion and soil mobilization. See **Section 8.1.3** for a list of recommendations considered for inclusion in the ESC plan. Key ESC measures likely to be used to mitigate the potential negative effects include (but are not limited to): ○ Maintaining existing riparian vegetation buffers around water bodies. Access roads are not anticipated to be constructed within 30 m of a water body.	No residual effect. Access roads will remain permeable and infiltration will be maintained. ESC plan measures will be maintained where necessary.
	Seepage Area 5	30 m (minimum distance to access road)						

Activity	Water Body With Potential to be Affected by Activity	Minimum Separation Distance Between Activity and Water Body	Potential Negative Effect(s)	Magnitude of Effect	Frequency of Effect	Duration of Effect	Summary of Mitigation Measures	Residual Effect
Temporary water takings during installation of underground Project components and dewatering of shallow surface excavations	Mud Creek	Mud Creek is associated with the surrounding wetland area. The average annual high water mark was approximated to be 12 m from the mapped centreline. The associated wetland edge extends a minimum of 30 m from this water body limit. Therefore, all minimum distances provided below are in addition to the 30 m setback from the average annual high water mark. They are identified from the wetland edge as this is a more identifiable feature. • 10 m (minimum distance to access road from wetland edge)	• Changes to local hydrological regime (groundwater). • Increased surface water from overland dispersal of water, potentially increasing erosion, sedimentation and turbidity to adjacent water bodies.	LOW	Occasionally; only when underground Project components are being installed and either groundwater levels are sufficiently high to require temporary water taking or precipitation events warrant dewatering of shallow surface excavations	During construction phase (see **Table 3**)	• The rate and timing of water pumping will be controlled. Water will be pumped onto vegetated surfaces if possible or into a filter bag or a temporary retention basin. Pumped water is to re-infiltrate the ground without causing increased run-off or significant changes to local hydrological regime. If possible, water takings will be restricted to less than 50,000 litres per day. • Should water takings in excess of 50,000 L/day be required (i.e., 50,000 – 400,000 L/day), the Proponent will file the water taking on the Environmental Activity and Sector Registry ("EASR") in accordance with EASR requirements. Dewatering will not occur until the EASR application has been filed. • ESC measures will be implemented and monitored according to the Project ESC plan.	No residual effect. Hydrological regimes will remain unchanged upon completion of temporary water taking. ESC plan measures will be maintained where necessary.
	Pennell's Creek	30 m (minimum distance to substation foundation)						
	Seepage Area 5	30 m (minimum distance to access road)						
Installation of underground collector/ collection line via directional boring *Note: The environmental effects and mitigation measures have been provided for various options of constructing the collector and connection lines. The method of installation will be determined during detailed design.*	Mud Creek	Collector and/or connection lines may cross water body	Directional boring (also termed horizontal directional drilling, or "HDD") has the limited potential for "frac-out" as a result of a spill, tunnel collapse or rupture of drilling mud to the surface during directional boring. If this were to occur, there could be potential negative effects to surface water due to turbidity and inputs of nutrients and/or contaminants into the water body and the downstream receiving waters, potentially impacting water quality and fish habitat (*e.g.*, spawning areas, food sources, benthic composition).	LOW	Single event; potential during directional boring activities	Potential during directional boring activities	• Maintaining existing riparian vegetation buffers around water bodies. The boring entry and exit points are to be far enough from the water body/wetland to have minimal impact. • Proper geotechnical assessment practices, drilling planning and execution to be followed. Design the drill path to an appropriate depth below the water body/wetland to minimize the risk of frac-out. Develop an emergency frac-out response plan prior to undertaking direction boring activities. • Equipment should not be operated within the limits of the water body/wetland area. • Extent of a frac-out can be limited by careful monitoring during the boring activities and having appropriate response equipment available on-site and ready for use. Monitor the water body/wetland to observe signs of surface migration (frac-out) of drilling mud during boring activities. • Although Fisheries and Oceans Operational Statement for High-Pressure Directional Drilling (DFO 2007b) is no longer in circulation following changes to the federal *Fisheries Act*, the measures to protect fish and fish habitat when high-pressure directional drilling outlined in this document should be consulted (see ***Appendix A*** for DFO Operational Statements).	No residual effect. If a frac-out does occur, the emergency frac-out response plan will remediate the exposure to drilling mud in the surrounding area.
	Tributary 2 to Mud Creek	Connection line may cross water body						
	Tributary 2.1 to Mud Creek	Connection line may cross water body						
	Salmon River	Connection line may cross water body						
	Tributary 1 to Salmon River	Connection line may cross water body						
	Tributary 2 to Salmon River	Connection line may cross water body						
	Tributary 2.1 to Salmon River	Connection line may cross water body						
	Tributary 2.2 to Salmon River	Connection line may cross water body						
	Tributary 3 to Salmon River	Connection line may cross water body						
	Tributary 3.1 to Salmon River	Connection line may cross water body						
	Black Creek	Connection line may cross water body						

Activity	Water Body With Potential to be Affected by Activity	Minimum Separation Distance Between Activity and Water Body	Potential Negative Effect(s)	Magnitude of Effect	Frequency of Effect	Duration of Effect	Summary of Mitigation Measures	Residual Effect
	Pennell's Creek	Connection line may cross water body						
	Seep 1	Connection line may cross water body						
	Seep 2	Connection line may cross water body						
	Seep 3	Connection line may cross water body						
Installation of underground collector/ collection line via isolated or dry open-cut crossing *Note: The environmental effects and mitigation measures have been provided for various options of constructing the collector and connection lines. The method of installation will be determined during detailed design.*	Mud Creek	Collector and/or connection lines may cross water body (where water body crosses Rattie Road and/or Centreville Road)	• Isolated crossing may create barrier to species movement • Potential for increased erosion and sedimentation impacting the water body • For seepage areas, physical disturbance could remove pathway to surface • Decrease in water quality	MODERATE	Short-term; only when equipment is on site.	During construction phase (see **Table 3**)	• Where possible for intermittent streams, conduct activities when the water body is dry. • Minimize duration of in-stream work and time crossings to prevent sensitive life fish stages (fish timing windows). • Use portable dams, pea gravel bags, concrete blocks, steel or wood walls, clean rock, sheet pile or other appropriate designs to separate the dewatered work site from flowing water. • Before dewatering, rescue any fish from within the isolate and release them downstream. • Divert water around the isolate area to maintain natural downstream flows and prevent upstream ponding. • Avoid construction during wet, rainy or winter thaw conditions where possible. • The construction area adjacent to sensitive features should be clearly delineated by sediment or erosion control fencing, or other similar boundary, to avoid impacting the adjacent feature(s). • Restore and stabilize the streambed, substrate and banks to their original shape and condition. • Although Fisheries and Oceans Operational Statement for Isolated or Dry Open-cut Stream Crossings (DFO 2008) is no longer in circulation following changes to the federal *Fisheries Act*, the measures to protect fish and fish habitat when carrying out an isolated or dry open-cut stream crossing outlined in this document should be consulted (see ***Appendix A*** for DFO Operational Statements).	No residual effect. If required, contamination of soil will be managed by spill response kits and by measures outlined in a spill response plan. Potential for increased turbidity and sedimentation will be minimized controlling surface run-off and erodibility of soil in riparian areas by using re-vegetation measures.
	Tributary 2 to Mud Creek	Connection line may cross water body						
	Tributary 2.1 to Mud Creek	Connection line may cross water body						
	Salmon River	Connection line may cross water body						
	Tributary 1 to Salmon River	Connection line may cross water body						
	Tributary 2 to Salmon River	Connection line may cross water body						
	Tributary 2.1 to Salmon River	Connection line may cross water body						
	Tributary 2.2 to Salmon River	Connection line may cross water body						
	Tributary 3 to Salmon River	Connection line may cross water body						
	Tributary 3.1 to Salmon River	Connection line may cross water body						
	Black Creek	Connection line may cross water body						
	Pennell's Creek	Connection line may cross water body						
	Seep 1	Connection line may cross water body						
	Seep 2	Connection line may cross water body						
	Seep 3	Connection line may cross water body						

Activity	Water Body With Potential to be Affected by Activity	Minimum Separation Distance Between Activity and Water Body	Potential Negative Effect(s)	Magnitude of Effect	Frequency of Effect	Duration of Effect	Summary of Mitigation Measures	Residual Effect
Installation of overhead collector and connection lines	Water Body 1	105 m (minimum distance between water body and collector line)	• Contamination of soil by spills from equipment and machinery. • Movement of equipment, machinery and personnel on-site may lead to vegetation damage and/or loss, soil compaction and increased surface water run-off in riparian areas. This could potentially contribute to increased erosion, sedimentation, and turbidity to the receiving water body. • Disturbance of surface water flow from installation of poles.	LOW	Short-term; only when equipment is on site.	During construction phase (see **Table 3**)	• Avoid placing poles on meander belts, active floodplains or other unstable areas that may result in erosion or scouring of the stream bed. Locate poles above the high water mark where possible. • Design construction approaches to be perpendicular to water bodies to minimize disturbance. • A spill response plan and spill response kits are to be developed and kept on site during installation. • In accordance with the ESC plan, install effective sediment and erosion control measures to reduce the potential for entry of sediment into the water body. • Operate machinery in locations that maximize distance from the water body, and that minimize disturbance to riparian areas. • Construction equipment and materials will be primarily stored in temporary construction laydown area(s). No equipment or materials are to be stored within 30 m of a water body. • Following the construction phase and prior to vegetation establishment, areas of soil compaction will be rectified by methods such as scarification, etc.. • Minimize loss of vegetative cover to the extent possible. Area(s) of vegetation damage and/or loss will be re-vegetated to reduce erosion potential. • Although Fisheries and Oceans Operational Statement for Overhead Line Construction (DFO 2007a) is no longer in circulation following changes to the federal *Fisheries Act*, the measures to protect fish and fish habitat when constructing overhead lines outlined in this document should be consulted (see ***Appendix A*** for DFO Operational Statements).	No residual effect. If required, contamination of soil will be managed by spill response kits and by measures outlined in a spill response plan. Potential for increased turbidity and sedimentation will be minimized controlling surface run-off and erodibility of soil in riparian areas by using re-vegetation measures.
	Mud Creek	Collector and/or connection lines may cross water body						
	Tributary 2 to Mud Creek	Connection line may cross water body						
	Tributary 2.1 to Mud Creek	Connection line may cross water body						
	Salmon River	Connection line may cross water body						
	Tributary 1 to Salmon River	Connection line may cross water body						
	Tributary 2 to Salmon River	Connection line may cross water body						
	Tributary 2.1 to Salmon River	Connection line may cross water body						
	Tributary 2.2 to Salmon River	Connection line may cross water body						
	Tributary 3 to Salmon River	Connection line may cross water body						
	Tributary 3.1 to Salmon River	Connection line may cross water body						
	Black Creek	Connection line may cross water body						
	Pennell's Creek	Connection line may cross water body						
	Seep 1	Connection line may cross water body						
	Seep 2	Connection line may cross water body						
	Seep 3	Connection line may cross water body						

Activity	Water Body With Potential to be Affected by Activity	Minimum Separation Distance Between Activity and Water Body	Potential Negative Effect(s)	Magnitude of Effect	Frequency of Effect	Duration of Effect	Summary of Mitigation Measures	Residual Effect
Storage and use of construction materials and equipment	Water Body 1	105 m (minimum distance between water body and collector line)	• Contamination of soil from accidental spills or from equipment and machinery. • Contamination of water bodies with construction materials by surface runoff or wind, potentially impacting water quality and fish habitat. • Contamination of water bodies with construction materials by transport from construction equipment onto paved public roads and subsequent surface runoff or wind, potentially impacting water quality and fish habitat. • Movement of equipment and personnel on-site may lead to soil compaction and increased surface water run-off. This could potentially contribute to increased erosion, sedimentation, and turbidity to receiving waters.	LOW	Short-term; only when construction materials and equipment are on site.	During construction phase (see **Table 3**)	• Existing vegetation in the Project Location should be maintained wherever possible to act as a natural buffer. • A spill response plan and spill response kits are to be developed and kept on site during construction. • Construction equipment and materials will be primarily stored in temporary construction laydown area(s). No equipment or materials are to be stored within 30 m of a water body. • Utilize good management practices to reduce the transport of materials (*e.g.* soil, vegetation, etc.) off site. This may include installing construction entrance features such as mud mats at vehicle access points adjacent to paved roads or as otherwise agreed to with the municipality. • Following the construction phase and prior to vegetation establishment, areas of soil compaction will be rectified by methods such as scarification, etc. • Re-vegetate disturbed areas in the Project Location following the construction phase, as necessary.	No residual effect. Construction equipment and excess materials will be removed from site following completion of construction.
	Mud Creek	Collector and/or connection lines may cross water body; A minimum distance of 30 m from other Project components.						
	Tributary 2 to Mud Creek	Connection line may cross water body						
	Tributary 2.1 to Mud Creek	Connection line may cross water body						
	Salmon River	Connection line may cross water body						
	Tributary 1 to Salmon River	Connection line may cross water body						
	Tributary 2 to Salmon River	Connection line may cross water body						
	Tributary 2.1 to Salmon River	Connection line may cross water body						
	Tributary 2.2 to Salmon River	Connection line may cross water body						
	Tributary 2.4 to Salmon River	55 m (minimum distance between water body and collection line)						
	Tributary 3 to Salmon River	Connection line may cross water body						
	Tributary 3.1 to Salmon River	Connection line may cross water body						
	Black Creek	Connection line may cross water body						
	Pennell's Creek	Connection line may cross water body						
	Seep 1	Connection line may cross water body						
	Seep 2	Connection line may cross water body						
	Seep 3	Connection line may cross water body						
	Seep 4	119 m (minimum distance to edge of Project Location boundary / perimeter fence)						
	Seep 5	26 m (minimum distance to edge of Project Location boundary / perimeter fence)						

Activity	Water Body With Potential to be Affected by Activity	Minimum Separation Distance Between Activity and Water Body	Potential Negative Effect(s)	Magnitude of Effect	Frequency of Effect	Duration of Effect	Summary of Mitigation Measures	Residual Effect
Operations Phase								
Facility Operations	Water Body 1	105 m (minimum distance between water body and collector line)	• Overall decrease in permeability of Project Location caused by the impervious surfaces of some project components, and/or soil compaction from construction activities. A decrease in site permeability and/or an increase in soil compaction may lead to an increase in surface runoff, and potentially contributing to increased erosion, sedimentation, and turbidity to receiving waters. • Maintenance of the Project Location has the potential to introduce materials that are potentially harmful to the environment such as herbicides and/or de-icing substances	NONE	Ongoing throughout lifespan of Project	Throughout lifespan of Project.	• The Project Stormwater Management Plan will be developed to outline the key mitigations required to manage surface water drainage to adjacent water bodies. • The area below the PV panels will be re-vegetated with appropriate vegetation, either through seeding or natural re-vegetation, as necessary. Spaces occur between PV panels mounted on each rack to reduce concentration of run-off from the PV panel table during precipitation events. • Following the construction phase and prior to vegetation establishment, areas of soil compaction will be rectified by methods such as scarification, harrowing/tilling, etc. • ESC controls will remain in place until soils are stabilized by vegetative growth. • Maintenance of vegetation will occur in accordance with the mitigation measures outlined in the Environmental Effects Monitoring Plan (see the *Design and Operations Plan*). • Use of herbicides and/or de-icing substances within the Project Location will be minimal and only used as required for maintenance of the Project and to provide safe access to site personnel where other means such as mechanical weed control or removal of ice is ineffective.	No residual effect.
	Mud Creek	Collector and/or connection lines may cross water body; A minimum distance of 30 m from other Project components.						
	Tributary 2 to Mud Creek	Connection line may cross water body						
	Tributary 2.1 to Mud Creek	Connection line may cross water body						
	Salmon River	Connection line may cross water body						
	Tributary 1 to Salmon River	Connection line may cross water body						
	Tributary 2 to Salmon River	Connection line may cross water body						
	Tributary 2.1 to Salmon River	Connection line may cross water body						
	Tributary 2.2 to Salmon River	Connection line may cross water body						
	Tributary 2.4 to Salmon River	55 m (minimum distance between water body and collection line)						
	Tributary 3 to Salmon River	Connection line may cross water body						
	Tributary 3.1 to Salmon River	Connection line may cross water body						
	Black Creek	Connection line may cross water body						
	Pennell's Creek	Connection line may cross water body						
	Seep 1	Connection line may cross water body						
	Seep 2	Connection line may cross water body						
	Seep 3	Connection line may cross water body						
	Seep 4	119 m (minimum distance to edge of Project Location boundary / perimeter fence)						
	Seep 5	26 m (minimum distance to edge of Project Location boundary / perimeter fence)						

Activity	Water Body With Potential to be Affected by Activity	Minimum Separation Distance Between Activity and Water Body	Potential Negative Effect(s)	Magnitude of Effect	Frequency of Effect	Duration of Effect	Summary of Mitigation Measures	Residual Effect
Accidental spills from transformers (substation)	Pennell's Creek	100 m (minimum distance to edge of substation area)	• Contamination of soils with transformer fluids by accidental spills, and/or contamination of water bodies from surface runoff of fluids or of contaminated soils, potentially impacting water quality and fish habitat.	LOW	Throughout lifespan of Project.	Throughout lifespan of Project.	• Transformers are to be located more than 30 m from water bodies. • Spill containment structures will be constructed in association with the substation. • The Emergency Response and Communication Plan will be followed should a spill occur (as outlined in the *Design and Operations Report*). • The MOECC (Spills Action Centre) will be notified in the event of a spill.	No residual effects. In the event of a spill from a transformer, the area of the spill will be remediated.
Decommissioning Phase								
Removal of above-ground Project components	Water Body 1	105 m (minimum distance between water body and collector line)	• Increased erosion, sedimentation, and turbidity to receiving water bodies, potentially impacting water quality and fish habitat.	LOW	Short term.	During decommissioning phase.	• An ESC plan will be developed for the site and implemented prior to decommissioning activities.	No residual effects.
	Mud Creek	Collector and/or connection lines may cross water body; A minimum distance of 30 m from other Project components.						
	Tributary 2 to Mud Creek	Connection line may cross water body						
	Tributary 2.1 to Mud Creek	Connection line may cross water body						
	Salmon River	Connection line may cross water body						
	Tributary 1 to Salmon River	Connection line may cross water body						
	Tributary 2 to Salmon River	Connection line may cross water body						
	Tributary 2.1 to Salmon River	Connection line may cross water body						
	Tributary 2.2 to Salmon River	Connection line may cross water body						
	Tributary 2.4 to Salmon River	55 m (minimum distance between water body and collection line)						
	Tributary 3 to Salmon River	Connection line may cross water body						
	Tributary 3.1 to Salmon River	Connection line may cross water body						

Activity	Water Body With Potential to be Affected by Activity	Minimum Separation Distance Between Activity and Water Body	Potential Negative Effect(s)	Magnitude of Effect	Frequency of Effect	Duration of Effect	Summary of Mitigation Measures	Residual Effect
	Black Creek	Connection line may cross water body						
	Pennell's Creek	Connection line may cross water body						
	Seep 1	Connection line may cross water body						
	Seep 2	Connection line may cross water body						
	Seep 3	Connection line may cross water body						
	Seep 4	119 m (minimum distance to edge of Project Location boundary / perimeter fence)						
	Seep 5	26 m (minimum distance to edge of Project Location boundary / perimeter fence)						
Removal of access roads	Mud Creek	Mud Creek is associated with the surrounding wetland area. The average annual high water mark was approximated to be 12 m from the mapped centreline. The associated wetland edge extends a minimum of 30 m from this water body limit. Therefore, all minimum distances provided below are in addition to the 30 m setback from the average annual high water mark. They are identified from the wetland edge as this is a more identifiable feature. • 10 m (minimum distance to access road from wetland edge)	• Increased sedimentation and turbidity in receiving water bodies due to potential temporary changes in surface runoff regimes, potentially impacting water quality and fish habitat.	LOW	During removal of access road.	During decommissioning phase.	• An ESC plan will be developed for the site and implemented prior to decommissioning activities. • Access roads will be graded (at the discretion of the landowner) to match the surrounding landform. • The road base will be removed (at the discretion of the landowner) and replaced with native soils. • Land will be allowed to re-vegetate naturally or will be seeded to stabilize soils (if not part of an agricultural field).	None. Grading will restore any temporarily changed runoff regimes.
	Seepage Area 5	30 m (minimum distance to access road)						

11.0 Environmental Effects Monitoring Plan

The Environmental Effects Monitoring Plan (EEMP) prepared for the Project is designed to address environmental effects that have potential to occur during the construction, design and operation, and decommissioning of the solar facility. The potential negative environmental effects outlined in **Table 6** below are specific to the water bodies identified within the Project Location and surrounding 120 m and will form part of the overall EEMP for the Project in the *Design and Operations Report* and the *Construction Plan Report*, as applicable. **Table 6** also summarizes the monitoring plan and monitoring frequency during operation of the Project, as well as contingency measures that will be undertaken if performance objectives are not achieved.

Table 6: Water Body Environmental Effects Monitoring Plan for the Construction, Operation and Decommissioning of the Loyalist Solar Project

Potential Environmental Effect	Affected Water Bodies	Mitigation Strategy	Residual Effects	Performance Objective(s)	Monitoring Plan				Contingency Measures
					Methodology	Monitoring Locations	Frequency/ Duration	Reporting Requirements	
Construction Phase									
Vegetation clearing and/or grading may cause changes in natural surface drainage. This may include redirection of surface flow and/or increased or decreased surface runoff, which may cause increased or decreased stream flows.	• Mud Creek • Pennell's Creek • Seepage Area 5	Appropriate grading techniques will be used to prevent increased run-off potential, and to maintain positive drainage. Changes to land contours will be minimized; physical land alterations (*i.e.*, grading, cut and fill, etc.) required will be designed to remain consistent with the pre-existing drainage patterns.	None. Physical land alterations will remain consistent with the pre-existing drainage patterns.	Maintenance of pre-existing surface drainage.	Visual checks of drainage patterns.	Throughout construction areas.	Checks to occur monthly and/or after rain events greater than 10 mm until grading is complete.	Site records to include record of ESC monitoring during the construction phase. Logs to be provided to the MOECC if requested.	Grading techniques will be adjusted to meet pre-existing drainage outlined in construction design plans.
Vegetation clearing and/or grading may cause soil erosion and mobilization. This may result in increased sedimentation, turbidity and inputs of nutrients and/or contaminants in adjacent water bodies, which may affect fish habitat (*e.g.*, spawning areas, food sources, benthic composition).	• Mud Creek • Tributary 2 to Mud Creek • Tributary 2.1 to Mud Creek • Salmon River • Tributary 1 to Salmon River • Tributary 2 to Salmon River • Tributary 2.1 to Salmon River • Tributary 2.2 to Salmon River • Tributary 3 to Salmon River • Tributary 3.1 to Salmon River • Black Creek • Pennell's Creek • Seepage Areas 1,2,3,5	Mitigation measures from the ESC plan will be implemented, including: • Identifying and protecting trees and plants not shown for removal that are contained within the construction area. • Maintaining existing riparian vegetation buffers around water bodies. • Installing silt fences (placed at the downslope side of proposed grading activities, proposed stockpile areas, and the site limits) and necessary erosion control measures prior to commencing construction activities. • Re-vegetation of disturbed areas after construction has been completed (either through natural re-growth or planting, as necessary).	None. ESC plan measures will be maintained where necessary.	Minimize surface runoff and soil mobilization to receiving water bodies.	Routine visual checks of ESC measures implemented.	At areas where ESC measures are constructed.	Checks to occur monthly and/or after rain events greater than 10 mm until vegetative cover is established.	Site records to include record of ESC monitoring during the construction phase. Logs to be provided to the MOECC if requested.	Breaches to ESC measures will be repaired within 24 hours of identification.

Potential Environmental Effect	Affected Water Bodies	Mitigation Strategy	Residual Effects	Performance Objective(s)	Monitoring Plan				Contingency Measures
					Methodology	Monitoring Locations	Frequency/ Duration	Reporting Requirements	
Construction of access roads and soil compaction from use of equipment in Project Location may cause decreased surface permeability, redirection of runoff, and/or soil erosion and mobilization. This may result in increased sedimentation, turbidity and inputs of nutrients and/or contaminants into adjacent water bodies, potentially impacting water quality and fish habitat (*e.g.*, spawning areas, food sources, benthic composition).	• Mud Creek • Seepage Area 5	Access roads will be designed to promote infiltration. Mitigation measures from the ESC plan implemented to include: • Maintaining existing riparian vegetation buffers around water bodies where possible. • Installing silt fences (placed at the downslope side of proposed grading activities, proposed stockpile areas, and the site limits) and necessary erosion control measures prior to commencing construction activities. • Reduce soil compaction by scarifying land (or by other appropriate means) following the construction phase. • Re-vegetation of disturbed areas after construction has been completed (either through natural re-growth or planting, as necessary).	None. Access roads will remain permeable and infiltration will be maintained. ESC plan measures will be maintained where necessary.	Maintenance of surface infiltration and minimization of surface runoff and soil mobilization to receiving water bodies.	Routine checks of surface conditions and ESC measures implemented.	At access roads and areas where ESC measures are constructed.	Checks to occur monthly and/or after rain events greater than 10 mm until vegetative cover is established.	Site records to include record of ESC monitoring during the construction phase. Logs to be provided to the MOECC if requested.	Breaches to ESC controls will be repaired within 24 hours of notification.
Temporary water takings during installation of underground Project components may affect local hydrological regime (groundwater). The overland dispersal of water during temporary water takings may increase surface runoff and increase erosion and sedimentation to adjacent water bodies.	• Mud Creek • Pennell's Creek • Seepage Area 5	• The rate and timing of water pumping will be controlled. Water will be pumped onto vegetated surfaces if possible or into a filter bag or temporary retention basin. Pumped water is to re-infiltrate the ground without causing increased run-off or significant changes to local hydrological regime. If possible, water takings will be restricted to less than 50,000 litres per day. Should water takings in excess of 50,000 L/day be required (i.e., 50,000 – 400,000 L/day), the Proponent will file the water taking on the EASR in accordance with EASR requirements. Dewatering will not occur until the EASR application has been filed. • ESC measures will be implemented and monitored according to the Project ESC plan	None. ESC measures will mitigate excess overland runoff that may result from temporary water taking activities. No permanent impacts to the water table are anticipated.	Minimization of impacts to hydrological regime. Maintenance of surface runoff volume.	Ensure discharge of temporary water takings occur into vegetated areas or into a temporary retention basin or filter bag.	Where installation of Project component(s) requires temporary water takings.	Once during construction/during installation of Project components.	Site records to include record of locations that required temporary water takings and the volume of water taken each day.	If temporary water takings cause increased soil mobilization or surface run-off in areas of exposed soil, temporary water taking activities will be stopped until additional ESC measures can be implemented. If water taking needs to exceed 50,000 L/day, the MOECC will be consulted for appropriate approvals (i.e., filing the activity on the EASR).

Potential Environmental Effect	Affected Water Bodies	Mitigation Strategy	Residual Effects	Performance Objective(s)	Monitoring Plan				Contingency Measures
					Methodology	Monitoring Locations	Frequency/ Duration	Reporting Requirements	
The installation of overhead collector/collection line(s) may cause contamination of soil by spills from equipment and machinery, and may cause increased erosion, sedimentation, and/or turbidity in the water body. These effects may be caused from movement of equipment, machinery and personnel on-site leading to vegetation damage and/or loss, soil compaction and increased surface water run-off into riparian areas. *Note: The environmental effects and mitigation measures have been provided for various options of constructing the collector and connection lines. The method of installation will be determined during detailed design.*	• Water Body 1 • Mud Creek • Tributary 2 to Mud Creek • Tributary 2.1 to Mud Creek • Salmon River • Tributary 1 to Salmon River • Tributary 2 to Salmon River • Tributary 2.1 to Salmon River • Tributary 2.2 to Salmon River • Tributary 3 to Salmon River • Tributary 3.1 to Salmon River • Black Creek • Pennell's Creek • Seepage Areas 1,2,3	• Avoid placing poles on meander belts, active floodplains or other unstable areas that may result in erosion or scouring of the stream bed. Locate poles above the high water mark where possible. • Design construction approaches to be perpendicular to water bodies to minimize disturbance. • A spill response plan and spill response kits are to be developed and kept on site during installation. • In accordance with the ESC plan, install effective sediment and erosion control measures to reduce the potential for entry of sediment into the water body. • Operate machinery in locations that maximize distance from the water body, and that minimize disturbance to riparian areas. • Construction equipment and materials will be primarily stored in temporary construction laydown area(s). No equipment or materials are to be stored within 30 m of a water body. • Following the construction phase and prior to vegetation establishment, areas of soil compaction will be rectified by methods such as scarification, etc. • Minimize loss of vegetative cover to the extent possible. Area(s) of vegetation damage and/or loss will be re-vegetated to reduce erosion potential. • Although Fisheries and Oceans Operational Statement for Overhead Line Construction (DFO 2007a) is no longer in circulation following changes to the federal *Fisheries Act*, the measures to protect fish and fish habitat when constructing overhead lines outlined in this document should be consulted (see ***Appendix A*** for DFO Operational Statements).	None. If required, contamination of soil will be managed by spill response kits and by measures outlined in a spill response plan. Potential for increased turbidity and sedimentation will be minimized by controlling surface run-off and reducing erosion of soil in riparian areas by using re-vegetation measures.	• Ensure equipment and materials are stored more than 30 m from the water body • Minimize mobilization of sediment in riparian areas. • Ensure re-establishment of riparian vegetation to pre-disturbance conditions in disturbed areas following installation.	• Routine checks of equipment and machinery storage. • Routine inspection and maintenance of ESC measures. • Follow-up inspection of re-established riparian vegetation in disturbed areas.	Riparian areas around water bodies that are crossed by overhead collector/ connection lines	• Regularly, during installation of overhead line. • Once following installation and re-vegetation measures.	• Photo documentation showing soil stabilization and maintenance of riparian conditions through vegetation establishment (where required). • ESC records will be maintained until vegetative cover is established.	If mobilization of sediment is insufficiently controlled, additional ESC measures (e.g. more silt fencing) will be installed. ESC measures will be implemented and maintained until vegetation is observed to be established and thriving.

Potential Environmental Effect	Affected Water Bodies	Mitigation Strategy	Residual Effects	Performance Objective(s)	Monitoring Plan				Contingency Measures
					Methodology	Monitoring Locations	Frequency/ Duration	Reporting Requirements	
The installation of underground collector/collection line(s) via isolated or dry open-cut water body crossing may cause barriers to species movement, contamination of soil by spills from equipment and machinery, and may cause increased erosion, sedimentation, and/or turbidity in the water body. These effects may be caused from movement of equipment, machinery and personnel on-site leading to vegetation damage and/or loss, soil compaction and increased surface water run-off into riparian areas. *Note: The environmental effects and mitigation measures have been provided for various options of constructing the collector and connection lines. The method of installation will be determined during detailed design.*	• Mud Creek • Tributary 2 to Mud Creek • Tributary 2.1 to Mud Creek • Salmon River • Tributary 1 to Salmon River • Tributary 2 to Salmon River • Tributary 2.1 to Salmon River • Tributary 2.2 to Salmon River • Tributary 3 to Salmon River • Tributary 3.1 to Salmon River • Black Creek • Pennell's Creek • Seepage Areas 1,2,3	• Where possible for intermittent streams, conduct activities when the water body is dry. • Minimize duration of in-stream work and time crossings to prevent sensitive life fish stages (fish timing windows). • Use portable dams, pea gravel bags, concrete blocks, steel or wood walls, clean rock, sheet pile or other appropriate designs to separate the dewatered work site from flowing water. • Before dewatering, rescue any fish from within the isolate and release them downstream. • Divert water around the isolate area to maintain natural downstream flows and prevent upstream ponding. • Avoid construction during wet, rainy or winter thaw conditions where possible. • The construction area adjacent to sensitive features should be clearly delineated by sediment or erosion control fencing, or other similar boundary, to avoid impacting the adjacent feature(s). • Restore and stabilize the streambed, substrate and banks to their original shape and condition. • Although Fisheries and Oceans Operational Statement for Isolated or Dry Open-cut Stream Crossings (DFO 2008) is no longer in circulation following changes to the federal *Fisheries Act*, the measures to protect fish and fish habitat when carrying out an isolated or dry open-cut stream crossing outlined in this document should be consulted (see ***Appendix A*** for DFO Operational Statements).	None. If required, contamination of soil will be managed by spill response kits and by measures outlined in a spill response plan. Potential for increased turbidity and sedimentation will be minimized by controlling surface run-off, restoring water body banks to original (or better) condition, and reducing erosion of soil in riparian areas by using re-vegetation measures.	• Ensure equipment and materials are stored more than 30 m from the water body • Minimize mobilization of sediment in riparian areas. • Ensure re-establishment of water body banks and riparian vegetation to pre-disturbance conditions in disturbed areas following installation.	• Routine checks of equipment and machinery storage. • Routine inspection and maintenance of ESC measures. • Follow-up inspection of re-established riparian vegetation in disturbed areas.	Riparian areas around water bodies that are crossed by underground connection/collector lines	• Regularly, during installation of underground line. • Once following installation and re-vegetation measures.	• Photo documentation showing soil stabilization and maintenance of riparian conditions through vegetation establishment (where required). • ESC records will be maintained until vegetative cover is established.	If mobilization of sediment is insufficiently controlled, additional ESC measures (e.g. more silt fencing) will be installed. ESC measures will be implemented and maintained until vegetation is observed to be established and thriving. If required, additional bank restoration is to be completed if water body channel not restored to pre-construction condition.

Potential Environmental Effect	Affected Water Bodies	Mitigation Strategy	Residual Effects	Performance Objective(s)	Monitoring Plan				Contingency Measures
					Methodology	Monitoring Locations	Frequency/ Duration	Reporting Requirements	
The installation of underground collector/collection line(s) via directional boring (also termed HDD) may cause contamination of soil by spills from equipment and machinery, and may cause increased contamination, erosion, sedimentation, and/or turbidity in the water body. These effects may be caused from movement of equipment, machinery and personnel on-site leading to vegetation damage and/or loss, soil compaction and increased surface water run-off into riparian areas. Directional boring also has the potential for frac-outs. *Note: The environmental effects and mitigation measures have been provided for various options of constructing the collector and connection lines. The method of installation will be determined during detailed design.*	• Mud Creek • Tributary 2 to Mud Creek • Tributary 2.1 to Mud Creek • Salmon River • Tributary 1 to Salmon River • Tributary 2 to Salmon River • Tributary 2.1 to Salmon River • Tributary 2.2 to Salmon River • Tributary 3 to Salmon River • Tributary 3.1 to Salmon River • Black Creek • Pennell's Creek • Seepage Areas 1,2,3	• Maintaining existing riparian vegetation buffers around water bodies. The boring entry and exit points are to be far enough from the water body/wetland to have minimal impact. • Proper geotechnical assessment practices, drilling planning and execution to be followed. Design the drill path to an appropriate depth below the water body/wetland to minimize the risk of frac-out. Develop an emergency frac-out response plan prior to undertaking direction boring activities. • Equipment should not be operated within the limits of the water body/wetland area. • Extent of a frac-out can be limited by careful monitoring during the boring activities and having appropriate response equipment available on-site and ready for use. Monitor the water body/wetland to observe signs of surface migration (frac-out) of drilling mud during boring activities. • Although Fisheries and Oceans Operational Statement for High-Pressure Directional Drilling (DFO 2007b) is no longer in circulation following changes to the federal *Fisheries Act*, the measures to protect fish and fish habitat when high-pressure directional drilling outlined in this document should be consulted (see ***Appendix A*** for DFO Operational Statements).	No residual effect. If a frac-out does occur, the emergency frac-out response plan will remediate the exposure to drilling mud in the surrounding area.	No observable effects from directional boring observed in water body	Constant monitoring of water body during directional boring activities	Monitoring to occur in general area of underground crossing and immediately downstream, from a vantage point that allows for safe viewing.	Regularly, during drilling of underground line.	Drilling records to include name(s) of personnel responsible for monitoring water body	• If a frac-out occurs, implement emergency frac-out response plan. • Notify relevant agencies of frac-out. • Implement the contingency crossing plan, which may include measures to either re-drill at a different location or to isolate the water body to complete the crossing at the current location.

Potential Environmental Effect	Affected Water Bodies	Mitigation Strategy	Residual Effects	Performance Objective(s)	Monitoring Plan				Contingency Measures
					Methodology	Monitoring Locations	Frequency/ Duration	Reporting Requirements	
Storage and use of construction materials and equipment may cause contamination of soils and/or water bodies from accidental spills, from surface runoff, from wind, or from the transport of materials by equipment and machinery onto paved public roads and subsequent surface runoff or wind.	• Water Body 1 • Mud Creek • Tributary 2 to Mud Creek • Tributary 2.1 to Mud Creek • Salmon River • Tributary 1 to Salmon River • Tributary 2 to Salmon River • Tributary 2.1 to Salmon River • Tributary 2.2 to Salmon River • Tributary 2.4 to Salmon River • Tributary 3 to Salmon River • Tributary 3.1 to Salmon River • Black Creek • Pennell's Creek • Seepage Areas 1-5	• Existing vegetation in the Project Location should be maintained wherever possible to act as a natural buffer. • A spill response plan and spill response kits are to be developed and kept on site during construction. • Construction equipment and materials will be primarily stored in temporary construction laydown area(s). No equipment or materials are to be stored within 30 m of a water body. • Utilize good management practices to reduce the transport of materials (*e.g.* soil, vegetation, etc.) off site. This may include installing construction entrance features such as mud mats at vehicle access points adjacent to paved roads or as otherwise agreed to with the municipality. • Following the construction phase and prior to vegetation establishment, areas of soil compaction will be rectified by methods such as scarification, etc. • Re-vegetate disturbed areas in the Project Location following the construction phase.	None. Construction equipment and excess materials will be removed from the Project Location and municipal roads following completion of construction.	• Ensure equipment and materials are stored more than 30 m from a water body. • Use mud mats or other means to prevent off-site transport of soils and/or other deleterious materials. • Ensure soils transported off-site are washed away from water bodies if road washing is required. • Keep public roads clear of construction debris.	Routine checks of equipment and machinery storage, mats and entrances to municipal roads.	Main facility entrance points and in the construction laydown areas.	Regularly, during the construction phase.	Site records to include details of equipment and material storage.	If soil is mobilized onto paved public roads by equipment, clearing activities to avoid mobilizing soil into nearby water bodies
Operations Phase									
Facility operations may cause an overall decrease in permeability of Project Location due to the impervious surfaces of the PV panels and/or soil compaction from construction activities.	• Water Body 1 • Mud Creek • Tributary 2 to Mud Creek • Tributary 2.1 to Mud Creek • Salmon River • Tributary 1 to Salmon River • Tributary 2 to Salmon River • Tributary 2.1 to Salmon River	• The Project Stormwater Management Plan will be developed to outline the key mitigations required to manage surface water drainage to adjacent water bodies. • The area below the PV panels will be re-vegetated as appropriate, either through seeding or natural re-vegetation. • Following the construction phase and prior to vegetation establishment, areas of soil compaction will be rectified by methods such as scarification, harrowing/tilling, etc. • ESC controls will remain in place until soils are stabilized by vegetative growth.	None. Stormwater management and the vegetation on-site will prevent the mobilization of sediment and surface runoff. Use of herbicides and/or de-icing substances to be used when mechanical measures are insufficient.	Re-establishment of vegetation and management of stormwater will minimize surface water runoff and soil mobilization to receiving water bodies.	Visual check of the Project Location to ensure re-vegetation of lands occurs. Where herbicide and/or de-icing substances are required, visual monitoring to verify impacts to adjacent areas were minimized.	Throughout the Project Location.	Weekly during growing season until evidence of growth is observed, then monthly until all areas are vegetated or re-vegetated.	As part of the Stormwater Management Plan, photo documentation will be collected to document vegetation re-establishment.	If the performance measures are not met, the Stormwater management plan will be reviewed and revised as required. Areas with no growth will be vegetated using an appropriate seed mix. ESC measures will be implemented and maintained until vegetation is observed to be established and thriving.

Potential Environmental Effect	Affected Water Bodies	Mitigation Strategy	Residual Effects	Performance Objective(s)	Monitoring Plan				Contingency Measures
					Methodology	Monitoring Locations	Frequency/ Duration	Reporting Requirements	
A decrease in site permeability may lead to an increase in surface water runoff, potentially contributing to increased erosion, sedimentation, and turbidity to receiving waters. Further, maintenance of the Project Location has the potential to introduce materials that are potentially harmful to the environment such as herbicides and/or de-icing substances	• Tributary 2.2 to Salmon River • Tributary 2.4 to Salmon River • Tributary 3 to Salmon River • Tributary 3.1 to Salmon River • Black Creek • Pennell's Creek • Seepage Areas 1-5	• Maintenance of vegetation will occur in accordance with the mitigation measures outlined in the Environmental Effects Monitoring Plan (see the *Design and Operations Plan*). • Use of herbicides and/or de-icing substances within the Project Location will be minimal and only used as required for maintenance of the Project and to provide safe access to site personnel where other means such as mechanical weed control or removal of ice is ineffective.							
Operations may cause contamination of soils with transformer fluids by accidental spills, and/or contamination of water bodies from surface runoff of fluids or of contaminated soils, potentially impacting water quality and fish habitat.	Pennell's Creek	• Transformers are to be located more than 30 m from water bodies. • Spill containment structures will be constructed in association with the substation. • The Emergency Response and Communication Plan will be followed should a spill occur (as outlined in the *Design and Operations Report*). • The MOECC (Spills Action Centre) will be notified in the event of a spill.	None. In the event of a spill from a transformer, the area of the spill will be remediated.	Avoidance of deleterious materials entering a water body.	Routine checks of transformers to ensure appropriate working order.	Substation location	Throughout Project lifespan.	Site maintenance records to be kept for transformers	The Emergency Response and Communication Plan will be followed should a spill occur (as outlined in the Design and Operations Report). Notification of MOECC (Spills Action Centre) in the event of a spill.

Potential Environmental Effect	Affected Water Bodies	Mitigation Strategy	Residual Effects	Performance Objective(s)	Monitoring Plan				Contingency Measures
					Methodology	Monitoring Locations	Frequency/ Duration	Reporting Requirements	
Decommissioning Phase									
Removal of above-ground Project components may cause increased erosion, sedimentation, and/or turbidity to receiving water bodies, potentially impacting water quality and fish habitat.	• Water Body 1 • Mud Creek • Tributary 2 to Mud Creek • Tributary 2.1 to Mud Creek • Salmon River • Tributary 1 to Salmon River • Tributary 2 to Salmon River • Tributary 2.1 to Salmon River • Tributary 2.2 to Salmon River • Tributary 2.4 to Salmon River • Tributary 3 to Salmon River • Tributary 3.1 to Salmon River • Black Creek • Pennell's Creek • Seepage Areas 1-5	An erosion and sediment control plan will be developed for the site and implemented prior to decommissioning activities.	None. Decommissioned Project components will be removed and the Project Location restored to its original or better condition.	Minimize of surface runoff and soil mobilization to receiving water bodies.	• Routine checks of ESC measures implemented during decommissioning phase. • Routine monitoring to ensure exposed soils are permanently stabilized (unless land is returned to agricultural operations).	Areas where ESC measures are implemented	Monthly and/or after rain events greater than 10 mm until vegetative cover is established (if required).	Site records to include record of ESC monitoring during the decommissioning phase.	If it is determined during the routine checks, that ESC measures are not sufficient, work will stop until appropriate ESC measures can be established. If exposed soil shows signs of mobilization, appropriate corrective actions will be taken to prevent entry of soil into a water body.
Removal of access roads may cause increased sedimentation and turbidity in receiving water bodies due to potential temporary changes in surface water runoff regimes, potentially impacting water quality and fish habitat.	• Mud Creek • Seepage Area 5	• An erosion and sediment control plan will be developed for the site and installed prior to decommissioning activities. • Access roads will be graded (at the discretion of the landowner) to match the surrounding landform. • The road base will be removed (at the discretion of the landowner) and replaced with native soils. • Land will be allowed to re-vegetate naturally or will be seeded to stabilize soils (if not part of an agricultural field).	None. Grading will restore any temporarily changed surface water runoff regimes.	• Minimize surface runoff and soil mobilization to receiving water bodies. • Restoration of surface water runoff regimes.	• Routine checks of ESC measures implemented during decommissioning phase. • Visual checks of surface water runoff patterns.	Areas where ESC measures are implemented and along access roads.	Regular intervals and/or after rain events greater than 10 mm until vegetative cover is established (if required).	Site records to include record of ESC monitoring during the decommissioning phase.	If it is determined during the routine checks, that ESC measures are not sufficient, work will stop until appropriate ESC measures can be established. If exposed soil shows signs of mobilization, appropriate corrective actions will be taken to prevent entry of soil into a water body.

12.0 Negative Environmental Effects, Design and Operations

As required, an environmental effects monitoring plan (EEMP) has been prepared for inclusion in the *Design and Operations Report*. The potential negative environmental effects to water bodies within the Project Location and surrounding 120 m, as outlined in **Table 6,** will be negligible after mitigation measures are implemented. Upon the completion of construction, the exposed soil in the Project Location will be stabilized by re-vegetating as appropriate to the Project area.

Table 6 also summarizes the monitoring plan and monitoring frequency during the design and operation of the solar facility until the vegetation surrounding the Project components is established. Contingency measures that will be undertaken if performance objectives are not achieved are also included. Additional mitigation measures proposed to minimize impacts of the solar facility and not related to water bodies are summarized in the *Design and Operations Report*.

13.0 Negative Environmental Effects, Construction

As required in *Ontario Regulation 359/09*, the *Construction Plan Report* will include the information in **Table 5** and **Table 6** of this *Water Body Report* to address any negative environmental effects anticipated on water bodies within 300 m of the Project Location during the construction phase of the Project. The potential negative environmental effects to water bodies within 300 m of the Project Location, as outlined in **Table 6,** will be negligible after mitigation measures are implemented. During construction of the Project, appropriate erosion and sediment control measures will be implemented according to an ESC Plan.

Table 6 also summarizes the monitoring plan and monitoring frequency during the construction of the Project. Contingency measures that will be undertaken if performance objectives are not achieved are also included. Additional mitigation measures proposed to minimize impacts of the Project and not related to water bodies are summarized in the *Construction Plan Report*.

14.0 Additional Approvals and Permit Requirements

Permitting or approvals that may be required for work within or adjacent to water bodies will be obtained in a parallel process (as applicable) with the REA submission and review. Possible permitting requirements related to water bodies include, but are not limited to, authorizations from the *Lakes and River Improvement Act*, the *Conservation Authorities Act,* the *Fisheries Act*, and the *Drainage Act*.

15.0 Conclusions

Through a records review and site investigation, it was determined that 19 applicable water bodies exist within the Project Location and/or the 120 m prescribed setback area (see **Figure 3**). As such, a *Water Body Report* was required under Section 39 and 40 of *Ontario Regulation 359/09*. This second and final report therefore satisfies the requirements under *Ontario Regulation 359/09* with respect to water bodies.

This *Water Body Report* was completed to mitigate any potential negative environmental effects to the following water bodies (see **Figure 3**):

- Water Body 1
- Mud Creek
- Tributary 2 to Mud Creek
- Tributary 2.1 to Mud Creek
- Salmon River
- Tributary 1 to Salmon River
- Tributary 2 to Salmon River
- Tributary 2.1 to Salmon River
- Tributary 2.2 to Salmon River
- Tributary 2.4 to Salmon River
- Tributary 3 to Salmon River
- Tributary 3.1 to Salmon River
- Black Creek
- Pennell's Creek
- Seepage Area 1
- Seepage Area 2
- Seepage Area 3
- Seepage Area 4
- Seepage Area 5

Table 6 outlines how the activities related to the construction, operation and decommissioning of the solar facility may affect these water bodies and the appropriate mitigation and monitoring work to be implemented. This information is also included in the *Construction Plan Report* and the *Design and Operations Report,* as required.

16.0 References

Fisheries and Oceans Canada. 2007a. Ontario Operational Statement Version 1.0. Overhead Line Construction. 3 pp.

Fisheries and Oceans Canada. 2007b. Ontario Operational Statement Version 1.0. High-Pressure Directional Driling. 3 pp.

Fisheries and Oceans Canada. 2008. Ontario Operational Statement Version 1.0. Isolated or Dry Open-cut Stream Crossings. 4 pp.

Ontario Ministry of the Environmental and Climate Change. 2013. Technical Guide to Renewable Energy Approvals. Queen's Printer for Ontario. 267 pp.

Appendix A

DFO Operational Statements

ISOLATED OR DRY OPEN-CUT STREAM CROSSINGS

Fisheries and Oceans Canada
Ontario Operational Statement

Version 1.0

For the purpose of this Operational Statement, the term "Isolated Crossing" means a temporary stream crossing technique that allows work (e.g., trenched pipeline or cable installation) to be carried out "in-the-dry" while diverting the natural flow around the site during construction. These types of open trenched crossings are isolated using flume or dam and pump techniques (see *Pipeline Associated Watercrossings*, 2005 at **http://www.capp.ca/default.asp?V_DOC_ID=763&PubID=96717**). The term "Dry Open-cut Stream Crossing" means a temporary stream crossing work (e.g., trenched pipeline or cable installation) that is carried out during a period when the entire stream width is seasonally dry or is frozen to the bottom.

The risks to fish and fish habitat associated with isolated open cut stream crossings include the potential for direct damage to substrates, release of excessive sediments, loss of riparian habitat, stranding of fish in dewatered areas, impingement/entrainment of fish at pump intakes, and disruption of essential fish movement patterns. Similarly, dry open-cut stream crossings pose a risk to fish and fish habitat due to potential harmful alteration of substrates, loss of riparian habitat, and release of excessive sediment once stream flows resume.

The order of preference for carrying out a cable or pipeline stream crossing, in order to protect fish and fish habitat, is: a) punch or bore crossing (see *Punch & Bore Crossings* Operational Statement); b) high-pressure directional drill crossing (see *High-Pressure Directional Drilling* Operational Statement); c) dry open-cut crossing; and d) isolated open-cut crossing. This order must be balanced with practical considerations at the site.

Fisheries and Oceans Canada (DFO) is responsible for protecting fish and fish habitat across Canada. Under the *Fisheries Act* no one may carry out a work or undertaking that will cause the harmful alteration, disruption or destruction (HADD) of fish habitat unless it has been authorized by DFO. By following the conditions and measures set out below you will be in compliance with subsection 35(1) of the *Fisheries Act*.

The purpose of this Operational Statement is to describe the conditions under which it is applicable to your project and the measures to incorporate into your project in order to avoid negative impacts to fish habitat. You may proceed with your isolated or dry open-cut stream crossing project without a DFO review when you meet the following conditions:

- if working within the Thames River, Sydenham River, Ausable River, Grand River, or Maitland River, you have contacted your Conservation Authority or local DFO Office (see Ontario DFO office list) to ensure that your project will not impact Schedule I mussel species at risk under the federal *Species at Risk Act* (SARA), before proceeding,
- for dry, open-cut crossings the watercourse is dry or frozen completely to the bottom at the site,
- for isolated crossings, the channel width of the watercourse at the crossing site is less than 5 meters from ordinary high water mark to ordinary high water mark (HWM) (see definition below),
- the isolated crossing does not involve the construction or use of an off-stream diversion channel, or the use of earthen dams,
- the isolated crossing ensures that all natural upstream flows are conveyed downstream during construction, with no change in quality or quantity,
- the site does not occur at a stream location involving known fish spawning habitat, particularly if it is dependent on groundwater upwelling,
- the use of explosives is not required to complete the crossing, and
- you incorporate the *Measures to Protect Fish and Fish Habitat when Carrying Out an Isolated or Dry Open-cut Stream Crossing* listed below.

If you cannot meet all of the conditions listed above and cannot incorporate all of the measures listed below then your project may result in a violation of subsection 35(1) of the *Fisheries Act* and you could be subject to enforcement action. In this case, you should contact your Conservation Authority, or the DFO office in your area (see Ontario DFO office list) or Parks Canada if the project is located within its jurisdiction, including the Trent-Severn Waterway and the Rideau Canal, if you wish to obtain an opinion on the possible options you should consider to avoid contravention of the *Fisheries Act*.

You are required to respect all municipal, provincial and federal legislation that applies to the work being carried out in relation to this Operational Statement. The activities undertaken in this Operational Statement must also comply with SARA (**www.sararegistry.gc.ca**). If you have questions regarding this Operational Statement, please contact one of the agencies listed above.

We ask that you notify DFO, preferably 10 working days before starting your work, by filling out and sending the Ontario Operational Statement notification form (**www.dfo-mpo.gc.ca/regions/central/habitat/os-eo/prov-terr/index_e.htm**) to the DFO office in your area. This information is requested in order to evaluate the effectiveness of the work carried out in relation to this Operational Statement.

Measures to Protect Fish and Fish Habitat when Carrying Out an Isolated or Dry Open-Cut Stream Crossing

1. Use existing trails, roads or cut lines wherever possible, as access routes to avoid disturbance to the riparian vegetation.

2. Locate crossings at straight sections of the stream, perpendicular to the banks, whenever possible. Avoid crossing on meander bends, braided streams, alluvial fans, active floodplains or any other area that is inherently unstable and may result in the erosion and scouring of the stream bed.

3. Complete the crossing in a manner that minimizes the duration of instream work.

4. Construction should be avoided during unusually wet, rainy or winter thaw conditions.

5. While this Operational Statement does not cover the clearing of riparian vegetation, the removal of select plants may be necessary to access the construction site. This removal should be kept to a minimum and within the utility right-of-way.

6. Machinery fording a flowing watercourse to bring equipment required for construction to the opposite side is limited to a one-time event (over and back) and is to occur only if an existing crossing at another location is not available or practical to use. Operational Statements are also available for *Ice Bridges and Snow Fills*, *Clear-Span Bridges*, and *Temporary Stream Crossing*.

    6.1. If minor rutting is likely to occur, stream bank and bed protection methods (e.g., swamp mats, pads) should be used provided they do not constrict flows or block fish passage.
    6.2. Grading of the stream banks for the approaches should not occur.
    6.3. If the stream bed and banks are steep and highly erodible (e.g., dominated by organic materials and silts) and erosion and degradation is likely to occur as a result of equipment fording, then a temporary crossing structure or other practice should be used to protect these areas.
    6.4. Time the one-time fording to prevent disruption to sensitive fish life stages by adhering to appropriate fisheries timing windows (see the *Ontario In-Water Construction Timing Windows*).
    6.5. Fording should occur under low flow conditions and not when flows are elevated due to local rain events or seasonal flooding.

7. Operate machinery in a manner that minimizes disturbance to the watercourse bed and banks.

    7.1. Protect entrances at machinery access points (e.g., using swamp mats) and establish single site entry and exit.
    7.2. Machinery is to arrive on site in a clean condition and is to be maintained free of fluid leaks.
    7.3. Wash, refuel and service machinery and store fuel and other materials for the machinery away from the water to prevent deleterious substances from entering the water.
    7.4. Keep an emergency spill kit on site in case of fluid leaks or spills from machinery.

8. Install effective sediment and erosion control measures before starting work to prevent entry of sediment into the watercourse. Inspect them regularly during the course of construction and make all necessary repairs if any damage occurs.

9. Stabilize any waste materials removed from the work site, above the HWM, to prevent them from entering the watercourse. This could include covering spoil piles with biodegradable mats or tarps or planting them with grass or shrubs.

10. Vegetate any disturbed areas by planting and seeding preferably with native trees, shrubs or grasses and cover such areas with mulch to prevent soil erosion and to help seeds germinate. If there is insufficient time remaining in the growing season, the site should be stabilized (e.g., cover exposed areas with erosion control blankets to keep the soil in place and prevent erosion) and vegetated the following spring.

    10.1. Maintain effective sediment and erosion control measures until re-vegetation of disturbed areas is achieved.

Measures to Protect Fish and Fish Habitat when Carrying Out an Isolated Crossing

Temporary isolation is used to allow work “in-the-dry” while maintaining the natural downstream flow by installing dams up and downstream of the site and conveying all of the natural upstream flow into a flume, or pumping it around the isolated area. In addition to measures 1 to 10, the following measures should be carried out when conducting an isolated stream crossing:

11. Time isolated crossings to protect sensitive fish life stages by adhering to fisheries timing windows (see Measure 6.4).

12. Use dams made of non-earthen material, such as water-inflated portable dams, pea gravel bags, concrete blocks, steel or wood wall, clean rock, sheet pile or other appropriate designs, to separate the dewatered work site from flowing water.

    12.1. If granular material is used to build dams, use clean or washed material that is adequately sized (i.e., moderately sized rock and not sand or gravel) to withstand anticipated flows during the construction. If necessary, line the outside face of dams with heavy poly-plastic to make them impermeable to water. Material to build these dams should not be taken from below the HWM of any water body.
    12.2. Design dams to accommodate any expected high flows of the watercourse during the construction period.

13. Before dewatering, rescue any fish from within the isolated area and return them safely immediately downstream of the worksite.

13.1. You will require a permit from DFO to relocate any aquatic species that are listed as either endangered or threatened under SARA. Please contact your Conservation Authority or the DFO office in your area to determine if an aquatic species at risk is in the vicinity of your project and, if appropriate, use the DFO website at **www.dfo-mpo.gc.ca/species-especes /permits/sarapermits_e.asp** to apply for a permit.

14. Pump sediment laden dewatering discharge into a vegetated area or settling basin, and prevent sediment and other deleterious substances from entering any water body.

15. Remove accumulated sediment and excess spoil from the isolated area before removing dams.

16. Stabilize the **streambed** and restore the original channel shape, bottom gradient and substrate to pre-construction condition before removing dams.

17. Ensure **banks** are stabilized, restored to original shape, adequately protected from erosion and re-vegetated, preferably with native species.

18. If rock is used to stabilize banks, it should be clean, free of fine materials, and of sufficient size to resist displacement during peak flood events. The rock should be placed at the original stream bank grade to ensure there is no infilling or narrowing of the watercourse.

19. Gradually remove the downstream dam first, to equalize water levels inside and outside of the isolated area and to allow suspended sediments to settle.

20. During the final removal of dams, restore the original channel shape, bottom gradient and substrate at these locations.

21. Pumped Diversion
Pumped diversions are used to divert water around the isolated area to maintain natural downstream flows and prevent upstream ponding.

21.1. Ensure intakes are operated in a manner that prevents streambed disturbance and fish mortality. Guidelines to determine the appropriate mesh size for intake screens may be obtained from DFO (e.g., *Freshwater Intake End-of-Pipe Fish Screen Guideline* (1995), available at **www.dfo-mpo.gc.ca/Library/223669.pdf**).

21.2. Ensure the pumping system is sized to accommodate any expected high flows of the watercourse during the construction period. Pumps should be monitored at all times, and back-up pumps should be readily available on-site in case of pump failure.

21.3. Protect pump discharge area(s) to prevent erosion and the release of suspended sediments downstream, and remove this material when the works have been completed.

Measures to Protect Fish and Fish Habitat when Carrying Out a Dry Open-Cut Stream Crossing

In addition to measures 1 to 10, the following measures should be carried out when conducting a dry open-cut stream crossing:

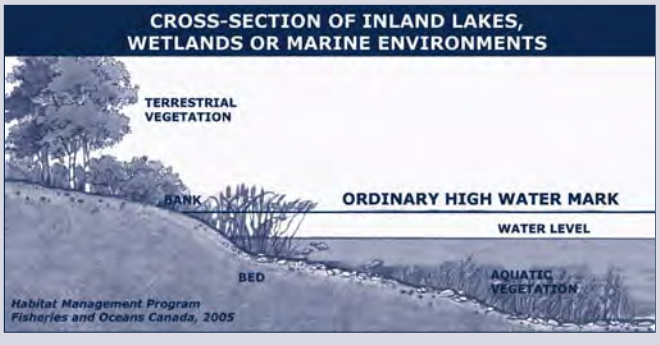
22. Stabilize the **streambed** and restore the original channel shape, bottom gradient and substrate to pre-construction condition.

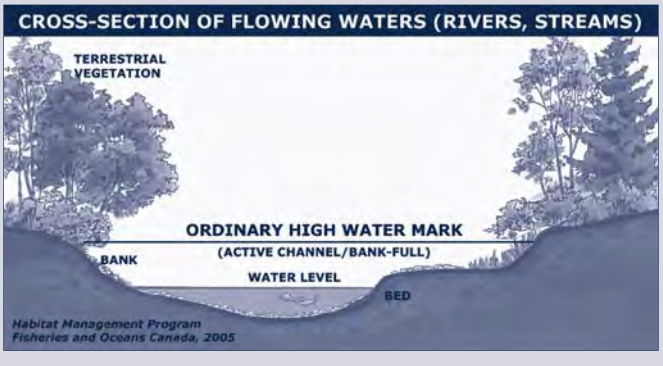
23. Ensure **banks** are stabilized, restored to original shape, adequately protected from erosion and re-vegetated, preferably with native species.

Definition:

Ordinary high water mark (HWM) - The usual or average level to which a body of water rises at its highest point and remains for sufficient time so as to change the characteristics of the land. In flowing waters (rivers, streams) this refers to the "active channel/bank-full level" which is often the 1:2 year flood flow return level. In inland lakes, wetlands or marine environments it refers to those parts of the water body bed and banks that are frequently flooded by water so as to leave a mark on the land and where the natural vegetation changes from predominately aquatic vegetation to terrestrial vegetation (excepting water tolerant species). For reservoirs this refers to normal high operating levels (Full Supply Level).

For the Great Lakes this refers to the 80th percentile elevation above chart datum as described in DFO's Fish Habitat and Determining the High Water Mark on Lakes.





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DFO/2007-1329

OVERHEAD LINE CONSTRUCTION

Fisheries and Oceans Canada
Ontario Operational Statement

Version 3.0

Overhead lines are constructed for electrical or telecommunication transmission across many watercourses that range in size from small streams and ponds to large rivers, lakes and reservoirs. This Operational Statement applies to selective removal of vegetation along the right-of-way to provide for installation and safe operation of overhead lines, and passage of equipment and materials across the water body.

Although fish habitat occurs throughout a water system, it is the riparian habitat that is most sensitive to overhead line construction. Riparian vegetation occurs adjacent to the watercourse and directly contributes to fish habitat by providing shade, cover, and spawning and food production areas. It is important to design and build your overhead line project to meet your needs while also protecting riparian areas. Potential impacts to fish and fish habitat include excessive loss of riparian vegetation, erosion and sedimentation resulting from bank disturbance and loss of plant root systems, rutting and compaction of stream substrate at crossing sites, and disruption of sensitive fish life stages.

Fisheries and Oceans Canada (DFO) is responsible for protecting fish and fish habitat across Canada. Under the *Fisheries Act* no one may carry out a work or undertaking that will cause the harmful alteration, disruption or destruction (HADD) of fish habitat unless it has been authorized by DFO. By following the conditions and measures set out below you will be in compliance with subsection 35(1) of the *Fisheries Act*.

The purpose of this Operational Statement is to describe the conditions under which it is applicable to your project and the measures to incorporate into your project in order to avoid negative impacts to fish habitat. You may proceed with your overhead line project without a DFO review when you meet the following conditions:

- it does not require the construction or placement of any temporary or permanent structures (e.g. islands, poles, crib works, etc.) below the ordinary high water mark (HWM) (see definition below), and
- you incorporate the *Measures to Protect Fish and Fish Habitat when Constructing Overhead Lines* listed below in this Operational Statement.

If you cannot meet all of the conditions listed above and cannot incorporate all of the measures listed below then your project may result in a violation of subsection 35(1) of the *Fisheries Act* and you could be subject to enforcement action. In this case, you should contact your Conservation Authority, or the DFO office in your area (see Ontario DFO office list) or Parks Canada if the project is located within its jurisdiction, including the Trent-Severn Waterway and the Rideau Canal, if you wish to obtain an opinion on the possible options you should consider to avoid contravention of the *Fisheries Act.*

You are required to respect all municipal, provincial or federal legislation that applies to the work being carried out in relation to this Operational Statement. The activities undertaken in this Operational Statement must also comply with the *Species at Risk Act* (**www.sararegistry.gc.ca**). If you have questions regarding this Operational Statement, please contact one of the agencies listed above.

We ask that you notify DFO, preferably 10 working days before starting your work by filling out and sending the Ontario Operational Statement notification form (**www.dfo-mpo.gc.ca/regions/central/habitat/os-eo/prov-terr/index_e.htm**) to the DFO office in your area. This information is requested in order to evaluate the effectiveness of the work carried out in relation to this Operational Statement.

Measures to Protect Fish and Fish Habitat when Constructing Overhead Lines

1. Installing overhead lines under frozen conditions is preferable in all situations. On wet terrains (e.g., bogs), lines should be installed under frozen conditions, where possible, or using aerial methods (i.e., helicopter).

2. Design and construct approaches so that they are perpendicular to the watercourse wherever possible to minimize loss or disturbance to riparian vegetation.

3. Avoid building structures on meander bends, braided streams, alluvial fans, active floodplains or any other area that is inherently unstable and may result in erosion and scouring of the stream bed or overhead line structures.

   3.1. Wherever possible, locate all temporary or permanent structures, such as poles, sufficiently above the HWM to prevent erosion.

4. While this Operational Statement does not cover the clearing of riparian vegetation, the removal of select plants may be necessary to accommodate the overhead line. This removal

should be kept to a minimum and within the road or utility right-of-way.

5. Machinery fording the watercourse to bring equipment required for construction to the opposite side is limited to a one-time event (over and back) and should occur only if an existing crossing at another location is not available or practical to use. A *Temporary Stream Crossing* Operational Statement is also available.

- **5.1.** If minor rutting is likely to occur, stream bank and bed protection methods (e.g., swamp mats, pads) should be used provided they do not constrict flows or block fish passage.
- **5.2.** Grading of the stream banks for the approaches should not occur.
- **5.3.** If the stream bed and banks are steep and highly erodible (e.g., dominated by organic materials and silts) and erosion and degradation is likely to occur as a result of equipment fording, then a temporary crossing structure or other practice should be used to protect these areas.
- **5.4.** Time the one-time fording to prevent disruption to sensitive fish life stages by adhering to appropriate fisheries timing windows (see the *Ontario In-Water Construction Timing Windows*).
- **5.5.** Fording should occur under low flow conditions and not when flows are elevated due to local rain events or seasonal flooding.

6. Operate machinery on land and in a manner that minimizes disturbance to the banks of the watercourse.

- **6.1.** Machinery is to arrive on site in a clean condition and is to be maintained free of fluid leaks.
- **6.2.** Wash, refuel and service machinery and store fuel and other materials for the machinery away from the water to prevent any deleterious substance from entering the water.
- **6.3.** Keep an emergency spill kit on site in case of fluid leaks or spills from machinery.
- **6.4.** Restore banks to original condition if any disturbance occurs.

7. Install effective sediment and erosion control measures before starting work to prevent entry of sediment into the watercourse. Inspect them regularly during the course of construction and make all necessary repairs if any damage occurs.

- **7.1.** Avoid work during wet, rainy conditions or use alternative techniques such as aerial methods (i.e., helicopter) to install overhead lines.

8. Stabilize any waste materials removed from the work site to prevent them from entering the watercourse. This could include covering spoil piles with biodegradable mats or tarps or planting them with grass or shrubs.

9. Vegetate any disturbed areas by planting and seeding preferably with native trees, shrubs or grasses and cover such areas with mulch to prevent erosion and to help seeds germinate. If there is insufficient time remaining in the growing season, the site should be stabilized (e.g., cover exposed areas with erosion control blankets to keep the soil in place and prevent erosion) and vegetated the following spring.

- **9.1.** Maintain effective sediment and erosion control measures until re-vegetation of disturbed areas is achieved.

Definition:

Ordinary high water mark (HWM) – The usual or average level to which a body of water rises at its highest point and remains for sufficient time so as to change the characteristics of the land. In flowing waters (rivers, streams) this refers to the "active channel/bank-full level" which is often the 1:2 year flood flow return level. In inland lakes, wetlands or marine environments it refers to those parts of the water body bed and banks that are frequently flooded by water so as to leave a mark on the land and where the natural vegetation changes from predominately aquatic vegetation to terrestrial vegetation (excepting water tolerant species). For reservoirs this refers to normal high operating levels (Full Supply Level).

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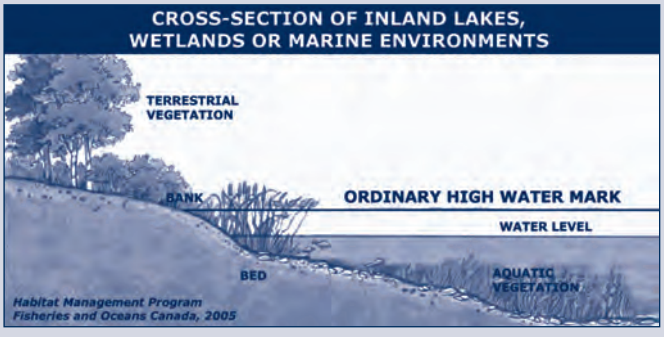

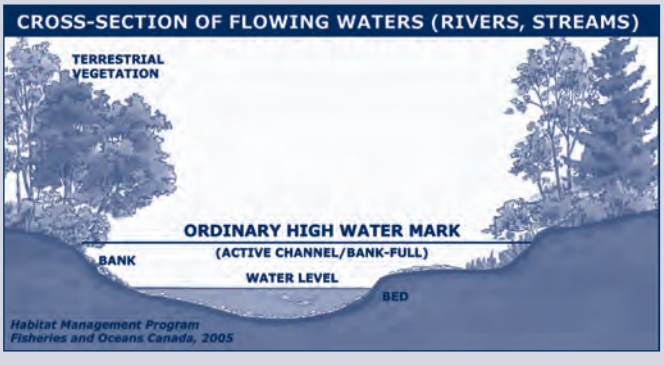

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http://www.dfo-mpo.gc.ca/oceans-habitat/habitat/modernizing-moderniser/epmp-pmpe/index_f.asp

DFO/2007-1329

HIGH-PRESSURE DIRECTIONAL DRILLING

Fisheries and Oceans Canada
Ontario Operational Statement

Version 3.0

For the purpose of this Operational Statement, the term High-Pressure Directional Drilling (HPDD) means trenchless methods of crossing a watercourse using pressurized mud systems. HPDD is used to install cables and pipelines for gas, telecommunications, fibre optics, power, sewer, oil and water lines underneath watercourses and roads. This method is preferable to open-cut and isolated crossings since the cable or pipeline is drilled underneath the watercourse with very little disturbance to the bed or banks. HPDD involves drilling a pilot bore hole underneath the watercourse towards a surface target, back-reaming the bore hole to the drill rig while pulling the pipe along through the hole. This process typically uses the freshwater gel mud system composed of a mixture of clean, freshwater as the base, bentonite (clay-based drilling lubricant) as the viscosifier and synthetic polymers.

The general order of preference for carrying out a cable or pipeline stream crossing in order to protect fish and fish habitat is: a) a punch or bore crossing (see *Punch & Bore Crossings* Operational Statement), b) HPDD crossing, c) dry open-cut crossing, and d) isolated open-cut crossing (see *Isolated or Dry Open-cut Stream Crossings* Operational Statement). This order must be balanced with practical considerations at the site.

One of the risks associated with HPDD is the escape of drilling mud into the environment as a result of a spill, tunnel collapse or the rupture of mud to the surface, commonly known as "frac-out". A frac-out is caused when excessive drilling pressure results in drilling mud propagating toward the surface. The risk of a frac-out can be reduced through proper geotechnical assessment practices and drill planning and execution. The extent of a frac-out can be limited by careful monitoring and having appropriate equipment and response plans ready in the event that one occurs. HPDD can also result in excessive disturbance of riparian vegetation and sedimentation and erosion due to operation of equipment on the shoreline or fording to access the opposite bank.

Fisheries and Oceans Canada (DFO) is responsible for protecting fish and fish habitat across Canada. Under the *Fisheries Act* no one may carry out a work or undertaking that will cause the harmful alteration, disruption or destruction (HADD) of fish habitat unless it has been authorized by DFO. By following the conditions and measures set out below you will be in compliance with subsection 35(1) of the *Fisheries Act.*

The purpose of this Operational Statement is to describe the conditions under which it is applicable to your project and the measures to incorporate into your project in order to avoid negative impacts to fish habitat. You may proceed with your high-pressure directional drill project without a DFO review when you meet the following conditions:

- the crossing technique will not damage the stream bed and thereby negatively impact fish or fish habitat,
- the crossing is not a wet open-cut crossing,
- you have an emergency frac-out response plan and a contingency crossing plan in place that outline the protocol to monitor, contain and clean-up a potential frac-out and an alternative method for carrying out the crossing, and
- you incorporate the *Measures to Protect Fish and Fish Habitat when High-Pressure Directional Drilling* listed below in this Operational Statement.

If you cannot meet all of the conditions listed above and cannot incorporate all of the measures listed below then your project may result in a violation of subsection 35(1) of the *Fisheries Act* and you could be subject to enforcement action. In this case, you should contact your Conservation Authority, or the DFO office in your area (see Ontario DFO office list) or Parks Canada if the project is located within its jurisdiction, including the Trent-Severn Waterway and the Rideau Canal, if you wish to obtain an opinion on the possible options you should consider to avoid contravention of the *Fisheries Act*.

You are required to respect all municipal, provincial or federal legislation that applies to the work being carried out in relation to this Operational Statement. The activities undertaken in this Operational Statement must also comply with the *Species at Risk Act* (**www.sararegistry.gc.ca**). If you have questions regarding this Operational Statement, please contact one of the agencies listed above.

We ask that you notify DFO, preferably 10 working days before starting your work by filling out and sending the Ontario Operational Statement notification form (**www.dfo-mpo.gc.ca/regions/central/habitat/os-eo/prov-terr/index_e.htm**) to the DFO office in your area. This information is requested in order to evaluate the effectiveness of the work carried out in relation to this Operational Statement.

Measures to Protect Fish and Fish Habitat when High-Pressure Directional Drilling

1. Use existing trails, roads or cut lines wherever possible, as access routes to avoid disturbance to the riparian vegetation.

2. Design the drill path to an appropriate depth below the watercourse to minimize the risk of frac-out and to a depth

to prevent the line from becoming exposed due to natural scouring of the stream bed. The drill entry and exit points are far enough from the banks of the watercourse to have minimal impact on these areas.

3. While this Operational Statement does not cover the clearing of riparian vegetation, the removal of select plants may be necessary to access the construction site. This removal should be kept to a minimum and within the road or utility right-of-way.

4. Machinery fording the watercourse to bring equipment required for construction to the opposite side is limited to a one-time event (over and back) and should occur only if an existing crossing at another location is not available or practical to use. A *Temporary Stream Crossing* Operational Statement is also available.

- **4.1.** If minor rutting is likely to occur, stream bank and bed protection methods (e.g., swamp mats, pads) should be used provided they do not constrict flows or block fish passage.
- **4.2.** Grading of the stream banks for the approaches should not occur.
- **4.3.** If the stream bed and banks are steep and highly erodible (e.g., dominated by organic materials and silts) and erosion and degradation are likely to occur as a result of equipment fording, then a temporary crossing structure or other practice should be used to protect these areas.
- **4.4.** Time the one-time fording to prevent disruption to sensitive fish life stages by adhering to appropriate fisheries timing windows (see the *Ontario In-Water Construction Timing Windows*).
- **4.5.** Fording should occur under low flow conditions and not when flows are elevated due to local rain events or seasonal flooding.

5. Operate machinery on land above the ordinary high water mark (see definition below) and in a manner that minimizes disturbance to the banks of the watercourse.

- **5.1.** Machinery is to arrive on site in a clean condition and is to be maintained free of fluid leaks.
- **5.2.** Wash, refuel and service machinery and store fuel and other materials for the machinery away from the water to prevent any deleterious substance from entering the water.
- **5.3.** Keep an emergency spill kit on site in case of fluid leaks or spills from machinery.
- **5.4.** Restore banks to original condition if any disturbance occurs.

6. Construct a dugout/settling basin at the drilling exit site to contain drilling mud to prevent sediment and other deleterious substances from entering the watercourse. If this cannot be achieved, use silt fences or other effective sediment and erosion control measures to prevent drilling mud from entering the watercourse. Inspect these measures regularly during the course of construction and make all necessary repairs if any damage occurs.

- **6.1.** Dispose of excess drilling mud, cuttings and other waste materials at an adequately sized disposal facility located away from the water to prevent it from entering the watercourse.

7. Monitor the watercourse to observe signs of surface migration (frac-out) of drilling mud during all phases of construction.

Emergency Frac-out Response and Contingency Planning

8. Keep all material and equipment needed to contain and clean up drilling mud releases on site and readily accessible in the event of a frac-out.

9. Implement the frac-out response plan that includes measures to stop work, contain the drilling mud and prevent its further migration into the watercourse and notify all applicable authorities, including the closest DFO office in the area (see Ontario DFO office list). Prioritize clean up activities relative to the risk of potential harm and dispose of the drilling mud in a manner that prevents re-entry into the watercourse.

10. Ensure clean up measures do not result in greater damage to the banks and watercourse than from leaving the drilling mud in place.

11. Implement the contingency crossing plan including measures to either re-drill at a more appropriate location or to isolate the watercourse to complete the crossing at the current location. See *Isolated or Dry Open-cut Stream Crossings* Operational Statement for carrying out an isolated trenched crossing.

12. Stabilize any waste materials removed from the work site to prevent them from entering the watercourse. This could include covering spoil piles with biodegradable mats or tarps or planting them with preferably native grass or shrubs.

13. Vegetate any disturbed areas by planting and seeding preferably with native trees, shrubs or grasses and cover such areas with mulch to prevent erosion and to help seeds germinate. If there is insufficient time remaining in the growing season, the site should be stabilized (e.g., cover exposed areas with erosion control blankets to keep the soil in place and prevent erosion) and vegetated the following spring.

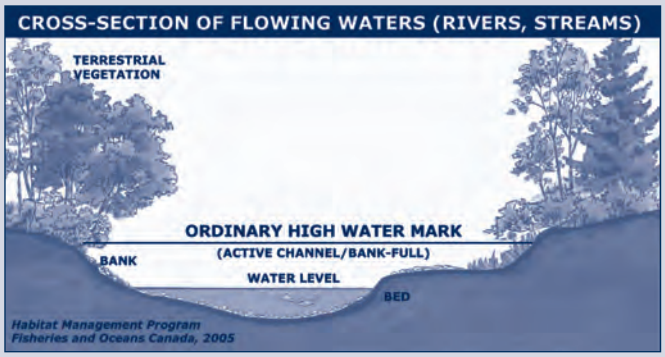
- **13.1.** Maintain effective sediment and erosion control measures until re-vegetation of disturbed areas is achieved.

Definition:

Ordinary high water mark – The usual or average level to which a body of water rises at its highest point and remains for sufficient time so as to change the characteristics of the land. In flowing waters (rivers, streams) this refers to the “active channel/bank-full level” which is often the 1:2 year flood flow return level. In inland lakes, wetlands or marine environments it refers to those parts of the water body bed and banks that are frequently flooded by water so as to leave a mark on the land and where the natural vegetation changes from predominately aquatic vegetation to terrestrial

vegetation (excepting water tolerant species). For reservoirs this refers to normal high operating levels (Full Supply Level).

For the Great Lakes this refers to the 80th percentile elevation above chart datum as described in DFO's *Fish Habitat and Determining the High Water Mark on Lakes*.



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