



**SUNCOR ENERGY
ADELAIDE WIND POWER PROJECT
WATER ASSESSMENT AND WATER
BODY REPORT**

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Prepared for:

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1.0 Introduction

1.1 PROJECT OVERVIEW

Suncor Energy Products Inc. (“Suncor”) is proposing to develop the Suncor Energy Adelaide Wind Power Project (the Project) within the Municipality of Adelaide Metcalfe, County of Middlesex, Ontario.

The Project will include 18 wind turbines (Siemens SWT-2.3-113 operated at a 2.221 MW rating) with an estimated total nameplate capacity of up to 40 MW. The proposed Project would also include access roads, meteorological tower (met tower), electrical collector lines, and a substation which would connect the Project with the provincial high voltage transmission system. Suncor has elected to assess and seek approval for some alternative wind turbine locations. The Renewable Energy Approval (REA) application will consider up to four alternative turbine locations. Final selection of the turbine sites will be determined prior to Project construction and will be based on consultation activities, potential effects assessments, and detailed design / engineering work. A full description of Project infrastructure is provided in the **Project Description Report**. The Project site plan is provided in **Appendix A**.

This Water Assessment and Water Body Report is intended to satisfy the requirements outlined within Ontario Regulation 359/09 and is to be submitted as one component of the Renewable Energy Approval (REA) application for the Project. The Project boundary is not located within the Niagara Escarpment Plan, the Oak Ridges Moraine Conservation Plan Area or the Protected Countryside of the Greenbelt Plan.

The Project Location includes all land and buildings/structures associated with the Project and any air space which the Project will occupy, including temporary lands during construction (“constructible areas”).

A “Zone of Investigation” has been identified based on the requirements of Ontario Regulation 359/09 (O. Reg. 359/09) and the Ministry of Natural Resources’ (MNR) Approval and Permitting Requirements Document (APRD). The zone of investigation encompasses the Project Location and an additional 120 m surrounding the Project Location. This report identifies water bodies that are within the Zone of Investigation and assesses potential negative environmental effects that may result from construction activities. Mitigation measures are also identified to alleviate potential negative environmental effects.

Once the Project layout and locations of water bodies were confirmed, a water records review was conducted according to Section 30(1) of O. Reg. 359/09. Additionally, fish communities were sampled at selected water bodies within the 120 m Zone of Investigation and a general aquatic habitat assessment was conducted. A combination of background data and results of

Stantec’s 2011 and 2012 surveys were used to determine the presence or absence of water bodies and fish habitat within the 120 m Zone of Investigation. Photographs of all water features were taken during field surveys and are included in **Appendix B**.

Locations where water bodies are present within 120 m of a proposed Project Location are presented in Figures 2.1 to 2.13 and summarized in **Table 3.1**. All water bodies identified in this report are located farther than 30 m from any turbine blade tip. The designation of features as water bodies was agreed upon by field staff using field conditions at the time of the survey and the definition of water body provided in O. Reg. 359/09.

This Water Assessment and Water Body Report has been prepared in accordance with O. Reg. 359/09 (s. 39 and 40), the MOE document “Technical Guide to Renewable Energy Approvals”, and the MNR’s APRD.

1.2 REPORT REQUIREMENTS

A Water Assessment includes a records review and site investigation to determine the presence and boundaries of water bodies as defined in O. Reg. 359/09 within 120 m of the Project Location (assuming that no Lake Trout lakes that are at or above development capacity are identified within 300 m). If water bodies are identified within 120 m of the Project Location, a Water Body Report must be prepared.

A renewable energy project includes all activities associated with the construction, installation, use, operation, maintenance, changing or retiring of the renewable energy generation facility. Therefore, for the purposes of measuring the distance from the Project Location to a water body, a Project Location is considered to be the outer limit where site preparation and construction activities will occur and where infrastructure will be located (e.g. temporary structures, laydown areas, storage facilities, generation equipment, access roads, transmission lines less than 50 kilometres in length, etc.).

Table 1.1 summarizes the documentation requirements of the Water Assessment and Water Body Reports as specified under O. Reg. 359/09.

Table 1.1: Water Assessment Report and Water Body Report Requirements: O. Reg. 359/09		
Requirements (Water Assessment)	Completed	Section Reference
A person who proposes to engage in a renewable energy project shall conduct a water assessment, consisting of the following:		
1. A records review conducted in accordance with section 30.	✓	2.2, 4.0
2. A site investigation conducted in accordance with section 31, including:		
31(4)(1). A summary of any corrections to the report.	✓	Section 4, Figures 2.1 to 2.13
31(4)(2). Information relating to each water body.	✓	4.1, 4.2, 4.3, 4.4.
31(4)(3). A map showing boundaries, location/type and distances.	✓	Appendix A, Section 4 Summary Tables

Table 1.1: Water Assessment Report and Water Body Report Requirements: O. Reg. 359/09

Requirements (Water Assessment)	Completed	Section Reference
31(4)(4). A summary of methods used to make observations for the purposes of the site investigation.	✓	2.3
31(4)(5). The name and qualifications of any person conducting the site investigation.	✓	2.4
31(4)(6)(i). The dates and times of the beginning and completion of the site investigation.	✓	2.3
If an investigation was conducted by visiting the site:		
31(4)(6)(ii). The duration of the site investigation.		2.3
31(4)(6)(iii). The weather conditions during the site investigation	✓	2.3
31(4)(6)(iv). Field notes kept by the person conducting the site investigation.	✓	Appendix D
If an alternative investigation of the site was conducted:		
31(4)(7)(i). The dates of the generation of the data used in the site investigation.		N/A
31(4)(7)(ii). An explanation of why the person who conducted the alternative investigation determined that it was not reasonable to conduct the site investigation by visiting the site.		N/A
Requirements (Water Body)		
4. Report identifies and assesses any negative environmental effects of the project on a water body and on land within 30 metres of the water body.	✓	4.6, 5.0
5. Report identifies mitigation measures in respect of any negative environmental effects.	✓	6.0
6. Report describes how the environmental effects monitoring plan addresses any negative environmental effects.	✓	7.0
7. Report describes how the construction plan report addresses any negative environmental effects.	✓	6.0, 7.1

2.0 Methods

2.1 DEFINITION OF A WATER BODY

The presence or absence of water bodies within the Project's 120 m Zone of Investigation was assessed using the definition of a water body provided in O. Reg. 359/09, which is as follows:

"...a lake, a permanent stream, an intermittent stream and a seepage area but does not include, a) grassed waterways, b) temporary channels for surface drainage, such as furrows or shallow channels that can be tilled and driven through, c) rock chutes or spillways, d) roadside ditches that do not contain a permanent or intermittent stream, e) temporarily ponded areas that are normally farmed, f) dugout ponds, or g) artificial bodies of water intended for the storage, treatment or recirculation of runoff from farm animal yards, manure storage facilities and sites and outdoor confinement areas".

2.2 RECORDS REVIEW

A water records review was conducted according to Section 30(1) of O.Reg. 359/09, sending data requests and searching databases as follows:

- Ontario Ministry of Natural Resources
 - Land Information Ontario (LIO) mapping database
 - Natural Heritage Information Centre (NHIC) online database
- Ausable Bayfield Conservation Authority
- St. Clair Region Conservation Authority
- Middlesex County Online Mapping
- Township of Adelaide-Metcalf

Copies of all correspondence related to the Records Review will be provided in the Record of Consultation which will be submitted as part of the complete REA application to the MOE. Information obtained as a result of the information requests/records review are presented in Section 4 of this report. A review of the Crown in the right of Canada is not applicable as there are no federal lands within the Project Location.

Figures depicting the watercourses and waterbodies identified by LIO mapping (MNR, 2009) are included in **Figures 2.1 through 2.13, Appendix A**, where “watercourses” and “waterbodies” are water features (including lakes, rivers, streams, etc.), as mapped by MNR. These water features may or may not meet the definition of a water body as described in Section 2.1. Potential waterbodies were also identified through a review of aerial photographs of the Zone of Investigation. Further information on these potential water bodies was obtained during the site investigations (as described in Section 2.3).

The MNR provided background data regarding fish communities at a number of locations in the Zone of Investigation. The Ausable Bayfield Conservation Authority (ABCA) provided Department of Fisheries and Oceans (DFO) Drain Classification mapping (ABCA, 2004) and fish community data (ABCA, 2010) for watercourses within the Zone of Investigation.

2.3 SITE INVESTIGATIONS

Site investigations were carried out according to Section 31 of O. Reg. 359/09. The investigations were conducted on November 21 through November 23, 2011 and May 14 to 16, 2012 as noted on the field records (see **Appendix D**). Table 2.1 summarizes the weather conditions surrounding the time of the site investigations.

Table 2.1: Weather conditions at the time of Site Investigations*

Dates	Air Temperature (Range) °C	Duration of Site Investigations	Weather Prior to Surveys
November 21 to 23, 2011	0 – 4.3	Nov. 21 - 11:00 am to 5:00 pm Nov. 22 - 8:00 am to 6:00 pm Nov 23 – 8:00 am to 1:00 pm	During the two weeks preceding the field investigations, temperatures were relatively warm and 11 mm of rain was recorded on Nov 14, 2011. During the investigations, the weather was cold, overcast and 20 mm of rain fell on Nov 22, 2011.
May 14 to 16, 2012	10 - 24	May 14 - 7:30 am to 6:30 pm May 15 - 8 am to 5:30 pm May 16 – 8:00 am to 11:00 am	During the two weeks preceding the field investigations, the weather was warm and approximately 30 mm of rain was recorded. During the investigations, the weather was hot and dry with minor precipitation on the morning of May 16, 2012.

*Temperature and rainfall data from the Strathroy-Mullifarry Environment Canada Station (EC 2012).

The purpose of the site investigations was to:

- Ground truth the results of the records review to identify any required corrections;
- Determine whether any additional water bodies exist, other than those identified during the records review; and
- Identify the boundaries of any water body located within 120 m of the Project Location.

While on site, the field crews used visual inspections to verify the presence or absence of potential water bodies within 120 m of the Project Location. In some cases, marshes or portions of other on-line wetland features meet the definition of a water body if they are part of a permanent or intermittent channel or seepage area. All other wetland types do not contain channels and therefore do not meet the definition of a water body under O.Reg. 359/09 and are addressed in the NHA/EIS.

Once the Project layout and locations of water bodies were confirmed, a general aquatic habitat assessment was conducted within the 120 m Zone of Investigation and fish communities were sampled at selected locations. Fish were collected using a Smith Root Model 12 backpack electrofisher or minnow traps and were sampled between May 14 and 16, 2012. In cases where one water body traversed several Project Locations, one or two representative locations were fished to determine the general species assemblage for the watercourse. Specific locations where fishing was completed are identified in Appendix C. A combination of background data and results of Stantec's 2011 and 2012 surveys were used to determine the presence or absence of fish habitat within the 120 m Zone of Investigation.

As a result of the collection of background data and field data, an assessment was made with respect to the presence or absence of fish habitat at each surveyed reach in the Zone of Investigation. The following criteria were used for the designation of fish habitat:

Direct Fish Habitat – Permanent – permanently flowing watercourse with available fish community data (background and/or Stantec surveys).

Direct Fish Habitat – Seasonal – intermittent watercourse (as per drain classification or field observation) that is directly connected to a downstream watercourse that supports fish or where Stantec surveys captured fish.

Indirectly Contributes to Fish Habitat – intermittent flow (as per field observations) and although no fish were observed or captured, the channel contributes indirectly (e.g., allochthonous inputs, flow) to downstream reaches supporting fish.

Not Fish Habitat – not directly connected to a downstream water feature that supports fish or where Stantec surveys captured fish.

2.4 QUALIFICATIONS

The following Stantec personnel were responsible for the identification of water bodies and for determining any implications associated with fish and fish habitat:

- Katie Easterling, H.B.Sc., Dip., EPt – Fisheries Ecologist
- Nancy Harttrup, B.Sc. – Senior Fisheries Ecologist

Curricula vitae are provided in **Appendix F**.

3.0 Water Bodies and Fish Habitat within the 120 m Zone of Investigation

As indicated in Section 2.2, the presence or absence of water bodies within the Zone of Investigation was assessed using the definition of a water body provided in O. Reg. 359/09. Based on the results of field investigations and the records review, water bodies within 120 m of the Project Location are summarized in **Table 3.1** and illustrated in **Figures 2.1 to 2.13 (Appendix A)**. Approximately 13 water features were classified as water bodies within the 120 m Zone of Investigation. Some of the surface water features identified on MNR mapping (e.g. watercourses) did not exist in the field or consisted of surficial drainage; therefore, these features were not classified as water bodies during Stantec's 2011 and 2012 field investigations. During the field investigations, there were no additional water bodies, identified within 120 m of the Project Location other than those described in Sections 4.1, 4.2, 4.3, and 4.4. No lakes or seepage areas were identified during the records review or field investigations. Photographs and field notes of these investigations are provided in **Appendices B, C, and D** respectively.

Additional field surveys included fish sampling at selected locations and an assessment of fish habitat. Fish habitat within the 120 m Zone of the Investigation is identified in **Table 3.1** and is illustrated in **Figure 3.1 to 3.13 (Appendix A)**.

Table 3.1: Summary of Water Bodies and Fish Habitat within the 120 m Zone of Investigation (by subwatershed)

Subwatershed/Tributary/ Reach ID	Crossing Type		w/in 120 m of Turbine or Access Road	Fish Habitat	
	Access Road ^a	Overhead or Underground Collector Line		Direct	Not Fish Habitat
Ausable River					
Lewis Drain Extension Tributary A (Station 17-1 and 17-2)		✓		Seasonal	
Adelaide Creek					
Lenting Drain (Stations 6-1, 6-2, and 23-4)		✓✓		Permanent	
Adelaide Creek (Station 8-1)		✓		Permanent	
Cleland Drain (Station 8-5)			Substation	Permanent	
Unnamed Drain 1 (Station 9-3)		✓		Seasonal	
Adelaide Creek Trib Ad F (Station 9-1)		✓		Seasonal	
Rombout Drain (Stations 10-4 and 10-3)	T 18	✓✓	T 19	Seasonal	
Seeds Drain (Stations 10-2 and 10-3)		✓✓	T 19	Permanent	

Table 3.1: Summary of Water Bodies and Fish Habitat within the 120 m Zone of Investigation (by subwatershed)

Subwatershed/Tributary/ Reach ID	Crossing Type		w/in 120 m of Turbine or Access Road	Fish Habitat	
	Access Road ^a	Overhead or Underground Collector Line		Direct	Not Fish Habitat
Mud Creek					
Gerry Drain (Stations 11-1 and 11-3)			T 16	Permanent	
Sutherland Drain (Station 14-1)		✓		Permanent	
Nettleton Drain (Station 14-2 and 15-3)	T 12	✓	T 12	Permanent	
Unnamed Drain A (Station 15-2)		✓		Seasonal	
Sydenham River					
Unnamed Tributary to Sydenham River (Station 22-2)			Access Road to T 5	Seasonal	

^a includes crane path and underground collector line

T = Turbine

Based on a review of the document entitled “Inland Ontario Lakes Designated for Lake Trout Management” (MNR, 2003), there are no Lake Trout lakes that are at or above development capacity identified within 300 m of the Project Location.

Review of sourcewater protection planning documents indicates that the Project Location is within the Ausable Bayfield Sourcewater Protection Area (ABSPA). According to the assessment report drafted by the Ausable Bayfield Sourcewater Protection Committee (ABSPC) (2011a), two “Highly Vulnerable Aquifers” are located at the northwest limit of the Project Boundary, but are not within the 120 m ZOI. . Specifically, two small aquifers are located along Townsend Line at the corner of Wilson Road east of Sexton Road. No project components are located within or adjacent to the highly vulnerable aquifers. . Additionally, the Project Location is situated within areas classified as “low” and “medium” with respect to groundwater vulnerability (ABSPC 2011b).

4.0 Existing Conditions and Predicted Impacts

In the following sub-sections, available background data are provided for each subwatershed, followed by site-specific information regarding physical habitat and fish communities, as determined by Stantec in 2011 and 2012. Potential impacts to fish habitat and general mitigation measures are provided for each site where fish habitat is present. In some cases, DFO Operational Statements may be used for construction activities in or near water (e.g. crossing watercourses with overhead lines, underground cables, etc.). When an Operational Statement is used, mitigation measures provided in the Operational Statement will protect fish habitat and no further review or approvals are required.

Although specific Operational Statements are referenced in this report, consultation with the ABCA, SCRCA and/or DFO may result in site-specific construction methods and mitigation measures for some locations.

The following information is presented on a subwatershed basis for each Project component. Listed generally north to south, the Project Location has been described according to the following subwatersheds:

- Ausable River Tributary;
- Adelaide Creek;
- Mud Creek; and,
- Sydenham River Tributary.

Information on mapped features that were not deemed to be water bodies is provided in photographs (**Appendix B**) and field notes (**Appendix D**). Within each subwatershed, only those water features occurring within 120 m of the Project Location, and that were deemed to be water bodies, are summarized in Sections 4.1 to 4.4.

4.1 AUSABLE RIVER TRIBUTARY SUBWATERSHED

4.1.1 Lewis Drain Extension Tributary A (Station 17-1 and 17-2)

The Lewis Drain Extension Tributary A generally flows north across the northeast portion of the Project boundary prior to converging with the Kramer Drain and Wood Drain Extension and eventually flowing into the Ausable River. Within the upstream surveyed reach along Newell Road (Station 17-2), no defined channel was observed within the low-lying area. Downstream of Newell Road the Lewis Drain Extension Tributary A (Station 17-1) consists of a narrow and shallow watercourse that flows through an agricultural field. Riparian vegetation is dominated by reed canary grass.

Within the downstream surveyed reach along Crathie Drive (Station 17-1), the Lewis Drain Extension Tributary A is a narrow and shallow watercourse flowing through a relatively straight, incised channel; however, according to mapping this drain may display a more natural meander pattern farther to the north. LIO Drain Classification mapping (LIO 2012) indicates that Lewis Drain Extension Tributary A has been designated a Class F (i.e., intermittent flow). No further background data was available from the ABCA or the MNR regarding watercourse thermal regime classification or the fish community. Electrofishing efforts by Stantec in May 2012 did not yield any fish (**Appendix C** – Station 17-1).

Within the Zone of Investigation, there are:

- Two reaches of Lewis Drain Extension Tributary A that have been designated as a water body that provides seasonal fish habitat, and are crossed by a proposed collector line.

Habitat information at the locations identified in Figure 2.11 is provided in **Table 4.1** along with references to general impacts, mitigation measures and net effects.

Reach ID^a	Site Description*	Proposed Works	Potential Impacts	Mitigation	Net Effects^b
Lewis Drain Extension Tributary A	Likely intermittent flow consisting of both run and pool morphology. Riparian area dominated reed canary grass. Bankfull width = 1.5 m Water depth = 10 cm Substrate = Clay and silt. Fished May 2012 Seasonal Fish habitat	Collector line to cross and be located within 120 m of water body providing fish habitat (Figure 2.11)	With the exception of potential construction activities, collector lines should not affect fish and fish habitat (see Sections 6.1 and 6.3).	See Sections 7.1 and 7.3. Apply DFO Operational Statement for Overhead Line Construction, Directional Drilling or Punch and Bore Crossings (Appendix E)	None expected

a see **Figure 2.11 (Appendix A)**

b assumes all mitigation measures are implemented and successful

*summary of the surveyed reach

4.2 ADELAIDE CREEK SUBWATERSHED

4.2.1 Lenting Drain (Stations 6-1, 6-2 and 23-4)

Lenting Drain is a tributary of Adelaide Creek and generally flows in a northerly direction through the northwest corner of the Project boundary. LIO Drain Classification mapping indicates that Lenting Drain has been designated as a Class D (i.e., permanent flow, cool/coldwater with

sensitive species present) and Class A (i.e., permanent flow, cool/coldwater). One short tributary along Wilson Road is classified as Class F (i.e., intermittent flow) (LIO 2012).

The surveyed reaches consisted of diverse substrates and clear flowing water through an incised channel that flows through a narrow riparian area consisting of reed canary grass surrounded by agricultural fields. Thermal regime data was not available from the MNR or ABCA; however, background fish community data from ABCA (2012) indicate the presence of the following six fish species in Lenting Drain:

- Blacknose Dace
- Bluntnose Minnow
- Creek Chub
- Johnny Darter
- White Sucker
- *Cyprinidae sp.*

Electrofishing efforts by Stantec in May 2012 yielded 29 fish representing the following three fish species (**Appendix C – Station 23-1**):

- Creek Chub
- Blacknose Dace
- Fathead Minnow

Within the Zone of Investigation, there are:

- Three reaches of Lenting Drain that have been designated as a water body that provides fish habitat, and are crossed by a proposed collector line; and,
- One reach of Lenting Drain that has been designated as a water body that provides fish habitat, and is located within 120 m of (but does not cross) a proposed access road and associated underground collector line associated with Turbine 22 and 23.

Habitat information at the locations identified in Figures 2.2, 2.3 and 2.4 is provided in **Table 4.2** along with references to general impacts, mitigation measures and net effects.

4.2.2 Adelaide Creek (Station 8-1)

Adelaide Creek is a large tributary of the Ausable River generally flowing in a northerly direction through the central portion of the Project boundary. According to LIO mapping, within the surveyed reach Adelaide Creek has been designated a Class E drain (i.e., permanent flow, warmwater, with sensitive species present) that consists of a large, wide, deep and sinuous watercourse flowing through agricultural fields (LIO 2012).

Information on the thermal regime of the creek was not available from the MNR or ABCA; however, background fish community data from ABCA (2012) indicate the presence of the following nine fish species in Adelaide Creek:

- Blackside Darter
- Bluntnose Minnow
- Common Carp
- Common Shiner
- Creek Chub
- Green Sunfish
- Johnny Darter
- Northern Pike
- White Sucker

Electrofishing efforts by Stantec in May 2012 yielded 38 fish representing the following six fish species (**Appendix C** – Station 8-1):

- Creek Chub
- Fathead Minnow
- Bluntnose Minnow
- Johnny Darter
- Common Shiner
- Pumpkinseed

Within the Zone of Investigation, there is:

- One reach of Adelaide Creek that has been designated as a water body that provides fish habitat, and is crossed by a proposed collector line; and,
- One reach of Adelaide Creek that has been designated as a water body that provides fish habitat, and is located within 120 m of (but does not cross) a proposed access road and associated underground collector line associated with turbine 20.

Habitat information at the location identified in Figure 2.5 is provided in **Table 4.2** along with references to general impacts, mitigation measures and net effects.

4.2.3 Cleland Drain (Station 8-5)

Cleland Drain is located approximately 1.3 km north of Egremont Road on Kerwood Road and flows through a grassed riparian area surrounded by agricultural fields and forest. This drain consists of a narrow, shallow channel that flows east directly into Adelaide Creek. According to LIO mapping, within the surveyed reach Cleland Creek has been designated a Class C drain (i.e., permanent flow, warmwater, with no sensitive species present) (LIO 2012). Thermal regime data was not available from the MNR or ABCA.

Background fish community data from ABCA (2012) indicate the presence of the following seven fish species from Cleland Drain:

- Blackside Darter
- Bluntnose Minnow
- Creek Chub
- Fathead Minnow
- Green Sunfish
- Johnny Darter
- White Sucker

Electrofishing efforts by Stantec in May 2012 yielded 23 fish representing the following five fish species (**Appendix C** – Station 8-5):

- Creek Chub
- Fathead Minnow
- Bluntnose Minnow
- Johnny Darter
- Pumpkinseed

Within the Zone of Investigation, there is:

- One reach of Cleland Drain that has been designated as a water body that provides fish habitat, and is located within 120 m of the proposed substation.

Habitat information at the location identified in Figure 2.4 is provided in **Table 4.2** along with references to general impacts, mitigation measures and net effects.

4.2.4 Unnamed Drain 1 (Station 9-3)

Unnamed Drain 1 is a short reach of a watercourse that is located approximately 1.7 km east of Kerwood Road on Cuddy Drive. This drain flows north directly into Adelaide Creek on the north side of Cuddy Drive and consists of a narrow, shallow watercourse flowing through a narrow treed riparian area located between two grassed residential properties. The reach upstream of Cuddy Drive consists of a catch basin. LIO Drain Class mapping indicated this reach as as Closed/Tiled drainage (LIO 2012). Field investigations by Stantec in November 2011 noted a narrow, shallow channel flowing into Adelaide Creek. No further background data was available from the ABCA or the MNR regarding thermal regime classification or the fish community of this drain. During the May 2012 surveys, the area within the road Right-of-Way (RoW) was dry. Fish sampling could not be conducted in the downstream reach (outside the RoW) due to a lack of landowner permission. This Unnamed Drain 1 flows directly into Adelaide Creek, thus it is expected that species found in Adelaide Creek could reside in Unnamed Drain 1.

Within the Zone of Investigation, there is:

- One reach of Unnamed Drain 1 that has been designated as a water body that provides seasonal fish habitat, and is crossed by a proposed collector line.

Habitat information at the location identified in Figure 2.5 is provided in **Table 4.2** along with references to general impacts, mitigation measures and net effects.

4.2.5 Adelaide Creek Trib Ad F (Station 9-1)

Adelaide Creek Trib Ad F generally flows north through agricultural fields located in the central portion of the Project boundary and eventually drains into Adelaide Creek. This watercourse is a narrow, slightly incised, clay channel that shows evidence of erosion within the downstream reach. LIO Drain Classification mapping indicates that this tributary has been designated Class F (i.e., intermittent flow) (LIO 2012). No background information was available from the MNR or the ABCA regarding watercourse thermal regime. Electrofishing efforts by Stantec in May 2012 did not yield any fish (**Appendix C** – Station 9-1).

Within the Zone of Investigation, there is:

- One reach of Adelaide Creek Trib Ad F that has been designated as water body that provides seasonal fish habitat, and is crossed by a proposed collector line.

Habitat information at the locations identified in **Figures 2.6** is provided in **Table 4.2** along with references to general impacts, mitigation measures and net effects.

4.2.6 Rombout Drain (Station 10-3 and 10-4)

Rombout Drain generally flows northeast from Cuddy Drive and flows into Seeds Drain along Seed Road. Within the surveyed reach, this watercourse consists of a narrow, grass vegetated, incised channel with evidence of erosion within the upstream section. LIO Drain Classification mapping has designated the surveyed portion of Rombout Drain as a Class F (i.e., intermittent flow) (LIO 2012). No further background information was available from the ABCA or the MNR regarding thermal regime classification or fish communities of this drain. Electrofishing efforts by Stantec in May 2012 at the confluence of Seeds Drain and Rombout Drain yielded 20 fish representing the following three fish species (**Appendix C** –Station 10-3):

- Creek Chub
- Fathead Minnow
- Pumpkinseed

Within the Zone of Investigation, there is:

- One reach of Rombout Drain that has been designated as a water body that provides seasonal fish habitat, and is crossed by a proposed collector line; and,
- One reach of Rombout Drain that has been designated as a water body that provides seasonal fish habitat, and is crossed by a proposed access road and associated underground collector line associated with Turbine 18.

Habitat information at the locations identified in Figures 2.6 and 2.7 is provided in **Table 4.2** along with references to general impacts, mitigation measures and net effects.

4.2.7 Seeds Drain (Station 10-2 and 10-3)

Seeds Drain generally flows north along Seed Road before angling west to drain into Adelaide Creek south of Townsend Line. Within the surveyed reach, this watercourse consists of a narrow, incised grass lined channel flowing through agricultural fields. Erosion was noted in the downstream section and during the Spring 2012 surveys, iron staining was visible along the banks, suggesting a possible groundwater input nearby. LIO Drain Classification mapping has designated the surveyed portion of Seeds Drain as a Class F (i.e., intermittent flow) (LIO 2012). No further background information was available from the ABCA or the MNR regarding thermal regime classification or fish communities of this drain. Electrofishing efforts by Stantec in May 2012 at the confluence of Rombout Drain and Seeds Drain, and upstream along Seeds Drain at Cuddy Drive yielded 21 fish representing the following three fish species (**Appendix C - Stations 10-2 and 10-3**):

- Creek Chub
- Fathead Minnow
- Pumpkinseed
- Brook Stickleback

Within the Zone of Investigation, there is:

- One reach of Seeds Drain that has been designated as a water body that provides fish habitat, and is within 120 m of (but does not cross) a proposed collector line;
- One reach of Seeds Drain that has been designated as a water body that provides fish habitat, and is crossed by a proposed collector line; and,
- One reach of Seeds Drain that has been designated as a water body that provides fish habitat, and is within 120 m of (but does not cross) a proposed access road, associated underground collector line and turbine (Turbine 19).

Habitat information at the locations identified in Figures 2.6 is provided in **Table 4.2** along with references to general impacts, mitigation measures and net effects.

Table 4.2: Summary of Fish Habitat Within the 120 m Zone of Investigation – Adelaide Creek Subwatershed

Reach ID ^a	Site Description*	Proposed Works	Potential Impacts	Mitigation	Net Effects ^b
Lenting Drain	<p>Permanent flow dominated by run morphology. Riparian area consists of herbaceous plant species such as grasses and teasel.</p> <p>Bankfull width = 3 - 4 m</p> <p>Water depth = 5 -30 cm</p> <p>Substrate = clay, silt, boulder, gravel, cobble and detritus</p> <p>Fished May 2012</p> <p>Fish habitat</p>	<p>Collector line to cross a water body providing fish habitat. Collector line and access road to Turbines 22 and 23 to be located within 120 m of water body providing fish habitat.</p> <p>(Figures 2.2, 2.3 and 2.4).</p>	<p>Construction activities associated with the installation of the turbine access road may affect the reach (e.g. Temporary increase in surface water turbidity due to runoff during construction. See Section 6.1.)</p> <p>With the exception of potential construction activities, collector lines and turbine access roads should not affect fish and fish habitat. See Sections 6.1 and 6.3.</p>	<p>See Sections 7.1 and 7.3. Apply DFO Operational Statement for Overhead Line Construction, Directional Drilling or Punch and Bore Crossings (Appendix E)</p>	None expected
Adelaide Creek	<p>Permanent flow dominated by run morphology. Riparian area consists of dense shrubs and herbaceous plant species upstream of Cuddy Drive. Downstream riparian area is dominated by herbaceous species with sparse dogwood.</p> <p>Bankfull width = 15 m</p> <p>Water depth = > 1 m</p> <p>Substrate = Clay, silt and cobble</p> <p>Fished May 2012</p> <p>Fish habitat</p>	<p>Collector line to cross and be located within 120 m of water body providing fish habitat. Turbine #20 access road to be located within 120 m of water body providing fish habitat (Figure 2.5).</p>	<p>Construction activities associated with the installation of the turbine access road may affect the reach (e.g. Temporary increase in surface water turbidity due to runoff during construction. See Section 6.1.)</p> <p>With the exception of potential construction activities, collector lines should not affect fish and fish habitat. See Sections 6.1 and 6.3.</p>	<p>See Sections 7.1 and 7.3. Apply DFO Operational Statement for Overhead Line Construction, Directional Drilling or Punch and Bore Crossings (Appendix E)</p>	None expected

Table 4.2: Summary of Fish Habitat Within the 120 m Zone of Investigation – Adelaide Creek Subwatershed

Reach ID ^a	Site Description*	Proposed Works	Potential Impacts	Mitigation	Net Effects ^b
Cleland Drain	Permanent flow dominated by run morphology. Riparian area consists predominantly of grasses, with sparse trees. Bankfull width = 3 m Water depth = 0.2 m Substrate = Silt, clay and gravel Watercress observed at road culvert, suggesting groundwater inputs. Fished May 2012 Fish habitat	Substation to be located within 120 m of water body providing fish habitat (Figure 2.4)	Construction activities associated with the installation of the substation may affect the reach (e.g. Temporary increase in surface water turbidity due to runoff during construction. See Section 6.1.)	See Sections 7.1.	None expected
Unnamed Drain 1	Likely intermittent. Flow dominated by pool morphology. Riparian area dominated by grasses with sparse trees and shrubs. Bankfull width = 6 m Water depth = 50 cm Substrate = Clay, boulder and detritus Seasonal Fish Habitat	Collector line to be located within 120 m of water body providing fish habitat. (Figure 2.5)	With the exception of potential construction activities, collector lines should not affect fish and fish habitat. See Sections 6.1 and 6.3.	See Sections 7.1 and 7.3. Apply DFO Operational Statement for Overhead Line Construction, Directional Drilling or Punch and Bore Crossings (Appendix E)	None expected
Adelaide Creek Trib Ad F	Likely intermittent. Flow dominated by pool morphology. Sparse cover provided by dense herbaceous vegetation in riparian area. Bankfull width = 4 m Water depth = 10 cm Substrate = clay and boulder Fished August 2011 Seasonal Fish habitat	Collector line to cross and be located within 120 m of water body providing fish habitat. (Figures 2.6)	With the exception of potential construction activities, collector lines should not affect fish and fish habitat. See Sections 6.1 and 6.3.	See Sections 7.1 and 7.3. Apply DFO Operational Statement for Overhead Line Construction, Directional Drilling or Punch and Bore Crossings (Appendix E)	None expected

Table 4.2: Summary of Fish Habitat Within the 120 m Zone of Investigation – Adelaide Creek Subwatershed

Reach ID ^a	Site Description*	Proposed Works	Potential Impacts	Mitigation	Net Effects ^b
Rombout Drain	Likely intermittent. Flow dominated by pool morphology. Riparian vegetation dominated by dense herbaceous vegetation such as grasses and teasel. Bankfull width = 0.4 m Water depth = 7 cm Substrate = clay and gravel Fished May 2012 Fish habitat	Collector line to cross a water body providing fish habitat. Turbine #18 access road and underground collector line to cross a water body providing fish habitat immediately downstream but consists of tile drainage at the crossing and upstream of the crossing. The blade tip of Turbine #19 is 92 m from Rombout Drain (Figures 2.6 and 2.7).	Construction activities associated with the installation of the turbine access road may affect the reach (e.g. Temporary increase in surface water turbidity due to runoff during construction. See Section 6.1.) With the exception of potential construction activities, collector lines and turbine access roads should not affect fish and fish habitat. See Sections 6.1 and 6.3.	See Sections 7.1, 7.2 and 7.3. Apply DFO Operational Statement for Overhead Line Construction, Directional Drilling or Punch and Bore Crossings (Appendix E)	Culvert under access road. Can likely be mitigated – unlikely that DFO authorization would be required.
Seeds Drain	Permanent flow dominated by pool morphology. Riparian area is predominantly herbaceous vegetation with sparse shrubs. Bankfull width = 6 m Water depth = 7 - 15 cm Substrate = clay, boulder, gravel and detritus Fished May 2012 Fish habitat Iron staining suggests the presence of groundwater inputs.	Collector line to cross and be located within 120 m of water body providing fish habitat. Turbine #19 access road and underground collector line to be located within 120 m of water body providing fish habitat. The blade tip of Turbine #19 is 92 m from Seeds Drain (Figures 2.6).	With the exception of potential construction activities, collector lines and turbine access roads should not affect fish and fish habitat. See Sections 6.1 and 6.3.	See Sections 7.1 and 7.3. Apply DFO Operational Statement for Overhead Line Construction, Directional Drilling or Punch and Bore Crossings (Appendix E)	None expected

a see **Figures 2.2 through 2.7 (Appendix A)**

b assumes all mitigation measures are implemented and successful

*summary of the surveyed reach

4.3 MUD CREEK SUBWATERSHED

4.3.1 Gerry Drain (Station 11-1 and 11-3)

Gerry Drain generally flows north through the central portion of the Project boundary, prior to converging with the mainstem of Mud Creek. Within the surveyed reach, this drain consists of a narrow, deeply incised channel flowing through a grassy riparian area surrounded by agricultural fields. LIO Drain Classification mapping indicates that Gerry Drain has been designated a Class C (i.e., permanent flow, warmwater with no sensitive species present) (LIO 2012). No further background information was available from the ABCA or the MNR regarding thermal regime classification or fish communities of this drain. Electrofishing efforts by Stantec during May 2012 yielded nine Brook Stickleback and 12 Fathead Minnow (**Appendix C – Station 11-3**).

Within the Zone of Investigation, there is:

- One reach that has been designated as a water body that provides fish habitat, and is within 120 m of a proposed turbine 16, access road and associated underground collector line.

Habitat information at the location identified in Figure 2.7 is provided in **Table 4.3** along with references to general impacts, mitigation measures and net effects.

4.3.2 Sutherland Drain (Station 14-1)

Sutherland Drain consists of a somewhat wide, relatively straight, incised channel generally flowing northeast through a narrow grassy riparian area within the central portion of the Project boundary. LIO Drain Classification mapping indicates that this tributary of Mud Creek has been designated a Class F (i.e., intermittent flow) (LIO 2012). No further background data was available from the ABCA or the MNR regarding watercourse thermal regime classification or the fish community. Electrofishing efforts by Stantec during May 2012 yielded eight Fathead Minnow (**Appendix C – Station 14-1**).

Within the Zone of Investigation, there is:

- One reach of Sutherland Drain has been designated as a water body that provides fish habitat, and is crossed by proposed collector lines; and,
- One reach of Sutherland Drain has been designated as a water body that provides fish habitat and is located within 120 m of (but does not cross) a proposed access road and associated underground collector line associated with Turbine 13.

Habitat information at the location identified in Figure 2.8 is provided in **Table 4.3** along with references to general impacts, mitigation measures and net effects.

4.3.3 Nettleton Drain (Stations 14-2 and 15-3)

Nettleton Drain generally flows northwest through the eastern/central portion of the Project boundary to converge with Sutherland Drain at the intersection of Cuddy Drive and Robotham Road. This drain consists of a narrow, deeply incised channel flowing through a narrow grassy riparian area and surrounded by agricultural fields. According to LIO Drain Classification mapping, Nettleton Drain has been designated a Class F (i.e., intermittent flow) (LIO 2012). No further background data was available from the ABCA or the MNR regarding watercourse thermal regime classification or the fish community. No fish were captured during the May 2012 electrofishing survey (**Appendix C** – Station 14-2). This drain is directly connected to Sutherland Drain and thus the fish species found in Sutherland Drain may also be present in Nettleton Drain.

Within the Zone of Investigation, there is:

- One reach of Nettleton Drain that has been designated as a water body that provides fish habitat, and is crossed by a collector line;
- One reach of Nettleton Drain that has been designated as a water body that provides fish habitat, and is crossed by an access road and associated underground collector lines associated with proposed Turbine 12; and,
- One reach of Nettleton Drain that has been designated as water body that provides fish habitat, and is within 120 m of proposed Turbine 12.

Habitat information at the locations identified in Figure 2.8 and 2.10 is provided in **Table 4.3** along with references to general impacts, mitigation measures and net effects.

4.3.4 Unnamed Drain A (Station 15-2)

Unnamed Drain A is a small tributary drain that converges with Mud Creek and Sutherland Drain southeast of Robotham Road and Townsend Line. During the November 2011 field investigation, a narrow, incised, grassy channel with minimal flow was observed flowing through the surrounding agricultural fields. LIO Drain Classification mapping indicates that Unnamed Drain A is designated a Class F (i.e., intermittent flow) (LIO 2012). No further background data was available from the ABCA or the MNR regarding watercourse thermal regime classification or the fish community. Stantec was unable to conduct electrofishing sampling in 2012 at proposed collector line crossing location due to insufficient water depths.

Within the Zone of Investigation, there is:

- One reach of Unnamed Drain A that has been designated as water body that provides seasonal fish habitat and is within 120 m of proposed collector lines.

Habitat information at the location identified in Figure 2.10 is provided in **Table 4.3** along with references to general impacts, mitigation measures and net effects.

Table 4.3: Summary of Fish Habitat Within the 120 m Zone of Investigation – Mud Creek Subwatershed

Reach ID ^a	Site Description*	Proposed Works	Potential Impacts	Mitigation	Net Effects ^b
Gerry Drain	Permanent flow dominated by run morphology. Riparian area dominated by herbaceous meadow species, with sparse trees. Bankfull width = 3.5 m Water depth = 15 cm Substrate = Clay, wilt and detritus Fished May 2012 Fish habitat	Turbine #16 and associated access road to be located within 120 m of water body providing fish habitat. The blade tip of Turbine #16 is 68 m from Gerry Drain (Figure 2.7).	Construction activities within the constructible area of Turbine #16 may affect the reach despite being outside of the turbine constructible area (e.g. Temporary increase in surface water turbidity due to runoff during construction. See Section 6.1.) With the exception of potential construction activities, turbine access roads should not affect fish and fish habitat. See Sections 6.1 and 6.3.	See Sections 7.1.	None expected
Sutherland Drain	Permanent flow dominated by run and pool morphology. Upstream of Cuddy Road, the riparian area is dominated by willows and grass. Downstream of Cuddy Road, the riparian area consists of herbaceous meadow species. Bankfull width = 6 m Water depth = 20 cm Substrate = Clay, boulder, silt and detritus Fished May 2012 Fish habitat	Collector line to cross and be located within 120 m of water body providing fish habitat. (Figure 2.8)	With the exception of potential construction activities, collector lines should not affect fish and fish habitat. See Sections 6.1 and 6.3.	See Sections 7.1 and 7.3. Apply DFO Operational Statement for Overhead Line Construction, Directional Drilling or Punch and Bore Crossings (Appendix E)	None expected

SUNCOR ENERGY ADELAIDE WIND POWER PROJECT

WATER ASSESSMENT AND WATER BODY REPORT

Existing Conditions and Predicted Impacts

November 2012

Table 4.3: Summary of Fish Habitat Within the 120 m Zone of Investigation – Mud Creek Subwatershed

Reach ID ^a	Site Description*	Proposed Works	Potential Impacts	Mitigation	Net Effects ^b
Nettleton Drain	<p>Permanent flow dominated by run and pool morphology. Riparian area contains a mix of herbaceous meadow species and woody shrubs, including goldenrod, teasel, and dogwood.</p> <p>Bankfull width = 4 - 8 m</p> <p>Water depth =15-50 cm</p> <p>Substrate = Clay, silt and gravel</p> <p>Fished May 2012</p> <p>Fish habitat</p>	<p>Collector lines to be located within 120 m of a water body providing fish habitat (Station 14-2).</p> <p>Collector lines to cross a water body providing fish habitat (Station 14-2).</p> <p>Underground collector lines and access roads associated with Turbine 12 to cross a water body providing fish habitat (Station 15-3).</p> <p>Turbine #12 and associated access road to be located within 120 m of a water body providing fish habitat (Station 15-3). The blade tip of Turbine #12 is 101 m from Nettleton Drain (Figure 2.8 and 2.10).</p>	<p>Construction activities within the constructible area of Turbine #12 may affect the reach despite being outside of the turbine constructible area (e.g. Temporary increase in surface water turbidity due to runoff during construction. See Section 6.1.)</p> <p>With the exception of potential construction activities, collector lines, turbine access roads and laydown area should not affect fish and fish habitat. See Sections 6.1, 6.2, 6.3 and 6.4.</p>	<p>See Sections 7.1, 7.2, 7.3 and 7.4.</p> <p>Apply DFO Operational Statement for Overhead Line Construction, Directional Drilling or Punch and Bore Crossings (Appendix E)</p>	<p>Replacement of access road culvert. Can likely be mitigated – unlikely that DFO authorization would be required.</p>
Unnamed Drain A	<p>Likely intermittent flow downstream of Crathie Drive, no channel observed upstream. Riparian area predominantly consists of herbaceous meadow species such as goldenrod, grass, and teasel.</p> <p>Bankfull width = 2 m</p> <p>Water depth = 5 cm</p> <p>Substrate = Clay and silt</p> <p>Seasonal fish habitat</p>	<p>Collector line to be located within 120 m of water body providing seasonal fish habitat. (Figure 2.10)</p>	<p>With the exception of potential construction activities, collector lines should not affect fish and fish habitat. See Sections 6.1 and 6.3.</p>	<p>See Sections 7.1 and 7.3. Apply DFO Operational Statement for Overhead Line Construction, Directional Drilling or Punch and Bore Crossings (Appendix E)</p>	<p>None expected</p>

a see Figures 2.7 through 2.10 (Appendix A)

b assumes all mitigation measures are implemented and successful

*summary of the surveyed reach

4.4 SYDENHAM RIVER SUBWATERSHED

4.4.1 Unnamed Tributary to Sydenham River (Station 22-2)

This Unnamed Tributary to Sydenham River generally flows south through the southeastern portion of the Project boundary, prior to converging with the Sydenham River south of Highway 402. Downstream of Egremont Road a short tributary consisting of a shallow, incised, grassy channel trampled by cattle, flows through the adjacent agricultural fields to join with the main tributary in the large pasture to the south. LIO Drain Classification mapping indicates that this Unnamed Tributary to Sydenham River has been designated as 'unknown' (LIO 2012). No further background information was available from the SCRCA or the MNR regarding thermal regime classification or fish communities of this drain. Electrofishing efforts by Stantec during May 2012 at Station 22-4 (downstream) yielded seven fish representing the following three species (**Appendix C** – Station 22-4):

- Pumpkinseed
- Fathead Minnow
- White Sucker

Within the Zone of Investigation, there is:

- One reach that has been designated as a water body that provides fish habitat, and is located within 120 m of a proposed access road and associated underground collector line with Turbine 5 (Station 22-2);

Habitat information at the location identified in Figure 2.12 is provided in **Table 4.4** along with references to general impacts, mitigation measures and net effects.

Table 4.4: Summary of Fish Habitat Within the 120 m Zone of Investigation – Sydenham River Subwatershed

Reach ID ^a	Site Description*	Proposed Works	Potential Impacts	Mitigation	Net Effects ^b
Unnamed Tributary to Sydenham River	Seasonal flow dominated by pool morphology. Riparian area consists of grassed cattle pasture. Bankfull width = 4 m Water depth = 10 cm Substrate = soil Fished May 2012 Fish habitat	Turbine #5 access road and associated underground collector line to be located within 120 m of a water body providing fish habitat (Station 22-2) (Figure 2.16).	With the exception of potential construction activities, collector lines and access roads located within 120 m should not affect fish and fish habitat. See Sections 6.1, 6.2 and 6.4	See Sections 7.1 and 7.2 (Appendix E)	None expected

a see Figure 2.12 (Appendix A)

b assumes all mitigation measures are implemented and successful

*summary of the surveyed reach

4.5 SUMMARY OF PREDICTED IMPACTS TO FISH HABITAT AND APPROVAL PROCESS

Based on the current Project layout, in-water work has the potential to affect fish or fish habitat, or areas that contribute indirectly to fish habitat, at two watercourse locations (**Table 4.5**).

Based on previously submitted REA applications, it is likely that most Project-related impacts to water bodies and aquatic habitat can be mitigated. Locations where further DFO consultation will occur during the permitting process include sites where new roads and culverts are proposed. At these locations, DFO can issue a Letter of Advice if they conclude that the works can be conducted in a manner that will not require a *Fisheries Act* authorization. Suncor will comply with any conditions and recommendations resulting from the DFO consultation process.

Table 4.5: Locations of Potential Net Effects to Fish and Fish Habitat

Subwatershed/Reach ID	Fish Habitat Type	
	Direct	Indirect
Ausable River	None	None
Adelaide Creek		
Rombout Drain (Station 10-4)	√	
Mud Creek		
Nettleton Drain (Station 15-3)	√	
Sydenham River Tributaries	None	None

The conclusions of No Net Effects (Table 4.4) assume that negative effects associated with turbine construction, underground (or overhead if required) collector line installation can be mitigated. If conditions of applicable Operational Statements can be met and the mitigation measures implemented no further DFO review or approvals would be required. Although specific Operational Statements are referenced in this report, consultation with the DFO may result in site-specific construction methods and mitigation measures for some locations.

5.0 General Overview of Potential Impacts

5.1 GENERAL CONSTRUCTION-RELATED IMPACTS

The potential impacts of Project construction activities to watercourses located within 120 m of the Project Location could include:

- Short-term increase in turbidity from runoff and soil erosion during construction; and
- Water quality and habitat disturbance effects to aquatic habitat.

5.2 CULVERTS AND ACCESS ROADS

Potential impacts related to the installation and maintenance of culvert crossings in addition to the general impacts listed above may include:

- Disturbance to aquatic biota and habitat during installation;
- Permanent enclosure of portions of a watercourse;
- Loss of bed material within the length of the culvert; and
- Changes to riparian vegetation within road allowance.

Culverts must be designed and installed such that there is no:

- Restriction of flows through the culvert resulting in upstream pooling;
- Erosion at the culvert inlets and outlets; and
- Barrier to fish passage to upstream environments.

5.3 OVERHEAD COLLECTOR LINES

Short-term impacts on watercourses may include loss of riparian vegetation which can result in increased turbidity during construction but also affects fish habitat by removing sources of shade, cover and food production. There are no long term impacts associated with the operation and maintenance of overhead collector lines.

5.5 UNDERGROUND COLLECTOR LINES

Potential impacts to fish and fish habitat related to the installation of underground collector lines are as follows:

- Erosion and sedimentation from site disturbance and dewatering;
- Collapse of the punch or bore hold under the stream;
- Disturbing riparian vegetation can reduce shoreline cover, shade and food production areas; and
- Machinery fording the stream can disturb bottom and bank substrates, disrupt sensitive fish life stages and introduce deleterious substances i.e. equipment is not properly maintained.

5.6 SUBSTATION AND OPERATIONS

The potential for effects on watercourses exists from soil erosion resulting from unavoidable removal of stabilizing vegetative cover during construction activities. Erosion can cause sediment transport to nearby watercourses and a short-term increase in surface water turbidity, including associated impacts to fish and fish habitat. Due to the rural and agricultural land uses within the Project boundary, the watercourses are not highly sensitive to temporary disturbances. However, the magnitude and duration of potential effects to watercourses depend on the specific characteristics of each watercourse (e.g. flow regime, water velocity, bed substrates, bank conditions, local soils and the extent and duration of exposure).

Some materials, such as fuel, lubricating oils and other fluids associated with electrical equipment operation and maintenance have the potential for release to the environment in the event of accidental spills. An appropriate spill containment system should be installed or kept on-site as necessary.

6.0 Standard Mitigation Measures for Working around Fish Habitat

Standard mitigation measures used for works in and around water are summarized below. Specific details of the mitigation measures to be implemented would be determined through consultations with the local municipality, the ABCA, the SCRCA, and DFO. The extent of mitigation would be dependent on project details such as technical requirements, construction methods and schedule.

The mitigation measures provided below include specific construction activities that may be applicable. Since specific construction details are not known at the time of report preparation, the list is extensive such that all measures are included and the appropriate measures will be applied as needed. For example, methods for collector line crossings of water bodies are not known; therefore, mitigation measures for open cut methods and drilling under the watercourse are included. Specific timing of construction is not known at this time. Measures for the use of coffer dams (dam and pump) and fish removals are included in the event they will be required. If the drain is dry at the time of construction, these measures would not be applicable.

6.1 GENERAL MITIGATION MEASURES

There are many mitigation measures to protect fish and fish habitat from potential effects during the construction phase of a project. General mitigation measures for construction activities near a watercourse in the Zone of Investigation include:

- All in-water work would be completed within MNR timing windows to protect local fish populations during their spawning and egg incubation periods. A typical construction timing window for warmwater streams in the Aylmer District is July 1 to March 15.
- All materials and equipment used for the purpose of site preparation and Project construction shall be operated and stored in a manner that prevents any deleterious substance (e.g., petroleum products, silt, etc.) from entering the water:
 - Any stockpiled materials should be stored and stabilized away from the water;
 - Refuelling and maintenance of construction equipment should occur a minimum of 100 m from a water body;
 - As appropriate, spills should be reported to the MOE Spills Action Centre;
 - Any part of equipment entering the water should be free of fluid leaks and externally cleaned/degreased to prevent any deleterious substance from entering the water; and
 - Only clean material, free of fine particulate matter should be placed in the water.
- Sediment and erosion control measures should be implemented prior to construction and maintained during the construction phase to prevent entry of sediment into the water:

- Silt fencing and/or barriers should be used along all construction areas adjacent to natural areas;
- No equipment should be permitted to enter any natural areas beyond the silt fencing during construction;
- All sediment and erosion control measures should be inspected at least weekly and during and immediately following rainfall events to ensure that they are functioning properly and are maintained and/or upgraded as required;
- Topsoil stockpiles should be sufficiently distant from watercourses to preclude sediment inputs due to erosion of stored soil materials;
- If the sediment and erosion control measures are not functioning properly, no further work should occur until the sediment and/or erosion problem is addressed;
- All disturbed areas of the construction site should be stabilized immediately and re-vegetated as soon as conditions allow; and
- Sediment and erosion control measures should be left in place until all areas of the construction site have been stabilized.

6.2 MITIGATION MEASURES FOR NEW CULVERT CROSSINGS

Culverts would be required at watercourses crossed by access roads. Culverts should be sized according to hydrologic requirements to be determined during the detailed design / permit application stage. Other technical requirements may influence culvert size and materials.

Where fish habitat is present, culverts must be installed such that fish passage is maintained. Where a watercourse provides indirect habitat, the culvert must continue to convey flow to downstream areas.

Specific methods for culvert installation would be dependent on culvert type, size and construction seasons. If a temporary access road is required, the DFO Operational Statement for Temporary Stream Crossings can be used if the specific conditions can be met. This Operational Statement includes details of mitigation measures.

Under flowing water conditions, water must be pumped around the work area in order to install a culvert. The following steps outline how a site can be isolated for culvert construction:

Temporary Isolation

- Cofferdams (e.g., aqua-dams, sand bags, concrete blocks, steel or wood wall, clean rip-rap, sheet pile or other appropriate designs) can be used to separate the in-water work site from flowing water.
- If rip rap or sand bags are used, clean, washed material should be used to build the berm. The berm face should consist of clean, washed granular material that is adequately sized (i.e., moderate sized rip rap and not sand or gravel) to hold the berm in

place during construction. Material to build the berms should not be taken from below the high water mark.

- Cofferdams should be designed to accommodate any expected high flows of the watercourse during the construction period.
- Before starting construction, fish should be rescued from behind the cofferdam and returned to an area immediately upstream of the isolated area. Rescue operations would consist of electrofishing and/or seining.
- Accumulated sediment should be removed (ensuring that the original bed of the watercourse is not excavated) from behind the cofferdam before its removal.
- The original channel bottom gradient and substrate should be restored after cofferdam removal.
- Water from dewatered areas should be treated or diverted into a vegetated area or settling basin to remove suspended solids and prevent sediment and other deleterious substances from entering the watercourse.
- Cofferdams should be removed in a downstream to upstream sequence to allow gradual re-introduction of water to the dewatered area and prevent excessive suspension of silt or other bed material.
- Pump intakes should be sized and adequately screened to prevent debris blockage and fish mortality (refer to the DFO Freshwater Intake End-of-Pipe Fish Screen Guidelines).
- The pumping system should be sized to accommodate any expected high flows of the watercourse during the construction period. Back-up pumps should be kept on site in case of pump failure.
- The pump should be discharged to a grassed area to allow water to reenter the watercourse only after it has been filtered through vegetation to prevent silt deposition. If no suitable areas exist, a filter bag should be placed on the outlet to filter the water prior to reentry into the watercourse.
- Work should not be completed during flood stage flows or during times when heavy precipitation is occurring or is expected.

6.3 MITIGATION MEASURES FOR OVERHEAD COLLECTOR LINES

The DFO has prepared an Operational Statement for overhead line construction (Ontario Operational Statement Habitat Management Program: Overhead Line Construction – see **Appendix E**). This Operational Statement provides measures to protect fish and fish habitat when undertaking this type of construction activity. In addition to measures identified in the OS, an Emergency Spill Kit should be available on site in the event of leaks from machinery.

Although construction of overhead lines (as required) would not require any in-water works, as discussed in the Operational Statement, it is the riparian habitat that is most sensitive to disturbance from 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.

According to the DFO Operational Statement, a proponent may proceed with an overhead line project without DFO review when the conditions of the Operational Statement are met (Appendix E).

6.4 MITIGATION FOR UNDERGROUND COLLECTOR LINES

As appropriate, an Environmental Monitor (or designate) should be on-site during installation of watercourse crossings to ensure compliance with specifications and site plans. In particular, the Construction Contractor would ensure that pre-construction preparation is completed prior to commencement of in-stream work and that bank, bed, and floodplain conditions are restored to pre-construction conditions following completion of the construction activities.

Where required, the Construction Contractor would ensure that detailed pre-construction profiles of the slopes, banks, and bed are determined prior to installation of the collector line and/or roads. The Construction Contractor should monitor weather forecasts prior to the installation of the crossings, particularly before crossings of watercourses with year-round flow.

There are several crossing techniques that may be employed for installation of a buried collector line. According to DFO the order of preference for such crossings, in order to protect fish and fish habitat is: 1) punch or bore, 2) high pressure directional drilling, 3) dry open-cut crossing and 4) isolated open-cut crossing. There are DFO Operational Statements for all of the above methods and all are included in **Appendix E**.

7.0 Monitoring

7.1 CONSTRUCTION

Methodologies/Sampling Protocols

As appropriate, an Environmental Monitor should be on-site during installation of Project components that could potentially affect aquatic habitats to ensure compliance with specifications, site plans and permits. In particular, the Construction Contractor would ensure that pre-construction preparation is completed (e.g. erosion and sediment control plans) prior to commencement of in-stream work (if required). The Construction Contractor would ensure that detailed pre-construction profiles of the slopes, banks, and bed are determined prior to installation of the access roads, crane paths and power lines. The Environmental Monitor should monitor weather forecasts prior to the installation of access roads, crane paths and power lines, particularly prior to work near aquatic habitats.

The Environmental Monitor will:

- Perform routine checks of all erosion and sediment control measures
- Monitor flow conveyance during in-water works where culvert replacements are required
- Visually inspect access/exit pits and directional drill line for frac-outs
- Inspect drilling equipment and material for spills or leaks

Performance Objectives/Additional Actions

The Environmental Monitor should ensure that bank, bed, and floodplain conditions are restored to pre-construction conditions, where possible, following completion of the construction activities.

Environmental monitoring following spring run-off the year after construction (first year of operations) should also occur, to review the effectiveness of the bank and slope re-vegetation (if required), to check bank and slope stability, and to ensure surface drainage has been maintained. In the event that adverse effects are noted, appropriate remedial measures should be completed as necessary (i.e. site rehabilitation and re-vegetation) and additional follow-up monitoring conducted as appropriate, under the direction of an environmental advisor.

Compensation strategies and/or permits from Fisheries and Oceans Canada and/or the CRCA, as applicable, may include conditions of approval such as construction and post-construction monitoring. All such strategies and/or permits should be obtained prior to construction, and all such conditions and requirements would be implemented as appropriate.

7.2 OPERATION

The Environmental Effects Monitoring Plan for the Project is provided in the Design and Operations Report. Operation activities that have the potential to affect aquatic habitat includes accidental spills and/or leaks. Proper storage of materials (e.g. maintenance fluids) at off-site storage containers would greatly reduce the potential for accidental spills and/or leaks.

Appropriate remedial measures may be completed as necessary and additional follow-up monitoring conducted as appropriate in the event of an accidental spill and/or leak. The level of monitoring and reporting should be based on the severity of the spill/leak and may be discussed with the MOE (Spills Action Centre) and MNR.

If *Fisheries Act* approvals are required from DFO, some monitoring may be required, and would be stated in the DFO Authorization. Monitoring typically includes photographic records during construction and for two years after the completion of construction to ensure survival of plantings and overall function of the installation. If significant habitat enhancement or compensation measures are required, monitoring may also include assessments of the fish community and habitat use.

8.0 Conclusions

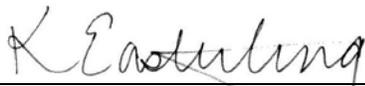
The Suncor Energy Adelaide Wind Power Project 'Water Assessment and Water Body Report' has been prepared by Stantec for Suncor Energy Products Inc. in accordance with Ontario Regulation 359/09. This report is one component of the REA application for the Project.

Locations where water bodies are present within 120 m of a proposed Project Location are presented in **Figures 2.1 to 2.14** and summarized in **Table 3.1**. The designation of various features as water bodies was agreed upon by field staff using field conditions at the time of the survey and the definition of water body provided in O. Reg. 359/09.

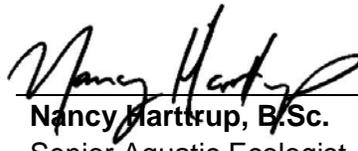
Based on the current Project layout and proposed environmental mitigation measures, in-water work would potentially affect a total of two water bodies providing fish habitat, as presented in **Table 4.5**. Additional DFO consultation is required due to culvert crossings and underground collector line installation associated with turbine access roads.

This report has been prepared by Stantec for the sole benefit of Suncor Energy Products Inc., and may not be used by any third party without the express written consent of Suncor Energy Products Inc. The data presented in this report are in accordance with Stantec's understanding of the Project as it was presented at the time of reporting.

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