

**DILLON**  
CONSULTING

NATURAL FORCES DEVELOPMENTS LP

## **Fish Habitat Surveys**

Benjamins Mill Wind Project - Appendix K

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## References

## 1.0 Introduction

### 1.1 Scope of Work

The scope of work included a desktop assessment and preliminary field assessment of mapped and unmapped watercourses within the Aquatic Local Assessment Area (LAA) for the proposed Benjamins Mill Wind Project (BMWP or the Project). The Aquatic LAA for this assessment includes a 100 m buffer upstream and downstream of watercourse crossings, including the Project site and is shown on Figure K-1. Potential locations where the project may intersect with watercourses or waterbodies was identified during the desktop assessment, as well as important information on local topography, forest cover type, watersheds and downstream aquatic habitat.

Watercourses in Nova Scotia are defined as: “The bed and shore of every river, stream, lake, creek, pond, spring, lagoon, or other natural body of water – whether it contains water or not – and the water therein, within the jurisdiction of the province. It also includes all groundwater.

## 2.0 Desktop Survey

A desktop assessment of watercourses and potential fish habitat was carried out prior to the onset of the fish habitat surveys. While reviewing the resources for the wetland and watercourse surveys the information was also reviewed to evaluate the potential for aquatic species of conservation concern (SoCC) and/or aquatic species at risk (SAR) within the general area of the proposed project and to assist in scoping the field programs. The following sources were reviewed:









- Atlantic Canada Conservation Data Centre (included in Appendix G of the EA registration document);
- The Committee on the Status of Endangered Wildlife in Canada (COSEWIC);
- Department of Fisheries and Oceans (DFO) Species at Risk Mapping; and
- Available aerial photography.

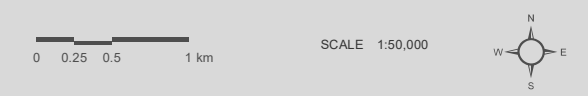
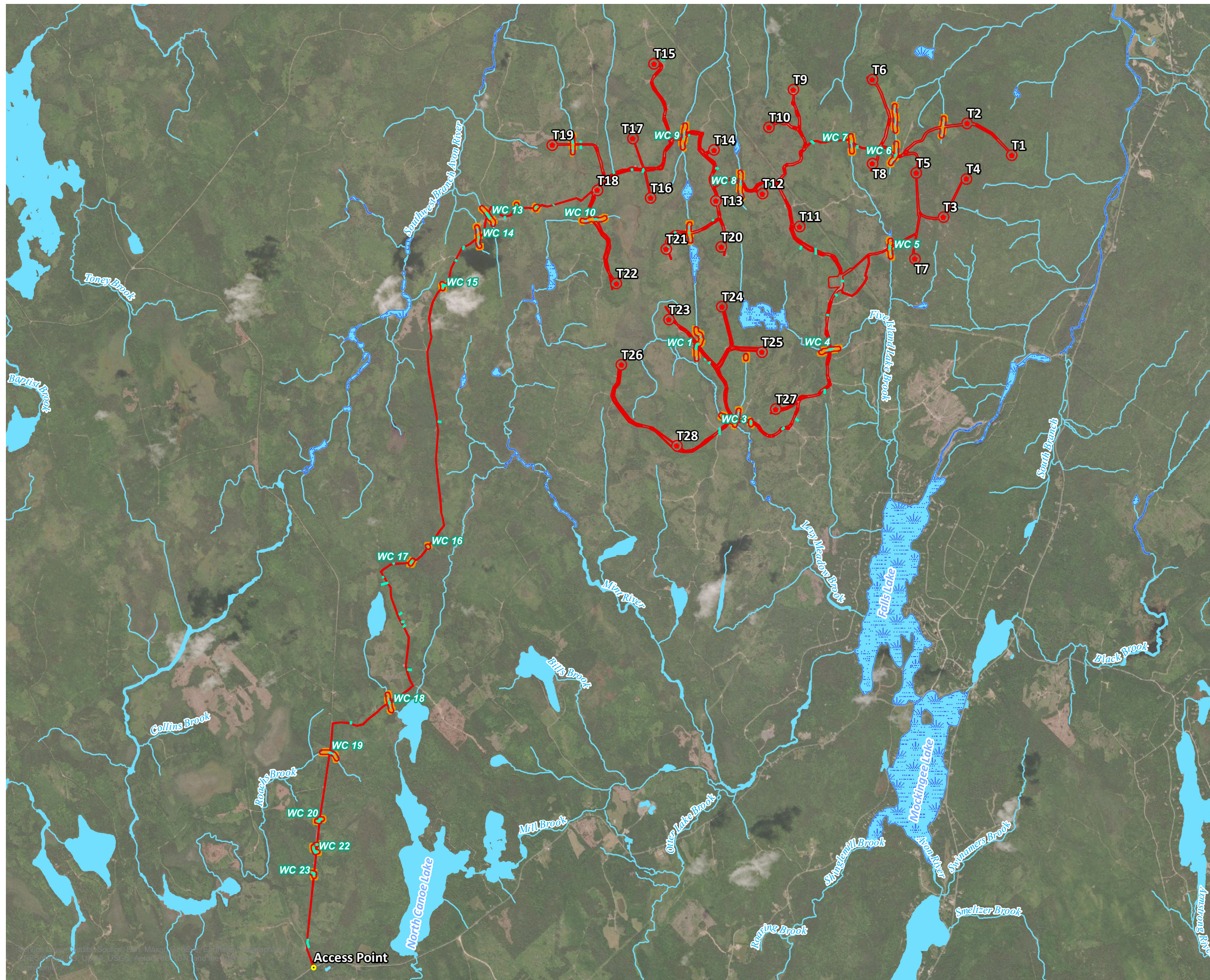
## 3.0 Preliminary Watercourse Field Assessment

The aquatic habitats field survey included the assessment of mapped and unmapped watercourses. Watercourses identified during other field habitat surveys they were noted and added to our program in addition to mapped watercourses in the LAA. Field surveys of the aquatic habitats in the assessment area were conducted from October 4 and 5, 2021, by Dillon Consulting biologists experienced in aquatic/fish habitat surveys. The detailed methods used for both watercourse and wetland assessments are summarized in the following sections.

**AQUATIC LOCAL ASSESSMENT AREA**

FIGURE K-1

-  Proposed Access Point
-  Proposed Turbine Location
-  Watercourse (NSHN)
-  Waterbody
-  Wetland (NSHN)
-  Project Development Area
-  Local Assessment Area for the Aquatic Environment
-  Field Delineated Watercourse



MAP DRAWING INFORMATION:  
DATA PROVIDED BY DILLON CONSULTING, GEONB, NATURAL FORCES

MAP CREATED BY: MEC  
MAP CHECKED BY: KB  
MAP PROJECTION: NAD 1983 UTM ZONE 20N

The watercourse assessments were conducted within the assessment area in concert with other targeted field surveys including: rare plants and vegetation, wetlands, and terrestrial wildlife and wildlife habitat. The following assessment criteria were included in the preliminary fish habitat and aquatic features survey:

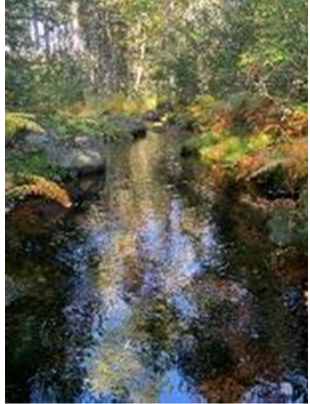

**Dominant substrate type:** Dominant substrate types (e.g., gravel or silt) were described and documented. Substrate type is especially important for fish spawning habitat;



**Stream channel characteristics:** Stream channel characteristics including average wet width, approximate bankfull width, average wetted depth and maximum wetted depth were measured in the field;

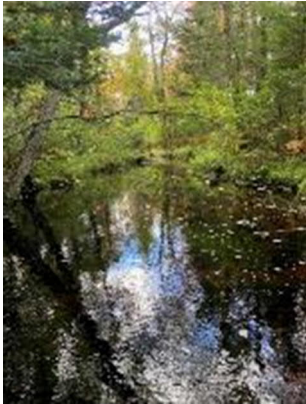

**In-situ water quality parameters:** Water quality parameters (i.e., dissolved oxygen (DO), conductivity, specific conductivity, total dissolved solids (TDS), salinity, pH, oxidation-reduction potential (ORP) were measured in the field with a calibrated YSI professional plus multi meter. Water quality sampling was not completed as this Project site is used for forestry and the conditions may change prior to the start construction; and,

**Representative photos and GPS points** (using a handheld GPS unit and Arc Geographic Information Systems (ArcGIS) applications) were collected for each watercourse during the field assessments.

**Table K-1: Baseline Preliminary Aquatic Habitat Survey Summary**

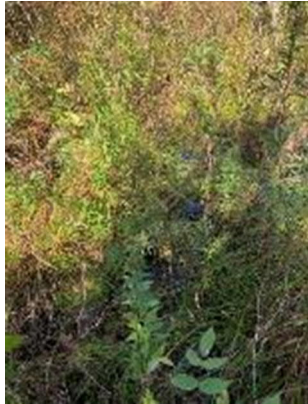
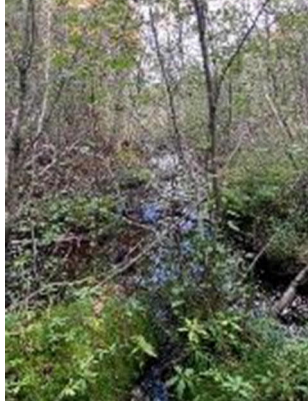
| Watercourse ID | Channel Width (m) | Wetted Width (m) | Depth (m) | Temp. (°C) | Dissolved Oxygen (mg/L) | Cond. (µS/cm) | Sp. Cond. (µS/cm) | TDS (mg/L) | Salinity (ppt) | pH   | ORP (mV) | Substrate Type | Representative Photo   |
|----------------|-------------------|------------------|-----------|------------|-------------------------|---------------|-------------------|------------|----------------|------|----------|----------------|--|
| WC1            | 2.4               | 2.4              | 0.35      | 8.2        | 9.48                    | 25.4          | 37.4              | 24.32      | 0.02           | 3.98 | 374.50   | Small gravel   |   |
| WC2            | 1.5               | 1.5              | 0.20      | 8.9        | 3.49                    | 17.6          | 25.7              | 16.72      | 0.01           | 4.95 | 280.20   | Fines          |  |



| Watercourse ID | Channel Width (m) | Wetted Width (m) | Depth (m) | Temp. (°C) | Dissolved Oxygen (mg/L) | Cond. (µS/cm) | Sp. Cond. (µS/cm) | TDS (mg/L) | Salinity (ppt) | pH   | ORP (mV) | Substrate Type | Representative Photo   |
|----------------|-------------------|------------------|-----------|------------|-------------------------|---------------|-------------------|------------|----------------|------|----------|----------------|--|
| WC3            | 1.8               | 1.8              | 0.15      | 8.3        | 5.95                    | 17.8          | 26.2              | 17.00      | 0.01           | 4.36 | 325.60   | Small gravel   |   |
| WC4            | 2.9               | 2.9              | 0.25      | 9.2        | 8.74                    | 18.2          | 26.0              | 16.92      | 0.01           | 4.30 | 328.90   | Small gravel   |  |


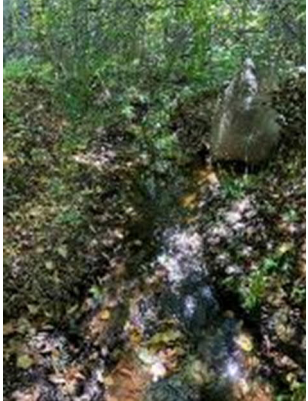
| Watercourse ID | Channel Width (m) | Wetted Width (m) | Depth (m) | Temp. (°C) | Dissolved Oxygen (mg/L) | Cond. (µS/cm) | Sp. Cond. (µS/cm) | TDS (mg/L) | Salinity (ppt) | pH   | ORP (mV) | Substrate Type | Representative Photo   |
|----------------|-------------------|------------------|-----------|------------|-------------------------|---------------|-------------------|------------|----------------|------|----------|----------------|--|
| WC5            | 3.5               | 3.5              | 0.35      | 8.1        | 8.81                    | 21.8          | 32.4              | 21.03      | 0.01           | 4.22 | 316.60   | Small gravel   |   |
| WC6            | 1.5               | 1.5              | 0.30      | 9.2        | 3.19                    | 15.9          | 22.7              | 14.78      | 0.01           | 5.09 | 192.00   | Boulder        |  |






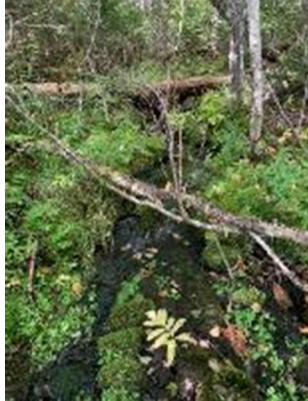



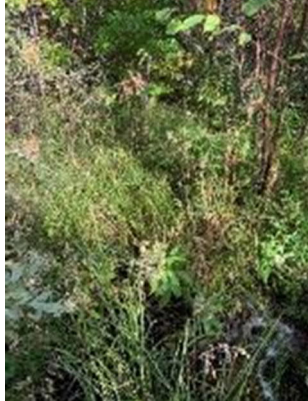
| Watercourse ID | Channel Width (m) | Wetted Width (m) | Depth (m) | Temp. (°C) | Dissolved Oxygen (mg/L) | Cond. (µS/cm) | Sp. Cond. (µS/cm) | TDS (mg/L) | Salinity (ppt) | pH   | ORP (mV) | Substrate Type | Representative Photo   |
|----------------|-------------------|------------------|-----------|------------|-------------------------|---------------|-------------------|------------|----------------|------|----------|----------------|--|
| WC7            | 0.9               | 0.9              | 0.10      | 10.1       | 8.72                    | 15.3          | 21.3              | 13.86      | 0.01           | 5.49 | 168.40   | Fines          |   |
| WC8            | 1.7               | 1.7              | 0.25      | 9.1        | 5.93                    | 15.1          | 21.7              | 14.11      | 0.01           | 4.75 | 275.00   | Small gravel   |  |

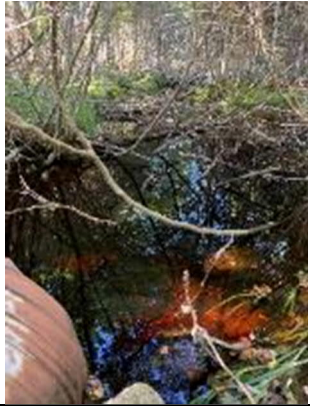

| Watercourse ID | Channel Width (m) | Wetted Width (m) | Depth (m) | Temp. (°C) | Dissolved Oxygen (mg/L) | Cond. (µS/cm) | Sp. Cond. (µS/cm) | TDS (mg/L) | Salinity (ppt) | pH   | ORP (mV) | Substrate Type | Representative Photo   |
|----------------|-------------------|------------------|-----------|------------|-------------------------|---------------|-------------------|------------|----------------|------|----------|----------------|--|
| WC9            | 1.9               | 1.9              | 0.30      | 10.8       | 9.09                    | 21.3          | 29.3              | 19.05      | 0.01           | 4.09 | 346.20   | Large gravel   |   |
| WC10           | 0.5               | 0.5              | 0.10      | 9.5        | 8.35                    | 26.7          | 38.3              | 25.00      | 0.02           | 4.05 | 353.50   | Fines          |  |


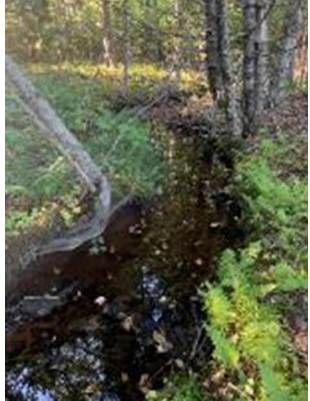
| Watercourse ID | Channel Width (m) | Wetted Width (m) | Depth (m) | Temp. (°C) | Dissolved Oxygen (mg/L) | Cond. (µS/cm) | Sp. Cond. (µS/cm) | TDS (mg/L) | Salinity (ppt) | pH   | ORP (mV) | Substrate Type | Representative Photo   |
|----------------|-------------------|------------------|-----------|------------|-------------------------|---------------|-------------------|------------|----------------|------|----------|----------------|--|
| WC11           | 1.1               | 1.1              | 0.15      | 10.8       | 10.46                   | 18.7          | 26.0              | 16.94      | 0.01           | 4.35 | 305.70   | Fines          |   |
| WC12           | 0.9               | 0.9              | 0.15      | 10.2       | 8.33                    | 18.0          | 25.1              | 16.31      | 0.01           | 5.37 | 158.50   | Large gravel   |  |

| Watercourse ID | Channel Width (m) | Wetted Width (m) | Depth (m) | Temp. (°C) | Dissolved Oxygen (mg/L) | Cond. (µS/cm) | Sp. Cond. (µS/cm) | TDS (mg/L) | Salinity (ppt) | pH   | ORP (mV) | Substrate Type | Representative Photo   |
|----------------|-------------------|------------------|-----------|------------|-------------------------|---------------|-------------------|------------|----------------|------|----------|----------------|--|
| WC13           | 3.5               | 3.5              | 0.30      | 9.5        | 10.13                   | 16.0          | 22.7              | 14.75      | 0.01           | 5.38 | 243.40   | Small gravel   |   |
| WC14           | 1.4               | 1.4              | 0.10      | 9.3        | 9.45                    | 14.9          | 21.3              | 13.82      | 0.01           | 5.58 | 240.60   | Small gravel   |  |


| Watercourse ID | Channel Width (m) | Wetted Width (m) | Depth (m) | Temp. (°C) | Dissolved Oxygen (mg/L) | Cond. (µS/cm) | Sp. Cond. (µS/cm) | TDS (mg/L) | Salinity (ppt) | pH   | ORP (mV) | Substrate Type | Representative Photo   |
|----------------|-------------------|------------------|-----------|------------|-------------------------|---------------|-------------------|------------|----------------|------|----------|----------------|--|
| WC15           | 0.5               | 0.5              | 0.05      | 9.7        | 2.02                    | 17.2          | 24.3              | 15.80      | 0.01           | 4.77 | 218.90   | Fines          |   |
| WC16           | 1.4               | 1.4              | 0.10      | 8.8        | 10.02                   | 18.3          | 26.6              | 17.27      | 0.01           | 5.44 | 284.50   | Small gravel   |  |

| Watercourse ID | Channel Width (m) | Wetted Width (m) | Depth (m) | Temp. (°C) | Dissolved Oxygen (mg/L) | Cond. (µS/cm) | Sp. Cond. (µS/cm) | TDS (mg/L) | Salinity (ppt) | pH   | ORP (mV) | Substrate Type | Representative Photo   |
|----------------|-------------------|------------------|-----------|------------|-------------------------|---------------|-------------------|------------|----------------|------|----------|----------------|--|
| WC17           | 1.6               | 1.6              | 0.20      | 9.5        | 7.39                    | 20.7          | 29.4              | 19.13      | 0.01           | 5.05 | 257.20   | Small gravel   |   |
| WC18           | 2.2               | 2.2              | 0.15      | 9.8        | 1.57                    | 22.9          | 32.4              | 21.07      | 0.01           | 4.38 | 330.90   | Large gravel   |  |

| Watercourse ID | Channel Width (m) | Wetted Width (m) | Depth (m) | Temp. (°C) | Dissolved Oxygen (mg/L) | Cond. (µS/cm) | Sp. Cond. (µS/cm) | TDS (mg/L) | Salinity (ppt) | pH   | ORP (mV) | Substrate Type | Representative Photo   |
|----------------|-------------------|------------------|-----------|------------|-------------------------|---------------|-------------------|------------|----------------|------|----------|----------------|--|
| WC19           | 1.7               | 1.7              | 0.15      | 9.3        | 5.27                    | 25.8          | 36.8              | 23.92      | 0.02           | 4.31 | 328.00   | Small gravel   |   |
| WC20           | 1.3               | 1.3              | 0.10      | 8.4        | 7.94                    | 17.0          | 24.9              | 16.15      | 0.01           | 5.01 | 218.80   | Fines          |  |

| Watercourse ID | Channel Width (m) | Wetted Width (m) | Depth (m) | Temp. (°C) | Dissolved Oxygen (mg/L) | Cond. (µS/cm) | Sp. Cond. (µS/cm) | TDS (mg/L) | Salinity (ppt) | pH   | ORP (mV) | Substrate Type | Representative Photo   |
|----------------|-------------------|------------------|-----------|------------|-------------------------|---------------|-------------------|------------|----------------|------|----------|----------------|--|
| WC21           | 1.2               | 1.2              | 0.10      | 9.5        | 7.38                    | 21.3          | 30.2              | 19.62      | 0.01           | 5.70 | 236.60   | Small gravel   |   |
| WC22           | 1.2               | 1.2              | 0.15      | 9.3        | 9.21                    | 16.2          | 23.1              | 15.03      | 0.01           | 4.73 | 232.70   | Large gravel   |  |



| Watercourse ID | Channel Width (m) | Wetted Width (m) | Depth (m) | Temp. (°C) | Dissolved Oxygen (mg/L) | Cond. (µS/cm) | Sp. Cond. (µS/cm) | TDS (mg/L) | Salinity (ppt) | pH   | ORP (mV) | Substrate Type | Representative Photo  |
|----------------|-------------------|------------------|-----------|------------|-------------------------|---------------|-------------------|------------|----------------|------|----------|----------------|---|
| WC23           | 1.2               | 1.2              | 0.15      | 9.4        | 8.75                    | 21.1          | 30.0              | 19.49      | 0.01           | 4.20 | 331.20   | Fines          |  |



**Table K-2: Fish Habitat Potential**

| Watercourse ID | Stream Permanency | Fish Observed | Restrictions | Likelihood of Fish Habitat |
|----------------|-------------------|---------------|--------------|----------------------------|
| WC1            | Permanent         | No            | pH<4.0       | Low                        |
| WC2            | Intermittent      | No            | pH<5.0       | Moderate                   |
| WC3            | Permanent         | No            | pH<5.0       | Moderate                   |
| WC4            | Permanent         | No            | pH<5.0       | Moderate                   |
| WC5            | Permanent         | Yes           | pH<5.0       | High                       |
| WC6            | Intermittent      | No            | pH<5.5       | Moderate                   |
| WC7            | Intermittent      | Yes           | pH<5.5       | High                       |
| WC8            | Permanent         | No            | pH<5.0       | Moderate                   |
| WC9            | Permanent         | Yes           | pH<5.0       | High                       |
| WC10           | Ephemeral         | No            | pH<5.0       | Moderate                   |
| WC11           | Permanent         | Yes           | pH<5.0       | High                       |
| WC12           | Intermittent      | No            | pH<5.5       | Moderate                   |
| WC13           | Permanent         | No            | pH<5.5       | Moderate                   |
| WC14           | Permanent         | No            | pH<6.0       | High                       |
| WC15           | Ephemeral         | No            | pH<5.0       | Low                        |
| WC16           | Ephemeral         | No            | pH<5.5       | Low                        |
| WC17           | Ephemeral         | No            | pH<5.5       | Low                        |
| WC18           | Permanent         | No            | pH<5.0       | Moderate                   |
| WC19           | Permanent         | No            | pH<5.0       | Moderate                   |
| WC20           | Permanent         | No            | pH<5.5       | Moderate                   |
| WC21           | Intermittent      | No            | pH<6.0       | Moderate                   |
| WC22           | Intermittent      | No            | pH<5.0       | Moderate                   |
| WC23           | Intermittent      | No            | pH<5.0       | Moderate                   |

The information obtained from the preliminary watercourse assessment will be taken under consideration by the proponent when finalizing the project footprint. Where possible, the design of the project will be finalized in a way to interact with as few watercourses as possible. Once the final project layout is determined and prior to the beginning of construction, detailed aquatic assessment including fish community surveys for watercourses within the LAA will be completed by qualified personnel. The information obtained from the detailed watercourse surveys will be included in a NSE Watercourse Alteration Permit, DFO Request for Review and, if required, Fisheries Act Authorization.

## References

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