

APPENDIX K

WATERCOURSE AND FISH HABITAT SURVEYS



NATURAL FORCES DEVELOPMENTS LP

Watercourse and Aquatic Habitat Surveys

Westchester Wind Project - Appendix K

February 2022 – 21-1329

Natural Forces Developments LP

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1.0

Introduction

This document is a supplementary technical report that is intended to support the environmental assessment (EA) registration document and other environmental permitting applications for the Westchester Wind Project (Project) in Cumberland County near the communities of Westchester Valley, Rose, and Londonderry.

Watercourses and aquatic habitat are considered an important feature and valued environmental component (VEC) of the environment and thus make up a key part of the assessment of the Project's potential effects on the environment. The Project is located within Economy (1DJ) and Phillip/Wallace (1DN) primary watersheds. The largest portion of the proposed Project Development Area (PDA) falls within the Economy watershed, specifically, the Portapique River secondary watershed (1DJ-7). Several nearby tributaries and lakes were identified within or near the PDA, shown on Figure K-1. As such, the Proponent engaged the expertise of Dillon Consulting Limited (Dillon) to complete the biophysical surveys and assessments for the Project, including assessments for watercourses and fish habitat. Surveys were completed by qualified biologists.

Surface water flow across the PDA is expected to be guided by topography. The general topography in the Cobequid ecodistrict (340) is characterized as having rolling hills with steep slopes (Neily et al. 2017). The highest points on the mainland of Nova Scotia are found in the Cobequid Hills at Nuttby Mountain and Dalhousie Mountain, which rise to 335 metres above sea level (m asl), and are located approximately 40 and 60 km east of the PDA, respectively. The PDA is situated on a ridge that is broken up by steep valleys and surface water flow is directed towards watercourses which are contained within their watersheds by the surrounding topography. The elevation within the PDA ranges from 280 m above sea level in the eastern portion of the PDA to maximum peaks approximately 330 m above sea level in the center of the PDA.

The PDA is located within the Economy (1DJ) and Phillip/Wallace (1DN) primary watersheds. The largest portion of the PDA falls within the Economy watershed, specifically, the Portapique River secondary watershed (1DJ-7) which flows south towards Minas Basin. Some areas of the PDA to the west and north are located within the River Philip (1DN-1) and Wallace River (1DN-3) secondary watersheds, respectively, which both flow north and eventually to the Northumberland Strait.

The following named watercourses and water bodies are located within the LAA for the physical environment, which includes the PDA as well as a 500 m buffer and shown on Figure X:

River Phillip (1DN-1):

- Tributaries to Mountain Brook

Wallace River (1DN-3):

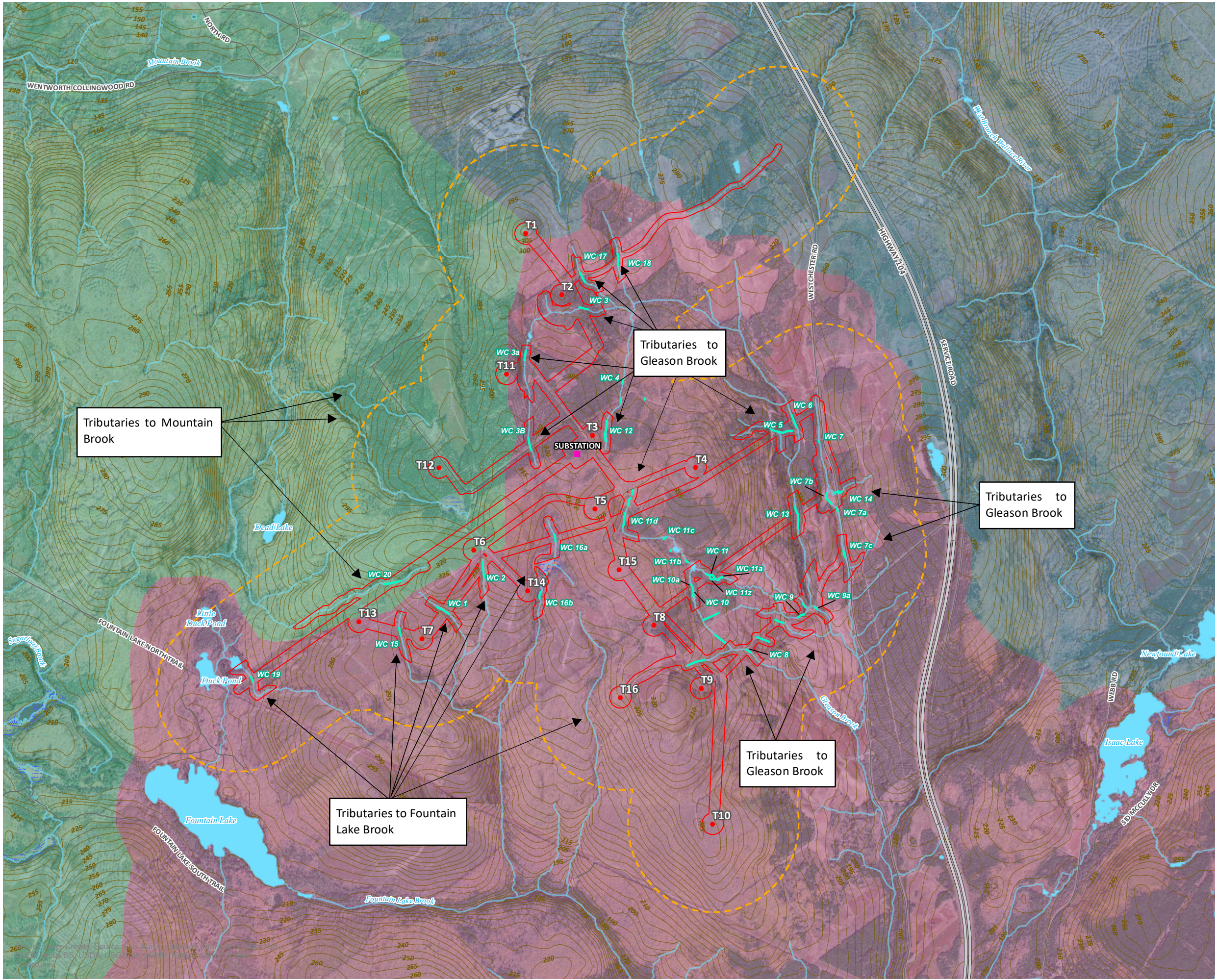
- Tributaries to West Branch Wallace River

Portapique River secondary watershed (IDJ-7):

- Duck Pond
- Little Duck Pond
- Tributaries to Fountain Lake
- Fountain Lake
- Tributaries to Fountain Lake Brook
- Tributaries to Gleason Brook
- Gleason Brook

Based on a review of the ACCDC records, American eel and Atlantic salmon from the Inner Bay of Fundy and the Gaspé-Southern Gulf of St. Lawrence populations were observed within 13, 14 and 16 km from the PDA, respectively. The Gaspé-Southern Gulf of St. Lawrence population was observed within the Wallace River (ACCDC 2021). The Portapique River secondary watershed (IDJ-7, NSECC 2011) has been reported to support Inner Bay of Fundy (IBoF) Atlantic salmon (*Salmo salar*) populations (DFO, 2022).

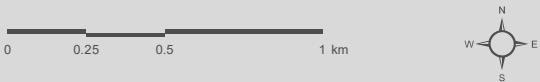
This appendix details the methods and results of the aquatic habitat surveys that were conducted for the Project. As with all forms of infrastructure development, the conservation and preservation of habitat is an important consideration when siting and designing wind power projects. Field surveys were carried out to develop a baseline understanding of the aquatic habitat that could be present within the Project development area. The assessment of residual effects (including potential interactions and mitigation) of the Project on fish and fish habitat is addressed within the main body of the Project's EA registration document.



WESTCHESTER WIND PROJECT

SURFACE WATER WITHIN THE
PHYSICAL ENVIRONMENT LOCAL
ASSESSMENT AREA
FIGURE K-1

- Proposed Turbine Location
- Substation
- ▭ Project Development Area
- ▭ Local Assessment Area
- Highway
- Local Road
- Field Delineated Watercourse
- Watercourse
- Contour
- Waterbody
- Wetland
- Portapique River Secondary Watershed
- River Philip Secondary Watershed
- Wallace River Secondary Watershed



SCALE 1:24,000

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



PROJECT: 21-1329
STATUS: DRAFT
DATE: 2022-02-11

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 Project. The Aquatic LAA for this assessment includes a 100 m buffer upstream and downstream of proposed watercourse crossings within the Project Development Area (PDA), defined as the anticipated area of physical disturbance (or physical footprint) associated with the Project, 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 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 (NS EAB 2021).

2.0 Methods

2.1 Desktop Survey

A desktop assessment of watercourses and potential aquatic habitat was carried out prior to the onset of the field survey. 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 L** 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;
- Nova Scotia Natural Resources and Renewables Provincial Landscape Viewer; and
- Available aerial photography.

2.2 Fish Habitat Survey

The fish habitat suitability assessment included the assessment of mapped and unmapped watercourses within the aquatic habitat LAA. Watercourses identified during other surveys were documented 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 5 and 8, 2021, by Dillon Consulting biologists experienced in aquatic habitat surveys. This included details on in-situ water quality parameters as well as notes on substrate, vegetation, habitat types etc. Additionally, incidental observations on water flow/seasonality of the watercourse and presence of fish were made throughout

the field season. The detailed methods used for watercourse assessments are summarized in the following sections.

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., temperature, pH, dissolved oxygen (DO), specific conductivity) were measured in the field with a calibrated YSI professional plus multi meter.

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.

2.3 Turtle Habitat Survey

The West Branch of the Wallace River represents Critical Habitat for the wood turtle. Critical Habitat is defined under Section 2 of SARA as: "the habitat that is necessary for the survival or recovery of a listed wildlife species and that is identified as the species' critical habitat in the recovery strategy or in an action plan for the species.

A habitat suitability assessment survey was conducted along sections of Gleason Brook, as this watercourse intersects the PDA and was identified as having the highest potential to support wood turtles during a desktop assessment. The purpose of a habitat suitability assessment is to identify potential conditions in which turtle species can carry out any of the components of their life cycle. For wood turtles this includes activities such as overwintering, mating, thermoregulation, nesting, and foraging, as well as their movements between aquatic and terrestrial habitats. For the purpose of this assessment, it was assumed that watercourse attributes primarily associated with overwintering, thermoregulation and nesting within a 25 m buffer of the watercourses' banks were documented using a hand-held GPS unit with photographs.

The survey was conducted during the month of June (i.e., June 7, 2021), when air temperatures can be anticipated to be warmer than that of the assessed watercourses (Brown, Cochrane, & Moen, 2017). This survey timing increases the likelihood of turtle detection, as most turtle species tend to utilize terrestrial habitat more often, such as basking areas to regulate their body temperatures, during this time. In contrast, when air temperatures are colder than that of the water, turtles tend to stay

submerged, or on the surface of aquatic features such as watercourses or ponds (Brown, Cochrane, & Moen, 2017).

Any direct turtle observations were to be recorded including the species (if discernible), canopy coverage (%), and GPS (UTM NAD 83) location. Where turtles are protected species, if observed, no effort to capture, measure or disturb individuals will be made. All potential habitat features within 25 m of assessed watercourses were to be identified for the purpose of mapping potential habitat for Wood Turtles. Observations of suitable habitat features, if present, was documented with a GPS location (UTM NAD83), as well as an approximate size of the feature (m²), slope (degrees), and aspect.

Incidental searches for turtles were carried out in concert with the wetland field surveys, as well as during other surveys when suitable aquatic habitat was encountered. During the wetland surveys, encountered watercourses and waterbodies were assessed visually for signs of turtles (i.e., direct observations or evidence of nesting). The incidental searches for turtles occurred between June 1 and September 30, 2021.

3.0

Results and Discussion

3.1

Watercourse Assessment

The LAA for the physical environment (i.e., A 500 m buffer around all Project components, including the PDA) includes the River Philip and Wallace River secondary watersheds (IDN-1 and IDN-3 respectively), and contains several tributaries and lakes (NSE 2011). Mapped water features within the Project Area are shown on **Figure K-1**.

Gleason Brook, tributaries to Gleason Brook, tributaries to Fountain Lake Brook and tributaries to Mountain Brook enter the PDA at 31 identified locations, shown on **Figures K-1 and K-2**, respectively. In general, the watercourses within the PDA are relatively small, ephemeral to seasonally flowing. The majority of the watercourses flow in a south/south-easterly direction with the exception of the headwaters and a headwater tributary to Gleason Brook (WC12, WC4, WC3a and WC3b) which flow north, and a tributary to Mountain Brook which flows west (WC20). There are no known springs on the site.

Of the 31 intersections with the PDA, 22 watercourse locations were verified during the field assessments conducted in 2021. Seven of the assessed watercourse areas intersect with the locations of proposed roads within the PDA. The remaining crossings in the PDA occur on existing roads, the proposed collector network, or the transmission lines which will not require new watercourse crossing construction. A summary on the characterization of the watercourses that intersect the PDA as well as the current development conditions is presented in Table K-1.



FIGURE K-2

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SCALE 1:20,000

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



STATUS: DRAFT

DATE: 2022-02-11

Table K-1 Watercourse Characterization

Watercourse ID	Characterization of Watercourse	Existing Conditions
WC1	Ephemeral tributary to Fountain Lake Brook	No development, proposed new road crossing
WC2	Intermittent/ephemeral tributary to Fountain Lake Brook	No development, proposed new road crossing
WC3	Small permanent tributary to Gleason Brook	No development, proposed new road crossing
WC3a	Small permanent tributary to Gleason Brook	No development, proposed new road crossing
WC3b*	Intermittent/ephemeral tributary to Gleason Brook	Existing road
WC4	Intermittent tributary to Gleason Brook	Existing road
WC5	Intermittent/ephemeral tributary to Gleason Brook	No development, proposed collector network
WC6	Permanent channel - Gleason Brook	No development, proposed collector network
WC7	Small permanent tributary to Gleason Brook	Existing road
WC7a	Small permanent tributary to Gleason Brook	No development, proposed collector network
WC7b	Small permanent tributary to Gleason Brook	No development, proposed collector network
WC7c*	Small permanent tributary to Gleason Brook	Existing road
WC8	Intermittent tributary to Gleason Brook	No development, new crossing
WC9	Small permanent tributary to Gleason Brook	No development, adjacent to proposed road location
WC9a	Permanent channel - Gleason Brook	Existing road
WC10	Intermittent tributary to Gleason Brook	No development, proposed collector network
WC10a	Intermittent tributary to Gleason Brook	No development, proposed collector network
WC11	Small permanent tributary to Gleason Brook	No development, proposed collector network
WC11d	Ephemeral tributary to Gleason Brook	No development, proposed collector network
WC11a	Small permanent tributary to Gleason Brook	No development, proposed collector network
WC11b	Small permanent tributary to Gleason Brook	Existing road
WC11c	Small permanent tributary to Gleason Brook	Existing road
WC11z	Intermittent tributary to Gleason Brook	No development, proposed collector network
WC12	Intermittent tributary to Gleason Brook	No development, within 100m of proposed turbine

Watercourse ID	Characterization of Watercourse	Existing Conditions
WC13	Permanent channel - Gleason Brook	No development, proposed collector network
WC14	Intermittent/ephemeral tributary to Gleason Brook	Existing road
WC15*	Intermittent/ephemeral tributary to Gleason Brook	No development, proposed new road crossing
WC16a*	Intermittent/ephemeral tributary to Gleason Brook	No development, proposed collector network
WC16b*	Intermittent/ephemeral tributary to Gleason Brook	No development, within 100m of proposed turbine
WC17*	Intermittent/ephemeral tributary to Gleason Brook	Existing road
WC18*	Intermittent/ephemeral tributary to Gleason Brook	Existing road
WC19*	Intermittent/ephemeral tributary to Duck Pond	No development, proposed transmission line
WC20*	Intermittent/ephemeral tributary to Mountain Brook	No development, proposed transmission line

*Based on a desktop assessment (following post-field season changes to the proposed Project layout)

Based on the desktop assessment, there is one proposed watercourse crossing that was not included in the scope of the 2021 field surveys, which were conducted based on a former potential site layout. Prior to any onsite activities an assessment for habitat will be conducted at this remaining crossing (WC15); if habitat is identified the mitigation measures outlined in Section 7.1.2 and 7.2.6 of the main registration document will be followed.

Water quality measurements were taken in the field at 15 of the assessment locations in October 2021. **Table K-2** is a summary of the water quality results from the watercourse assessments.

Table K-2 In-Situ Water Quality Measurements

Watercourse Crossing ID	Temp. (°C)	Dissolved Oxygen (mg/L)	pH	Sp. Cond. (µS/cm)
WC2	6.6	7.04	6.03	24.6
WC3a	6.5	10.53	6.9	28.7
WC5	6.6	10.99	6.92	25.9
WC6	6	12.15	6.87	35.6
WC7	6.4	9.41	6.82	42.2
WC7a	8.6	11.28	6.56	40.8
WC8	8.3	9.96	7.35	27.7
WC9	8.1	11.66	7.22	26.5
WC9a	7.4	11.87	7.27	31.3
WC10	7.9	8.03	6.02	41.2
WC10a	7.9	8.03		27.8
WC11b	7.7	9.86	6.06	28.5
WC12	7.6	9.17	5.94	23.4
WC13	7.4	11.8	6.96	34.1
WC14	7.5	11.55	6.68	37.7

*Measurements taken October 5-8, 2021 with a YSI Professional Plus Meter

In terms of water quality, dissolved oxygen and pH are often used as indicators of suitability for aquatic life. The Canadian Council of Ministers of the Environment (CCME) publishes guidelines for these parameters. During the October 2021 watercourse assessment, 5 of 15 sites where water quality was measured contained levels of dissolved oxygen (DO) that were above the Canadian Council of Ministers of the Environment (CCME) recommended requirement of early life stages of cool water biota of (i.e., 9.5 mg/L). With the exceptions of lower field pH measurements at four watercourse locations (WC2, WC10, WC11b, and WC12), the majority of the assessed watercourses had a field-reported pH within the CCME recommended range for the protection of aquatic life (i.e., 6.5-9.0). Low field pH (i.e., below the recommended CCME guideline) was measured at one proposed crossing location of a tributary to Fountain Lake Brook (WC2 – pH 6.03). In addition, low pH was measured at three locations within tributaries to Gleason Brook (i.e., WC10, WC11b and WC12; pH 6.02, 6.06 and 5.94 respectively). Acid sensitive species (e.g., salmonids and cyprinids) have been historically observed within the watersheds of the PDA. Watercourses with a pH less than 6.5 have the potential to exhibit low fish densities with few or no acid-sensitive species (Lacroix, 2011).





A summary of the assessed watercourse characteristics within the PDA is presented in Table K-3. These watercourses are characterized, in general, as a headwater systems with steep gradients, large substrate, and low flows.

Table K-3 Watercourse Characteristics

Watercourse ID	Channel Width (m)	Wetted Width (m)	Depth (m)	Dominant Substrate Type	Crown Closure	Intstream woody debris	Overhanging vegetation	Undercut banks	Instream vegetation
WC1	0.8	0.6	0.1	Cobbles	50-75%	Trace/Moderate	Moderate	None	None
WC2	0.6	0.6	0.1	Cobble	50-75%	Trace/Moderate	Moderate	None	None
WC3a	1.0	1.0	0.12	Cobble	25-50%	Trace/Moderate	Moderate	Moderate	Trace
WC4	3.2	0 (dry)	0 (dry)	Boulder	75-100%	Trace/Moderate	Trace	Trace	None
WC5	0.3	0.3	0.1	Fines	0-25%	None	Trace	None	Abundant
WC6	2.9	2.9	0.2-0.4	Large gravel	25-50%	Trace/Moderate	Abundant	Moderate	Trace/Moderate
WC7	1.3	1.3	0.15	Small gravel	25-50%	Moderate/Abundant	Abundant	Trace/Moderate	Trace
WC7a	1.8	1.7	0.18	Large gravel	0-25%	Trace/Moderate	Moderate/Abundant	Moderate	Trace
WC7b	1.2	1.2	0.4	Fines	0-25%	Trace/Moderate	Moderate/Abundant	Moderate	Trace
WC8	0.7	0.7	0.1-0.35	Cobble	0-25%	None	Moderate	Abundant	Trace/Moderate
WC9	2.6	2.4	0.15	Cobble	25-50%	Trace/Moderate	Abundant	Trace/Moderate	Trace
WC9a	4.5	4.2	0.25-0.55	Cobble	50-75%	None	Moderate	Moderate/Abundant	None
WC10	0.7	0.7	0.12	Fines	0-25%	Moderate	Trace	Moderate/Abundant	Abundant
WC11	1.6	1.4	0.2	Cobble	50-75%	Moderate/Abundant	Trace	Moderate	None
WC11a	0.8	0.8	0.1	Boulder	50-75%	Moderate/Abundant	Trace	Moderate	None
WC11b	1.2	1.1	0.1	Cobble	50-75%	Moderate/Abundant	Trace	Moderate	None
WC12	0.7	0.7	0.1	Cobble	50-75%	Trace/Moderate	Trace	Trace	None
WC13	3.2	3	0.2	Large gravel	25-50%	Abundant	Abundant	Moderate	Trace/Moderate
WC14	0.6	0.4	0.05	Cobble	50-75%	Moderate	Moderate	Moderate	None



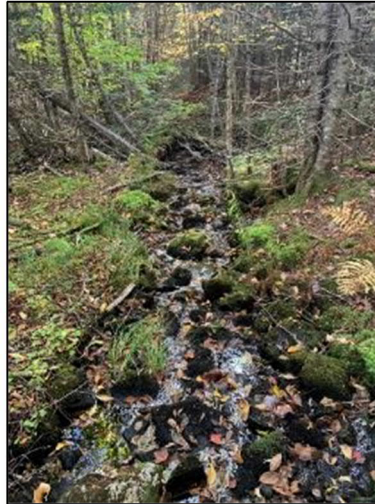

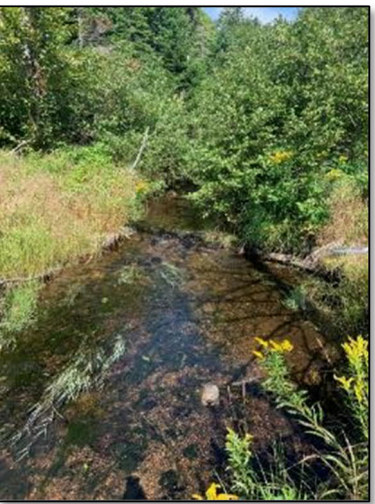

Representative photos of the taken at 24 locations along the assessed watercourses are shown in Table K-4.

Table K-4: Watercourse Assessments Photo Log

Unnamed Tributary to Fountain Lake Brook - Watercourse 1 (WC 1)	Unnamed Tributary to Fountain Lake Brook - Watercourse 2 (WC 2)	Unnamed Tributary to Gleason Brook- Watercourse 3 (WC 3)
		
Unnamed Tributary to Gleason Brook- Watercourse 3a (WC 3a)	Unnamed Tributary to Gleason Brook- Watercourse 4 (WC 4)	Unnamed Tributary to Gleason Brook- Watercourse 5 (WC 5)
		

Gleason Brook - Watercourse 6 (WC 6)	Unnamed Tributary to Gleason Brook- Watercourse 7 (WC 7)	Unnamed Tributary to Gleason Brook- Watercourse 7a (WC 7a)
		
Unnamed Tributary to Gleason Brook- Watercourse 7b (WC 7b)	Unnamed Tributary to Gleason Brook- Watercourse 8 (WC 8)	Unnamed Tributary to Gleason Brook- Watercourse 9 (WC 9)
		

Gleason Brook - Watercourse 9a (WC 9a)	Unnamed Tributary to Gleason Brook- Watercourse 10 (WC 10)	Unnamed Tributary to Gleason Brook- Watercourse 10a (WC 10a)
		
Unnamed Tributary to Gleason Brook- Watercourse 11 (WC 11)	Unnamed Tributary to Gleason Brook- Watercourse 11d (WC 11d)	Unnamed Tributary to Gleason Brook- Watercourse 11a (WC 11a)
		

<p>Unnamed Tributary to Gleason Brook- Watercourse 11b (WC 11b)</p>	<p>Unnamed Tributary to Gleason Brook- Watercourse 11c (WC 11c)</p>	<p>Unnamed Tributary to Gleason Brook- Watercourse 11z (WC 11z)</p>
		
<p>Unnamed Tributary to Gleason Brook- Watercourse 12 (WC 12)</p>	<p>Gleason Brook – Watercourse 13 (WC 13)</p>	<p>Unnamed Tributary to Gleason Brook- Watercourse 14 (WC 14)</p>
		

3.2

Fish and Fish Habitat

Fish habitat suitability assessments were conducted from October 5 to 13th 2021 in concert with watercourse assessments. Fish habitat was also assessed throughout the 2021 field season through observations on water levels/stream permanency, and fish presence. A summary of aquatic habitat characteristics of assessed watercourses within the PDA was presented in Table K-3. As stated above, the watercourses were characterized, in general, as a headwater systems with steep gradients, large substrate, and low flows. A good variety of habitat niches were identified (i.e., large woody debris, and undercut banks) in the assessed locations to support aquatic species.

Based on a review of the ACCDC records, American eel and Atlantic salmon from the Inner Bay of Fundy and the Gaspé-Southern Gulf of St. Lawrence populations were observed within 13, 14 and 16 km from the PDA, respectively (ACCDC 2021). The Gaspé-Southern Gulf of St. Lawrence population was observed within the Wallace River (ACCDC 2021). Though part of the PDA does cross through the Wallace River secondary watershed, the West Branch Wallace River connection to the Wallace River is located 18 km from the PDA and it is not anticipated that to be effected by the Project. The Inner Bay of Fundy population of Atlantic salmon, however, have been identified throughout the Portapique River watershed (DFO, 2021), which has been identified as critical habitat for this species. Suitable Atlantic salmon habitat was identified during initial field studies near several watercourses (summarized in Table K-5).

Suitable habitat characteristics, along with water quality to support aquatic species and direct observations of fish were the basis of considerations on the likelihood of watercourses to support fish habitat. Watercourses were classed as either 'does not provide direct fish habitat', 'may provide seasonally accessible fish habitat', 'likely provides direct fish habitat', or 'fish observed', an explanation was provided where fish habitat is possible but unconfirmed. Ephemeral streams and watercourses with barriers to fish passage were typically given a low rating, whereas permanent watercourses with direct observations of fish were classed as a yes, for presence of fish habitat. Permanent or intermittent watercourses where fish were not observed that were deemed likely to provide fish habitat, and/or contained seasonally accessible fish habitat are also identified as such. Based on the fish habitat suitability assessments, Table K-5 provides a summary of the potential for fish habitat to be present at assessed watercourse crossing within the PDA.

With the exception of ten locations (i.e., WC3b, WC4, WC7, WC7c, WC9a, WC11b, WC11c, WC14, WC17, and WC18 which flow under existing roads), the watercourses intersect the PDA along proposed roads and collector networks. The proposed locations of the WTGs were not within 30 m of waterbodies or watercourses.

Table K-5: Fish Habitat Potential

Watercourse and Crossing ID	Characterization	Likelihood of Fish Habitat
Unnamed Tributary to Fountain Lake Brook - (WC 1)	Ephemeral drainage feature with fine substrate. The channel flows through hardwood dominant forest.	Does not provide direct fish habitat.
Unnamed Tributary to Fountain Lake Brook - (WC 2)	Intermittent channel with ephemeral qualities, cobble substrate and stable banks. The channel flows through hardwood dominant forest.	May provide seasonally accessible fish habitat.
Unnamed Tributary to Gleason Brook - (WC 3)	Small permanent channel with cobble substrate and stable banks. The channel flows through mature mixed forest.	Likely provides direct fish habitat.
Unnamed Tributary to Gleason Brook - (WC 3a)	Small permanent channel with cobble substrate and stable banks. The channel flows through mature mixed forest.	Likely provides direct fish habitat.
Unnamed Tributary to Gleason Brook - (WC 3b)*	Upstream of WC 3a, a small permanent channel with cobble substrate and stable banks.	May provide seasonally accessible fish habitat
Unnamed Tributary to Gleason Brook - (WC 4)	Intermittent channel with boulder substrate. Likely has flashy flows due to substrate size, and location in watershed (high elevation).	May provide seasonally accessible fish habitat.
Unnamed Tributary to Gleason Brook - (WC 5)	Intermittent, poorly defined channel with ephemeral qualities and fine substrate. The channel flows through conifer dominant forest.	May provide seasonally accessible fish habitat.
Gleason Brook - (WC 6)	Permanent, defined channel with gravel substrate and stable banks. The channel flows through mature mixed forest. Fish >10cm observed	Yes, fish observed
Unnamed Tributary to Gleason Brook - (WC 7)	Small permanent, braided channel with gravel substrate. The channel flows through a wetland.	Yes, fish observed in nearby downstream sections
Unnamed Tributary to Gleason Brook - (WC 7a)	Permanent channel with gravel substrate and stable banks. Below beaver dam and wetland. Minnows up to 10cm observed	Yes, fish observed
Unnamed Tributary to Gleason Brook - (WC 7 b)	Permanent braided channel with fine and some gravel substrate. Channel flows through grasses and wetland. Lots of large woody debris and undercut banks. School of 10cm brook trout observed	Yes, fish observed
Unnamed Tributary to Gleason Brook - (WC 7 c)*	Likely similar to WC7a given proximity.	Yes (anticipated)
Unnamed Tributary to Gleason Brook - (WC 8)	Intermittent, deeply incised channel with cobble substrate. The channel flows over the existing roadbed.	May provide seasonally accessible fish habitat.
Unnamed Tributary to Gleason Brook - (WC 9)	Permanent, defined channel with gravel substrate and stable banks. The channel flows through mature mixed forest.	Likely provides direct fish habitat.
Gleason Brook - (WC 9a)	Large permanent, defined channel with gravel substrate and stable banks. Location of confluence with another	Yes, fish observed in nearby upstream sections

Watercourse and Crossing ID	Characterization	Likelihood of Fish Habitat
	channel. The channel flows through mature mixed forest.	
Unnamed Tributary to Gleason Brook - (WC 10)	Intermittent, defined channel with fine substrate and stable banks. The channel flows through grasses and shrubs.	May provide seasonally accessible fish habitat.
Unnamed Tributary to Gleason Brook - (WC 10a)	Intermittent channel with fine substrate and ephemeral characteristics. The channel flows through grasses and shrubs.	May provide seasonally accessible fish habitat
Unnamed Tributary to Gleason Brook - (WC 11)	Permanent, defined channel with cobble substrate and stable banks. The channel flows through mature mixed forest. Minnows observed.	Yes, fish observed
Unnamed Tributary to Gleason Brook - (WC 11d)	Ephemeral, undefined channel, subsurface flow sometimes visible. Likely headwaters of channel. The channel flows through a wetland.	Does not provide direct fish habitat
Unnamed Tributary to Gleason Brook - (WC 11a)	Permanent, defined channel with cobble substrate and stable banks. The channel flows through mature mixed forest. Steep grade. Exposed bedrock throughout	Yes, fish observed in nearby downstream sections
Unnamed Tributary to Gleason Brook - (WC 11b)*	Permanent, defined channel with cobble substrate and stable banks. The channel flows through shrubs and grasses. Location of culvert blowout. Minnows observed.	Yes, fish observed
Unnamed Tributary to Gleason Brook - (WC 11c)*	Small permanent, defined channel with fine substrate and stable banks. The channel flows through shrubs and grasses.	Likely provides direct fish habitat
Unnamed Tributary to Gleason Brook - (WC 11z)	Intermittent side channel with boulder substrate and exposed bedrock. The channel flows through mature mixed forest.	May provide seasonally accessible fish habitat
Unnamed Tributary to Gleason Brook - (WC 12)	High gradient intermittent channel with cobble substrate and stable banks. The channel flows through mature mixed forest.	May provide seasonally accessible fish habitat.
Gleason Brook - (WC 13)	Permanent, defined channel with gravel substrate and stable banks. The channel flows through mature mixed forest. Minnows observed.	Yes, fish observed
Unnamed Tributary to Gleason Brook - (WC 14)	High gradient intermittent or ephemeral channel with cobble substrate. The channel flows through mature mixed forest.	May provide seasonally accessible fish habitat.
Unnamed Tributary to Fountain Lake Brook - (WC 15)*	Likely similar to WC1 and WC2, given proximity (will need to be assessed prior to project activities – located on a proposed road)	May provide seasonally accessible fish habitat (unconfirmed)
Unnamed Tributary to Fountain Lake Brook - (WC 16a)*	Likely similar to WC1 and WC2, given proximity	May provide seasonally accessible fish habitat (unconfirmed)
Unnamed Tributary to Fountain Lake Brook - (WC 16b)*	Likely similar to WC1 and WC2, given proximity	May provide seasonally accessible fish habitat (unconfirmed)

Watercourse and Crossing ID	Characterization	Likelihood of Fish Habitat
Unnamed Tributary to Gleason Brook - (WC 17)	Likely similar to WC3, given proximity	May provide seasonally accessible fish habitat (unconfirmed)
Unnamed Tributary to Gleason Brook - (WC 18)	Likely similar to WC3, given proximity	May provide seasonally accessible fish habitat (unconfirmed)
Unnamed Tributary to Duck Pond - (WC 19)*	Likely similar to WC1 and WC2, given proximity	May provide seasonally accessible fish habitat (unconfirmed)
Unnamed Tributary to Mountain Brook - (WC 20)*	Likely similar to WC1 and WC2, given proximity	May provide seasonally accessible fish habitat (unconfirmed)

*Based on desktop assessment

As stated previously, there is one potential watercourse crossing (WC15) that was not included in the scope of the 2021 field surveys, which were conducted based on a former potential site layout. The watercourse crossing is a headwater tributary to Fountain Lake Brook and is located within the Portapique River secondary watershed. Given its location in the watershed (i.e., headwaters) and generally steep topography of the area, it is anticipated that it will be intermittent/ephemeral in nature and may only provide fish habitat seasonally. This assumption will be confirmed prior to construction, if it is found that the watercourse is fish habitat, mitigation measures outlined in Section 7.1.2 and 7.2.6 of the main document will be followed.

3.2.1 Turtle and Turtle Habitat

No turtles were encountered during the surveys conducted in June. Furthermore, no locations of suitable wood turtle habitat were identified in the assessed section of Gleason Brook as the watercourse did not contain the necessary characteristics to support turtle habitat (i.e., slow moving, relatively deep water, and/or sand banks/bars). In addition, no observations of turtles or suitable wood turtle habitat were made during other biophysical surveys.

According to the 2021 ACCDC report (Appendix L), there have been no records of turtle SAR reported within 5 km the PDA. Additionally, the nearest known record for snapping turtle is at least 16.5 km away. However, the Blanding's and wood turtles are considered "data sensitive" species by NS DNRR and the sharing of locational data, including critical habitat polygons, is highly restricted. Nevertheless, the results of the 2021 ACCDC report (Appendix L) do indicate that there have been reported observations of turtles between 5 and 20 km of the PDA.

4.0

Summary and Conclusions

The results of the field surveys confirm that fish occupancy and suitable habitats are present within the study area. No SAR/SOCC were observed during the field surveys; however, based on available background data, there is potential for SAR or SOCC to be using aquatic environments in the LAA. The results of the in-situ surface water quality measurements indicate that water quality of watercourses within the PDA is generally acceptable to support salmonids and other fish species, which were observed at 6 locations during the surveys.

None of the proposed WTG locations, which were selected to avoid encroachment of watercourses, intersect or are within 30 meters of a watercourse. However the desktop assessment identified the PDA intersects watercourses in 31 locations (Figure K-1). Seven occur on proposed roads. The remaining crossings in the PDA occur on existing roads, the proposed collector network, or the transmission lines which will not require new watercourse crossing construction. The majority of the assessed watercourses flow in a south/south-easterly direction with the exception of the headwaters and a tributary to Gleason Brook (WC3a, WC3b, WC4, and WC12) which flows north and a tributary to Mountain Brook (WC20) which flows west.

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 assessments 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.

5.0

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