Sisson Project:

Baseline Aquatic Field Surveys of the Corridor for the Relocation of the Existing 345 kV Transmission Line and Fire Road

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1.0 INTRODUCTION

This is the report on baseline aquatic field surveys conducted in the proposed corridor for the relocation of the existing 345 kV transmission line and Fire Road as part of the Sisson Project (the Project) proposed by Northcliff Resources Ltd. (Northcliff) near Napadogan, approximately 60 km directly northwest of Fredericton, in central New Brunswick.

The Project location is shown in Figure 1.1. The Project involves the construction and operation of an open pit mine, associated ore processing and tailings storage facilities, and infrastructure. To support the Project, a new 138 kV electrical transmission line will be constructed to supply electrical power to the mine site, and an existing 345 kV transmission line and forest resource road (Fire Road) will be relocated.

1.1 BACKGROUND

The Project will require a new 138 kV electrical transmission line to supply electrical power to the mine site. Additionally, there is an existing 345 kV electrical transmission line (Line 3011) operated by NB Power that is very close to the proposed open pit and will thus require relocation in order to avoid any effects to this line from the mining operations. Furthermore, portions of the Fire Road (an existing forest resource road providing access to the Sisson Project site) are near or within the Project footprint and will also need to be relocated as part of the Project. As these features require relocation as a result of the Sisson Project, their relocation and any environmental effects associated with them must be assessed as part of the environmental impact assessment (EIA) for the Project. The proposed new 138 kV electrical transmission line will be located alongside the existing 345 kV transmission line, between the Project site and Keswick some 42 km to the southeast, by widening the existing 50 m wide corridor for the 345 kV transmission line by an additional 25 m.

Following an agreement on the proposed relocation for the 345 kV transmission line, Northcliff and its engineering consultants made a decision to co-locate the Fire Road within the same corridor as the relocated 345 kV transmission line. Thus, near the mine site, the proposed new 138 kV transmission line, the relocated 345 kV transmission line, and the relocated Fire Road will be co-located in a common corridor (hereinafter referred to as the “linear facilities corridor”). The linear facilities corridor that was the subject of this field investigation thus includes the right-of-ways (RoW) for the following linear facilities in a common corridor:

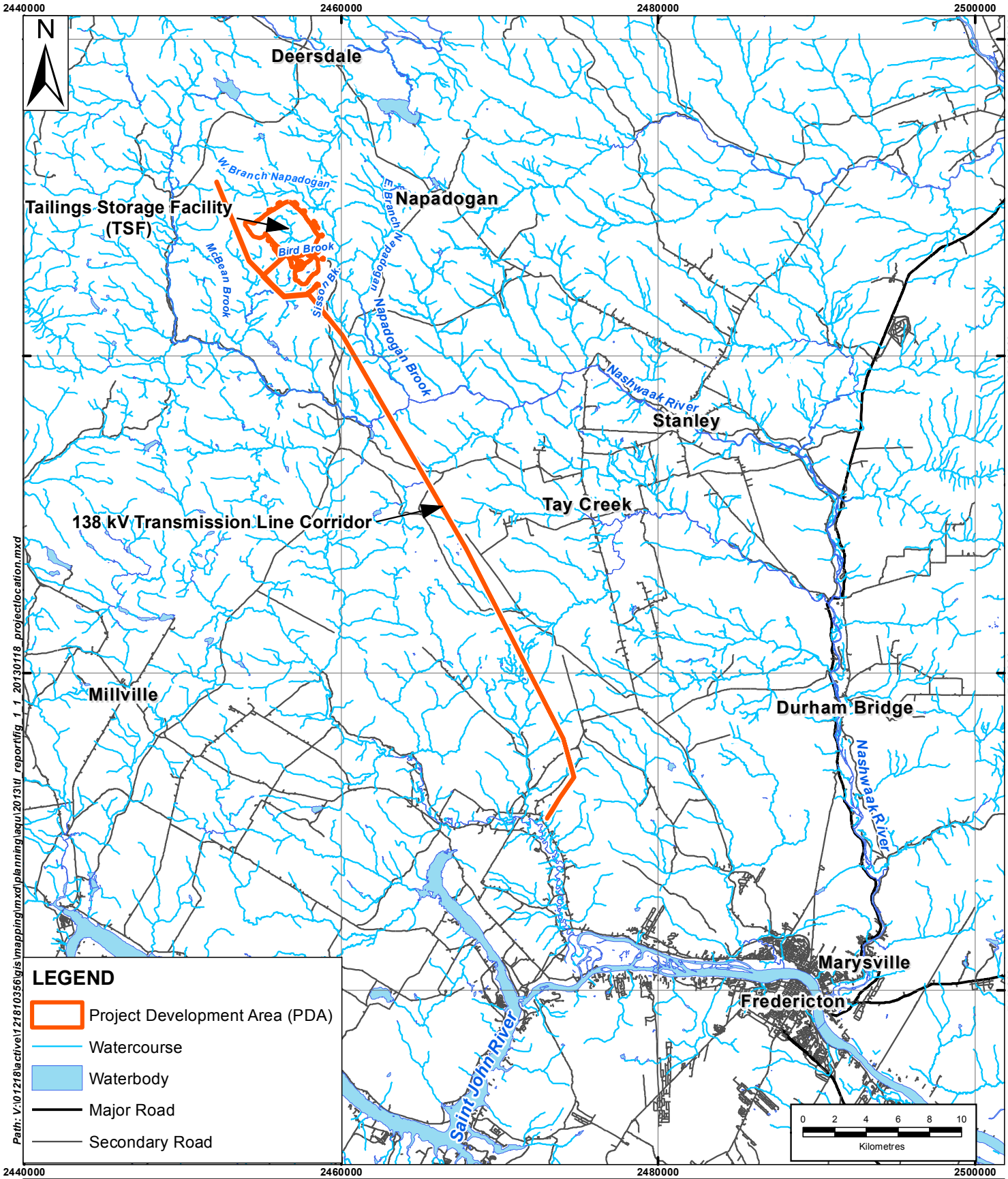
- 345 kV transmission line (50 m RoW in width);
- 138 kV transmission line (25 m RoW in width); and
- Fire Road and other site access roads (25 m RoW in width).

These proposed new and relocated linear facilities are shown in Figure 1.2. The linear facilities corridor is 200 m in width where it includes the 345 kV transmission line, and 100 m where only the relocated Fire Road, site access roads and / or the 138 kV transmission line will be located. This total width, which is at least double that required to comfortably site the above-noted RoWs, provides the flexibility to enable minor changes to the alignment of the RoWs as detailed design moves forward.

It is noted that, as proposed, the new 138 kV transmission line will be constructed by widening the existing 345 kV transmission line corridor, with access for construction provided via the existing corridor. Additionally, no transmission line towers or other transmission line infrastructure will be located within 30 m of any watercourse or wetland. With this avoidance and the implementation of standard mitigation measures to avoid environmental effects from its construction, the potential for adverse environmental effects to fish and fish habitat in watercourses crossed by the new 138 kV transmission line is very low (subject to confirmation in the EIA Report). Additionally, with avoidance of any activity within 30 m of a watercourse or wetland as proposed, there was no need to carry out any field work in watercourses along the new 138 kV transmission line. With the proposed relocation of the 345 kV transmission line to be carried out in the same corridor as the relocated Fire Road, however, it will not be possible to avoid construction activities within 30 m of a watercourse or wetland with these facilities as with the 138 kV transmission line, and as such detailed field work was required to characterize existing conditions in this linear facilities corridor.

1.2 PURPOSE OF THIS REPORT

This report provides baseline information on existing conditions for the aquatic environment in the proposed linear facilities corridor, in support of the EIA of the Project. This report presents the results of the aquatic environment field survey related to the linear facilities corridor. These include results regarding habitat surveys, *in situ* water quality measurements, and qualitative electrofishing surveys carried out in watercourses situated within the linear facilities corridor.



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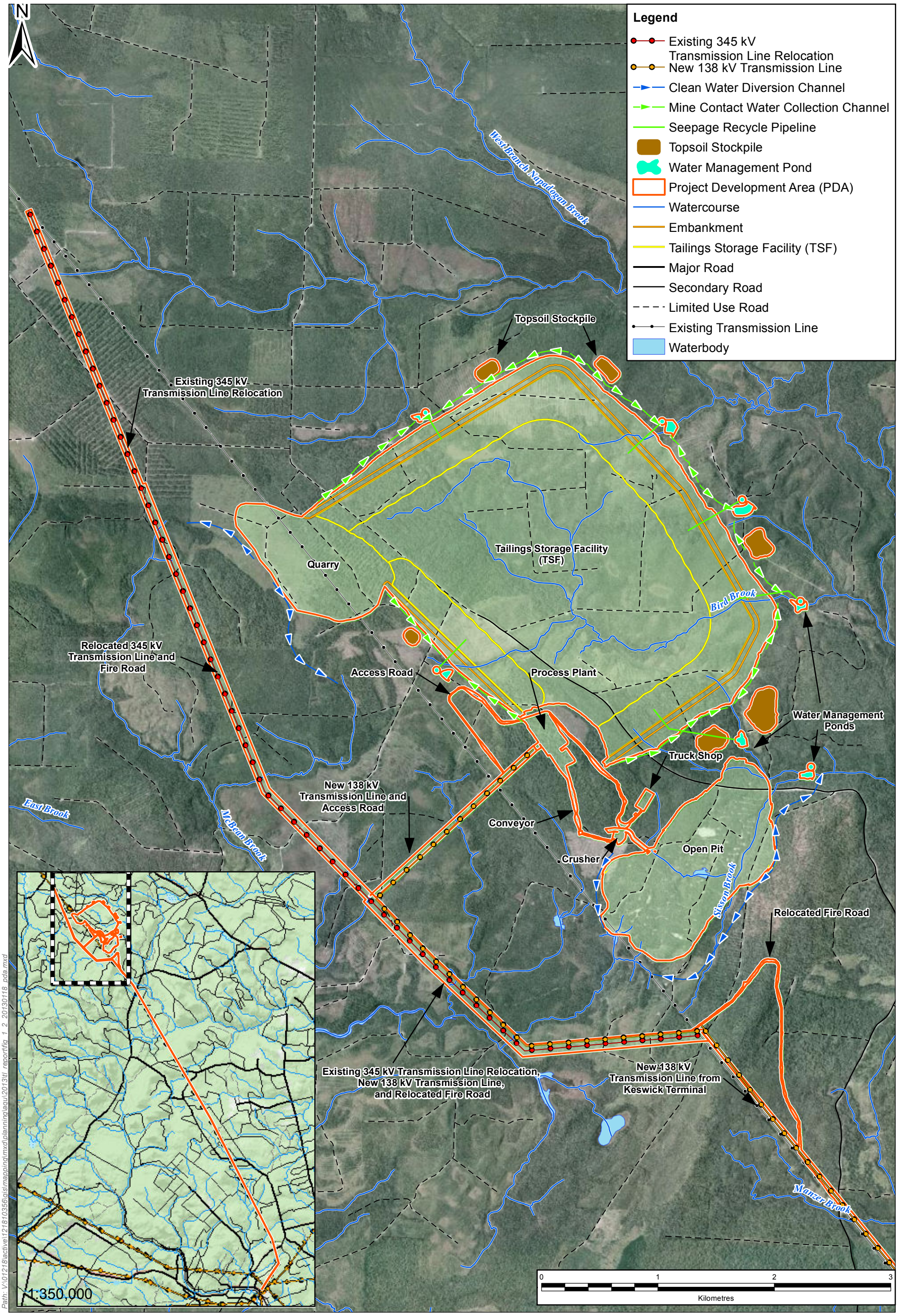
Project Location Sisson Project Napadogan, N.B. Client: Northcliff Resources Ltd.	Scale: 1:325,000	Project No.: 121810356	Data Sources: ArcGIS World Topo NBDNR NHN	Fig. No.: 1.1	Stantec
	Date: (dd/mm/yyyy) 18/01/2013	Dwn. By: JAB	Appd. By: DLM		

Map: NAD83 CSRS NB Double Stereographic



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Project Development Area (PDA)

Sisson Project
Napadogan, N.B.

Client: Northcliff Resources Ltd.

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Date: (dd/mm/yyyy)	Dwn. By:	Appd. By:
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2.0 STUDY AREA AND METHODS

The methods used as part of the surveys conducted followed generally accepted methodologies for carrying out fish and fish habitat assessments in New Brunswick. A complete description of these methods is provided in the Baseline Aquatic Environment Technical Report for the Sisson Project (Stantec 2012). For brevity, those methods are not repeated here. The reader is referred to Stantec (2012) for a description of those methods.

2.1 SURVEY AREA

In total, ten watercourses were surveyed along the linear facilities corridor from August 27 to 30, 2012 (Figure 2.1). The watercourses situated in the linear facilities corridor were all located on McBean Brook, except for one (Site 61; Figure 2.1) which was located on a first order tributary to West Branch Napadogan Brook.

Of the ten surveyed watercourses, nine partially or fully crossed the study corridor (*i.e.*, streams indicated with number; Figure 2.1). On these watercourses, a habitat survey, *in situ* water quality measurements and a qualitative electrofishing survey was carried out for every 100 m of watercourse length such that one or two locations were surveyed on each of the watercourses.

In addition to watercourses that cross the linear facilities corridor, an approximate 600 m section of McBean Brook runs parallel with the edge of the linear facilities corridor, and at some points enters the linear facilities corridor (*i.e.*, stream 51; Figure 2.1). As this watercourse was mostly outside of the linear facilities corridor, a walkover survey was carried out on the whole length of the stream to establish the type and quantity of habitat found in this portion of the watercourse. A habitat survey, and *in situ* water quality measurements were conducted at approximately every 100 m of the watercourse, but no electrofishing surveys were conducted in this watercourse.

2.2 METHODS

All habitat surveys were conducted as per NBDNR and DFO guidelines, using modified stream habitat methodology and forms (Hooper *et al.* 1995). The quantified *in situ* water quality parameters included water temperature, dissolved oxygen, and conductivity (all measured using YSI 85 meter); and pH (measured suing a Hanna Instruments 98127 pH meter).

In addition, apparent stream colour and transparency were qualitatively evaluated using a secchi disk held at a standardized depth of 20 cm, because stream depth did not allow a measurement of actual secchi depth. The secchi disk was photographed at each site, and the photographs were compared to standard indices of water colour (Coleman and Cook 2007) (Figure 2.2). The water transparency was qualitatively categorized into one of three classes (“clear”, “slightly turbid”, or “turbid”), based on the visibility of the secchi disk, as follows:

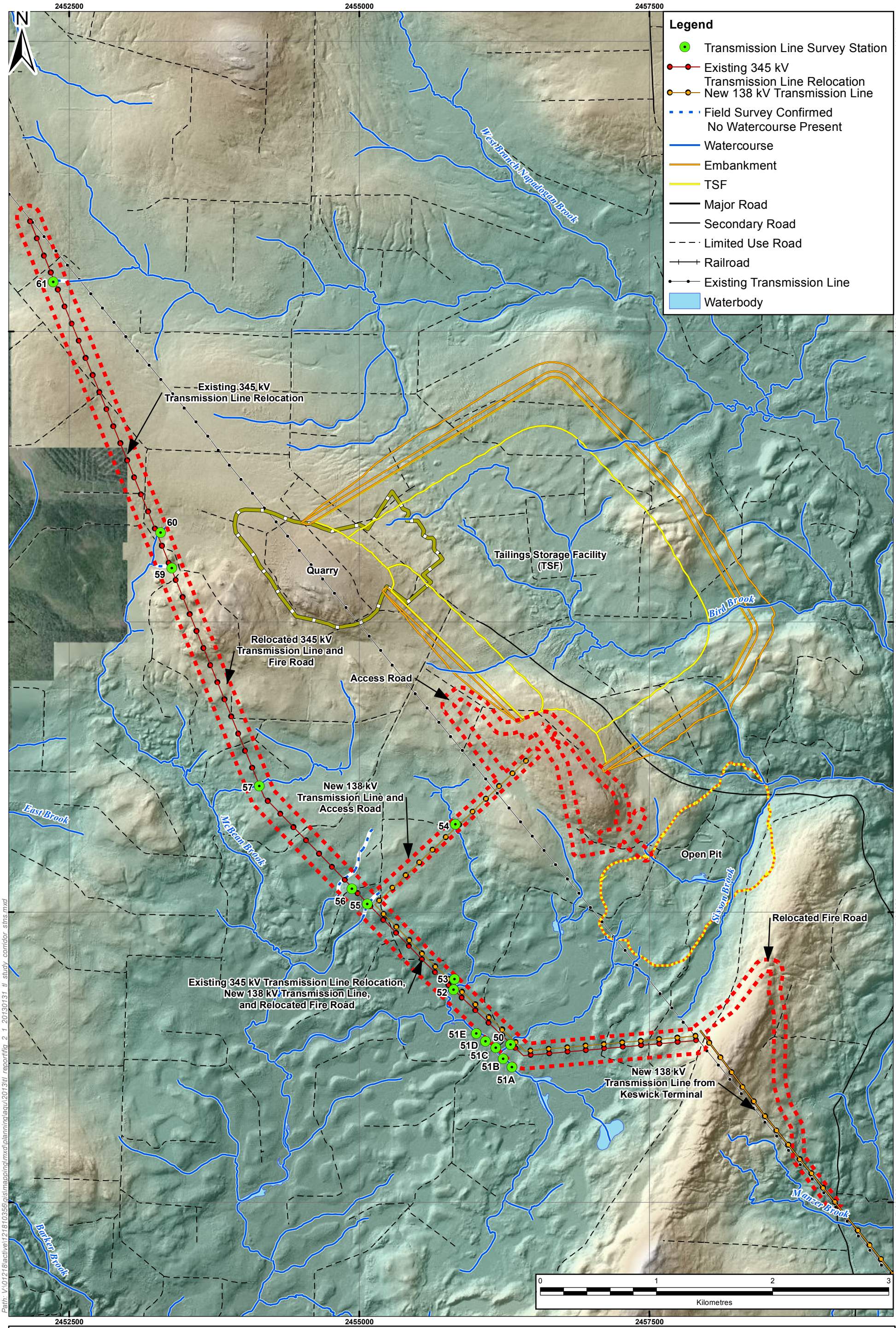
- “clear” indicating little to no suspended particulate matter;

- "slightly turbid" indicating some suspended particulate matter (*i.e.,* secchi disk was still easily visible at 20 cm); and
- "turbid" indicating difficulty observing the secchi disk at 20 cm of water depth.

A qualitative electrofishing survey was conducted at up to two sites along each watercourse, depending on the feasibility to conduct the survey (*e.g.,* wetted or dry channel conditions) and the length of the watercourse present in the linear facilities corridor (*i.e.*, one electrofishing site for every 100 m of stream located in the corridor), for a total of eight sites situated in five different watercourses. The electrofishing survey was conducted using a Smith-Root backpack electrofisher (Model 24B). An electrical current was applied through the water for approximately 500 seconds at each sampling site. Fish were collected, identified to species, measured for fork length and weighed, then released.

Fish abundance was determined by calculating catch per unit effort (CPUE) defined as the number of fish of each species captured per 100 seconds of electrofishing time. The field crew also monitored the occurrence of the following rare species, if present:

- Outer Bay of Fundy (OBoF) Atlantic salmon (*Salmo salar*);
- American eel (*Anguilla rostrata*);
- pygmy snaketail (*Ophiogomphus howei*, a dragonfly);
- yellow lampmussel (*Lampsilis cariosa*, a mussel); and
- brook floater (*Alasmidonta varicosa*, a mussel).



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Study Corridor and Aquatic Survey Stations

Sisson Project
Napadogan, N.B.

Client: Northcliff Resources Ltd.

Scale:	Project No.:	Data Sources:	Fig. No.:
1:30,000	121810356	NBDNR Leading Edge Geomatics Ltd.	2.1

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Map: NAD83 CSRS NB Double Stereographic

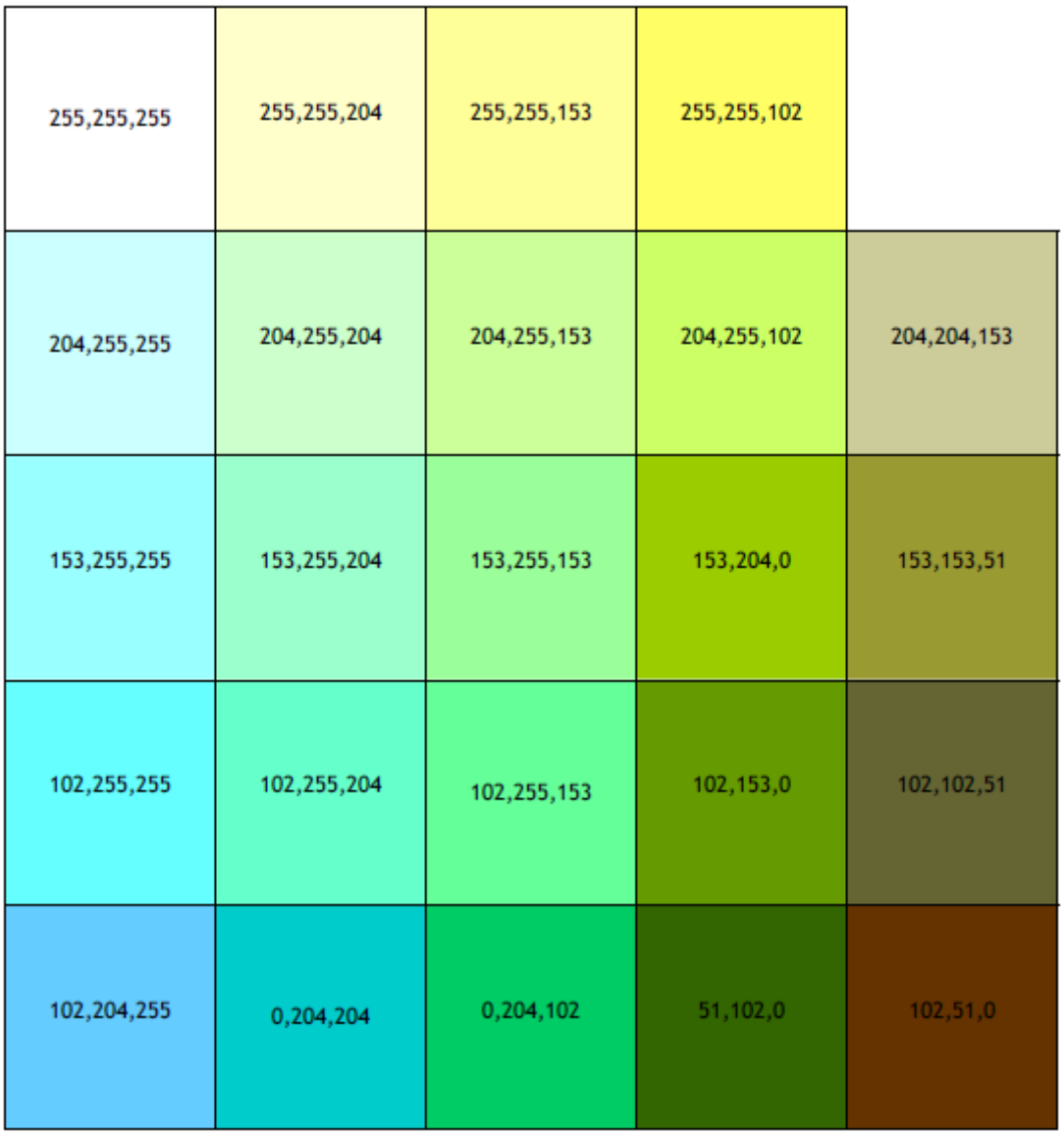


Figure 2.2 Reference Table for Indices of Apparent Stream Colour (Coleman and Cook 2007)

3.0 RESULTS

3.1 FISH HABITAT QUALITY AND WATER QUALITY

3.1.1 Watercourses Traversing the Linear Facilities Corridor

Of the nine mapped watercourses that were surveyed in the linear facilities corridor, only six (Sites 50, 51, 54, 57, 53) were classified as watercourses (Appendix A).

Site 55 consisted of a wetland with unconsolidated channel and very small amounts of occasional surface flow. The road crossing at the uppermost end of that watercourse had a small culvert, indicating that the watercourse does experience some amount of water during some parts of the year. Overall, this watercourse was intermittent and flowed underground approximately 100 m downstream of the upper boundary of the linear facilities corridor, and was determined to not be fish habitat (Photo 1).

Standing water was present at site 56 but no defined channel for this watercourse was found in the linear facilities corridor (Photo 2).

No water was present in the upstream portions of site 59 (Photo 3), but the mapped watercourse ended in a beaver pond approximately 30 m upstream of the border of the linear facilities corridor. However, no apparent watercourse was present in that vicinity.

No watercourse was observed at the mapped location for site 61 inside of the linear facilities corridor study corridor, although hydrophytic wetland plant species were noted (Photo 4).

In general, the watercourses within the linear facilities corridor are small headwater streams, ranging from 1st to 3rd stream order (Photos 5 to 12). The streams are primarily second order, ranging from 2.0 to 5.3 m in width and 0.26 to 0.75 m in depth during bankfull conditions (Table 3.1). The substrate in the studied streams is primarily sand and fines, with abundant aquatic vegetation at sites that provide sufficient depth (Table 3.1). The condition of the stream channels is good, braided in parts and intermittent in headwater areas, flowing under and/or around boulders. Riparian vegetation is well established, with primarily grasses and shrubs providing approximately 50% shade. Dissolved oxygen levels ranged from 6.5 to 10.8 mg/L, and were typically above 8.5 mg/L (Table 3.2). Specific conductivity ranged from 20 to 39 µS/cm and pH ranged from 5.8 to 6.6 (Table 3.2). Water temperatures ranged from 13.6 to 15.8°C, which can be considered cold for the time of sampling. Stream colour and transparency were similar between sites, slightly yellowish in colour with clear transparency (Table 3.1; Photos 13 to 19).

One watercourse (site 59) was not as mapped during the survey, and was identified during the wetland survey approximately 150 m northwest from watercourse 60 (Figure 2.1). The stream flowed approximately 300 m through the linear facilities corridor, and ended at the north end of a beaver pond. On August 29, 2012, wetland biologists measured that the stream was approximately 10 cm deep (wet depth), and on November 5, 2012, archaeology crews indicated that the stream was approximately 25-50 cm deep. The stream was 1 to 2 m in width. The substrate consisted primarily of sand, with a mix of some gravel, cobble, and rock (Photo 20). The photo of the unmapped watercourse was taken

on November 5, 2012 and is representative of higher flow conditions than were observed during the surveys of other watercourses in August. The riparian area was forested and contained abundant overhead cover. The channel condition was good, and well defined. Fish were observed in this stream by the wetland crews, but could not be identified for species.

Table 3.1 Habitat Characteristics at the Study Sites Within the Linear Facilities Corridor

Site	Stream Order	%Riffle-run	% Pool	Average Bankfull Width (m)	Average Bankfull Depth (m)	Dominant Substrate	Embeddedness	% Shade	Overall Channel Condition	Stream Colour	Water Transparency
50 DS	2	100	0	3.5	0.31	Sand	1	75	Good, braided.	3a	Clear
50 US	2	100	0	2	0.32	Sand	1	60	Good, braided.	3a	Clear
51 DS	3	100	0	5.3	0.75	Fines	4	30	Good vegetated.	2a	Clear
51 US	3	90	10	4.5	0.6	Sand/Fines	2	40	Good vegetated.	3a	Clear
54	2	100	0	3.5	0.65	Sand/Fines	4	2	Good vegetated.	3a	Clear
55	1	-	-	-	-	Fines	-	60	Intermittent headwater, wetland.	-	
56	1	NA	NA	NA	NA	NA	NA	NA	No defined channel, standing water.	NA	NA
57 DS	2	100	0	2.5	0.8	Sand	2	70	Good, braided.	3a	Clear
57 US	2	100	0	2.5	0.8	Fines	2	50	Beaver influenced.	3a	Clear
59	1	NA	NA	NA	NA	NA	NA	NA	Not a watercourse.	NA	NA
61	1	NA	NA	NA	NA	NA	NA	NA	Not a watercourse.	NA	NA
53	2	100	0	3.4	0.26	Fines	4	65	Intermittent, headwater.	-	Clear

Legend:
Embeddedness: 1 =<20%, 2 =20-35%, 3 =35-50%, 4 = >50%.
DS = Downstream.
US = Upstream.
NA = Not available.

Table 3.2 *In Situ* Water Quality by Site Within the Linear Facilities Corridor

Site	Dissolved Oxygen (mg/L)	pH	Conductivity (µS/cm)	Temperature (°C)
50 DS	9.4	5.8	20.3	14.9
50 US	9.6	5.9	20.4	15.0
51 DS	9.3	6.3	31.5	13.6
51 US	9.0	6.6	31.9	14.9
54	10.8	6.5	39.1	15.8
57 DS	7.2	5.9	31.7	15.3
57 US	6.5	6	32.4	15.2
53	8.3	5.8	21.2	12.6

Notes:
**In situ* water quality could not be measured in site 55, 56, 59, and 61as they were intermittent or not classified as watercourses.
DS = Downstream.
US = Upstream.

3.1.2 Watercourse Flowing Parallel to the Linear Facilities Corridor

The watercourse which paralleled the linear facilities corridor was a 3rd order stream. It ranged from 1.5 to 6.5 m in width and 0.34 to 0.70 m in depth during bankfull conditions (Table 3.3). The substrate is primarily sand, with some boulder and rock, with abundant aquatic vegetation at sites that provide sufficient depth (Table 3.3) (Photos 21 to 25). The channel is stable and well formed, of low gradient, and braided in parts. There is evidence of prior beaver activity as the stream flows through old beaver ponds and dams. Channel banks are well vegetated with grasses and shrubs, with approximately 50% shade. Dissolved oxygen levels ranged between 8.5 to 9.5 mg/L. Specific conductivity was 28.8 to 29.3 µS/cm and pH of 6.5 to 7.0 (Table 3.4). Temperature was warmer than the 1st and 2nd order tributaries, and ranged from 20.9 to 21.5°C. Stream colour was similar between sites, slightly yellowish in colour and clear (Table 3.3; Photos 26 to 30).

Table 3.3 Habitat Characteristics at the Study Sites Parallel to the Linear Facilities Corridor

Site	Stream Order	%Riffle-run	% Pool	Average Bankfull Width	Average Bankfull Depth	Dominant Substrate	Embeddedness	% Shade	Overall Channel Condition	Stream Colour	Water Transparency
51A	3	100	0	1.8	0.43	Fines	1	50	Good, some braiding.	3a	Clear
51B	3	100	0	1.5	0.34	Sand	1	30	Good, some braiding.	3a	Clear
51C	3	100	0	2.5	0.42	Sand	1	60	Good.	2a	Clear
51D	3	100	0	4.5	0.60	Sand	1	60	Good.	2a	Clear
51E	3	100	0	6.5	0.70	Sand	1	60	Good.	3a	Clear

Legend:
Embeddedness: 1 =<20%, 2 =20-35%, 3 =35-50%, and 4 =>50%.

Table 3.4 *In Situ* Water Quality at the Study Sites Parallel to the Linear Facilities Corridor

Site	Dissolved Oxygen (mg/L)	pH	Conductivity (µS/cm)	Temperature (°C)
51A	8.8	6.5	29.2	21.5
51B	8.8	6.5	29.3	21.5
51C	9.5	6.7	28.8	20.9
51D	8.5	6.7	29	21.2
51E	8.7	6.7	*	21.5

Notes:
* Conductivity meter malfunctioned.

3.2 ELECTROFISHING SURVEYS

Four species of fish were found in the five watercourses that were electrofished, and included brook trout (*Salvelinus fontinalis*), blacknose dace (*Rhinichthys atratulus*), creek chub (*Semotilus atromaculatus*), and American eel (*Anguilla rostrata*).

Brook trout was present at all of the electrofished sites and was the most abundant fish species within the sites. One brook trout was observed at TL9, however it was not captured because of the difficulty in electrofishing the watercourse. Brook trout abundance ranged from 0.6 to 4.6 fish/100 s (Table 3.5). American eel abundance ranged from 0.0 to 0.4 fish/100 s, for blacknose dace from 0.0 to 1.9 fish/100 s, and for creek chub from 0.0 to 0.6 fish/100 s (Table 3.5). The abundance of brook trout and all other species are within the range of values found elsewhere in the Project Development Area (PDA) (Stantec 2012).

Table 3.5 Abundance of Fish (Number of Fish / 100 Electrofishing Seconds) by Species and Site in the Five Streams Situated in the Linear Facilities Corridor

Site	Abundance (Number of Fish of Species/100 Electrofishing Seconds)				
	Brook Trout	American Eel	Blacknose Dace	Creek Chub	All Species
50 DS	0.6	0.2	0.2	0.4	1.4
50 US	1.1	0.0	0.4	0.0	1.5
51 DS	0.2	0.4	0.6	0.6	1.8
51 DS	0.9	0.0	1.9	0.0	2.8
54	2.8	0.0	0.0	0.0	2.8
57 DS	4.6	0.0	0.0	0.0	4.6
57 US	2.2	0.2	0.0	0.0	2.4
53	1.2	0.0	0.0	0.0	1.2
Average ± S.D.	**1.7±1.4**	**0.1±0.0**	**0.4±0.0**	**0.1±0.2**	**2.3±1.1**

Legend:
DS = Downstream.
US = Upstream.
S.D. = Standard deviation of the mean.

Age was estimated from a length-frequency distribution for brook trout only (Figure 3.1), since insufficient numbers of blacknose dace, American eel, and creek chub were captured in the linear facilities corridor. The young-of-the-year brook trout (age 0) ranged in length from 47 mm to 70 mm (Figure 3.1). The ages of brook trout larger than 70 mm could not be explicitly determined based on the length-frequency distribution due to the low number of observations, but likely ranged from 1 to 3 years of age based on scales collected as part of the Baseline Aquatic Environment Technical Report in 2011 (Stantec 2012). Average length and weight of fish for all species is shown in Table 3.6.

The average condition factor (*i.e.,* [Weight (g) * 10, 0000] / [length $(mm)^3$]) ranged from 0.8 to 1.1 for young of the year, and 0.9 to 1.1 for age 1 and older brook trout in the different watercourses. Overall, the condition factor of age 0 (young-of-the-year) individual fish ranged from 0.8 to 1.2, and it ranged from 0.6 to 1.2 for fish aged one and older (Table 3.7). The majority of brook trout (both age 0 and, age 1, and older) had condition factors similar to those found elsewhere in the PDA (0.8 to 1.2) and other wild brook trout populations (Carlander 1969) (Table 3.7).

Table 3.6 Mean Condition Factor ± Standard Deviation of Fish by Species and Site in the Five Streams Situated in the Linear Facilities Corridor

Site	Mean Condition Factor ± Standard Deviation of Fish by Species				
	Brook Trout (Age 0)	Brook Trout (Age 1 and Older)	American Eel	Blacknose Dace	Creek Chub
50 DS	0.8	0.9±0.00	0.2±0.0	0.9±0.00	0.9±0.05
50 US	1.1	1.0±0.07	-	1.1±0.02	-
51 DS	-	1.0±0.00	0.2±0.01	0.8±0.29	1.2±0.02
51 US	1.1±0.03	1.0±0.07	-	1.1±0.10	-
54	-	1.0±0.05	-	-	-
57 DS	-	1.0±0.11	-	-	-
57 US	1.1±0.08	1.0±0.04	0.2±0.00	-	-
53	*	-	-	-	-
Average ± S.D.	**1.1±0.12**	**1.0±0.09**	**0.2±0.02**	**1.0±0.20**	**1.0±0.15**

Legend:
DS = Downstream.
US = Upstream.
S.D. = Standard deviation of the mean.

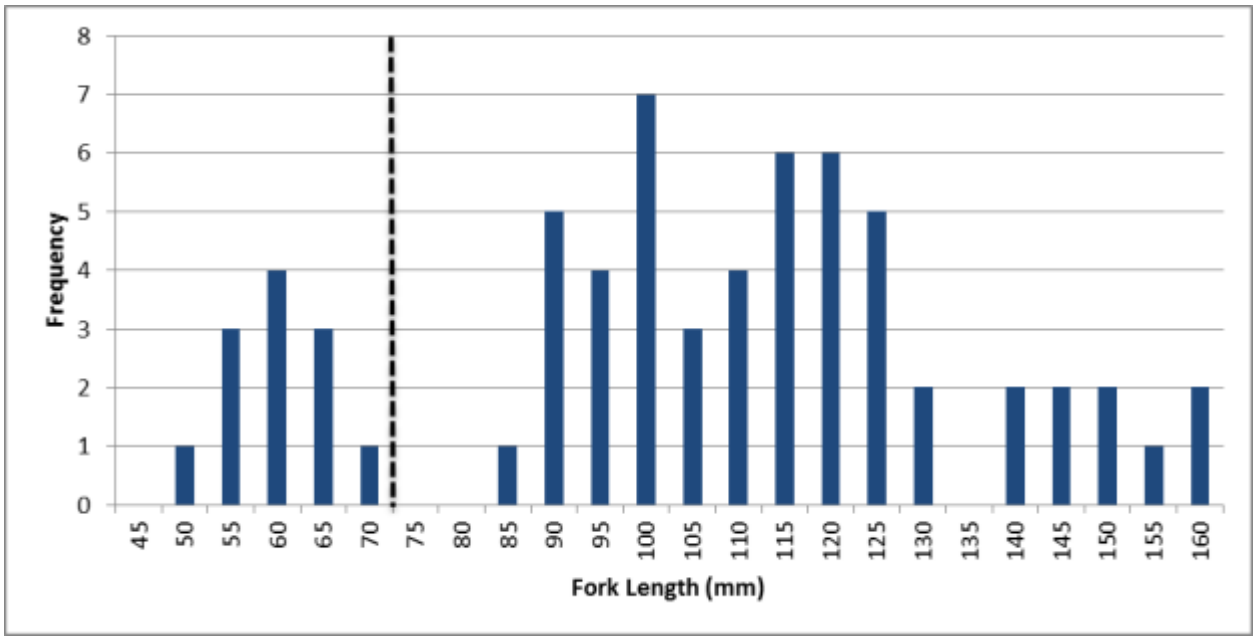


Figure 3.1 Length-Frequency Distribution of Brook Trout Captured in Five Streams Situated in the Linear Facilities Corridor

Table 3.7 Average ± Standard Deviation Fork Length and Weight of Fish Species Captured in the Five Streams Situated in the Linear Facilities Corridor

Species	Sample Size	Average Length (mm)	Length Range (mm)	Average Weight (g)	Weight Range (g)
Brook trout 0+	12	58±6	47 - 70	1.98±0.5	1.02 – 2.81
Brook trout >0+	52	114±19	84 - 157	16.2±9.1	6.32 - 40.69
American eel	4	218±77	17 - 332	24.2±29.8	7.54 – 68.74
Blacknose dace	17	58±10	44 - 75	2.2±1.2	0.48 – 5.10
Creek chub	5	63±17	43 - 82	3.2±2.6	0.91 – 6.29

3.3 RARE AQUATIC SPECIES

American eel (*Anguilla rostrata*) was the only rare aquatic species found within the linear facilities corridor which is listed as a species of conservation concern (SOCC). Outer Bay of Fundy (OBoF) Atlantic salmon, pigmy snaketail, yellow lampmussel, and brook floater were not found in the linear facilities corridor.

4.0 SUMMARY

Six of the nine watercourses that were surveyed in the linear facilities corridor were classified as watercourses containing fish habitat, and one of those watercourses (59) was not depicted as mapped (60) but did appear to contain fish habitat.

The fish bearing watercourses in the studied area were small, 2nd to 3rd order streams. The substrate in these brooks is primarily sand and fines, with abundant aquatic vegetation in sites with sufficient depth. The channels were well formed, braided in parts and intermittent in headwater areas. There was evidence of prior beaver activity in the parts of McBean Brook flowing parallel to and just outside of the linear facilities corridor. Riparian vegetation is well established consisting primarily of grasses and shrubs, and the streams are generally well shaded. Water quality was generally considered good for aquatic life, and water temperatures in watercourses in the linear facilities corridor were cool for the time of year sampled. However, the 600 m portion of McBean Brook flowing along the border of the linear facilities corridor was approximately 5-6°C warmer than the streams traversing the linear facilities corridor.

Four species of fish were found in the watercourses that were sampled, and included brook trout, blacknose dace, creek chub, and American eel. Atlantic salmon were not captured during these surveys. A range of sizes and ages of each species was captured. Brook trout had condition factors typical to the ages sampled, and the values are similar to those found in other parts of the Project's study area. The only rare species (a species of conservation concern) that was observed in the linear facilities corridor was American eel.

Overall, the water quality, fish habitat, and fish species observed in the linear facilities corridor is characteristic of other parts of McBean Brook that have been previously surveyed.

5.0 REFERENCES

Carlander, K.D. 1969. Handbook of Freshwater Fishery Biology, Volume One. The Iowa State University Press, Ames, Iowa.

Coleman, P. and F.S. Cook. 2007. Community Estuarine Monitoring Manual, South Australian Environment Protection Authority. Adelaide. ISBN 1 921125 29 2. Accessed on November 21, 2012 at http://www.epa.sa.gov.au/xstd_files/Water/Report/cemm_b.pdf.

Hooper, W.C., McCabe, L., and T. Robertson. 1995. A Standardized Fisheries Stream Survey Approach for Atlantic Canada. Department of Natural Resources and Energy, Fredericton, New Brunswick.

Stantec. 2012. Sisson Project: Baseline Aquatic Environment Technical Report. Prepared for Northcliff Resources Ltd. by Stantec Consulting Ltd., Fredericton, New Brunswick, June 1, 2012.

Appendix A

Photos

Sites Not Classified as Watercourses	
	
Photo 1 Site 55 Habitat	**Photo 2 Site 56 Habitat**
	
Photo 3 Site 59 Habitat	**Photo 4 Site 61 Habitat**

Watercourses in the Corridor for the 345 kV Electrical Transmission Line Relocation	
	
Photo 5 Site 50 Downstream Habitat	**Photo 6** Site 50 Upstream Habitat
	
Photo 7 Site 51 Downstream Habitat	**Photo 8** Site 51 Upstream Habitat

Watercourses in the Corridor for the 345 kV Electrical Transmission Line Relocation	
	
Photo 9 Site 54 Habitat	**Photo 10 Site 57 Downstream Habitat**
	
Photo 11 Site 57 Upstream Habitat	**Photo 12 Site 53 Habitat**

Watercourses in the Corridor for the 345 kV Electrical Transmission Line Relocation	

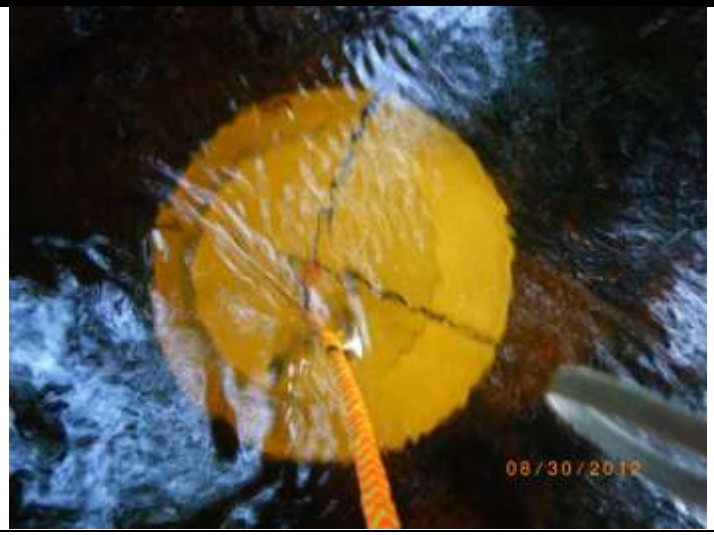
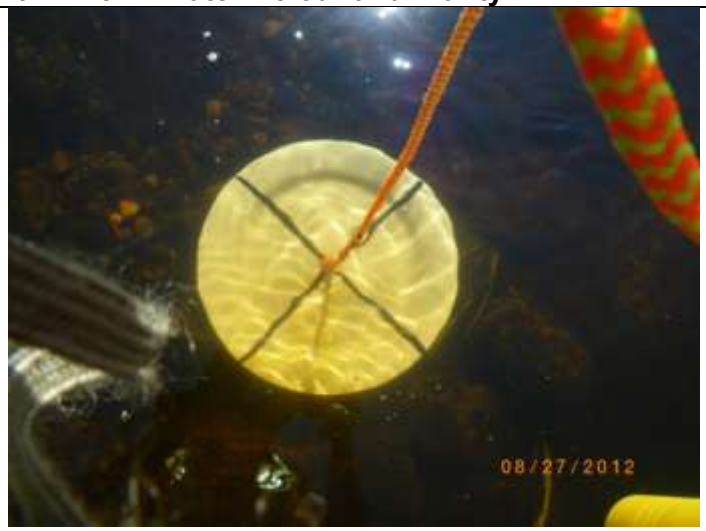



Photo 13 Site 50 Downstream Water Colour and Clarity	**Photo 14** Site 50 Upstream Water Colour and Clarity
	
Photo 15 Site 51 Downstream Water Colour and Clarity	**Photo 16** Site 51 Downstream Water Colour and Clarity

Watercourses in the Corridor for the 345 kV Electrical Transmission Line Relocation	
	
Photo 17 Site 54 Water Colour and Clarity	**Photo 18 Site 57 Downstream Water Colour and Clarity**
	
Photo 19 Site 57 Upstream Water Colour and Clarity	**Photo 20 Site 60 Habitat From Watercourse (59) Not as Mapped**

Watercourse Parallel to the Corridor for the 345 kV Electrical Transmission Line Relocation	
	
Photo 21 51A Habitat	**Photo 22 51B Habitat**
	
Photo 23 51C Habitat	**Photo 24 51D Habitat**

Watercourse Parallel to the Corridor for the 345 kV Electrical Transmission Line Relocation	
	
Photo 25 51E Habitat	**Photo 26 51A Water Colour and Clarity**
	
Photo 27 51B Water Colour and Clarity	**Photo 28 51C Water Colour and Clarity**

Watercourse Parallel to the Corridor for the 345 kV Electrical Transmission Line Relocation	
	
Photo 29 51D Water Colour and Clarity	**Photo 30 51E Water Colour and Clarity**