Annexe 6

FISH AND FISH HABITAT SURVEYS – EIA SUPPORT FOR BOG 324W LEASE EXTENSION

PROJECT NO 161-02978

FISH AND FISH HABITAT SURVEYS – EIA SUPPORT FOR BOG #324W LEASE EXTENSION



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EXECUTIVE SUMMARY

WSP conducted fish and fish habitat surveys on August 11, and 12, and September 2, 2016 for the proposed peat harvesting development of Bog #324W. Four watercourses and one pond within the study area were assessed in the field for water quality and all watercourses were assessed for fish presence and fish habitat. The work was performed during the low flow season of summer 2016. All applicable and appropriate permits and licenses were obtained from the Department of Fisheries and Oceans (DFO) and the Kouchibouguac National Park (KNP).

Each sampling location was assessed for fish habitat characteristics including bank and channel vegetation structure, substrate, and standard widths and depths of the watercourse. A modified NBDNR/DFO Stream Assessment form was used to compile the habitat information. The water quality was tested in-situ using a YSI Multi-Parameter Water Quality Monitoring meter and water samples were collected and submitted to AGAT Laboratories for analysis of General Chemistry, Nutrients, Hardness, and Metals (Total and Dissolved).

Fish presence surveys were originally planned to be conducted with the use of an LR-24 Electrofisher, however the water temperature, and depth of channel for each watercourse was greater than the capacity to use the electrofisher. Minnow traps were set in all watercourses (with the exception of WC4) to catch fish. All fish caught were identified, measured, and released.

The field and laboratory observations indicate that the watercourses flowing away from Bog #324W are poor fish quality, with warm temperatures, low dissolved oxygen, and low pH. Although warm-water fish were observed in WC1-WC3, no sport fish (salmonids such as brook trout or Atlantic salmon) were present at the sampling locations. The habitat characteristics are also poor for salmonids with no spawning habitat noted. The watercourses appear to be beaver impacted drainage channels for the bog.

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1 INTRODUCTION

WSP conducted fish and fish habitat surveys on August 11, 12, 2016 and September 2, 2016 for the proposed peat harvesting development. Four (4) watercourses and one (1) Pond were assessed in the field for water quality. All watercourses were assessed for fish presence and fish habitat. The watercourses are channels transmitting excess water out of Bog #324W (Figure 2, Appendix A). WSP also completed a water quality assessment on a Pond located on the Theriault & Hachey site (Figure 2, Appendix A). This pond was within the study area of the intact bog. The locations of the five (5) sampling locations as seen in Figure 2 (Appendix A) are summarized below in Table 1-1.

Survey Location	X *	Y *	Characteristics
WC1	349280	5205155	Outlet from Pond and outflow from Bog #324W. Upper reaches were completely vegetated. Lower reaches were deep channels with low flow. Tributary to East Branch Eel River.
WC2	352330	5200606	Outflow from Bog #324W. The largest of the WC sampling locations, it had well established banks in portions, and was lined by historical beaver meadow/bog. Tributary of Riviere du Portage.
WC3	356522	5205014	Outflow from Bog #324W. The largest of the WC sampling locations, it had well established banks in portions, and was lined by historical beaver meadow/bog. Tributary of Riviere a L'anguille
WC4	356793	5204950	Outflow from Bog #324W. The largest of the WC sampling locations, it had well established banks in portions, and was lined by historical beaver meadow/bog. Tributary of Riviere a L'anguille
POND	350139	5206294	Small pond within undisturbed portion of Bog #324W. Pond has outlet that feeds WC1

Table 1-1 Sampling Locations

*UTM NAD 83, Zone 20

The methodology for this project followed the Guidelines for Peat Mining Operations in New Brunswick set by New Brunswick Natural Resources and Energy – Minerals and Energy¹. The field assessments were completed by WSP field personnel, Virgil D. Grecian, M.Sc. and Jessica McIntyre, Field Tech.

The fish and fish habitat surveys were completed during the low flow period of June 1- September 30 using the NBDNR/DFO Fish Habitat Survey Forms (Government of New Brunswick, 2007). A license from the Department of Fisheries and Oceans (DFO) for scientific purposes was obtained to capture fish

¹ Guidelines for Peat Mining Operations in New Brunswick; J. Thibault. New Brunswick, Natural Resources and Energy, Minerals and Energy, 1998.

with an electrofisher or minnow traps. License tags were attached to all the minnow traps. The DFO fishing Licence No. was SG-RHQ-16-090A. WSP was prepared to complete electrofishing surveys, but due to unsafe conditions and the temperature of the water, WSP could not use the electrofisher.

Water samples were collected for each sampling location and submitted to AGAT Laboratories, an accredited laboratory in Dartmouth, NS. The samples were analysed for:

- General chemistry;
- Total and Dissolved Metals;
- Nutrients;
- Total Organic Carbon;
- TSS;
- Hardness; and
- Turbidity.

Water quality was also tested in-situ using the YSI Multi-Parameter Water Quality Meter. The parameters tested in-situ included:

- Temperature;
- Conductivity;
- Total Dissolved Solids (TDS);
- Salinity;
- Dissolved Oxygen (DO); and
- pH.

The water sample results were compared to the Canadian Council of Ministers of the Environment (CCME) guidelines for the Protection of Aquatic Life and can be seen in Appendix B.

WSP obtained a permit from the Kouchibouguac National Park (KNP) to travel on a snowmobile trail inside the park boundaries in order to access remote sampling locations. WC2 in particular was difficult to reach and WSP resorted to hiring an Argo to get the sampling materials and crew over the wet and boggy terrain.

2 RESULTS OF FIELD SURVEYS

2.1 TRIBUTARY TO EAST BRANCH EEL RIVER (WC1)

Watercourse 1 (WC1) is a tributary to the East Branch Eel River and is located in an open bog. WC1 was assessed by WSP on August 12, 2016. The reaches and water quality sampling locations are shown in Figure 3, Appendix A.

2.1.1 FISH HABITAT

The upstream reach consisted of 75 m (Reach 1) and the two downstream reaches consisted of 60 m (Reach 2 and Reach 3). Reach 1 was 100% vegetated and the watercourse dispersed through the vegetation (see Photo 2).

Reach one did not have a defined channel and was 100% vegetated with a wide bank full width of 25 m. The average wetted width for Reach 1 is 15 m. Reach 2 and 3 had a defined channel of 1-3 m for the average wetted width and the bank full width. Reaches 1-3 is the main channel of a natural deadwater. The average depth of the wetted width for Reach 1 was approximately 40 cm and Reach 2 and Reach 3 was 75 cm. The substrate of each reach consisted of fines and organics with little to no flow.

Reach	Stream	Channel		AVG. Width (m)		Substrate (%)	Avg. Depth Wet	0-5 Overha Veget	anging	Large Woody Debris in	Flow	
No. T	Type*	Type**		Wet	Bank Channel	Fines / Organics	Width (cm)	L	R	Stream (m)	(cm/s)	
	WC1											
1	24	1	75	15	25	100	40	5	5	5	0	
2	24	1	60	1	3	100	75	2	2	-	1-2	
3	24	1	60	1	3	100	75	2	2	-	1-2	
*Stream	n Type> ^	13 = Beaver	; 24 = Natur	al Deadwa	ter							

Table 2-1 WC1 Field Characteristics

** Channel Type --> 1 = Main

			Stream	Banks		Depth						
Reach	Shade	Vegetation			Vegetation 1/4 (cm)			cm)	1/2 (cm)	3/4 (cm)	
No. (%)	(%)	Bare Ground	Grasses	Shrubs	Trees	Wet	Channel	Wet	Cha nnel	Wet	Chann el	
	WC1											
1	0	0	80	15	5	40	5	40	5	40	5	
2	0	0	85	10	5	75	5	75	95	75	15	
3	0	0	85	10	5	75	5	75	95	75	15	

Reaches 1-3 are dominated by grasses with some shrubs and trees. Reach 1 did not contain defined banks; however, Reach 2 and Reach 3 had stable banks on both sides. The canopy cover above each reach was 0% and Reach 1 had 5 m of woody debris. Table 2-1 above summarizes the characteristics of WC1.



Photo 1 – Looking upstream at Reach 1. WC1 disperses into the vegetation.



Photo 2 – Looking downstream at Reach 2 of WC1.



Photo 3 – Looking at the minnow trap location in Reach 2

2.1.2 WATER QUALITY

The water quality of WC1 was sampled in the field with a YSI meter. The results can be seen in Table 2-2. The pH of WC1 is below the CCME guideline, as well as the dissolved oxygen.

Parameter	CCME Guideline	WC1 12-Aug-16
Temperature (°C)		17.34
Conductivity (µs/cm)		61
TDS (mg/L)		0.041
Salinity (ppm)		0.03
Dissolved Oxygen (%)		42.7
Dissolved Oxygen (mg/L)	5	4.08
рН	6.5-9.0	5.69

Table 2-2 Field Wate	er Quality M	leasurements (YSI Meter)
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WSP sampled WC1 and sent the samples to AGAT Labs for analysis. The results can be seen in Appendix B. The water samples were compared to the CCME guidelines for the Protection of Aquatic Life (freshwater) and the exceedances are as follows:

- Dissolved Cadmium;
- pH; and
- Total Iron.

The effects of cadmium on the freshwater environment can be influenced by hardness, alkalinity, pH, dissolved organic matter and temperature (CCME, 2014). This is not known to inhibit fish, however, the extended exposure to metals such as iron and cadmium are not known.

2.1.3 FISH PRESENCE

WSP deployed 3 minnow traps throughout the two downstream reaches and were allowed to fish for at least 48 hours. The fish presence captured in WC1 is summarized in Table 2-3. WSP did not observe live fish during the habitat assessment.

No fish were harmed during the surveys and all fish captured were released. WSP completed the fish identification using the UNB Inland Fish Species of New Brunswick².

² Inland Fish Species of New Brunswick; University of New Brunswick

Fish Survey										
WC 1		WC 1	-	WC 1	WC 1					
Tag No.	1596	Tag No.	Tag No. 1597		1598					
Fish Species	Total	Fish Species	Total	Fish Species	Total					
Dates Fished	Aug 12- 19/16	Dates Fished	Aug 12- 19/16	Dates Fished	Aug 12- 19/16					
Ninespine Stickleback	0	Ninespine Stickleback	1	Ninespine Stickleback	0					
Common Shiner	0	Common Shiner	0	Common Shiner	0					
White Sucker	0	White Sucker	0	White Sucker	0					
Pearl Dace	0	Pearl Dace	0	Pearl Dace	0					
Blacknose Shiner	0	Blacknose Shiner	0	Blacknose Shiner	0					
TOTAL	0	TOTAL	1	TOTAL	0					

Table 2-3 Fish Presence in WC1

2.2 TRIBUTARY OF RIVIERE-AU-PORTAGE (WC2)

Watercourse 2 (WC2) is a tributary to Riviere-au-Portage and flows south out of Bog #324W and through the KNP. WSP field personnel completed the stream assessment on September 2, 2016. The reaches and water quality sampling locations are shown in Figure 3 (Appendix A).

2.2.1 FISH HABITAT

Three reaches were assessed on WC2 and each reach consisted of 75 m. The main channel of the tributary has a history of beaver impacts. The left bank of Reach 1 was a large wetland that extended 36 m to the tree line. The right bank of Reach 2 was wetland that extended 19 m to the tree line and the left bank of Reach 3 was a wetland that extended 36 m to the tree line. Located approximately 10 m downstream of Reach 1 was a manmade bridge used by the snowmobile trail. Beaver logs were observed under the bridge.

The average wetted width for Reach 1 is 7 m and the bank full channel average width is 36 m. The average wetted width for Reach 2 is 7 m and the bank full channel average is 19 m. The average wetted width for Reach 3 is 8 m and the bank full channel average is 31 m. The average depth of the wetted width for Reaches 1-3 was approximately 75 cm. The depth was measured from the bridge due to the depth of the water and safety protocols.

The substrate consisted of fines and organics with a flow of 2 cm/s. Reaches 1-3 are dominated by grasses with some shrubs and trees. The banks of each reach were stable. The canopy cover above Reach 1 on the left bank was 2% and the right bank was 12%. The right bank of Reach 2 had a canopy cover of 2% and the left bank had a canopy cover of 2%. The canopy cover of the right bank of Reach 3 was 6% and the left bank was 2%. There was 6-8 m of woody debris located in Reach 1; 8 m of woody debris in Reach 2; and 10 m of woody debris in Reach 3. Table 2-4 below summarizes the characteristics of WC2.

It is unlikely that WC2 supports the fish habitat quality for sport fish such as trout or salmon at this location. Water quality parameters such as the low pH are known inhibitors of cold water fish. It is likely that this slow moving, beaver impacted stream, that does not have a lot of shade, will reach temperatures beyond those suitable for cold water salmonid type fish. Further downstream within the Riviere au Portage system, trout and salmon are known (Eric Trembley, KNP Ecologist, Pers. Com.).

	Watercourse Characteristics											
Reac	Strea	Channe	Length	AVG. W	/idth (m)	Substrate (%)	Avg. Depth Wet	Ove	-50% rhanging getation	Large Wood y Debris	Flow	
h No. Type*	I Туре**	(m)	Wet	Bank Channe I	Fines/Organic s	Width (cm)	L	R	in Strea m (m)	(cm/s)		
	WC2											
1	13	1	75	8	31	100	75	2	12	7	2	
2	13	1	75	7	19	100	75	2	2	8	2	
3	13	1	75	7	36	100	75	2	6	10	2	
	*Stream Type> 13 = Beaver; 24 = Natural Deadwater ** Channel Type> 1 = Main											

Table 2-4 WC2 Characteristics

Stream Banks Depth Reac h No. Shade 3/4 (cm) Vegetation 1/4 (cm) 1/2 (cm) (%) Bare Grasse Shrub Channe We Channe Channe Trees Wet Wet Ground I Т s s t Т WC2 5 0 85 10 5 1 Avg. 75 cm across 5 2 5 0 85 10 Avg. 75 cm across 5 3 5 0 85 10 Avg. 75 cm across



Photo 1 – Looking upstream at Reach 3.



Photo 2 – Looking at right bank of Reach 3.



Photo 3 – Looking at the wetland on the left bank of Reach 3.



Photo 4 – Looking downstream from Reach 3 at the manmade bridge on the snowmobile trail.

2.2.2 WATER QUALITY

The water quality of WC2 was sampled in the field with a YSI meter. The results can be seen in Table 2-5. The pH of WC2 is below the CCME guideline.

Parameter	CCME Guideline	WC2 2-Sep-16
Temperature (°C)		16.86
Conductivity (µs/cm)		36
TDS (mg/L)		0.023
Salinity (ppm)		0.02
Dissolved Oxygen (%) Dissolved Oxygen		77.4
(mg/L)	5	7.57
рН	6.5-9.0	5.83

Table 2-5 Field Water Quality Measurements (YSI Meter)

WSP sampled WC2 and sent the samples to AGAT Labs for analysis. The results can be seen in Appendix B. The water samples were compared to the CCME guidelines for the Protection of Aquatic Life (freshwater) and the exceedances are as follows:

- Dissolved Iron;
- pH; and
- Total Iron.

This is not known to inhibit fish, however, the extended exposure to metals such as iron is not known.

2.2.3 FISH PRESENCE

WSP deployed 5 minnow traps throughout the reaches and were allowed to fish for at least 48 hours. The fish presence captured in WC2 is summarized in Table 2-6. WSP did not observe live fish during the habitat assessment.

No fish were harmed during the surveys and all were released. WSP completed the fish identification using the UNB Inland Fish Species of New Brunswick³.

³ Inland Fish Species of New Brunswick; University of New Brunswick

Fish Survey											
WC 2		wc	2	WC 2		WC 2		WC 2			
Tag No.	1592	Tag No.	1598	Tag No.	1597	Tag No.	1596	Tag No.	1593		
Fish Species	Total	Fish Species	Total	Fish Species	Total	Fish Species	Total	Fish Species	Total		
Dates Fished	Sept.2/16	Dates Fished	Sept.2/16	Dates Fished	Sept.2/16	Dates Fished	Sept.2/16	Dates Fished	Sept. 2/16		
Ninespine Stickleback	0	Ninespine Stickleback	0	Ninespine Stickleback	0	Ninespine Stickleback	1	Ninespine Stickleback	0		
Common Shiner	0	Common Shiner	2	Common Shiner	0	Common Shiner	0	Common Shiner	0		
White Sucker	0	White Sucker	2	White Sucker	4	White Sucker	0	White Sucker	0		
Pearl Dace	0	Peal Dace	0								
Blacknose Shiner	0										
TOTAL	0	TOTAL	4	TOTAL	4	TOTAL	1	TOTAL	0		

Table 2-6 Fish Presence in WC2

2.3 TRIBUTARY TO RIVIERE A L'ANGUILLE (WC 3)

Watercourse 3 (WC3) is a tributary to Riviere a L'Anguille and flows west. WSP field personnel completed the stream assessment on August 11, 2016. The reaches and water quality sampling locations are shown in Figure 3, Appendix A.

2.3.1 FISH HABITAT

WSP completed a survey on three reaches of the main channel of a beaver impacted watercourse. WC3 has extensive wetland on the right and left banks, however, all reaches are deemed similar. The average wetted width for Reaches 1-3 is 3 m and the bankful channel average width is 5.5 m. The average depth of the wetted width for all three reaches was greater than 70 cm. The substrate consisted of fines and organics with little to no flow.

Reaches 1-3 are dominated by grasses with spots of bare ground and shrubs. There were no defined banks for either reach. The canopy cover above Reaches 1-3 was 0%; the left bank had approximately 5% overhanging vegetation and the right bank had approximately 3% overhanging vegetation. There was 2 m of woody debris in Reach 1 and Reach 3 and 1 m of woody debris in Reach 2. Table 2-7 below summarizes the characteristics of WC3.

	Watercourse Characteristics										
Reac	Strea m Type*	Channe I Type**	Length (m)	AVG. Width (m)		Substrate (%)	Avg. Depth Wet	0-50% Overhanging Vegetation		Large Wood y Debris	Flow
h No.				Wet	Bank Channe I	Fines/Organic s	Width (cm)	L	R	in Strea m (m)	(cm/s)
	WC3										
1	13	1	30	3	5-6	100	> 70	5	3	2	-
2	13	1	30	3	5-6	100	75	5	3	1	-
3	13	1	30	3	5-6	100	>70	5	3	2	-
*Stream	*Stream Type> 13 = Beaver; 24 = Natural Deadwater										
** Chan	** Channel Type> 1 = Main										

Table 2-7 WC3 Characteristics

Stream Banks Depth Reac h No. Shade Vegetation 1/4 (cm) 1/2 (cm) 3/4 (cm) (%) Channe I Grasse Shrub We Channe Bare Channe Ground Wet Wet Trees Т s s L t WC3 0 5 90 5 0 1 Avg. 70 cm across 2 0 5 90 5 0 Avg. 70 cm across 3 0 5 90 5 0 Avg. 70 cm across



Photo 1 – Looking downstream at Reach 1 and the extensive wetland.



Photo 2 – Looking upstream at Reach 1.



Photo 3 – Looking at a white sucker caught in one of the minnow traps.



Photo 4 – Looking at the common shiner caught in one of the minnow traps.

2.3.2 WATER QUALITY

The water quality of WC3 was sampled in the field with a YSI meter. The results can be seen in Table 2-8. The pH of WC3 is below the CCME guideline and the temperature is does not support the habitat for cold water fish.

Parameter	CCME Guideline	WC3 11-Aug-16		
Temperature (°C)		21.25		
Conductivity (µs/cm)		49		
TDS (mg/L)		0.033		
Salinity (ppm)		0.02		
Dissolved Oxygen (%)		71.2		
Dissolved Oxygen (mg/L)	5	6.05		
рН	6.5-9.0	6.77		

Table 2-8 Field Water Quality Measurements (YSI Meter)

WSP sampled WC3 and sent the samples to AGAT Labs for analysis. The results can be seen in Appendix B. The water samples were compared to the CCME guidelines for the Protection of Aquatic Life (freshwater) and the exceedances are as follows:

- Dissolved Iron;
- pH;
- Total Cadmium; and
- Total Iron.

The effects of cadmium on the freshwater environment can be influenced by hardness, alkalinity, pH, dissolved organic matter and temperature (CCME, 2014). This is not known to inhibit fish, however, the extended exposure to metals such as iron and cadmium are not known.

2.3.3 FISH PRESENCE

WSP deployed 3 minnow traps throughout the reaches and were allowed to fish for at least 48 hours. The fish presence captured in WC3 is summarized in Table 2-9. WSP did not observe live fish during the habitat assessment.

No fish were harmed during the surveys and all were released. WSP completed the fish identification using the UNB Inland Fish Species of New Brunswick⁴.

⁴ Inland Fish Species of New Brunswick; University of New Brunswick

Fish Survey									
WC 3		WC 3		WC 3					
Tag No.	1591	Tag No.	1593	Tag No.	1592				
Fish Species	Total	Fish Species	Total	Fish Species	Total				
Dates Fished	Aug 12-15/16	Dates Fished	Aug 12-15/16	Dates Fished	Aug 12-15/16				
Ninespine		Ninespine		Ninespine					
Stickleback	0	Stickleback	0	Stickleback	0				
Common Shiner	12	Common Shiner	10	Common Shiner	9				
White Sucker	9	White Sucker	4	White Sucker	6				
Peal Dace	17	Pearl Dace	7	Pearl Dace	8				
Blacknose Shiner 1		Blacknose Shiner	0	Blacknose Shiner	0				
TOTAL	39	TOTAL	21	TOTAL	23				

Table 2-9 Fish Presence in WC3

Ninespine Stickleback – Pungitius pungitius

The body of the ninespine stickleback is much more slender compared to other members of this family. Its colour is light olive to brown and sometimes grayish back. Their sides are darkly mottled and the belly is lighter, silvery to white. Their body is not scaled and they do not have bony plates. They have nine (7-12) short and inclined alternately to left and right. The ninespine stickleback has a long and narrow caudal peduncle and the caudal fin is rounded. The average size of the ninespine stickleback is 2.5 inches.

The ninespine stickleback is found in both brackish waters and freshwater lakes and rivers. In rivers and streams it is generally found in slower areas where there is vegetation. The diet of the ninespine stickleback consists mostly on aquatic insects and crustaceans, but will eat the eggs and young other species of fish. Spawning takes place over the summer in fresh water. Like other sticklebacks, the ninespine stickleback male builds a nest using pieces of vegetation and other debris, courts a female, and guards the eggs and young. Likely predators of the ninespine stickleback are any larger fishes and fish eating birds (Univsersity of New Brunswick).

Common Shiner - Notropis cornutus

The common shiner has an olive back with a dark dorsal stripe. Its sides are silvery and sometimes have a bronze tinge. The body is strongly laterally compressed fish and its head and mouth are large. The origin of the dorsal fin is directly over the origin of the pelvic fins. Anal fin rays 9-12 (25% of population may have only 8 rays). The lateral line is slightly curved downwards with 40 - 44 scales along its length. The scales are noticeably taller than wide (twice as high as wide). The average size of the common shiner is 2 - 4 inches, but can grow up to 8 inches.

The common shiner prefers faster pools in rivers and streams, but is also found in lakes. Food items of the common shiner include terrestrial and aquatic insects, vegetation, and other fishes. Spawning occurs from spring to early summer. The male fish develops red to orange colour on the tips of its fins and tubercles on its head. The male will dig a nest in gravel or may use the nest of another fish. After eggs are deposited the male will guard the nest. Like the golden shiner, the common shiner is popular bait among anglers. Natural predators include larger fish like smallmouth bass and chain pickerel, and birds, such as mergansers and kingfishers. (Univsersity of New Brunswick).

White Sucker; Catostomus commersoni

Scales larger, usually fewer than 90 in lateral line; lower lip much wider than its height; oblique rows of scales from lateral line to dorsal origin 8-10; dorsal fin rays 10-12; least caudal peduncle depth more than one-half length of dorsal fin base; no membranous connection between pelvic fins and body (University of New Brunswick).

Peal Dace - Semotilus margarita

Similar in appearance to the lake chub, pearl dace have a cigar shaped body with a more blunt head and slightly sub-terminal mouth. Its back is dark olive to black with lighter silvery sides and white belly. The sides will often have brown and black spots. The dorsal fin (lacks a dark spot) begins behind the pelvic fins and the caudal is slightly forked. The lateral line is complete with 62 - 78 scales. The pearl dace has a small barbel located on the premaxillaries, however, it can be absent on one or both sides. The average size of the pearl dace is 3.5 inches but can grow to 6 inches.

The pearl dace habitats are cool bogs, streams, and lakes. Pearl dace eat a variety of aquatic organisms including plankton, chironomids, and copepods. The pearl dace is likely to be a forage fish for many larger fish and fish eating birds. Spawning occurs in the spring to early summer (May - June). At this time the males take on orange/red colouration on its sides below the lateral line. Spawning sites are in shallow water with sand or gravel substrate (University of New Brunswick).

Blacknose Shiner, Notropis heterolepis

Anal fin rays typically 8, sometimes 7; dorsal fin located over or behind a vertical through pelvic insertion; lateral line complete (University of New Brunswick).

2.4 TRIBUTARY TO RIVIERE A L'ANGUILLE (WC 4)

Watercourse 4 (WC4) is a tributary to Riviere a L'Anguille and flows west. This tributary is located south of WC3. WSP field personnel completed the stream assessment on August 11, 2016. The reaches and water quality sampling locations are shown in Figure 3, Appendix A.

2.4.1 FISH HABITAT

Three reaches were assessed and all three reaches had the same characteristics; there were no differentiable reaches. The stream is the main channel of a deadwater watercourse. Each reach consisted of 25 m and the average wetted width was 1.25 m and the bankful channel average width is 1.75 m. The average depth of the wetted width was 25 cm. The substrate consisted of fines and organics with little to no flow.

Reaches 1-3 is dominated by grasses and shrubs. There were no defined banks and the canopy cover was 55%. The left bank had approximately 35% overhanging vegetation and the right bank had approximately 30% overhanging vegetation. There was no woody debris in either reach. Table 2-10 below summarizes the characteristics of WC4.

It is unlikely that WC4 supports the fish habitat of many fish from lack of water due to the vegetation choked channel and the poor water quality.

- I

0.02

0.02

0.02

1 	Table 2-10 WC4 Characteristics										
	Watercourse Characteristics										
Reac Strea		Channe	Length	AVG. Width (m)		Substrate (%)	Avg. Depth Wet	0-50% Overhanging Vegetation		Large Wood y Debris	Flow
h No.	Type*	I Type**	(m)	Wet	Bank Channe I	Fines/Organic s	Width (cm)	L	R	in Strea m (m)	(cm/s)
	WC4										
1	24	1	25	1.25	1.75	100	25	35	30	-	-
2	24	1	25	1.25	1.75	100	25	35	30	-	-
3	24	1	25	1.25	1.75	100	25	35	30	-	-
*Stream	*Stream Type> 13 = Beaver; 24 = Natural Deadwater										
** Channel Type> 1 = Main											

. . ..

Stream Banks Depth Reac Shade Vegetation 1/4 (cm) 1/2 (cm) 3/4 (cm) h No. (%) Bare Grasse Shrub Channe We Channe Channe Ground Wet Wet s s Trees 1 Т WC4 0.2 0 0.2 0.02 1 55 84 15 <1 0.03 0.07 2 50 0 84 15 0.03 0.07 0.2 0.2 0.02 <1 3 6 0 84 15 <1 0.03 0.07 0.2 0.2 0.02



Photo 1 – Looking upstream at Reach 1 of WC4.



Photo 2 – Looking downstream at Reach 1.



Photo 3 – Looking upstream at the vegetation around WC4.



Photo 4 – Looking at the water level in WC4.

2.4.2 WATER QUALITY

The water quality of WC1 was sampled in the field with a YSI meter. The results can be seen in Table 2-11. The pH and dissolved oxygen of WC4 is below the CCME guideline and the temperature is does not support the habitat for cold water fish.

Parameter	CCME Guideline	WC4 11-Aug-16
Temperature (°C)		19.98
Conductivity (µs/cm)		117
TDS (mg/L)		0.75
Salinity (ppm)		0.05
Dissolved Oxygen (%)		24.4
Dissolved Oxygen (mg/L)	5	2.18
рН	6.5-9.0	6.45

Table 2-11 Field Water Quality Measurements (YSI Meter)

WSP sampled WC4 and sent the samples to AGAT Labs for analysis. The results can be seen in Appendix B. The water samples were compared to the CCME guidelines for the Protection of Aquatic Life (freshwater) and the exceedances are as follows:

- Dissolved Iron;
- pH;
- Total Arsenic; and
- Total Iron.

Arsenic is absorbed by colloidal humic material under conditions of high organic content, low pH, low phosphorous, and low mineral content (CCME, 2001). This is not known to inhibit fish, however, the extended exposure to metals such as iron and arsenic is not known.

2.4.3 FISH PRESENCE

Fish surveys were not conducted on WC4 due to the nature of the watercourse, lack of water and no potential habitat for fish species.

2.5 **POND**

The pond that was sampled is located on the Theriault & Hachey Peat Moss Plant in Baie-Ste-Anne. It is situated immediately east of a harvesting field (see Figure 2, Appendix A). WSP field personnel completed the field survey on August 12, 2016. The sampling location can be seen in Figure 2, Appendix A.

2.5.1 FISH HABITAT

WSP did not complete a fish habitat assessment on the Pond. It is unlikely that the Pond supports cold water fish. The potential for warm water species does exist, though the pH is low and the Pond is likely to warm significantly in summer. The outlet (WC1 – tributary to E Branch Eel River) is blocked by vegetation wherever the channel disappears and the potential for fish passage through to the Pond is diminished.



Photo 1 - Looking northeast at the Pond



Photo 2 – Looking southwest at the Pond.



Photo 3 – Looking west towards the harvesting field from the edge of the Pond.

2.5.2 WATER QUALITY

The water quality of the Pond was sampled in the field with a YSI meter. The results can be seen in Table 2-12. The pH of the Pond is below the CCME guideline and the temperature does not support the habitat for cold water fish.

Parameter	CCME Guideline	POND 12-Aug-16
Temperature (°C)		21.95
Conductivity (µs/cm)		31
TDS (mg/L)		0.02
Salinity (ppm)		0.01
Dissolved Oxygen (%)		83.4
Dissolved Oxygen (mg/L)	5	7.12
рН	6.5-9.0	7.57

Table 2-12 Field Water Quality Measurements (YSI Meter)

WSP sampled the Pond and sent the samples to AGAT Labs for analysis. The results can be seen in Appendix B. The water samples were compared to the CCME guidelines for the Protection of Aquatic Life (freshwater) and the exceedances are as follows:

- Dissolved Iron; and
- Total Iron.

This is not known to inhibit fish, however, the extended exposure to metals such as iron is not known.

2.5.3 FISH PRESENCE

WSP did not complete any fish surveys for the Pond. No fish were observed during water sampling at the Pond.

3 SUMMARY

WSP conducted fish and fish habitat surveys on August 11, and 12, and September 2, 2016 for the proposed peat harvesting development of Bog #324W. Four watercourses and one pond within the study area were assessed in the field for water quality and all watercourses were assessed for fish presence and fish habitat. The work was performed during the low flow season of summer 2016. All applicable and appropriate permits and licenses were obtained from the Department of Fisheries and Oceans (DFO) and the Kouchibouguac National Park (KNP).

Each sampling location was assessed for fish habitat characteristics including bank and channel vegetation structure, substrate, and standard widths and depths of the watercourse. A modified NBDNR/DFO Stream Assessment form was used to compile the habitat information. The water quality was tested in-situ using a YSI Multi-Parameter Water Quality Monitoring meter and water samples were collected and submitted to AGAT Laboratories for analysis of General Chemistry, Nutrients, Hardness, and Metals (Total and Dissolved).

Fish presence surveys were originally planned to be conducted with the use of an LR-24 Electrofisher, however the water temperature, and depth of channel for each watercourse was greater than the capacity to use the electrofisher. Minnow traps were set in all watercourses (with the exception of WC4) to catch fish. All fish caught were identified, measured, and released.

The field and laboratory observations indicate that the watercourses flowing away from Bog #324W are poor fish quality, with warm temperatures, low dissolved oxygen, and low pH. Although warm-water fish were observed in WC1-WC3, no sport fish (salmonids such as brook trout or Atlantic salmon) were present at the sampling locations. The habitat characteristics are also poor for salmonids with no spawning habitat noted. The watercourses appear to be beaver impacted drainage channels for the bog.

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4 CLOSURE

This report has been authored by Virgil Grecian, M.Sc., Environmental Site Assessor.

Vigel D Gier

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University of New Brunswick. (n.d.). *Canadian Rivers Institute*. Retrieved 10 05, 2016, from White Sucker: The common shiner prefers faster pools in rivers and streams, but is also found in lakes. Food items of the common shiner include terrestrial and aquatic insects, vegetation, and other fishes. Spawning occurs from spring to early summer. The male fish

University of New Brunswick. (n.d.). *Canadian Rivers Institute.* Retrieved 10 5, 2016, from Blacknose Shiner:

http://www.unb.ca/research/institutes/cri/links/inlandfishesnb/Species/blacknoseshiner.html University of New Brunswick. (n.d.). *Canadian Rivers Institute*. Retrieved 10 5, 2016, from Pearl Dace:

http://www.unb.ca/research/institutes/cri/links/inlandfishesnb/Species/stpearldace.html Univsersity of New Brunswick. (n.d.). *Canadian Rivers Institue*. Retrieved 10 05, 2016, from Common

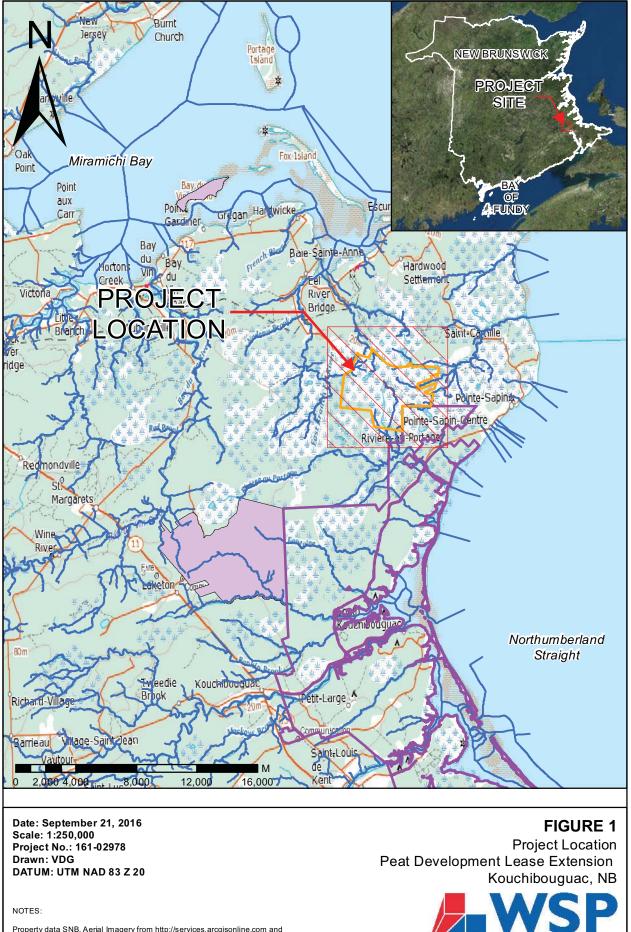
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Univsersity of New Brunswick. (n.d.). *Canadian Rivers Institute.* Retrieved 10 05, 2016, from Ninespine Stickleback:

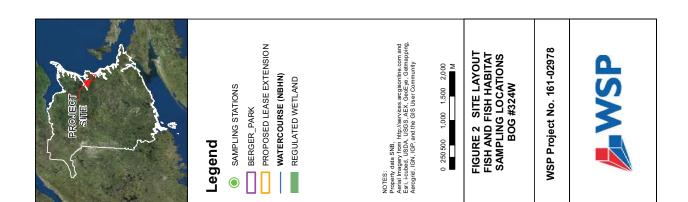
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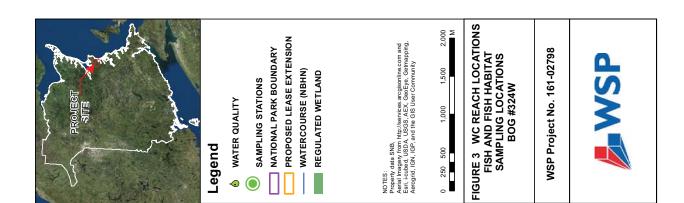
WSP Canada Inc. 161-02978

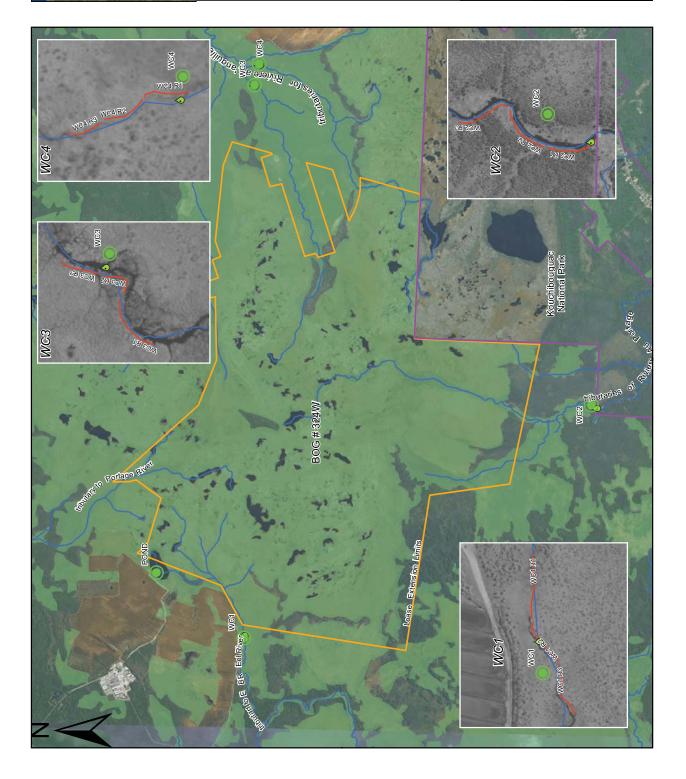


Property data SNB, Aerial Imagery from http://services.arcgisonline.com and Esri, i-cubed, USDA, USGS, AEX, GeoEye, Getmapping, Aerogrid, IGN, IGP, and the GIS User Community











WSP Canada Inc. 161-02978

Appendix B

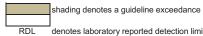
Standard Water Analysis & Total Metals Scan Berger Peat Development, Pointe-Sapin, NB Project No.: 161-02978



						Fre	eshwater Samp	les	
				ME ¹	WC1	WC2	WC3	WC4	POND
Parameter	Units	RDL			7773828	7824652	7771679	7771681	7773818
					12-Aug-16	2-Sep-16	11-Aug-16	11-Aug-16	12-Aug-16
			Short Term (mg/L)	Long Term (mg/L)					
pH		-	6.5	-9.0	5	5.55	6.14	5.54	6.78
Reactive Silica as SiO2	mg/L	0.5	-	-	0.5	6.6	3.5	3.5	0.7
Chloride	mg/L	1	640	120	3	4	3	3	5
Fluoride	mg/L	0.1	-	0.12	<0.12	< 0.12	<0.12	<0.12	<0.12
Sulphate	mg/L	2	-	-	<2	< 2	<2	<2	<2
Alkalinity	mg/L	5	-	-	<5	< 5	8	5	<5
True Color	TCU	5	-	-	189	314	349	502	242
Turbidity	NTU	0.1	-	-	1.5	2.6	6.9	121	5.8
Electrical Conductivity	umho/cm	1	-	-	34	31	35	40	29
Nitrate + Nitrite as N	mg/L	0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nitrate as N	mg/L	0.05	550	13	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nitrite as N	mg/L	0.05		0.06 9	< 0.05	< 0.05 < 0.03	< 0.05	< 0.05	< 0.05
Ammonia as N Total Organic Carbon	mg/L	0.03		9	<0.03 24.5	26.6	<0.03 31.2	0.16 61.7	<0.03 17.6
Ortho-Phosphate as P	mg/L mg/L	0.5	-	-	<0.01	<0.01	<0.01	<0.01	0.05
Total Sodium	mg/L	0.01	-	-	2.4	3	4.5	4.4	2.3
Total Potassium	mg/L	0.1	-	-	0.2	0.5	0.6	0.7	0.3
Total Calcium	mg/L	0.1	-	-	0.2	2.2	5.6	8.9	1.7
Total Magnesium	mg/L	0.1		-	0.4	0.5	1	1.2	0.4
Total Phosphorous	mg/L	0.02			<0.02	0.09	0.15	0.78	0.08
Bicarb. Alkalinity (as CaCO3)	mg/L	5	-	-	<5	<5	8	5	<5
Carb. Alkalinity (as CaCO3)	mg/L	10	-	-	<10	<10	<10	<10	<10
Hydroxide	mg/L	5	-	-	<5	<5	<5	<5	<5
Calculated TDS	mg/L	1	-	-	7	14	23	44	11
Hardness	mg/L	-	-	-	3.6	7.6	18.1	27.2	5.9
Langelier Index (@20C)	NA	-	-	-	-5.89	-4.92	-3.73	-4.36	-3.8
Langelier Index (@ 4C)	NA	-	-	-	-6.21	-5.24	-4.05	-4.68	-4.12
Saturation pH (@ 20C)	NA	-	-	-	10.9	10.5	9.87	9.9	10.6
Saturation pH (@ 4C)	NA	-	-	-	11.2	10.8	10.2	10.2	10.9
Anion Sum	me/L	-	-	-	0.08	0.11	0.24	0.18	0.14
Cation sum	me/L	-	-	-	0.21	0.44	0.73	1.62	0.29
% Difference/ Ion Balance (NS)	%	-	-	-	41.9	59.2	49.9	79.5	34
			Short Term (ug/L)	Long Term (ug/L)					
Total Aluminum	ug/L	5	-	-	27	109	301	695	77
Total Antimony	ug/L	2	-	-	<2	<2	<2	<2	<2
Total Arsenic	ug/L	2		5	<2	2	2	8	3
Total Barium	ug/L	5	-	-	17	53	161	573	61
Total Beryllium	ug/L	2	-	-	<2	<2	<2	<2	<2
Total Bismuth	ug/L	2	-	-	<2	<2	<2	<2	<2
Total Boron	ug/L	5 0.17	29000	1500	<5 <0.017	<5 0.074	5 0.100	6 0.076	<5 0.026
Total Cadmium Total Chromium	ug/L ug/L	0.17	1	0.09	<0.017	0.074 <1	0.100	0.076	0.026
Total Cobalt	ug/L ug/L	1	-	-	<1	<1	<1	<1	<1
Total Copper	ug/L ug/L	1		-	<1	1	<1	<1	<1
Total Iron	ug/L ug/L	50		- 00	310	3340	3350	21300	1410
Total Lead	ug/L ug/L	0.5	- 5	-	0.7	0.7	0.7	7.9	1.3
Total Manganese	ug/L	2	-	-	14	31	130	256	37
Total Molybdenum	ug/L	2		/3	<2	<2	<2	<2	<2
Total Nickel	ug/L	2	-	-	<2	<2	<2	<2	<2
Total Selenium	ug/L	1	i .	1	<1	<1	<1	<1	<1
Total Silver	ug/L	0.1	-	0.25	<0.1	<0.1	<0.1	<0.1	<0.1
Total Strontium	ug/L	5	-	-	6	11	20	41	7
Total Thallium	ug/L	0.1	0	.8	<0.1	<0.1	<0.1	<0.1	<0.1
Total Tin	ug/L	2	-	-	<2	<2	<2	<2	<2
Total Titanium	ug/L	2	-	-	<2	<2	4	16	<2
Total Uranium	ug/L	0.1	33	15	<0.1	<0.1	<0.1	0.2	0.1
Total Vanadium	ug/L	2	-	-	<2	<2	<2	3	<2
Total Zinc	ug/L	5	3	30	<5	6	6	19	<5
Total Suspended Solids	mg/L	5	Narrative	-	<5	12	21	90	8
		-			-	=	=:		-

Notes:

¹ CCME Water Quality Guidelines for the Protection of Aquatic Life (Freshwater)



denotes laboratory reported detection limit denotes no value/not analysed

WC1 WSP Sample ID 7773828 Laboratory Sample ID 12-Aug-16 Sampling date

Dissolved Metals Berger Peat Development, Pointe-Sapin, NB Project No.: 161-02978

Appendix B



	•								
			Guideline	line		Fre	Freshwater Samples	oles	
			Chout	200	WC1	WC2	WC3	WC4	DND
Parameter	Units	RDL	Term	Long Term	7773828	7824652	7771679	7771681	7773818
			(ng/L)	(ng/L)	12-Aug-16	02-Sen-16	11-Aug-16	11-Δ110-1F	12-Aug-16
Dissolved Aluminum	Πα/Ι	ı.		,	11	82	91	100	32
Dissolved Antimonv	na/L	2			2	~	2	<2	2
Dissolved Arsenic	ng/L	2	2		\$	<2	<2	<2	4
Dissolved Barium	ng/L	5	ı	ı	12	43	83	136	33
Dissolved Beryllium	ng/L	2			~2	<2	~2	<2	<2
Dissolved Bismuth	ng/L	2			42	<2	<2	<2	<2
Dissolved Boron	ng/L	5	29000	1500	<5	<5	<5	<5	<5
Dissolved Cadmium	ng/L	0.017	٢	0.09	0.15	<0.017	0.031	<0.017	<0.017
Dissolved Chromium	ng/L	1			۲ ۲	1	۲ ۲	<1	4
Dissolved Cobalt	ng/L	1			۲ ۲	۲	Ý	4	۲ ۲
Dissolved Copper	ng/L	1			42	<2	<2	<2	<2
Dissolved Iron	ng/L	50	300	0	266	1510	2040	3330	1120
Dissolved Lead	ng/L	0.5			<0.5	<0.5	<0.5	<0.5	<0.5
Dissolved Manganese	ng/L	2			23	293	46	151	23
Dissolved Molybdenum	ng/L	2	73	3	42	<2	<2	<2	<2
Dissolved Nickel	ng/L	2			5	<2	~2	<2	<2
Dissolved Selenium	ng/L	1	1		<1	<1	<1	<1	<1
Dissolved Silver	ng/L	0.1		0.25	<0.1	<0.1	<0.1	<0.1	<0.1
Dissolved Strontium	ng/L	5			9	6	14	19	9
Dissolved Thallium	ng/L	0.1	0.8	8	<0.1	<0.1	<0.1	<1.0	<0.1
Dissolved Tin	ng/L	2			<2	<2	<2	<2	<2
Dissolved Titanium	ng/L	2			<2	<2	2	<2	<2
Dissolved Uranium	ng/L	0.1	33	15	<0.1	<0.1	<0.1	<0.1	<0.1
Dissolved Vanadium	ng/L	2			<2	<2	<2	<2	<2
Dissolved Zinc	ng/L	5	30	0	<5	<5	<5	<5	<5
Notes:									

¹ CCME Water Quality Guidelines for the Protection of Aquatic Life (Freshwater)

 shading denotes a guideline exceedance

 RDL
 denotes laboratory reported detection limit

 denotes no value/not analysed

 WC1
 WSP Sample ID

 WC1
 WSP Sample ID

 7773828
 Laboratory Sample ID

 12-Aug-16
 Sampling date

Appendix C Laboratory Certificates



CLIENT NAME: WSP CANADA INC. 55 DRISCOLL CRESCENT MONCTON, NB E1E4C8 (506) 857-1675

ATTENTION TO: VIRGIL GRECIAN

PROJECT: 161-02978

AGAT WORK ORDER: 16X126285

WATER ANALYSIS REVIEWED BY: Jason Coughtrey, Inorganics Supervisor

DATE REPORTED: Aug 23, 2016

PAGES (INCLUDING COVER): 14

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (902) 468-8718

*NOTES	

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

AGAT Laboratories (V1)

Member of: Association of Professional Engineers, Geologists and Geophysicists of Alberta (APEGGA) Western Enviro-Agricultural Laboratory Association (WEALA) Environmental Services Association of Alberta (ESAA)

AGAT Laboratories is accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA) and/or Standards Council of Canada (SCC) for specific tests listed on the scope of accreditation. AGAT Laboratories (Mississauga) is also accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) for specific drinking water tests. Accreditations are location and parameter specific. A complete listing of parameters for each location is available from www.cala.ca and/or www.scc.ca. The tests in this report may not necessarily be included in the scope of accreditation.

Page 1 of 14

Results relate only to the items tested and to all the items tested

All reportable information as specified by ISO 17025:2005 is available from AGAT Laboratories upon request

E: D: 2016-08-15 D: 2016-08-17 D: 2017-00-17 D:
016-08-15 SAMPLE DESCRIPTION: WC3 016-08-15 SAMPLE TYPE: Wate SAMPLE TYPE: BATE SAMPLED: W11/201 ug/L G/S RDL 777167 ug/L G/S RDL 777167 ug/L G/S RDL 777167 ug/L G/S RDL 777167 ug/L C/S SAMPLED: 8/11/201 ug/L G/S RDL 777167 ug/L 12:5 2 ~2 ug/L NRG,NRG 5 ~2 ug/L 0.12 0.017 0.031 ug/L 0.12 0.017 0.031 ug/L 0.12 0.017 0.031 ug/L 0.12 0.017 0.2040 ug/L 0.12 0.017 0.05 ug/L 0.12 0.017 0.031 ug/L 0.1 0.1 ~2 ug/L 0.1 0.1 ~1 ug/L 0.1 0.1 ~2 ug/L 0.1 0.1<
016-08-15 SAMPLE DESCRIPTION: Wc3 SAMPLE TYPE: Water DATE SAMPLE D: 8/11/2016 ug/L G/S RDL ug/L G/S RDL ug/L 12.5 2 ug/L 12.5 2 ug/L 12.5 2 ug/L 12.5 2 ug/L 0.12 0.017 ug/L 0.12 0.017 ug/L 0.12 0.017 ug/L 0.12 2 ug/L 0.12 0.017 ug/L 0.12 0.017 ug/L 0.12 0.017 ug/L 0.12 0.117 ug/L 0.1 1 ug/L 1 1 ug/L 0.1 0.1 ug/L 0.1 0.1 ug/L 0.1 0.1
SAMPLE DESCRIPTION: WC3 SAMPLE TYPE: Water Nater SAMPLE TYPE: Water DATE SAMPLE DESCRIPTION: WC3 BATE SAMPLE TYPE: Water Dug/L G/S B/11/2016 Ug/L G/S SAMPLED: Ug/L 12.5 2 -2 Ug/L 12.5 2 -2 Ug/L NRG, NRG 5 8/3 Ug/L 12.5 2 -2 Ug/L 0.12 0.017 0.031 Ug/L 0.12 0.017 0.031 Ug/L 0.12 0.017 0.031 Ug/L 2 -2 -2 Ug/L 0.12 0.017 0.05 Ug/L 0.1 2 -2 Ug/L 2 -2 -2 Ug/L 0.1 -1 -1 Ug/L 2 -2 -2 Ug/L 0.1 -2 -2 Ug/L 2 -
SAMPLE TYPE: Water DATE SAMPLED: 8/11/2016 Date SAMPLED: 8/11/2016 Unit G/S RDL 777/679 Ug/L G/S RDL 777/679 Ug/L 12.5 2 2 Ug/L 12.5 2 2 Ug/L NRG, NRG 5 83 Ug/L NRG, NRG 5 83 Ug/L 0.12 0.017 0.031 Ug/L 0.12 0.017 0.031 Ug/L 0.12 0.017 0.031 Ug/L 0.12 0.17 0.017 0.031 Ug/L 0.12 0.17 0.031 0.01 Ug/L 0.1 0.1 < < Ug/L 0.1 0.1 < < <
r Unit G/S RDL 7771679 ug/L 12.5 5 91 ug/L 12.5 2 < 2 ug/L 12.5 2 < 2 ug/L 12.5 2 < 2 ug/L NRG, NRG 5 83 ug/L NRG, NRG 2 < 2 ug/L NRG, NRG 5 < 2 ug/L 0.12 0.017 0.031 ug/L 0.1 < -2 < -2
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ug/L 2 2 2 ug/L NRG, NRG 5 2 ug/L NRG, NRG 5 2 ug/L 0.12 0.017 0.031 ug/L 0.12 0.017 0.031 ug/L 0.12 0.017 6 ug/L 0.12 0.017 6 ug/L 1 1 <1 ug/L 2 2 6 ug/L 2 2 6 ug/L 2 2 6 ug/L 2 2 6 ug/L 0 0 0 6 ug/L 0 0 6 6 ug/L 0 0 6 6 ug/L 0 6 6 6 ug/L 6
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ug/L NRG, NRG 5 <5 ug/L 0.12 0.017 0.031 ug/L 0.12 0.017 0.031 ug/L 0.12 0.017 0.031 ug/L 0.12 0.017 0.031 ug/L 1 1 <1 ug/L 2 2040 <2 ug/L 0.5 2040 <2 ug/L 2 <2 <2 ug/L 2 <2 <2 ug/L 0.1 <2 <2 ug/L 0.1 <2 <2 ug/L 0.1 <2 <2 ug/L 0.1 <2 <2 ug/L <2 <2 <
ug/L 0.12 0.017 0.031 ug/L 1 <1 ug/L 1 <1 ug/L 1 $<<1$ ug/L 2 <0.031 ug/L 2 <0.031 ug/L 2 <0.5 ug/L 0.5 <0.5 ug/L 2 <46 ug/L 2 <46 ug/L 2 <46 ug/L 2 <22 ug/L 0.1 <0.1 ug/L <0.1 <0.1 ug/L <0.1 <0.1 ug/L <0.1 <0.1 ug/
ug/L 1 <1 ug/L 1 <1 ug/L 2 <2 ug/L 50 2040 ug/L 50 2040 ug/L 0.5 <0.5 ug/L 0.5 <0.5 ug/L $2 <0.5 ug/L 2 <0.5 ug/L 2 <0.5 ug/L 2 <0.5 ug/L 2 <0.1 ug/L 0.1 <0.1 ug/L <0.1 <0.1 ug/L <0.1 <0.1 ug/L <0.1 <0.1 ug/L <0.1 <0.1 $
ug/L 1 <1 ug/L 2 <2 ug/L 50 2040 ug/L 50 2040 ug/L 0.5 <0.5 ug/L 0.5 <0.5 ug/L 2 <0.1 ug/L 0.1 <0.1 ug/L <0.1 <0.1 ug/L <0.1 <0.1 ug/L <0.1 <0.1 ug/L <0.1 <0.1
ug/L 2 < 2 ug/L 50 2040 ug/L 50 2040 ug/L 0.5 < 0.5 ug/L 2 < 46 ug/L 2 < 46 ug/L 2 < 6.5 ug/L 2 < 72 ug/L 2 < 6.5 ug/L 0.1 < 6.1 ug/L < 6.1 < 6.1
ug/L 50 2040 ug/L 0.5 <0.5 ug/L 2 <46 ug/L 2 <46 ug/L 2 <5 ug/L 2 <22 ug/L 2 <22 ug/L 1 <1 ug/L 0.1 <51 ug/L 0.1 <0.1 ug/L 0.1 <0.1 ug/L <0.1 <0.1
ug/L 0.5 <0.5 ug/L 2 <46 ug/L 2 <46 ug/L 2 <2 ug/L 2 <2 ug/L 2 <2 ug/L 0.1 <0.1
ug/L 2 46 ug/L 2 2 ug/L 2 <2 ug/L 1 <1 ug/L 0.1 <1 ug/L 0.1 <0.1 ug/L 0.1 <0.1 ug/L 0.1 <0.1 ug/L 0.1 <0.1
ug/L 2 ~ 2 ug/L 2 ~ 2 ug/L 1 ~ 1 ug/L 0.1 ~ 0.1 ug/L 5 14 ug/L 0.1 ~ 0.1 ug/L 0.1 ~ 0.1 ug/L 2 ~ 0.1
ug/L 2 <2 ug/L 1 <1 ug/L 0.1 <1 ug/L 5 114 ug/L 0.1 <0.1 ug/L 2 2 <2
ug/L 1 <1 ug/L 0.1 <1 ug/L 5 14 ug/L 0.1 <0.1 ug/L 2 2 <2
ug/L 0.1 <0.1 ug/L 5 14 ug/L 0.1 <0.1 ug/L 2 <2
ug/L 5 14 ug/L 0.1 <0.1 ug/L 2 2 <2
ug/L 0.1 <0.1 ug/L 2 <2
ug/L 2 <2
N
v
Dissolved Vanadium ug/L 2 <2 <2
55
Comments: BDI - Benorted Detection Limit: G / S - Guideline / Standard: Befers to CCME MAL - undated 2015
1681 Analysis completed on a filtered sample.

Results relate only to the items tested and to all the items tested

Certified By:

AGAT CERTIFICATE OF ANALYSIS (V1)

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Jaw Coopertury

		Laboratories	atories		Certificate of Analysis	11 Morris Drive, Unit 122 Dartmouth, Nova Scotia CANADA B3B 1M2 TEL (902)468-8718 FAX (902)468-8924
CLIENT NAME: WSP CANADA INC. SAMPLING SITE:	INC.				ATTENTION TO: VIRGIL GRECIAN SAMPLED BY:	http://www.agatlabs.com
			MTL	- Standar	Standard Water Analysis + Total Metals	
DATE RECEIVED: 2016-08-15					DATE REPORTED: 2016-08-18	D: 2016-08-18
	SA	SAMPLE DESCRIPTION:	RIPTION:	WC3	WC4	
		SAMPLE TYPE: DATE SAMPLED:	SAMPLE TYPE: ATE SAMPLED:	Water 8/11/2016	Water 8/11/2016	
Parameter	Unit	G/S	RDL	7771679	7771681	
Hd		6.5-9.0		6.14	5.54	
Reactive Silica as SiO2	mg/L		0.5	3.5	3.5	
Chloride	mg/L	NRG	-	ო	ς	
Fluoride	mg/L	NRG	0.12	<0.12	<0.12	
Sulphate	mg/L mg/l		7 4	∾ ∿	42 п	
True Color		Morrotivo	ה ע	340	503	
Turbidity	DD-	Narrative	, C	6.9		
Electrical Conductivity	umho/cm		; -	35	40	
Nitrate + Nitrite as N	mg/L		0.05	<0.05	<0.05	
Nitrate as N	mg/L	1500, 200	0.05	<0.05	<0.05	
Nitrite as N	mg/L		0.05	<0.05	<0.05	
Ammonia as N	mg/L		0.03	<0.03	0.16	
Total Organic Carbon	mg/L		0.5	31.2	61.7	
Ortho-Phosphate as P	mg/L		0.01	<0.01	<0.01	
Total Sodium	mg/L		0.1	4.5	4.4	
Total Potassium	mg/L		0.1	0.6	0.7	
Total Calcium	mg/L		0.1	5.6	8.9	
Total Magnesium	mg/L		0.1	1.0	1.2	
Total Phosphorous	mg/L	Fact Sheet	0.02	0.15	0.78	
Bicarb. Alkalinity (as CaCO3) Carb. Alkalinity (as CaCO3)	mg/L mg/l		ۍ 10	8 <10	9 U	
Hvdroxide	ma/L		5 5	2 2 2	5. 5	
Calculated TDS	mg/L		-	23	44	
Hardness	mg/L			18.1	27.2	
Langelier Index (@20C)	ΝA			-3.73	-4.36	
Langelier Index (@ 4C)	NA			-4.05	-4.68	
Saturation pH (@ 20C)	NA			9.87	9.90	
Saturation pH (@ 4C)	NA			10.2	10.2	
Anion Sum	me/L			0.24	0.18	
					VE WAY W	Talling
					Certified Bv.	7
						>

Results relate only to the items tested and to all the items tested

AGAT CERTIFICATE OF ANALYSIS (V1)

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CLIENT NAME: WSP CANADA INC. SAMPLING SITE: ATL - Standar DATE RECEIVED: 2016-08-15 DATE RECEIVED: 2016-08-15 DATE RECEIVED: 2016-08-15 DATE RECEIVED: 2016-08-15 CATO ATT SAMPLE TYPE: Water DATE RECEIVED: 2016-08-15 Cation sum me/L G/S RDL 0.73 % Difference/ Ion Balance (NS) % Methy 0.73 % Difference/ Ion Balance (NS) % % Methy 0.73 % Difference/ Ion Balance (NS) % % % % % % % % % % % % % % % % % % %	ATTENTION TO: VIRGIL GRECIAN SAMPLED BY: AMPLED BY: DATE REPORTED: 2016-08-18 Water Water Mater
MTL - Stal MTL - Stal MTL - Stal SAMPLE DESCRIPTION: Wca SAMPLE TYPE: Wate DATE SAMPLED: 8/11/20 DATE SAMPLED: 8/11/20 0.73 SAMPLE TYPE: Wate Wate DATE SAMPLED: 8/11/20 0.73 SAMPLE TYPE: Wca Wate DATE SAMPLED: 8/11/20 0.73 SAMPLE TYPE: Wca Wate Unit G/S RDL 7/7165 0.73 0.73 0.73 0.700 0.12 0.100 0.100	Jard Water Analysis + Total Metals WC4 Water Water 8/11/2016 7771681 1.62 79.5 695 62 8 573 62 8 573 6 0.076
SAMPLE DESCRIPTION: SAMPLE TYPE: BAMPLE TYPE: BATE SAMPLED: DATE SAMPLED: DATE SAMPLED: DATE SAMPLED: DATE SAMPLED: DATE SAMPLE TYPE: SAMPLE TYPE: DATE DESCRIPTION: SAMPLE TYPE: DATE DESCRIPTION: SAMPLE TYPE: DATE DESCRIPTION: SAMPLE TYPE: DATE SAMPLE TYPE: DATE S	WC4 Water 8/11/2016 7771681 1.62 79.5 695 695 63 6 8 573 6 6 6 6 0.076
SAMPLE DESCRIPTION: SAMPLE TYPE: DATE SAMPLED: DATE SAMPLED: DATE SAMPLED: DATE SAMPLED: CANPLED: DATE SAMPLED: DATE SAMPLED: SAMPLED: DATE SAMPLED: SAMPLED: DATE SAMPLED: SAMPLED: DATE SAMPLED: SAMPLED: DATE SAMPLED: SAMPLED: SAMPLED: SAMPLED: SAMPLED: SAMPLED: DATE SAMPLED: SA	
SAMPLE TYPE: DATE SAMPLED: DATE SAMPLED: me/L G/S RDL me/L 5 ug/L 12.5 2 ug/L 12.5 2 ug/L 12.5 2 ug/L 0.12 0.017 ug/L 0.12 0.017 ug/L 0.12 0.017	
Unit G/S RDL me/L me/L 5 wg/L 5 9 ug/L 12.5 2 ug/L 12.5 2 ug/L 12.5 2 ug/L 0.012 5 ug/L 0.12 0.017 ug/L 0.12 0.017 ug/L 0.12 0.017	
me/L % ug/L 5 ug/L 12.5 2 ug/L 12.5 2 ug/L 12.5 2 ug/L 22 ug/L 22 ug/L 0.12 0.017 ug/L 0.12 0.017 ug/L 1	
% ug/L 5 ug/L 5 ug/L 12.5 2 ug/L 12.5 2 ug/L 12.5 2 ug/L 22 ug/L 0.12 0.017 ug/L 0.12 0.017 ug/L 1	
ug/L 5 ug/L 2 ug/L 12.5 2 ug/L 12.5 2 ug/L 22 ug/L NRG, NRG 5 ug/L 0.12 0.017 ug/L 1	
ug/L 2 ug/L 12.5 2 ug/L 12.5 2 ug/L 2 ug/L NRG, NRG 5 ug/L 0.12 0.017 ug/L 1	
ug/L 12.5 2 ug/L 5 ug/L 2 ug/L NRG, NRG 5 ug/L 0.12 0.017 ug/L 0.12 1	
ug/L 5 ug/L 2 ug/L NRG, NRG 5 ug/L 0.12 0.017 ug/L 1 1	
ug/L 2 ug/L 2 ug/L NRG, NRG 5 ug/L 0.12 0.017 ug/L 1	
ug/L 2 ug/L NRG, NRG 5 ug/L 0.12 0.017 ug/L 1	
ug/L NRG, NRG 5 ug/L 0.12 0.017 ug/L 1	
ug/L 0.12 0.017 1 ug/L 1	
ug/L 1	
ug/L 1	
ng/L 50	
0.5	
ug/L 2	
denum ug/L 2	
	<2
um ug/L 1	
ug/L 7.5, NRG 0.1	<0.1
ר ug/L 5	
llium ug/L 0.1	<0.1
NRG, NRG 0.1	0.2
Total Vanadium ug/L 2 <2	
	19

Results relate only to the items tested and to all the items tested

Certified By:

GGGT CERTIFICATE OF ANALYSIS (V1)

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Garder Coapiting

11 Morris Drive, Unit 122 Dartmouth, Nova Scotia CANADA B3B 1M2 TEL (902)468-8718 FAX (902)468-8924 http://www.anatlabs.com			2016-08-18		The second se
ysis 85	ATTENTION TO: VIRGIL GRECIAN SAMPLED BY:	letals	DATE REPORTED: 2016-08-18		y:
Certificate of Analysis AGAT WORK ORDER: 16X126285 PROJECT: 161-02978		Standard Water Analysis + Total Metals		to CCME MAL - updated 2015 ed.	Certified By:
ப் Laboratories	A INC.	MTL - Sta		Comments: RDL - Reported Detection Limit; G/S - Guideline / Standard: Refers to CCME MAL - updated 2015 7771679-7771681 TOC was analysed at AGAT Montreal. Ion Balance is biased high, contributing parameters have been confirmed.	
	CLIENT NAME: WSP CANADA INC. SAMPLING SITE:		DATE RECEIVED: 2016-08-15	Comments: RDL - Reported Detection Limit; 7771679-7771681 TOC was analysed at AGAT Mor Ion Balance is biased high, contr	

AGAT CERTIFICATE OF ANALYSIS (V1)

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CLIENT NAME: WED CANADA INC	Laboratories	Certificate of Analysis AGAT WORK ORDER: 16X126285 PROJECT: 161-02978	11 Morris Drive, Unit 122 Dartmouth, Nova Scotia CANADA B3B 1M2 TEL (902)468-8718 FAX (902)468-8924 http://www.agatlabs.com
CLIENT NAML. WOL CANADA INC. SAMPLING SITE:		SAMPLED BY:	
		TSS	
DATE RECEIVED: 2016-08-15		DATE REPORTED: 2016-08-16	-08-16
Parameter Linit	SAMPLE DESCRIPTION: WC3 SAMPLE TYPE: Water DATE SAMPLED: 8/11/2016 G./S RDI 7771679	3 WC4 er Water 016 8/11/2016 279 77718A1	
	e 5		
		Tortified Bu	ज्ञ

AGAT CERTIFICATE OF ANALYSIS (V1)

	H H J H J H J H J H J H J H J H J H J H	Laboratories	Guideline Violation AGAT WORK ORDER: 16X126285 PROJECT: 161-02978	_	11 Mo Darth C	1 Morris Drive, Unit 122 Dartmouth, Nova Scotia CANADA B3B 1M2 TEL (902)468-8924 FAX (902)468-8924
CLIENT NAME	CLIENT NAME: WSP CANADA INC.		-	ATTENTION TO: VIRGIL GRECIAN		nttp://www.agatlabs.com
SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	GUIDEVALUE	RESULT
7771679	WC3	NS-CCME MAL MTI	'L - Standard Water Analysis + Total Metals	Hq	6.5-9.0	6.14
7771681	WC4	NS-CCME MAL MTI	'L - Standard Water Analysis + Total Metals	Hd	6.5-9.0	5.54



Quality Assurance

CLIENT NAME: WSP CANADA INC.

PROJECT: 161-02978

SAMPLING SITE:

AGAT WORK ORDER: 16X126285 ATTENTION TO: VIRGIL GRECIAN SAMPLED BY:

Water Analysis

RPT Date:			Г	UPLICATE		alysi	REFEREN	ICE MA	TERIAI	METHOD	BLANK	SPIKE	МАТ	RIX SPI	KE
						Method		Acce	ptable	WE THOD	Acce	ptable		Acce	ptable
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Blank	Measured Value	Lin Lower	nits Upper	Recovery	Lir Lower	nits Upper	Recovery	Lir Lower	nits Upper
MTL - Standard Water Analysis	+ Total Meta	als		II							1				
pH	7771679		6.14	6.03	1.8%	<	100%	80%	120%	NA	80%	120%	NA	80%	120%
Reactive Silica as SiO2		7770175	4.1	4.1	0.0%	< 0.5	114%	80%	120%		80%	120%	96%	80%	120%
Chloride	7767958		48	49	2.1%	< 1	104%	80%	120%	NA	80%	120%	NA	80%	120%
Fluoride	7767958		<0.12	<0.12	NA	< 0.12	115%	80%	120%	NA	80%	120%	89%	80%	120%
Sulphate	7767958		<2	<2	NA	< 2	113%	80%	120%	NA	80%	120%	114%	80%	120%
Alkalinity	7771679	7771679	8	7	NA	< 5	95%	80%	120%	NA	80%	120%	NA	80%	120%
True Color	1	7773828	189	171	10.0%	< 5	110%	80%	120%		80%	120%		80%	120%
Turbidity	1	7773828	1.5	1.3	14.3%	< 0.1	103%	80%	120%		80%	120%		80%	120%
Electrical Conductivity	7771679	7771679	35	36	2.8%	< 1	80%	80%	120%	NA	80%	120%	NA	80%	120%
Nitrate as N	7767958		0.22	0.22	NA	< 0.05	97%	80%	120%	NA	80%	120%	85%	80%	120%
Nitrite as N	7767958		0.06	<0.05	NA	< 0.05	103%	80%	120%	NA	80%	120%	88%	80%	120%
Ammonia as N	1	7770175	0.04	0.05	NA	< 0.03	103%	80%	120%		80%	120%	106%	80%	120%
Total Organic Carbon	4		NA	NA	0.0%	< 0.5	98%	80%	120%	105%	80%	120%	NA	80%	120%
Ortho-Phosphate as P	1		< 0.01	< 0.01	NA	< 0.01	103%	80%	120%	95%	80%	120%	104%	80%	120%
Total Sodium	8162016		358	378	5.4%	< 0.1	120%	80%	120%	120%	80%	120%	96%	70%	130%
Total Potassium	8162016		0.2	0.2	NA	< 0.1	120%	80%	120%	120%	80%	120%	130%	70%	130%
Total Calcium	8162016		2.0	2.4	18.2%	< 0.1	120%	80%	120%	96%	80%	120%	100%	70%	130%
Total Magnesium	8162016		0.3	0.3	NA	< 0.1	120%	80%	120%	120%	80%	120%	120%	80%	120%
Total Phosphorous	8162016		0.03	< 0.02	NA	< 0.02	NA	80%	120%	85%	80%	120%	NA	70%	130%
Bicarb. Alkalinity (as CaCO3)	7771679	7771679	8	7	NA	< 5	NA	80%	120%	NA	80%	120%	NA	80%	120%
Carb. Alkalinity (as CaCO3)	7771679	7771679	<10	<10	NA	< 10	NA	80%	120%	NA	80%	120%	NA	80%	120%
Hydroxide	7771679	7771679	<5	<5	NA	< 5	NA	80%	120%	NA	80%	120%	NA	80%	120%
Total Aluminum	8162016		24	23	NA	< 5	NA	80%	120%	NA	80%	120%	130%	70%	130%
Total Antimony	8162016		< 2	< 2	NA	< 2	80%	80%	120%	113%	80%	120%	103%	70%	130%
Total Arsenic	8162016		< 2	< 2	NA	< 2	102%	80%	120%	101%	80%	120%	85%	70%	130%
Total Barium	8162016		< 5	< 5	NA	< 5	101%	80%	120%	105%	80%	120%	104%	70%	130%
Total Beryllium	8162016		< 2	< 2	NA	< 2	104%	80%	120%	110%	80%	120%	108%	70%	130%
Total Bismuth	8162016		< 2	< 2	NA	< 2	93%	80%	120%	103%	80%	120%	99%	70%	130%
Total Boron	8162016		145	147	1.4%	< 5	106%	80%	120%	110%	80%	120%	104%	70%	130%
Total Cadmium	8162016		< 0.017	< 0.017	NA	< 0.017	101%	80%	120%	101%	80%	120%	101%	70%	130%
Total Chromium	8162016		< 1	< 1	NA	< 1	98%	80%	120%	94%	80%	120%	111%	70%	130%
Total Cobalt	8162016		< 1	< 1	NA	< 1	97%	80%	120%	101%	80%	120%	107%	70%	130%
Total Copper	8162016		< 1	< 1	NA	< 1	103%	80%	120%	80%	80%	120%	103%	70%	130%
Total Iron	8162016		85	94	NA	< 50	103%	80%	120%	100%	80%	120%	122%	70%	130%
Total Lead	8162016		1.2	< 0.5	NA	< 0.5	101%	80%	120%	105%	80%	120%	86%	70%	130%
Total Manganese	8162016		24	23	4.3%	< 2	105%	80%	120%	108%	80%	120%	92%	70%	130%
Total Molybdenum	8162016		< 2	< 2	NA	< 2	98%	80%	120%	103%	80%	120%	112%	70%	130%
Total Nickel	8162016		< 2	< 2	NA	< 2	101%	80%	120%	106%	80%	120%	114%	70%	130%
Total Selenium	8162016		< 1	< 1	NA	< 1	98%	000/	120%	105%	0.00/	120%	84%	700/	130%

AGAT QUALITY ASSURANCE REPORT (V1)

AGAT Laboratories is accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA) and/or Standards Council of Canada (SCC) for specific tests listed on the scope of accreditation. AGAT Laboratories (Mississauga) is also accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) for specific drinking water tests. Accreditations are location and parameter specific. A complete listing of parameters for each location is available from www.cala.ca and/or www.scc.ca. The tests in this report may not necessarily be included in the scope of accreditation.

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Quality Assurance

CLIENT NAME: WSP CANADA INC.

PROJECT: 161-02978

SAMPLING SITE:

AGAT WORK ORDER: 16X126285 ATTENTION TO: VIRGIL GRECIAN SAMPLED BY:

Water Analysis (Continued)

					,	`									
RPT Date:			C	UPLICAT	E		REFEREN	NCE MA	TERIAL	METHOD	BLANK	SPIKE	MAT	RIX SPI	KE
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value		ptable nits	Recovery	Lin	ptable nits	Recovery	1 1 1 1	ptable nits
		iù					value	Lower	Upper		Lower	Upper		Lower	Upper
Total Silver	8162016		< 0.1	< 0.1	NA	< 0.1	104%	80%	120%	103%	80%	120%	98%	70%	130%
Total Strontium	8162016		7	6	NA	< 5	92%	80%	120%	94%	80%	120%	92%	70%	130%
Total Thallium	8162016		< 0.1	< 0.1	NA	< 0.1	104%	80%	120%	107%	80%	120%	101%	70%	130%
Total Tin	8162016		< 2	< 2	NA	< 2	97%	80%	120%	105%	80%	120%	109%	70%	130%
Total Titanium	8162016		< 2	< 2	NA	< 2	116%	80%	120%	120%	80%	120%	125%	70%	130%
Total Uranium	8162016		< 0.1	< 0.1	NA	< 0.1	99%	80%	120%	105%	80%	120%	107%	70%	130%
Total Vanadium	8162016		< 2	< 2	NA	< 2	96%	80%	120%	100%	80%	120%	111%	70%	130%
Total Zinc	8162016		< 5	< 5	NA	< 5	95%	80%	120%	89%	80%	120%	91%	70%	130%

Comments: If RPD value is NA, the results of the duplicates are less than 5x the RDL and the RPD will not be calculated.

Dissolved Metals (FWAL)														
Dissolved Aluminum	8162016	73	79	7.9%	< 5	117%	80%	120%	106%	80%	120%	115%	70%	130%
Dissolved Antimony	8162016	< 2	< 2	0.0%	< 2	80%	80%	120%	113%	80%	120%	106%	70%	130%
Dissolved Arsenic	8162016	< 2	< 2	0.0%	< 2	94%	80%	120%	92%	80%	120%	95%	70%	130%
Dissolved Barium	8162016	181	176	2.8%	< 5	100%	80%	120%	102%	80%	120%	96%	70%	130%
Dissolved Beryllium	8162016	< 2	< 2	0.0%	< 2	106%	80%	120%	111%	80%	120%	114%	70%	130%
Dissolved Bismuth	8162016	< 2	< 2	0.0%	< 2	90%	80%	120%	100%	80%	120%	70%	70%	130%
Dissolved Boron	8162016	54	53	1.9%	< 5	120%	80%	120%	107%	80%	120%	99%	70%	130%
Dissolved Cadmium	8162016	< 0.017	< 0.017	0.0%	< 0.017	100%	80%	120%	104%	80%	120%	109%	70%	130%
Dissolved Chromium	8162016	3	3	0.0%	< 1	102%	80%	120%	106%	80%	120%	107%	70%	130%
Dissolved Cobalt	8162016	2	2	0.0%	< 1	98%	80%	120%	101%	80%	120%	116%	70%	130%
Dissolved Copper	8162016	48	17	0.0%	< 2	109%	80%	120%	80%	80%	120%	70%	70%	130%
Dissolved Iron	8162016	23400	23700	1.3%	< 50	107%	80%	120%	104%	80%	120%	99%	70%	130%
Dissolved Lead	8162016	1.3	1.3	0.0%	< 0.5	96%	80%	120%	97%	80%	120%	79%	70%	130%
Dissolved Manganese	8162016	1.15	1.16	NA	< 2	102%	80%	120%	101%	80%	120%	95%	70%	130%
Dissolved Molybdenum	8162016	< 2	< 2	0.0%	< 2	97%	80%	120%	101%	80%	120%	99%	70%	130%
Dissolved Nickel	8162016	4	3	28.6%	< 2	106%	80%	120%	111%	80%	120%	116%	70%	130%
Dissolved Selenium	8162016	< 1	< 1	0.0%	< 1	98%	80%	120%	95%	80%	120%	92%	70%	130%
Dissolved Silver	8162016	< 0.1	< 0.1	0.0%	< 0.1	102%	80%	120%	100%	80%	120%	NA	70%	130%
Dissolved Strontium	8162016	142	143	0.7%	< 5	88%	80%	120%	89%	80%	120%	96%	70%	130%
Dissolved Thallium	8162016	< 0.1	< 0.1	0.0%	< 0.1	100%	80%	120%	104%	80%	120%	94%	70%	130%
Dissolved Tin	8162016	< 2	< 2	0.0%	< 2	97%	80%	120%	103%	80%	120%	104%	70%	130%
Dissolved Titanium	8162016	< 2	< 2	0.0%	< 2	104%	80%	120%	89%	80%	120%	86%	70%	130%
Dissolved Uranium	8162016	< 0.1	< 0.1	0.0%	< 0.1	97%	80%	120%	101%	80%	120%	91%	70%	130%
Dissolved Vanadium	8162016	6	7	15.4%	< 2	91%	80%	120%	99%	80%	120%	110%	70%	130%
Dissolved Zinc	8162016	23	17	0.0%	< 5	82%	80%	120%	85%	80%	120%	107%	70%	130%

Comments: If RPD value is NA, the results of the duplicates are less than 5x the RDL and the RPD will not be calculated.

AGAT QUALITY ASSURANCE REPORT (V1)

AGAT Laboratories is accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA) and/or Standards Council of Canada (SCC) for specific tests listed on the scope of accreditation. AGAT Laboratories (Mississauga) is also accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) for specific drinking water tests. Accreditations are location and parameter specific. A complete listing of parameters for each location is available from www.cala.ca and/or www.scc.ca. The tests in this report may not necessarily be included in the scope of accreditation.



Quality Assurance

CLIENT NAME: WSP CANADA INC.

PROJECT: 161-02978

SAMPLING SITE:

AGAT WORK ORDER: 16X126285

ATTENTION TO: VIRGIL GRECIAN

SAMPLED BY:

Water Analysis (Continued)

RPT Date:			D	UPLICAT	E		REFEREN	ICE MA	TERIAL	METHOD	BLANK	SPIKE	MAT	RIX SPI	KE
PARAMETER	Batch	Sample	Dup #1	Dup #2	RPD	Method Blank	Measured		ptable nits	Recoverv	Lin	ptable nits	Recoverv	Lin	ptable nits
		ld					Value	Lower	Upper		Lower	Upper			Upper

Comments: If RPD value is NA, the results of the duplicates are less than 5x the RDL and the RPD will not be calculated.

Certified By:

Josan Coughtry

AGAT QUALITY ASSURANCE REPORT (V1)

AGAT Laboratories is accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA) and/or Standards Council of Canada (SCC) for specific tests listed on the scope of accreditation. AGAT Laboratories (Mississauga) is also accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) for specific drinking water tests. Accreditations are location and parameter specific. A complete listing of parameters for each location is available from www.cala.ca and/or www.scc.ca. The tests in this report may not necessarily be included in the scope of accreditation.

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Method Summary

CLIENT NAME: WSP CANADA INC. PROJECT: 161-02978			RDER: 16X126285 : VIRGIL GRECIAN
SAMPLING SITE:		SAMPLED BY:	
PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			1
Dissolved Aluminum	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Dissolved Antimony	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Dissolved Arsenic	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Dissolved Barium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Dissolved Beryllium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Dissolved Bismuth	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Dissolved Boron	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Dissolved Cadmium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Dissolved Chromium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Dissolved Cobalt	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Dissolved Copper	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Dissolved Iron	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Dissolved Lead	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Dissolved Manganese	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Dissolved Molybdenum	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Dissolved Nickel	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Dissolved Selenium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Dissolved Silver	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Dissolved Strontium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Dissolved Thallium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Dissolved Tin	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Dissolved Titanium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Dissolved Uranium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Dissolved Vanadium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Dissolved Zinc	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
рН	INOR-121-6001	SM 4500 H+B	PC-TITRATE
Reactive Silica as SiO2	INORG-121-6028	SM 4110 B	COLORIMETER
Chloride	INORG-121-6005	SM 4110 B	IC
Fluoride	INORG-121-6005	SM 4110 B	IC
Sulphate	INORG-121-6005	SM 4110 B	IC

AGAT METHOD SUMMARY (V1)



Method Summary

CLIENT NAME: WSP CANADA INC.

PROJECT: 161-02978

SAMPLING SITE:

AGAT WORK ORDER: 16X126285 ATTENTION TO: VIRGIL GRECIAN SAMPLED BY:

SAMPLING SITE:		SAMPLED BY:	
PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Alkalinity	INORG-121-6001	SM 2320 B	PC-TITRATE
True Color	INORG-121-6014	EPA 110.2	NEPHELOMETER
Turbidity	INORG-121-6022	SM 2130 B	NEPHELOMETER
Electrical Conductivity	INOR-121-6001	SM 2510 B	PC-TITRATE
Nitrate + Nitrite as N	INORG-121-6005	SM 4110 B	CALCULATION
Nitrate as N	INORG-121-6005	SM 4110 B	IC
Nitrite as N	INORG-121-6005	SM 4110 B	IC
Ammonia as N	INORG-121-6003	SM 4500-NH3 G	COLORIMETER
Total Organic Carbon	INORG-121-6026	SM 5310 B	TOC ANALYZER
Ortho-Phosphate as P	INORG-121-6005	SM 4110 B	COLORIMETER
Total Sodium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Potassium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Calcium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Magnesium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Phosphorous	MET-121-6104 & MET-121-6105	SM 3125	ICP/MS
Bicarb. Alkalinity (as CaCO3)	INORG-121-6001	SM 2320 B	PC-TITRATE
Carb. Alkalinity (as CaCO3)	INORG-121-6001	SM 2320 B	PC-TITRATE
Hydroxide	INORG-121-6001	SM 2320 B	PC-TITRATE
Calculated TDS	CALCULATION	SM 1030E	CALCULATION
Hardness	CALCULATION	SM 2340B	CALCULATION
Langelier Index (@20C)	CALCULATION	CALCULATION	CALCULATION
Langelier Index (@ 4C)	CALCULATION	CALCULATION	CALCULATION
Saturation pH (@ 20C)	CALCULATION	CALCULATION	CALCULATION
Saturation pH (@ 4C)	CALCULATION	CALCULATION	CALCULATION
Anion Sum	CALCULATION	SM 1030E	CALCULATION
Cation sum	CALCULATION	SM 1030E	CALCULATION
% Difference/ Ion Balance (NS)	CALCULATION	SM 1030E	CALCULATION
Total Aluminum	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Antimony	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Arsenic	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Barium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Beryllium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Bismuth	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Boron	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Cadmium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Chromium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Cobalt	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Copper	MET121-6104 & MET-121-6105	SM 3125	ICP/MS

AGAT METHOD SUMMARY (V1)



Method Summary

CLIENT NAME: WSP CANADA INC.		AGAT WORK OF	RDER: 16X126285
PROJECT: 161-02978		ATTENTION TO:	VIRGIL GRECIAN
SAMPLING SITE:		SAMPLED BY:	
PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Total Iron	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Lead	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Manganese	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Molybdenum	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Nickel	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Selenium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Silver	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Strontium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Thallium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Tin	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Titanium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Uranium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Vanadium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Zinc	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Suspended Solids	INOR-121-6024, 6025	SM 2540C, D	GRAVIMETRIC

atory Use Only Condition: Good Poor (Temperature: 6. 8	Notes: / / / / / / / / / / / / / / / / / / /	÷	pie: 🗌 Yes 🕅 No	Coliform DMPN DMF Coliform DMPN DMF CWS TPH/BTEX CWS TPH/	Tiert 1: Tiert 2:	Pink Copy - Client Page of Yellow Copy - AGAT No: 054235 White Copy- AGAT No: 054235 Ref Page 14 of 14 6. 2016
Unit 122 • 11 Morris Drive Unit 122 • 11 Morris Drive Dartmouth, NS ***	Report Information (Please print): Report Format 1. Name: Virgil Green Single Email: virgil, green Sample per 2. Name: Name:	Email: Multiple Email: Samples per page Ist guidelines on Report Do not list Guidelines on Report Ist Guidelines on Report Do not list Guidelines on Report	Com N/Pot	Prosphorus Prosp	Comments - Site/Sample Info. Sample Containment * CCrI I ICSSICCO Sample Containment * CCrI I ICSSICCO NCINTURE	Samples Received Pretering And Bridges Baler March Baler Received By Sign: 812 16 Baler March Baler Ma
Chain of Custody Record	Normation NSP Canada Inc. Virgil Grecian	NB ElE 4CS 1675 Fax: - 02978	-		Sample Identification Date/Time Sampled Sample # Containers wuc3 Aug. II / Ib 3pm H 2:0 wuc3 Aug. II / Ib 3pm H 2:0 wuc3 H 3:0 H 2:0 wuc4 H 2:0 H 2:0	Samples Relinquished By (Sign): Samples Relinquished By (Sign): Date/Time Samples Relinquished By (Sign):



CLIENT NAME: WSP CANADA INC. 55 DRISCOLL CRESCENT MONCTON, NB E1E4C8 (506) 857-1675

ATTENTION TO: VIRGIL GRECIAN

PROJECT: 161-02978

AGAT WORK ORDER: 16X126659

WATER ANALYSIS REVIEWED BY: Laura Baker, Inorganics Data Reporter

DATE REPORTED: Aug 24, 2016

PAGES (INCLUDING COVER): 14

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (902) 468-8718

*NOTES	

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

AGAT Laboratories (V1)

Member of: Association of Professional Engineers, Geologists and Geophysicists of Alberta (APEGGA) Western Enviro-Agricultural Laboratory Association (WEALA) Environmental Services Association of Alberta (ESAA) AGAT Laboratories is accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA) and/or Standards Council of Canada (SCC) for specific tests listed on the scope of accreditation. AGAT Laboratories (Mississauga) is also accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) for specific drinking water tests. Accreditations are location and parameter specific. A complete listing of parameters for each location is available from www.cala.ca and/or www.scc.ca. The tests in this report may not necessarily be included in the scope of accreditation.

Page 1 of 14

Results relate only to the items tested and to all the items tested

All reportable information as specified by ISO 17025:2005 is available from AGAT Laboratories upon request

	L aboratories	Certificate of Analysis	11 Morris Drive, Unit 122 Dartmouth, Nova Scotia CANADA B3B 1M2 TEL (902)468-8718
CLIENT NAME: WSP CANADA INC. SAMPLING SITE:			FAX (902)468-8924 http://www.agatlabs.com
		TSS	
DATE RECEIVED: 2016-08-16		DATE REPORTED: 2016-08-24	08-24
S Parameter	SAMPLE DESCRIPTION: POND SAMPLE TYPE: Water DATE SAMPLED: 8/12/2016 G/S RDI 7773818	D WC1 Water 16 8/12/2016 8 7773828	
	9		
Comments: RDL - Reported Detection Limit;	G / S - Guideline / Standard: Refers to	to CCME MAL - updated 2015	
		Jour Pret	

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Certified By:

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フら	G	Labor	aboratories		AGAT WORK ORDER: 16X126659 PROJECT - 161-02978	CANADA B3B 1M2 TEL (902)468-8718 FAX (902)468-8924
CLIENT NAME: WSP CANADA INC. SAMPLING SITE:	DA INC.			-	ATTENTION TO: VIRGIL GRECIAN SAMPLED BY:	http://www.agatlabs.com
				Dis	Dissolved Metals (FWAL)	
DATE RECEIVED: 2016-08-16					DATE REPORTED: 2016-08-24	2016-08-24
		SAMPLE DESCRIPTION:	RIPTION:	POND	WC1	
		SAMPL	SAMPLE TYPE:	Water	Water	
Parameter	Unit	DATE SAMPLED: G / S RDL	(MPLED: RDL	8/12/2016 7773818	8/12/2016 7773828	
Dissolved Aluminum	ng/L		5	32	-1	
Dissolved Antimony	ng/L		2	4 7	\$	
Dissolved Arsenic	ng/L	12.5	2	4	<2	
Dissolved Barium	ng/L		5	33	12	
Dissolved Beryllium	ng/L		2	42	<2	
Dissolved Bismuth	ng/L		2	42	<2	
Dissolved Boron	ng/L	NRG, NRG	5	<5	<5	
Dissolved Cadmium	ng/L	0.12	0.017	<0.017	0.150	
Dissolved Chromium	ng/L		-	4	∇	
Dissolved Cobalt	ng/L		~	Ŷ	∇	
Dissolved Copper	ng/L		2	42	<2	
Dissolved Iron	ng/L		50	1120	266	
Dissolved Lead	ng/L		0.5	<0.5	<0.5	
Dissolved Manganese	ng/L		2	23	13	
Dissolved Molybdenum	ng/L		2	4	<2	
Dissolved Nickel	ng/L		2	4	-2	
Dissolved Selenium	ng/L		-	¥	$\overline{\mathbf{v}}$	
Dissolved Silver	ng/L		0.1	<0.1	<0.1	
Dissolved Strontium	ng/L		5	9	9	
Dissolved Thallium	ng/L		0.1	<0.1	<0.1	
Dissolved Tin	ng/L		2	42	-2	
Dissolved Titanium	ng/L		7	42	<2	
Dissolved Uranium	ng/L	NRG, NRG	0.1	<0.1	<0.1	
Dissolved Vanadium	ng/L		2	5	<2	
Dissolved Zinc	ng/L		5	<5	<5	

Page 3 of 14 Lamo Balu

Certified By:

AGAT CERTIFICATE OF ANALYSIS (V1)

		Laboratories	atorie		Certificate of Analysis	11 Morris Drive, Unit 122 Dartmouth, Nova Scotia CANADA B3B 1M2 TEL (902)468-89718 FAX (902)468-8924
CLIENT NAME: WSP CANADA INC. SAMPLING SITE:	INC.				AUEUL. 101-029/0 ATTENTION TO: VIRGIL GRECIAN SAMPLED BY:	http://www.agatlabs.com
			MTL	- Standaı	Standard Water Analysis + Total Metals	
DATE RECEIVED: 2016-08-16					DATE REPORTED: 2016-08-24	2016-08-24
	7S	SAMPLE DESCRIPTION:	RIPTION:	DND	WC1	
		SAMPL		Water	Water	
Parameter	Unit	DATE SAMPLED: G / S RDL		8/12/2016 7773818	8/12/2016 7773828	
Hd		6.5-9.0		6.78	5.00	
Reactive Silica as SiO2	mg/L		0.5	0.7	0.5	
Chloride	mg/L	NRG	-	5	ε	
Fluoride	mg/L	NRG	0.12	<0.12	<0.12	
Sulphate	mg/L		2	ç,	<2	
Alkalinity	mg/L		5	<5	<i>5</i>	
True Color	TCU	Narrative	5	242	189	
Turbidity	NTU	Narrative	0.1	5.8	1.5	
Electrical Conductivity	umho/cm		~	29	34	
Nitrate + Nitrite as N	mg/L		0.05	<0.05	<0.05	
Nitrate as N	mg/L	1500, 200	0.05	<0.05	<0.05	
Nitrite as N	mg/L		0.05	<0.05	<0.05	
Ammonia as N	mg/L		0.03	<0.03	<0.03	
Total Organic Carbon	mg/L		0.5	17.6	24.5	
Ortho-Phosphate as P	mg/L		0.01	0.05	<0.01	
Total Sodium	mg/L		0.1	2.3	2.4	
Total Potassium	mg/L		0.1	0.3	0.2	
Total Calcium	mg/L		0.1	1.7	0.8	
Total Magnesium	mg/L		0.1	0.4	0.4	
Total Phosphorous	mg/L	Fact Sheet	0.02	0.08	<0.02	
Bicarb. Alkalinity (as CaCO3)	mg/L		5	<5	<5	
Carb. Alkalinity (as CaCO3)	mg/L		10	<10	<10	
Hydroxide	mg/L		5	<5	<5	
Calculated TDS	mg/L		-	11	7	
Hardness	mg/L			5.9	3.6	
Langelier Index (@20C)	AN			-3.80	-5.89	
Langelier Index (@ 4C)	AN			-4.12	-6.21	
Saturation pH (@ 20C)	AN			10.6	10.9	
Saturation pH (@ 4C)	AN			10.9	11.2	
Anion Sum	me/L			0.14	0.08	
					Laura R	ah
					Certified Bv:	

Certified By:

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AGAT CERTIFICATE OF ANALYSIS (V1)

シミ		Laboratories	atories		AGAT WORK ORDER: 16X126659 PROJECT - 161-02978	CANADA B3B 1M2 TEL (902)468-8718 FAX (902)468-8924
CLIENT NAME: WSP CANADA INC. SAMPLING SITE:	A INC.				ATTENTION TO: VIRGIL GRECIAN SAMPLED BY:	http://www.agatiabs.com
			MTL	- Standar	dard Water Analysis + Total Metals	
DATE RECEIVED: 2016-08-16					DATE REPORTED: 2016-08-24	2016-08-24
		SAMPLE DESCRIPTION:	IPTION:	POND	WC1	
		SAMPLE TYPE: DATE SAMPLED:	SAMPLE TYPE: ATE SAMPLED:	Water 8/12/2016	Water 8/12/2016	
Parameter	Unit	G/S	RDL	7773818	7773828	
Cation sum	me/L			0.29	0.21	
% Difference/ Ion Balance (NS)	%			34.0	41.9	
Total Aluminum	ng/L		5	77	27	
Total Antimony	ng/L		2	ç,	<2	
Total Arsenic	ng/L	12.5	2	e	42	
Total Barium	ng/L		5	61	17	
Total Beryllium	ng/L		2	2	<2	
Total Bismuth	ng/L		2	\$	\$	
Total Boron	ng/L	NRG, NRG	5	<5	<5	
Total Cadmium	ng/L	0.12	0.017	0.026	<0.017	
Total Chromium	ng/L		-	Ý	<1	
Total Cobalt	ng/L		.	۲	<1	
Total Copper	ng/L		-	ŕ	<4	
Total Iron	ng/L		50	1410	310	
Total Lead	ng/L		0.5	1.3	0.7	
Total Manganese	ng/L		2	37	14	
Total Molybdenum	ng/L		2	\$	<2	
Total Nickel	ng/L		2	5	<2	
Total Selenium	ng/L		-	Ý	4	
Total Silver	ng/L	7.5, NRG	0.1	<0.1	<0.1	
Total Strontium	ng/L		5	7	9	
Total Thallium	ng/L		0.1	<0.1	<0.1	
Total Tin	ng/L		2	5	2	
Total Titanium	ng/L		2	ç,	<2	
Total Uranium	ng/L	NRG, NRG	0.1	0.1	<0.1	
Total Vanadium	ng/L		2	5	<2	
Total Zinc	ng/L		5	<5 5	\$	

Results relate only to the items tested and to all the items tested

AGAT CERTIFICATE OF ANALYSIS (V1)

Certified By:

Lamo Palu

Page 5 of 14

	Laboratories	Certificate of Analysis AGAT WORK ORDER: 16X126659 BROLECT - 161-02028	11 Morris Drive, Unit 122 Dartmouth, Nova Scotia CANADA B3B 1M2 TEL (902)468-8718 FAX (902)468-8924
CLIENT NAME: WSP CANADA INC.			http://www.agatlabs.com
SAMPLING SITE:		SAMPLED BY:	
	MTL - Sta	andard Water Analysis + Total Metals	
DATE RECEIVED: 2016-08-16		DATE REPORTED: 2016-08-24	016-08-24
Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to CCME MAL - updated 7773818-7773828 TOC was analysed at AGAT Montreal. When the cation and anion sums are below 1 me/L, the acceptable criteria is less than 0.3me/L.	G / S - Guideline / Standard: Refers to CCME MAL - updated 2015 real. are below 1 me/L, the acceptable criteria is less than 0.3me/L.	s to CCME MAL - updated 2015 teria is less than 0.3me/L.	
		Jame Pr	Port

AGAT CERTIFICATE OF ANALYSIS (V1)

Certified By:

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		PARAMETER GUIDEVALUE RESULT	Dissolved Cadmium 0.12 0.150	pH 6.5-9.0 5.00
Guideline Violation AGAT WORK ORDER: 16X126659 PROJECT: 161-02978		ANALYSIS PACKAGE	Dissolved Metals (FWAL)	'L - Standard Water Analysis + Total Metals
Laboratories		GUIDELINE	NS-CCME MAL	NS-CCME MAL MTI
LUDU	CLIENT NAME: WSP CANADA INC.	SAMPLE TITLE	WC1	WC1
	CLIENT NAME	SAMPLEID	7773828	7773828



Quality Assurance

CLIENT NAME: WSP CANADA INC.

PROJECT: 161-02978

SAMPLING SITE:

AGAT WORK ORDER: 16X126659 ATTENTION TO: VIRGIL GRECIAN

SAMPLED BY:

				Wate	er An	alysi	S								
RPT Date: Aug 24, 2016				UPLICATE			REFEREN		FERIAL	METHOD	BLANK	SPIKE	MAT	RIX SPI	KE
		Comple				Method	Maggurad	Accep				ptable			ptable
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Blank	Measured Value	Lim Lower	Upper	Recovery	Lin	nits Upper	Recovery	Lir	nits Upper
MTL - Standard Water Analysis	+ Total Meta	ls		11				II							
рН	7773828	7773828	5.00	4.28	15.5%	<	101%	80%	120%	NA	80%	120%	NA	80%	120%
Reactive Silica as SiO2	1	7770175	4.1	4.1	0.0%	< 0.5	114%	80%	120%		80%	120%	96%	80%	120%
Chloride	7767958		48	49	3.1%	< 1	104%	80%	120%	NA	80%	120%	NA	80%	120%
Fluoride	7767958		<0.12	<0.12	NA	< 0.12	115%	80%	120%	NA	80%	120%	89%	80%	120%
Sulphate	7767958		<2	<2	NA	< 2	113%	80%	120%	NA	80%	120%	114%	80%	120%
Alkalinity	7773828	7773828	<5	<5	NA	< 5	95%	80%	120%	NA	80%	120%	NA	80%	120%
True Color	1	7773828	171	189	10.0%	< 5	110%	80%	120%		80%	120%		80%	120%
Turbidity	1	7773828	1.5	1.3	14.3%	< 0.1	103%	80%	120%		80%	120%		80%	120%
Electrical Conductivity	7773828	7773828	34	34	1.4%	< 1	92%	80%	120%	NA	80%	120%	NA	80%	120%
Nitrate as N	7767958		0.22	0.22	NA	< 0.05	97%	80%	120%	NA	80%	120%	85%	80%	120%
Nitrite as N	7767958		0.06	<0.05	NA	< 0.05	103%	80%	120%	NA	80%	120%	88%	80%	120%
Ammonia as N	1	7775380	<0.03	<0.03	NA	< 0.03	102%	80%	120%		80%	120%	100%	80%	120%
Total Organic Carbon	7777382		4.7	4.5	4.6%	< 0.5	102%	80%	120%	106%	80%	120%	114%	80%	120%
Ortho-Phosphate as P	1		< 0.01	< 0.01	NA	< 0.01	103%	80%	120%	95%	80%	120%	104%	80%	120%
Total Sodium	8172016		32.0	30.8	3.8%	< 0.1	113%	80%	120%	114%	80%	120%	98%	70%	130%
Total Potassium	8172016		1.76	1.72	2.3%	< 0.1	111%	80%	120%	115%	80%	120%	105%	70%	130%
Total Calcium	8172016		12.2	12.2	0.0%	< 0.1	109%	80%	120%	108%	80%	120%	98%	70%	130%
Total Magnesium	8172016		4.1	4.0	2.5%	< 0.1	112%	80%	120%	119%	80%	120%	107%	80%	120%
Total Phosphorous	8172016		1.17	0.934	22.4%	< 0.02	80%	80%	120%	92%	80%	120%	88%	70%	130%
Bicarb. Alkalinity (as CaCO3)	7773828	7773828	<5	<5	NA	< 5	NA	80%	120%	NA	80%	120%	NA	80%	120%
Carb. Alkalinity (as CaCO3)	7773828	7773828	<10	<10	NA	< 10	NA	80%	120%	NA	80%	120%	NA	80%	120%
Hydroxide	7773828	7773828	<5	<5	NA	< 5	NA	80%	120%	NA	80%	120%	NA	80%	120%
Total Aluminum	8172016		7	5	0.0%	< 5	119%	80%	120%	120%	80%	120%	126%	70%	130%
Total Antimony	8172016		< 2	< 2	0.0%	< 2	80%	80%	120%	109%	80%	120%	93%	70%	130%
Total Arsenic	8172016		57	58	1.7%	< 2	94%	80%	120%	116%	80%	120%	125%	70%	130%
Total Barium	8172016		6	6	0.0%	< 5	100%	80%	120%	103%	80%	120%	99%	70%	130%
Total Beryllium	8172016		< 2	< 2	0.0%	< 2	97%	80%	120%	96%	80%	120%	92%	70%	130%
Total Bismuth	8172016		< 2	< 2	0.0%	< 2	103%	80%	120%	112%	80%	120%	116%	70%	130%
Total Boron	8172016		65	62	4.7%	< 5	100%	80%	120%	100%	80%	120%	89%	70%	130%
Total Cadmium	8172016		< 0.017	< 0.017	0.0%	< 0.017	103%	80%	120%	103%	80%	120%	96%	70%	130%
Total Chromium	8172016		< 1	< 1	0.0%	< 1	106%	80%	120%	107%	80%	120%	92%	70%	130%
Total Cobalt	8172016		< 1	< 1	0.0%	< 1	97%	80%	120%	100%	80%	120%	101%	70%	130%
Total Copper	8172016		< 1	< 1	0.0%	< 1	83%	80%	120%	80%	80%	120%	NA	70%	130%
Total Iron	8172016		1000	1000	0.0%	< 50	99%	80%	120%	105%	80%	120%	73%	70%	130%
Total Lead	8172016		< 0.5	< 0.5	0.0%	< 0.5	118%	80%	120%	113%	80%	120%	114%	70%	130%
Total Manganese	8172016		173	169	2.3%	< 2	103%	80%	120%	102%	80%	120%	98%	70%	130%
Total Molybdenum	8172016		6	6	0.0%	< 2	105%	80%	120%	109%	80%	120%	110%	70%	130%
Total Nickel	8172016		< 2	< 2	0.0%	< 2	98%	80%	120%	105%	80%	120%	97%	70%	130%
Total Selenium	8172016		< 1	< 1	0.0%	< 1	104%	80%	120%	100%	80%	120%	97%	70%	130%

AGAT QUALITY ASSURANCE REPORT (V1)

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Quality Assurance

CLIENT NAME: WSP CANADA INC.

PROJECT: 161-02978

SAMPLING SITE:

AGAT WORK ORDER: 16X126659 ATTENTION TO: VIRGIL GRECIAN SAMPLED BY:

Water Analysis (Continued)

RPT Date: Aug 24, 2016			C	UPLICAT	E		REFEREN	NCE MA	TERIAL	METHOD	BLANK	SPIKE	MAT	RIX SPI	KE
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value		ptable nits	Recovery	Lin	ptable nits	Recovery	1 1 10	ptable nits
		iù					value	Lower	Upper	-	Lower	Upper	-	Lower	Upper
Total Silver	8172016		< 0.1	< 0.1	0.0%	< 0.1	107%	80%	120%	102%	80%	120%	100%	70%	130%
Total Strontium	8172016		38	37	2.7%	< 5	92%	80%	120%	95%	80%	120%	92%	70%	130%
Total Thallium	8172016		< 0.1	< 0.1	0.0%	< 0.1	114%	80%	120%	114%	80%	120%	114%	70%	130%
Total Tin	8172016		< 2	< 2	0.0%	< 2	98%	80%	120%	106%	80%	120%	104%	70%	130%
Total Titanium	8172016		< 2	< 2	0.0%	< 2	88%	80%	120%	82%	80%	120%	98%	70%	130%
Total Uranium	8172016		13.9	13.4	3.7%	< 0.1	109%	80%	120%	109%	80%	120%	89%	70%	130%
Total Vanadium	8172016		< 2	< 2	0.0%	< 2	95%	80%	120%	92%	80%	120%	87%	70%	130%
Total Zinc	8172016		< 5	< 5	0.0%	< 5	98%	80%	120%	93%	80%	120%	70%	70%	130%

Comments: If RPD value is NA, the results of the duplicates are less than 5x the RDL and the RPD will not be calculated.

Dissolved Metals (FWAL)														
Dissolved Aluminum	8182016	< 5	6	0.0%	< 5	95%	80%	120%	98%	80%	120%	101%	70%	130%
Dissolved Antimony	8182016	< 2	< 2	0.0%	< 2	80%	80%	120%	111%	80%	120%	99%	70%	130%
Dissolved Arsenic	8182016	< 2	< 2	0.0%	< 2	111%	80%	120%	109%	80%	120%	99%	70%	130%
Dissolved Barium	8182016	15	15	0.0%	< 5	101%	80%	120%	102%	80%	120%	106%	70%	130%
Dissolved Beryllium	8182016	< 2	< 2	0.0%	< 2	111%	80%	120%	117%	80%	120%	101%	70%	130%
Dissolved Bismuth	8182016	< 2	< 2	0.0%	< 2	96%	80%	120%	103%	80%	120%	NA	70%	130%
Dissolved Boron	8182016	87	83	4.7%	< 5	103%	80%	120%	104%	80%	120%	116%	70%	130%
Dissolved Cadmium	8182016	0.126	0.133	5.4%	< 0.017	103%	80%	120%	103%	80%	120%	101%	70%	130%
Dissolved Chromium	8182016	< 1	< 1	0.0%	< 1	83%	80%	120%	87%	80%	120%	83%	70%	130%
Dissolved Cobalt	8182016	1	2	0.0%	< 1	100%	80%	120%	109%	80%	120%	88%	70%	130%
Dissolved Copper	8182016	< 2	< 2	0.0%	< 2	NA	80%	120%	NA	80%	120%	129%	70%	130%
Dissolved Iron	8182016	< 50	< 50	0.0%	< 50	100%	80%	120%	96%	80%	120%	89%	70%	130%
Dissolved Lead	8182016	< 0.5	< 0.5	0.0%	< 0.5	105%	80%	120%	104%	80%	120%	109%	70%	130%
Dissolved Manganese	8182016	1040	1080	3.8%	< 2	101%	80%	120%	101%	80%	120%	97%	70%	130%
Dissolved Molybdenum	8182016	89	93	4.4%	< 2	95%	80%	120%	100%	80%	120%	105%	70%	130%
Dissolved Nickel	8182016	4	4	0.0%	< 2	100%	80%	120%	95%	80%	120%	83%	70%	130%
Dissolved Selenium	8182016	2	2	0.0%	< 1	100%	80%	120%	99%	80%	120%	106%	70%	130%
Dissolved Silver	1	< 0.1	< 0.1	0.0%	< 0.1	103%	80%	120%	97%	80%	120%	70%	70%	130%
Dissolved Strontium	8182016	2970	2940	1.0%	< 5	99%	80%	120%	98%	80%	120%	97%	70%	130%
Dissolved Thallium	8182016	< 0.1	< 0.1	0.0%	< 0.1	104%	80%	120%	103%	80%	120%	93%	70%	130%
Dissolved Tin	8182016	< 2	< 2	0.0%	< 2	98%	80%	120%	105%	80%	120%	109%	70%	130%
Dissolved Titanium	8182016	< 2	< 2	0.0%	< 2	87%	80%	120%	80%	80%	120%	130%	70%	130%
Dissolved Uranium	8182016	35.8	35.8	0.0%	< 0.1	102%	80%	120%	103%	80%	120%	98%	70%	130%
Dissolved Vanadium	8182016	< 2	< 2	0.0%	< 2	109%	80%	120%	104%	80%	120%	82%	70%	130%
Dissolved Zinc	8182016	5	< 5	0.0%	< 5	84%	80%	120%	86%	80%	120%	83%	70%	130%

Comments: If RPD value is NA, the results of the duplicates are less than 5x the RDL and the RPD will not be calculated.

TSS Total Suspended Solids	1	0175	< 5	< 5	0.0%	< 5	96%	80% 120%	120% 120%	113%	80%	120%
AGAT QUALITY ASSURAN	NCE REPO	DRT (V1)									Page 9	of 14

AGAT QUALITY ASSURANCE REPORT (V1)

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Quality Assurance

CLIENT NAME: WSP CANADA INC.

PROJECT: 161-02978

SAMPLING SITE:

AGAT WORK ORDER: 16X126659

ATTENTION TO: VIRGIL GRECIAN

SAMPLED BY:

Water Analysis (Continued)

RPT Date: Aug 24, 2016			D	UPLICAT	E		REFEREN	ICE MA	TERIAL	METHOD	BLANK	SPIKE	MAT	RIX SPI	KE
PARAMETER	Batch	Sample	Dup #1	Dup #2	RPD	Method Blank	Measured L		otable nits	Recoverv	Acceptable Limits		Recoverv	Lin	ptable nits
		ld					Value	Lower	Upper		Lower				Upper

Comments: If RPD value is NA, the results of the duplicates are less than 5x the RDL and the RPD will not be calculated.

Certified By:

Lauro Balu

AGAT QUALITY ASSURANCE REPORT (V1)

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Method Summary

CLIENT NAME: WSP CANADA INC. AGAT WORK ORDER: 16X126659 PROJECT: 161-02978 ATTENTION TO: VIRGIL GRECIAN SAMPLING SITE: SAMPLED BY: PARAMETER AGAT S.O.P LITERATURE REFERENCE ANALYTICAL TECHNIQUE Water Analysis SM 2540C, D GRAVIMETRIC Total Suspended Solids INOR-121-6024. 6025 MET121-6104 & **Dissolved Aluminum** SM 3125 ICP/MS MET-121-6105 MFT121-6104 & SM 3125 ICP/MS **Dissolved Antimony** MET-121-6105 MET121-6104 & **Dissolved Arsenic** SM 3125 ICP/MS MET-121-6105 MET121-6104 & **Dissolved Barium** SM 3125 ICP/MS MET-121-6105 MET121-6104 & **Dissolved Beryllium** SM 3125 ICP/MS MET-121-6105 MFT121-6104 & **Dissolved Bismuth** SM 3125 ICP/MS MET-121-6105 MET121-6104 & **Dissolved Boron** SM 3125 ICP/MS MET-121-6105 MET121-6104 & **Dissolved Cadmium** ICP/MS SM 3125 MET-121-6105 MET121-6104 & **Dissolved Chromium** SM 3125 ICP/MS MET-121-6105 MFT121-6104 & **Dissolved** Cobalt SM 3125 ICP/MS MET-121-6105 MET121-6104 & **Dissolved** Copper SM 3125 ICP/MS MET-121-6105 MET121-6104 & Dissolved Iron SM 3125 ICP/MS MET-121-6105 MET121-6104 & Dissolved Lead SM 3125 ICP/MS MET-121-6105 MET121-6104 & **Dissolved Manganese** SM 3125 ICP/MS MET-121-6105 MET121-6104 & Dissolved Molybdenum SM 3125 ICP/MS MET-121-6105 MET121-6104 & SM 3125 ICP/MS Dissolved Nickel MET-121-6105 MET121-6104 & **Dissolved Selenium** SM 3125 ICP/MS MET-121-6105 MET121-6104 & **Dissolved Silver** SM 3125 ICP/MS MET-121-6105 MET121-6104 & Dissolved Strontium SM 3125 ICP/MS MET-121-6105 MET121-6104 & SM 3125 **Dissolved Thallium** ICP/MS MET-121-6105 MET121-6104 & **Dissolved** Tin SM 3125 ICP/MS MET-121-6105 MET121-6104 & **Dissolved Titanium** SM 3125 ICP/MS MET-121-6105 MET121-6104 & **Dissolved Uranium** SM 3125 ICP/MS MET-121-6105 MET121-6104 & **Dissolved Vanadium** SM 3125 ICP/MS MET-121-6105 MET121-6104 & **Dissolved Zinc** SM 3125 ICP/MS MET-121-6105 bΗ INOR-121-6001 SM 4500 H+B PC-TITRATE Reactive Silica as SiO2 INORG-121-6028 SM 4110 B COLORIMETER Chloride INORG-121-6005 SM 4110 B IC Fluoride INORG-121-6005 SM 4110 B IC

AGAT METHOD SUMMARY (V1)



Method Summary

CLIENT NAME: WSP CANADA INC.

PROJECT: 161-02978

SAMPLING SITE:

AGAT WORK ORDER: 16X126659 ATTENTION TO: VIRGIL GRECIAN SAMPLED BY:

SAMPLING SITE:		SAMPLED BY:	
PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Sulphate	INORG-121-6005	SM 4110 B	IC
Alkalinity	INORG-121-6001	SM 2320 B	PC-TITRATE
True Color	INORG-121-6014	EPA 110.2	NEPHELOMETER
Turbidity	INORG-121-6022	SM 2130 B	NEPHELOMETER
Electrical Conductivity	INOR-121-6001	SM 2510 B	PC-TITRATE
Nitrate + Nitrite as N	INORG-121-6005	SM 4110 B	CALCULATION
Nitrate as N	INORG-121-6005	SM 4110 B	IC
Nitrite as N	INORG-121-6005	SM 4110 B	IC
Ammonia as N	INORG-121-6003	SM 4500-NH3 G	COLORIMETER
Total Organic Carbon	INORG-121-6026	SM 5310 B	TOC ANALYZER
Ortho-Phosphate as P	INORG-121-6005	SM 4110 B	COLORIMETER
Total Sodium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Potassium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Calcium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Magnesium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Phosphorous	MET-121-6104 & MET-121-6105	SM 3125	ICP/MS
Bicarb. Alkalinity (as CaCO3)	INORG-121-6001	SM 2320 B	PC-TITRATE
Carb. Alkalinity (as CaCO3)	INORG-121-6001	SM 2320 B	PC-TITRATE
Hydroxide	INORG-121-6001	SM 2320 B	PC-TITRATE
Calculated TDS	CALCULATION	SM 1030E	CALCULATION
Hardness	CALCULATION	SM 2340B	CALCULATION
Langelier Index (@20C)	CALCULATION	CALCULATION	CALCULATION
Langelier Index (@ 4C)	CALCULATION	CALCULATION	CALCULATION
Saturation pH (@ 20C)	CALCULATION	CALCULATION	CALCULATION
Saturation pH (@ 4C)	CALCULATION	CALCULATION	CALCULATION
Anion Sum	CALCULATION	SM 1030E	CALCULATION
Cation sum	CALCULATION	SM 1030E	CALCULATION
% Difference/ Ion Balance (NS)	CALCULATION	SM 1030E	CALCULATION
Total Aluminum	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Antimony	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Arsenic	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Barium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Beryllium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Bismuth	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Boron	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Cadmium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Chromium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Cobalt	MET121-6104 & MET-121-6105	SM 3125	ICP/MS



Method Summary

CLIENT NAME: WSP CANADA INC. AGAT WORK ORDER: 16X126659 PROJECT: 161-02978 ATTENTION TO: VIRGIL GRECIAN SAMPLING SITE: SAMPLED BY: LITERATURE REFERENCE PARAMETER AGAT S.O.P ANALYTICAL TECHNIQUE MET121-6104 & Total Copper SM 3125 ICP/MS MET-121-6105 MET121-6104 & Total Iron SM 3125 ICP/MS MET-121-6105 MET121-6104 & Total Lead SM 3125 ICP/MS MET-121-6105 MET121-6104 & Total Manganese SM 3125 ICP/MS MET-121-6105 MET121-6104 & Total Molybdenum SM 3125 ICP/MS MET-121-6105 MET121-6104 & Total Nickel SM 3125 ICP/MS MET-121-6105 MET121-6104 & **Total Selenium** SM 3125 ICP/MS MET-121-6105 MET121-6104 & Total Silver SM 3125 ICP/MS MET-121-6105 MET121-6104 & SM 3125 ICP/MS **Total Strontium** MET-121-6105 MET121-6104 & Total Thallium SM 3125 ICP/MS MET-121-6105 MET121-6104 & Total Tin SM 3125 ICP/MS MET-121-6105 MET121-6104 & Total Titanium SM 3125 ICP/MS MET-121-6105 MET121-6104 & SM 3125 Total Uranium ICP/MS MET-121-6105 MET121-6104 & Total Vanadium SM 3125 ICP/MS MET-121-6105 MET121-6104 & Total Zinc SM 3125 ICP/MS MET-121-6105

Laboratory Use Only Arrival Condition:	AGAT Job Number: //eX/Jale/659	Notes: See bottom 2 Samples only.	_	TAT 1 5 to 7 working	Rush IAI U Same day U 1 day 2 days 3 days	ale requ	DIE: LYES XVD		ЗМС	noite N	EX EX	TEX Free Price Pri	8/H9 81 28/ 10 10 10 10 10 10	Hazardo Tier 2: Ti CCME-C Dither: PPH PAA PAA PAA PAA PAA PCB PCB PCB PCB PAA PAA PAA PCB PCB PCB PAA PAA									& AS SUCH			White Copy-AGAT Nº: 052646	Diffe Target June 4, 2015 Page 14 of 14.
 11 Morris Drive Dartmouth, NS B3B 1M2 ww.agatlabscom 	• F: 902.468.8924	Report Format Single	1	Multiple Samples per	page Excel	Included	Drinking Water Sample: Reg. No.:			-	SSA 🗆	SC	oydso 11 🗆	PH SST 1950 Phenols Phenols	×				×			∩ ×	07 5	7 X	16-DUL-16	Date/Time	2-0-
Unit 122 = 11 Morris Drive Dartmouth, NS B3B 1M2 Webearth.agatlabs.com • www.agatlabscom	P: 902.468.8718 • I	Vivoril Greation (Please print):	Email: Night greater any gra	2. Name: Email:	Regulatory Requirements (Check):	Res Coarse	Gas D Fuel D Lube	CDWQ		HRM 101	rved sisyl sziG	Tent A other Couldric Reserved	ered/ bsW b stoT B	# Containers Comments - Site/Sample Info. Teld File Standar Mercury Standar Standar	Il Jessica	Mcinture to X X	THICAN X.	analysis * X	201-424-093		SANAT THIS & No IS V	well 73	A HW	Committee Demonstration (Normality)	TIMACO CON C	Samples Received by (Sign:	1 traver
GGT La	ly Record	anada Inc.	reign	n NR FIE 408	H-1675 Fax:	AGAT Quotation: Please Note: If quotation number is not provided client will be billed full price for analysis.	Same Yes 🕅 No 🗆					Fax:		Date/Time Sampled Sample # 0	Aug. 12/16-2 0m H20				Aug.12/16-30m H30	-			>	Date Chan	al una douma	Date/Time	
	Chain of Custody Record	nformation v: <u>WSP</u> (Contact: VIrguer	ふか	Phone: 500 - 853 Client Project #: 161-	AGAT Quotation: Please Note: If quotation number is n	Invoice To	Company:	Contact:	Address:		Phone:	PO/Credit Card#:	Sample Identification	DUND	DND	CINC	UNVC	KJ~	MCJ	NC 1	MC 1	DWD	Sympton Reference for (Print Name)		Sampring Realify And Bay (Biggs):	Dacument (D: DIV.133 1503 002



CLIENT NAME: WSP CANADA INC. 55 DRISCOLL CRESCENT MONCTON, NB E1E4C8 (506) 857-1675

ATTENTION TO: VIRGIL GRECIAN

PROJECT: 161-02978

AGAT WORK ORDER: 16X134279

WATER ANALYSIS REVIEWED BY: Laura Baker, Inorganics Data Reporter

DATE REPORTED: Sep 14, 2016

PAGES (INCLUDING COVER): 14

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (902) 468-8718

*NOTES	

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

AGAT Laboratories (V1)

Member of: Association of Professional Engineers, Geologists and Geophysicists of Alberta (APEGGA) Western Enviro-Agricultural Laboratory Association (WEALA) Environmental Services Association of Alberta (ESAA) AGAT Laboratories is accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA) and/or Standards Council of Canada (SCC) for specific tests listed on the scope of accreditation. AGAT Laboratories (Mississauga) is also accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) for specific drinking water tests. Accreditations are location and parameter specific. A complete listing of parameters for each location is available from www.cala.ca and/or www.scc.ca. The tests in this report may not necessarily be included in the scope of accreditation.

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Results relate only to the items tested and to all the items tested

All reportable information as specified by ISO 17025:2005 is available from AGAT Laboratories upon request

CLIENT NAME: WSP CANADA INC. SAMPLING SITE:	Laboratories		AGAT WORK ORDER: 16X134279 PROJECT: 161-02978	CANADA B3B 1M2 TEL (902)468-8718 FAX (902)468-8924
		-	ATTENTION TO: VIRGIL GRECIAN SAMPLED BY:	http://www.agatlabs.com
		Dis	Dissolved Metals (FWAL)	
DATE RECEIVED: 2016-09-06			DATE REPORTED: 2016-09-14	2016-09-14
SAM	SAMPLE DESCRIPTION:	WC2 - 01	Dup2 - 02	
	SAMPLE TYPE:	Water	Water	
Parameter Unit	DATE SAMPLEU: G / S RDL	9/2/2016 7824652	9/2/2016 7824653	
Dissolved Aluminum ug/L	5	82	88	
Dissolved Antimony ug/L	2	42	42	
Dissolved Arsenic ug/L	12.5 2	42	-22	
Dissolved Barium ug/L	5	43	43	
Dissolved Beryllium ug/L	2	42	42	
Dissolved Bismuth ug/L	2	5	42	
	NRG, NRG 5	<5	\$	
Dissolved Cadmium ug/L	0.12 0.017	<0.017	<0.017	
ium	-	-	-	
	4	Ý	₽	
Dissolved Copper ug/L	2	₽	<2	
	50	1510	1610	
	0.5	<0.5	<0.5	
Dissolved Manganese ug/L	2	293	299	
denum	2	4	42	
	2	4	42	
m	-	Ý	$\overline{\mathbf{v}}$	
	0.1	<0.1	<0.1	
_	5	6	б	
Dissolved Thallium ug/L	0.1	<0.1	<0.1	
Dissolved Tin ug/L	2	42	42	
Dissolved Titanium ug/L	2	7	42	
	NRG, NRG 0.1	<0.1	<0.1	
Dissolved Vanadium ug/L	2	42	5	
Dissolved Zinc ug/L	5	<5	<5	

Certified By:

Lamo Balu

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		Laboratories	atorie		Certificate of Analysis	11 Morris Drive, Unit 122 Dartmouth, Nova Scotia CANADA B3B 1M2 TEL (902)468-8924 FAX (902)468-8924
CLIENT NAME: WSP CANADA INC. SAMPLING SITE:	INC.				ROJECT: 101-029/8 ATTENTION TO: VIRGIL GRECIAN SAMPLED BY:	http://www.agatlabs.com
			MTL	- Standa	Standard Water Analysis + Total Metals	
DATE RECEIVED: 2016-09-06					DATE REPORTED: 2016-09-14	2016-09-14
	SA	SAMPLE DESCRIPTION:	RIPTION:	WC2 - 01	Dup2 - 02	
		SAMPL	SAMPLE TYPE:	Water	Water	
Daramatar	l Init	DATE SAMPLED:	MPLED: RDI	9/2/2016 7824652	9/2/2016 7824653	
DH		6.5-9.0		5.55	5.26	
Reactive Silica as SiO2	mg/L		0.5	6.6	4.4	
Chloride	mg/L	NRG	-	4	ę	
Fluoride	mg/L	NRG	0.12	<0.12	<0.12	
Sulphate	mg/L		2	\$	<2	
Alkalinity	mg/L		5	<5	<5	
True Color	TCU	Narrative	5	314	316	
Turbidity	NTU	Narrative	0.1	2.6	2.9	
Electrical Conductivity	umho/cm		-	31	31	
Nitrate + Nitrite as N	mg/L		0.05	<0.05	<0.05	
Nitrate as N	mg/L	1500, 200	0.05	<0.05	<0.05	
Nitrite as N	mg/L		0.05	<0.05	<0.05	
Ammonia as N	mg/L		0.03	<0.03	<0.03	
Total Organic Carbon	mg/L		0.5	26.6	25.8	
Ortho-Phosphate as P	mg/L		0.01	<0.01	0.03	
Total Sodium	mg/L		0.1	3.0	3.1	
Total Potassium	mg/L		0.1	0.5	0.6	
Total Calcium	mg/L		0.1	2.2	2.1	
Total Magnesium	mg/L		0.1	0.5	0.5	
Total Phosphorous	mg/L	Fact Sheet	0.02	0.09	0.08	
Bicarb. Alkalinity (as CaCO3)	mg/L		2	<5	Ş	
Carb. Alkalinity (as CaCO3)	mg/L		10	<10	<10 -	
Hydroxide	mg/L		5	<5	55	
Calculated TDS	mg/L		-	14	13	
Hardness	mg/L			7.6	7.3	
Langelier Index (@20C)	AN			4.92	-5.23	
Langelier Index (@ 4C)	NA			-5.24	-5.55	
Saturation pH (@ 20C)	AN			10.5	10.5	
Saturation pH (@ 4C)	AN			10.8	10.8	
Anion Sum	me/L			0.11	0.08	
					Laure	Jahr
					Certified Bv	

Certified By:

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AGAT CERTIFICATE OF ANALYSIS (V1)

CLIENT NAME: WSP CANADA INC. SAMPLING SITE:	Lauuia	Laboratories	A G A G	AGAT WORK ORDER: 16X134279 PROJECT - 161-02978	CANADA B3B 1M2 TEL (902)468-8718 FAX (902)468-8924
				ATTENTION TO: VIRGIL GRECIAN SAMPLED BY:	http://www.agatiabs.com
		MTL -	Standard	dard Water Analysis + Total Metals	
DATE RECEIVED: 2016-09-06				DATE REPORTED: 2016-09-14	116-09-14
	SAMPLE DESCRIPTION:		WC2 - 01	Dup2 - 02	
	SAMPLE TYPE: DATE SAMPLED:		Water 9/2/2016	Water 9/2/016	
Parameter Unit	G/S I		7824652	7824653	
-			0.44	0.45	
e/ Ion Balance (NS)			59.2	68.1	
Total Aluminum ug/L		5	109	113	
Total Antimony ug/L		2	5	42	
Total Arsenic ug/L	12.5	2	2	3	
Total Barium ug/L		5	53	53	
-		2	₽	-22	
Total Bismuth ug/L		2	5	42	
Total Boron ug/L	NRG, NRG	5	<5	\$	
	0.12 0	0.017	0.074	0.086	
ium		-	¥	$\overline{\mathbf{v}}$	
		-	¥	$\overline{\mathbf{v}}$	
Total Copper ug/L		-	-	t	
		50	3340	3360	
Total Lead ug/L		0.5	0.7	0.8	
		2	310	314	
denum		2	5	42	
		2	\$	-22	
m		-	¥	$\overline{\mathbf{v}}$	
	7.5, NRG	0.1	<0.1	<0.1	
L		5	11	7	
Total Thallium ug/L		0.1	<0.1	<0.1	
Total Tin ug/L		2	5	42	
Total Titanium ug/L		2	5	42	
Total Uranium ug/L	NRG, NRG	0.1	<0.1	<0.1	
Total Vanadium ug/L		2	\$	42	
Total Zinc ug/L		5	9	\$	

Results relate only to the items tested and to all the items tested

AGAT CERTIFICATE OF ANALYSIS (V1)

Certified By:

Lamo Palu

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	PROJECT: 161-02978	FAX (902)468-8924
CLIENT NAME: WSP CANADA INC.	ATTENTION TO: VIRGIL GRECIAN	littp://www.agatiabs.colit
SAMPLING SITE:	SAMPLED BY:	
MTL - S	Standard Water Analysis + Total Metals	
DATE RECEIVED: 2016-09-06	DATE REPORTED: 2016-09-14	09-14
Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Re	G / S - Guideline / Standard: Refers to CCME MAL - updated 2015	
7824652-7824653 TOC was analysed at AGAT Montreal. Ion Balance is biased high, contributing parameters have been confirmed.	imed.	
	Lauro Mater	

AGAT CERTIFICATE OF ANALYSIS (V1)

Certified By:

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	Laboratories		Certificate of Analysis AGAT WORK ORDER: 16X134279 PROJECT: 161-02978	Tarmouth Darfmouth TEL (90 FAX (90	11 Morris Drive, Unit 122 Dartmouth, Nova Scotia CANADA B3B 1M2 TEL (902)468-8718 FAX (902)468-8924
CLIENT NAME: WSP CANADA INC. SAMPLING SITE:): VIRGIL GRECIAN	http://www.agatiabs.com
			TSS		
DATE RECEIVED: 2016-09-06				DATE REPORTED: 2016-09-14	
Parameter	SAMPLE DESCRIPTION: SAMPLE TYPE: DATE SAMPLED: G / S RDL	WC2 - 01 Water 9/2/2016 7824652	Dup2 - 02 Water 9/2/2016 7824653		
	0	12	ω		
Comments: RDL - Reported Detection Limit;	G / S - Guideline / Standard: Refers		to CCME MAL - updated 2015		

Certified By: Results relate only to the items tested and to all the items tested

AGAT CERTIFICATE OF ANALYSIS (V1)

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	LUDU	Laboratories	Guideline Violation AGAT WORK ORDER: 16X134279 PROJECT: 161-02978	_	11 Mo	1 Morris Drive, Unit 122 Dartmouth, Nova Scotia CANADA B3B 1M2 TEL (902)468-8924 FAX (902)468-8924
CLIENT NAME	CLIENT NAME: WSP CANADA INC.			ATTENTION TO: VIRGIL GRECIAN		http://www.agatlabs.com
SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	GUIDEVALUE	RESULT
7824652	WC2 - 01	NS-CCME MAL MT	-L - Standard Water Analysis + Total Metals	Hq	6.5-9.0	5.55
7824653	Dup2 - 02	NS-CCME MAL MT	'L - Standard Water Analysis + Total Metals	Hq	6.5-9.0	5.26



Quality Assurance

CLIENT NAME: WSP CANADA INC.

PROJECT: 161-02978

SAMPLING SITE:

AGAT WORK ORDER: 16X134279 ATTENTION TO: VIRGIL GRECIAN SAMPLED BY:

Water Analysis

				vvale		larysi	S								
RPT Date: Sep 14, 2016			C	UPLICATE	Ξ		REFEREN	ICE MA	TERIAL	METHOD	BLANK	SPIKE	MAT	RIX SPI	KE
PARAMETER	Batch	Sample	Dup #1	Dup #2	RPD	Method Blank	Measured		ptable nits	Recovery	Lir	ptable nits	Recovery	Lin	ptable nits
	Daten	ld	Dup #1	Dup #2	INF D		Value	Lower	Upper	Recovery	Lower	Upper	TRECOVERY	Lower	Upper
MTL - Standard Water Analysis	+ Total Metals														
pH	7816781		7.39	7.38	0.1%	<	100%	80%	120%	NA	80%	120%	NA	80%	120%
Reactive Silica as SiO2	1 782	4680	4.3	4.5	4.5%	< 0.5	111%	80%	120%		80%	120%	88%	80%	120%
Chloride	7821019		13	13	1.4%	< 1	94%	80%	120%	NA	80%	120%	NA	80%	120%
Fluoride	7821019		0.16	0.21	NA	< 0.12	110%	80%	120%	NA	80%	120%	108%	80%	120%
Sulphate	7821019		2	2	NA	< 2	96%	80%	120%	NA	80%	120%	95%	80%	120%
Alkalinity	7816781		57	56	1.4%	< 5	87%	80%	120%	NA	80%	120%	NA	80%	120%
True Color	1 782	4653	311	316	1.6%	< 5	100%	80%	120%		80%	120%		80%	120%
Turbidity	1 782	6523	1030	1060	2.9%	< 0.1	96%	80%	120%		80%	120%		80%	120%
Electrical Conductivity	7816781		178	177	0.2%	< 1	98%	80%	120%	NA	80%	120%	NA	80%	120%
Nitrate as N	7821019		0.07	<0.05	NA	< 0.05	89%	80%	120%	NA	80%	120%	90%	80%	120%
Nitrite as N	7821019		<0.05	<0.05	NA	< 0.05	95%	80%	120%	NA	80%	120%	99%	80%	120%
Ammonia as N	1 782	4680	<0.05	<0.05	NA	< 0.03	89%	80%	120%		80%	120%	104%	80%	120%
Total Organic Carbon	7829364		1.9	1.9	NA	< 0.5	NA	80%	120%	86%	80%	120%	81%	80%	120%
Ortho-Phosphate as P	1		0.04	0.02	NA	< 0.01	100%	80%	120%		80%	120%	117%	80%	120%
Total Sodium	9072016		16.3	17.3	6.0%	< 0.1	110%	80%	120%	111%	80%	120%	99%	70%	130%
Total Potassium	9072016		0.6	0.6	0.0%	< 0.1	109%	80%	120%	113%	80%	120%	118%	70%	130%
Total Calcium	9072016		19.2	20.5	6.5%	< 0.1	102%	80%	120%	106%	80%	120%	101%	70%	130%
Total Magnesium	9072016		1.2	1.2	0.0%	< 0.1	115%	80%	120%	120%	80%	120%	110%	80%	120%
Total Phosphorous	9072016		0.28	0.28	0.0%	< 0.02	113%	80%	120%	120%	80%	120%	98%	70%	130%
Bicarb. Alkalinity (as CaCO3)	7816781		57	56	1.4%	< 5	NA	80%	120%	NA	80%	120%	NA	80%	120%
Carb. Alkalinity (as CaCO3)	7816781		<10	<10	NA	< 10	NA	80%	120%	NA	80%	120%	NA	80%	120%
Hydroxide	7816781		<5	<5	NA	< 5	NA	80%	120%	NA	80%	120%	NA	80%	120%
Total Aluminum	9072016		16	13	NA	< 5	106%	80%	120%	111%	80%	120%	114%	70%	130%
Total Antimony	9072016		< 2	< 2	0.0%	< 2	88%	80%	120%	107%	80%	120%	100%	70%	130%
Total Arsenic	9072016		< 2	< 2	0.0%	< 2	102%	80%	120%	98%	80%	120%	97%	70%	130%
Total Barium	9072016		12	11	8.7%	< 5	100%	80%	120%	101%	80%	120%	94%	70%	130%
Total Beryllium	9072016		< 2	< 2	0.0%	< 2	107%	80%	120%	103%	80%	120%	113%	70%	130%
Total Bismuth	9072016		< 2	< 2	0.0%	< 2	97%	80%	120%	98%	80%	120%	104%	70%	130%
Total Boron	9072016		8	8	0.0%	< 5	110%	80%	120%	113%	80%	120%	118%	70%	130%
Total Cadmium	9072016		< 0.017	< 0.017	0.0%	< 0.017	97%	80%	120%	100%	80%	120%	101%	70%	130%
Total Chromium	9072016		< 1	< 1	0.0%	< 1	104%	80%	120%	104%	80%	120%	112%	70%	130%
Total Cobalt	9072016		< 1	< 1	0.0%	< 1	105%	80%	120%	105%	80%	120%	106%	70%	130%
Total Copper	9072016		16	17	6.1%	< 1	99%	80%	120%	106%	80%	120%	104%	70%	130%
Total Iron	9072016		57	65	13.1%	< 50	106%	80%	120%	109%	80%	120%	110%	70%	130%
Total Lead	9072016		< 0.5	< 0.5	0.0%	< 0.5	100%	80%	120%	101%	80%	120%	101%	70%	130%
Total Manganese	9072016		< 2	< 2	0.0%	< 2	107%	80%	120%	110%	80%	120%	109%	70%	130%
Total Molybdenum	9072016		< 2	< 2	0.0%	< 2	97%	80%	120%	98%	80%	120%	100%	70%	130%
Total Nickel	9072016		< 2	< 2	0.0%	< 2	101%	80%	120%	107%	80%	120%	114%	70%	130%
Total Selenium	9072016		< 1	< 1	0.0%	< 1	103%	80%	120%	96%	80%	120%	105%	70%	130%

AGAT QUALITY ASSURANCE REPORT (V1)

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Quality Assurance

CLIENT NAME: WSP CANADA INC.

PROJECT: 161-02978

SAMPLING SITE:

AGAT WORK ORDER: 16X134279 ATTENTION TO: VIRGIL GRECIAN SAMPLED BY:

Water Analysis (Continued)

RPT Date: Sep 14, 2016			C	UPLICAT	E		REFEREN	ICE MA	TERIAL	METHOD	BLANK	SPIKE	MAT	RIX SPI	KE
PARAMETER	Batch	Sample	Dup #1	Dup #2	RPD	Method Blank	Measured		ptable nits	Recovery	Lin	ptable nits	Recovery	1 1 1 1	ptable nits
		ld					Value	Lower	Upper		Lower	Upper		Lower	Upper
Total Silver	9072016		< 0.1	< 0.1	0.0%	< 0.1	101%	80%	120%	97%	80%	120%	101%	70%	130%
Total Strontium	9072016		20	22	9.5%	< 5	100%	80%	120%	100%	80%	120%	104%	70%	130%
Total Thallium	9072016		< 0.1	< 0.1	0.0%	< 0.1	100%	80%	120%	102%	80%	120%	103%	70%	130%
Total Tin	9072016		< 2	< 2	0.0%	< 2	97%	80%	120%	100%	80%	120%	99%	70%	130%
Total Titanium	9072016		< 2	< 2	0.0%	< 2	105%	80%	120%	101%	80%	120%	108%	70%	130%
Total Uranium	9072016		< 0.1	< 0.1	0.0%	< 0.1	102%	80%	120%	103%	80%	120%	110%	70%	130%
Total Vanadium	9072016		< 2	< 2	0.0%	< 2	109%	80%	120%	110%	80%	120%	114%	70%	130%
Total Zinc	9072016		63	63	0.0%	< 5	102%	80%	120%	105%	80%	120%	98%	70%	130%

Comments: If RPD value is NA, the results of the duplicates are less than 5x the RDL and the RPD will not be calculated.

00

Total Suspended Solids	1	6972	< 5	< 5	NA	< 5	98%	80%	120%	120%	120%	103%	80%	120%

Comments: If RPD value is NA, the results of the duplicates are less than 5x the RDL and the RPD will not be calculated.

Dissolved Metals (FWAL)														
Dissolved Aluminum	9082016	7	7	0.0%	< 5	118%	80%	120%	104%	80%	120%	89%	70%	130%
Dissolved Antimony	9082016	< 2	< 2	0.0%	< 2	93%	80%	120%	98%	80%	120%	96%	70%	130%
Dissolved Arsenic	9082016	< 2	< 2	0.0%	< 2	96%	80%	120%	90%	80%	120%	100%	70%	130%
Dissolved Barium	9082016	14	14	0.0%	< 5	101%	80%	120%	96%	80%	120%	97%	70%	130%
Dissolved Beryllium	9082016	< 2	< 2	0.0%	< 2	108%	80%	120%	109%	80%	120%	112%	70%	130%
Dissolved Bismuth	9082016	< 2	< 2	0.0%	< 2	103%	80%	120%	85%	80%	120%	NA	70%	130%
Dissolved Boron	9082016	12	13	8.0%	< 5	108%	80%	120%	102%	80%	120%	108%	70%	130%
Dissolved Cadmium	9082016	< 0.017	< 0.017	0.0%	< 0.017	100%	80%	120%	97%	80%	120%	97%	70%	130%
Dissolved Chromium	9082016	< 1	< 1	0.0%	< 1	115%	80%	120%	100%	80%	120%	92%	70%	130%
Dissolved Cobalt	9082016	< 1	< 1	0.0%	< 1	118%	80%	120%	111%	80%	120%	95%	70%	130%
Dissolved Copper	9082016	< 2	< 2	0.0%	< 2	110%	80%	120%	104%	80%	120%	92%	70%	130%
Dissolved Iron	9082016	< 50	< 50	0.0%	< 50	110%	80%	120%	101%	80%	120%	97%	70%	130%
Dissolved Lead	9082016	< 0.5	< 0.5	0.0%	< 0.5	104%	80%	120%	103%	80%	120%	99%	70%	130%
Dissolved Manganese	9082016	< 2	< 2	0.0%	< 2	111%	80%	120%	110%	80%	120%	91%	70%	130%
Dissolved Molybdenum	9082016	< 2	< 2	0.0%	< 2	103%	80%	120%	95%	80%	120%	92%	70%	130%
Dissolved Nickel	9082016	< 2	< 2	0.0%	< 2	113%	80%	120%	107%	80%	120%	96%	70%	130%
Dissolved Selenium	9082016	< 1	< 1	0.0%	< 1	106%	80%	120%	102%	80%	120%	103%	70%	130%
Dissolved Silver	9082016	< 0.1	< 0.1	0.0%	< 0.1	104%	80%	120%	99%	80%	120%	97%	70%	130%
Dissolved Strontium	9082016	56	55	1.8%	< 5	99%	80%	120%	94%	80%	120%	82%	70%	130%
Dissolved Thallium	9082016	< 0.1	< 0.1	0.0%	< 0.1	101%	80%	120%	98%	80%	120%	101%	70%	130%
Dissolved Tin	9082016	< 2	< 2	0.0%	< 2	100%	80%	120%	99%	80%	120%	100%	70%	130%
Dissolved Titanium	9082016	< 2	< 2	0.0%	< 2	105%	80%	120%	96%	80%	120%	99%	70%	130%
Dissolved Uranium	9082016	< 0.1	< 0.1	0.0%	< 0.1	104%	80%	120%	101%	80%	120%	99%	70%	130%
Dissolved Vanadium	9082016	< 2	< 2	0.0%	< 2	112%	80%	120%	105%	80%	120%	88%	70%	130%

AGAT QUALITY ASSURANCE REPORT (V1)

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Quality Assurance

CLIENT NAME: WSP CANADA INC.

PROJECT: 161-02978

SAMPLING SITE:

AGAT WORK ORDER: 16X134279 ATTENTION TO: VIRGIL GRECIAN

SAMPLED BY:

		V	Vater	Ana	lysis	(Cor	ntinue	ed)							
RPT Date: Sep 14, 2016			C	UPLICAT	E		REFEREN	ICE MA	TERIAL	METHOD	BLANK	SPIKE	MAT	RIX SPI	KE
PARAMETER	Batch	Sample	Dup #1	Dup #2	RPD	Method Blank	Measured		ptable nits	Recovery		ptable nits	Recovery	Lim	ptable nits
		ld					Value	Lower	Upper		Lower	Upper		Lower	Upper
Dissolved Zinc	9082016		8	8	0.0%	< 5	109%	80%	120%	98%	80%	120%	99%	70%	130%

Comments: If RPD value is NA, the results of the duplicates are less than 5x the RDL and the RPD will not be calculated.

Certified By:

Lauro Balu

AGAT QUALITY ASSURANCE REPORT (V1)

AGAT Laboratories is accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA) and/or Standards Council of Canada (SCC) for specific tests listed on the scope of accreditation. AGAT Laboratories (Mississauga) is also accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) for specific drinking water tests. Accreditations are location and parameter specific. A complete listing of parameters for each location is available from www.cala.ca and/or www.scc.ca. The tests in this report may not necessarily be included in the scope of accreditation.

Page 10 of 14



Method Summary

CLIENT NAME: WSP CANADA INC. PROJECT: 161-02978			RDER: 16X134279 : VIRGIL GRECIAN
SAMPLING SITE:		SAMPLED BY:	
PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis		1	1
Dissolved Aluminum	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Dissolved Antimony	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Dissolved Arsenic	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Dissolved Barium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Dissolved Beryllium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Dissolved Bismuth	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Dissolved Boron	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Dissolved Cadmium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Dissolved Chromium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Dissolved Cobalt	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Dissolved Copper	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Dissolved Iron	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Dissolved Lead	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Dissolved Manganese	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Dissolved Molybdenum	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Dissolved Nickel	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Dissolved Selenium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Dissolved Silver	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Dissolved Strontium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Dissolved Thallium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Dissolved Tin	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Dissolved Titanium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Dissolved Uranium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Dissolved Vanadium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Dissolved Zinc	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
ЪН	INOR-121-6001	SM 4500 H+B	PC-TITRATE
Reactive Silica as SiO2	INORG-121-6028	SM 4110 B	COLORIMETER
Chloride	INORG-121-6005	SM 4110 B	IC
Fluoride	INORG-121-6005	SM 4110 B	IC
Sulphate	INORG-121-6005	SM 4110 B	IC



Method Summary

CLIENT NAME: WSP CANADA INC.

PROJECT: 161-02978

SAMPLING SITE:

AGAT WORK ORDER: 16X134279 ATTENTION TO: VIRGIL GRECIAN SAMPLED BY:

SAMPLING SITE:		SAMPLED BY:	
PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Alkalinity	INORG-121-6001	SM 2320 B	PC-TITRATE
True Color	INORG-121-6014	EPA 110.2	NEPHELOMETER
Turbidity	INORG-121-6022	SM 2130 B	NEPHELOMETER
Electrical Conductivity	INOR-121-6001	SM 2510 B	PC-TITRATE
Nitrate + Nitrite as N	INORG-121-6005	SM 4110 B	CALCULATION
Nitrate as N	INORG-121-6005	SM 4110 B	IC
Nitrite as N	INORG-121-6005	SM 4110 B	IC
Ammonia as N	INORG-121-6003	SM 4500-NH3 G	COLORIMETER
Total Organic Carbon	INORG-121-6026	SM 5310 B	TOC ANALYZER
Ortho-Phosphate as P	INORG-121-6005	SM 4110 B	COLORIMETER
Total Sodium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Potassium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Calcium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Magnesium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Phosphorous	MET-121-6104 & MET-121-6105	SM 3125	ICP/MS
Bicarb. Alkalinity (as CaCO3)	INORG-121-6001	SM 2320 B	PC-TITRATE
Carb. Alkalinity (as CaCO3)	INORG-121-6001	SM 2320 B	PC-TITRATE
Hydroxide	INORG-121-6001	SM 2320 B	PC-TITRATE
Calculated TDS	CALCULATION	SM 1030E	CALCULATION
Hardness	CALCULATION	SM 2340B	CALCULATION
Langelier Index (@20C)	CALCULATION	CALCULATION	CALCULATION
Langelier Index (@ 4C)	CALCULATION	CALCULATION	CALCULATION
Saturation pH (@ 20C)	CALCULATION	CALCULATION	CALCULATION
Saturation pH (@ 4C)	CALCULATION	CALCULATION	CALCULATION
Anion Sum	CALCULATION	SM 1030E	CALCULATION
Cation sum	CALCULATION	SM 1030E	CALCULATION
% Difference/ Ion Balance (NS)	CALCULATION	SM 1030E	CALCULATION
Total Aluminum	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Antimony	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Arsenic	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Barium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Beryllium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Bismuth	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Boron	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Cadmium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Chromium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Cobalt	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Copper	MET121-6104 & MET-121-6105	SM 3125	ICP/MS

AGAT METHOD SUMMARY (V1)



Method Summary

CLIENT NAME: WSP CANADA INC.		AGAT WORK OF	RDER: 16X134279
PROJECT: 161-02978		ATTENTION TO:	VIRGIL GRECIAN
SAMPLING SITE:		SAMPLED BY:	
PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Total Iron	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Lead	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Manganese	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Molybdenum	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Nickel	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Selenium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Silver	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Strontium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Thallium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Tin	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Titanium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Uranium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Vanadium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Zinc	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Suspended Solids	INOR-121-6024, 6025	SM 2540C, D	GRAVIMETRIC

Only	Arrival Condition: Ugood UPoor (see notes) Arrival Temperature:	AGAT JOD Number: 16x134379	Notes:	Turnaround Time Required (TAT)	AT Las to 7 workin	Rush TAT Same day 1 day 1 2 days 3 days) are require	ple: LYes LNo		_	noitsno Ngh	YBTEX YBTEX Udomod MPI	(118/H4 vs TPH/ A/q A/q A/q	Hazerdor Tier 2: Th CCME-CV PAH PAA PAA PAA PAA PAA PAA PAA PAA PAA						ILE Pink Copy - Client Page of	105 White Copy-AGAT No: 054988	Date review. June 6, 2015 Page 14 of 14
 11 Morris Drive Dartmouth NS 	B3B 1M2 ww.agatlabscom	F: 902.468.8924	Report Format	Sample per	Multiple Samples per	page Excel Format	Included	Drinking Water Sample: Reg. No.:			SS/	\ 🗆	esbyoune 102 CB	TKN Treal Pho TKN TKN TKN	×	×				Polytene AAAAA	Daniera me	
Unit 122	Laboratories webearth.agatlabs.com • www.agatlabscom	P: 902.468.8718 =	Report Information (Please print): 1. Name: 11 (15) 6000 a.	Uin	Name: Email:	Regulatory Requirements (Check): Ist Guidelines on Report	Res	UTIer 2 U Com Gas D Fuel D Lube	CDWQ	Commercial NSESQ-Cont. Sites	C HKM 101 Storm Water		April 1. Ac	Comments - Site/Sample Info. Standard Sample Containment	×	XX				nos Sanning Received By (Pint Name):	Samples Received By (Sign):	
п	Labo		Rep 1.		5	6t91-1		Same Yes U / No	₩.					Sample # Containers Matrix	H20 5	Hau 5				Salt 16 9	Dates/ (Imé	
	55	iy Record	auchor Dar	6 Recta	Orberol Gres.	1- 02 978	AGAT Quotation: Please Note: If quotation number is not provided client will be billed full price for analysis.	Same Yes				Fax:		Date/Time Sampled	Secta/IA	Sept2/16 H	5			2M	•	
1 220		Chain of Custody Record	Report Information		Address: 55	Phone: 506 657- Client Project #: 16	AGAT Quotation: Please Note: If quotation number is I	Invoice To	Company:	Contact:	Address:	Phone:	PO/Credit Card#:	Sample Identification	WC3 -01	eo-edno				Sumotes Holmanahoo Bypring Jamos	Charles Handy Priver Is religion. R	Decision ID. CONTERS 1501.002

Appendix D Field Data Sheets

af		CHECKLIST OF LAND USE ATTRIBUTES (COMMENTS)	1. ACTIVE BEAVER DAM 2. INACTIVE BEAVER DAM	3. WOODY DEBKIS (OBSTRUCTION) 4. MAV-MADE DAM OBSTRUCTION 5. ROCK DAM (SWIMMING POOL) 6. BRAIDED STREAM CHANNELS 7. OBSTRUCTION IN STREAM	8. RUAD FORD POLLUTION CAUSED 8Y: 9. PODD PROCESSING INDUSTRY	11. CAREST INDUSTRY 11. CAMPBITES OR RESIDENTIAL 12. AMMENTES OR RESIDENTIAL 13. LITTER 14. OL	15. AGRICULTURE WASTE 14. HEALTH HAZARD 14. CLEAR CUT TO STREAM EDGE	19. SLEET FECOL 19. SLEER STRIP RESENT 20. CATLLE CROSSING 21. EROSION FROM AGRLCULTURE	22 SUSPENDED SILF NOTED 22. UNUSUAL STREAM SCOURING 24. LANGE BEDLOAD DEPOSIT 25. BANK EROSION - MODERATE 24. SANK EROSION - RCCESINF 22. STREAM BEDGUAGPULLIDOZING	28. GZAVEL REMOVAL 29. GLANNELIZATION (RIFRAP, ETC) 30. STREAM DIVERSION 31. WATTH WITHDEAWAL	22. RECULATED STREAM FLOW 33. CAMP/COTTAGE FRESENT 94. RESIDENTIAL AREA 35. ACCESS - NTV'S 36. ACCESS - TRAILS 36. ACCESS - TRAILS	37. ACCESS - TRUCK/CAR 36. ACCESS - BOAT 39. ROAD CROSSING (BRIDGE) 40. ROAD CROSSING (CUTVERT) 0. ROAD CROSSING (CUTVERT)	42 ORGANIC LITTER 42. AQUATIC PLANTS ABUNDANT 43. AQUATIC PLANTS ABUNDANT
		COMMENTS			<u> </u>		2.6	2	1 1 2 2 2 2 2	1 2 8		121	1
	AC N	EMBEDDEDNESS (CRITERIA) 1: < > 21%						1.82		×			
	60	FLOWS *	e FLOW TIME TEAPPED	0	-2-1	2-1							
Drainage Code:	:Name:	LARGE WOODY DEBRIS	STREAM TYPE	5	\times	X							
VICK ORY	Drainage Name:	0-50% OVERHANGING VEGETATION	2	50	22	5		- 					
DNR / DFO - NEW BRUNSWICK Stream Habitat inventory		0-50% UNDERCUT BANK	8		\langle	×							
2/ DFO - N		AVG DEPTH WET	(cm)	OH	2	5				-			
2	1		DINES	to	+				1				
End Point:	GIS Map No.	-	GRAVEL SAND		030	S					2		
		SUBSTRATE (%)	RUBBLE			AN					2/		
			ROCK			PCG			4				2
Ę	9		BOULDER	3									
E	1716	-	EL ROCK			1			-		× 1		
Start Point	W/I	AVG WIDTH (m)	BANK	Se.	2	Ś,					-		
Start	Date:	LENGTH	MEL	5	7	10		7				<u> </u>	
	X	CHANNEL LEN		H H	9	Ę.							
-+	21 50	STREAM CH.		11	74	34							
UN.	TTT .	UNIT 5	_	(-4		5							
04-98 River WCT	Personnel: No.	REACH		Ч	2	3							

APPENDIX 1

FISH HABITAT SURVEY FORMS

			17	#2:			45. GOOD NURSERY 46. ATLANTIC SALMON OBSERVED 47. BROOK TROUT OBSERVED	285ERVED 2VED
STREAM TYPE				THE PARTY PARTY PARTY		- 2	POOL RATING (revene side)	evene side)
FOOLS		ILS		CIMANELITE	SUBSIKALE	FLOW TYPE	CRITERIA NO.	% OF FOOLS IN SITE
14. Trench 18	2	18. Eddy	22 Wand Debris	3. Main (if meisurement refers to main area of river).	L. Dedrock, Ledge		POOL DEPTH > 15m	(LETTER) a - > 30%
15 Plunge 15	15	19. Gablan	23. Math-Made Dam	 2. Side Channel (water diverted by idlands) 	2. Boulder = >461 mm 3. Rack = 180 - 460 mm	1 Survey stream	1 - Instream Cover ≥ 30% 2 - Instream Cover < 30%	b - > 10 to 30%
16, 20	2	20. Log Structure	24. Natural Deadwater	 3. Splik (If river is splik into various different stream types) 	5	2. Spring		
17. Bogan 2	ir4	21 Road Crossing		* 4. Bogan	5. Gravel 2.6-53 mm 6. Sand 0.06-25 mm	3. Bruok/River Tributary	POUL DEPTH .5 - 15m 3. Instream cover 5-30%	b - < 50%
2				"Specify Left (th, Right (R) or Middle (M)	7. Fines • 0.005 • 0.05 mm	4. Spring Seep	4 - Instream Cover > 30%	

	TURBU-	LENCE	ŧ										12			
	% FINE		¥(24		v									
POOL TAIL	MEAN SUBSTRATE	512(E				2							24			
POG	EMBEDDEDNESS (CRITERIA)	7: < 20%	1405 < 14			29.	*	. 1		2		8	82 		VENTS	(NOIL)
NC	1	-			_	- 2	14		- 14						COMU	(1001)
PO	(CRITERIA ON OTHER SIDE	-	<u>p</u>						1							
	½ (m)		CHANNEL	5	12	5										
	3		Wet	40	PA	8		5								
DEPTH	(m) ²		CHANNEL	Ń	56	S								-		-
			Wet	PP.	2	35							1			A1160 4.010
	½ (m)		CHANNEL	J.	\mathcal{O}	\sim					ч н 				5	L
	2	_	Wet	04	P	2				8) 					AT TIME (V bist
	PHd	-	_				1								FLO	
_	5	<u>an</u>	c													(3m) LENGTH
	12	(%05 - 0	ERODING	C C			2						ē.		I NUTE SCREAM WET DEPTH (an) AVEAGE DEPTH 50/04 COEFFICENT WIDTH WIDTH	
	2	BICHT BANK (0 - 50%)	BARE	Y	K				- 14			140 11	_	2		(B)
	EROSION (%)	a	STABLE	\subset								[FFICTENT	(B.9 - SMOOTH)
	EROS	LEFT BANK (D. 50%) BARE EKODING	EKODING	× (-1	× - 0	-					1.1	- ×	Ē	T
BANKS	3	BANK (0 - 50	BARE	-											suw/4	
STREAM BANKS		185	STABLE	12								×.			RAGE DEFTF	
20.8		-	TREES	5	5	5					4				AVI	
	(%) N(SHRUBS	10	0	0						2	~			
	VEGETATION (%)		GRASSE5	R	85	X	k	-	0				0	**	DEPTH (cm)	
	8	BARE	GROUND	0	\bigcirc	0	1962		-			к И а а	÷	1		-
E.	SHADE	(º/a)		0	0	\bigcirc				12						-
a.F.		POOLS			\checkmark	-	-*									_
4TP	2	BIFFLEY	RUN .		\square			-								TYPE
	SITE	·(50m - interval)		-							ş					NO.
۰.		NO.		M	2	3						REACH NO.				

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	_				
	_				
	_				- (3
	_	<u></u>			
					EOPMID A (CMC)
,					Nava Nava

ULA (CMS) = W Infl X U Infl X U Infl X A X U Infl X Where: W = width, D = depth, L = tength, A is coefficient in the set of the s

WC I tend - 17,34°C Mond - 61 ws/cm Cond - 0.052 ms/cm TDS - 0.041 g/L Sal. - 0.03

42,7% - 100 42,7% - 100 41,0% - 100 m9/L 66% 100 PH-5,69

a correcte consistent a correct e consistent a supervolver sur a correct a supervolver sur a correct a supervolver sur a correct a manual supervolver a kaking legicada polmesin a kaking legicada polmesin a kaking legicada polmesin a kaking legicada polmesin b kaking legicada polmesin a caking legicada polmesin a caking legicada polmesin a caking legicada polmesin a struk legicada CHECKLIST OF LAND USE ATTRIBUTES (COMMENTS) I. ACTIVE BEAVER DAM
 I. ACTIVE BEAVER DAM
 I. ACTIVE BEAVER DAM
 WODY DIBBINS (DBSTRUCTION)
 MANAMDE DAM
 MORT DAM
 MANING TO DAM
 MANING TO DAM
 SURANDED STREAM CHANNELS
 Z.DBSTRUCTION IN STREAM 42 ORGANIC LITTER 43 AQUATIC PLANTS ABUNDANT 9, FOOD PROCESSING INDUSTRY 10, EXENST INDUSTRY 11, CAMBETTS OR RESIDENTIAL 12, MINING 13, LITTR 13, LITTR 13, LARCUTURE WASTE 13, FARLITH FAZARD WATER WITHDRAWL
 REGULATES FREAM FLOW
 CAMPYCOTTAGE FREASENT
 CANTYAGE REASENT
 ACCESS - ATV'S
 ACCESS - TRAUS
 ACCESS - TRUCKAR
 ACCESS - TRUCKAR
 ACCESS - DOAT 17. CLEAR CUT TO STREAM EDGE 18. SELECTIVE CUT 19. DUFFER STRIP PRESENT 39, ROAD CROSSING (BRIDGE) 40, ROAD CROSSING (CULVER'I) 41, BOAT LANDING ť POLUTION CAUSED BY: PH= 5. 83 COMMENTS DO = 100.9% - 71.4%. ENDEDNESS (CRITERIA) 1: ≤ 20% 2: 20% - 35% 3: 35% - 50% 4: ≥ 50% TIME TEMP (PC) 81 1.9 20 S 1.9 Pr.d TYPE FLOW (cms) 2 2 12 6832 22832 * masured frie bridge \sim Sal = 0.02 IN STREAM 0 Drainage Name: LARGE WOODY DEBRIS 91 0-50% OVERHANGING VEGETATION ы FISH HABITAT SURVEY FORMS 2 DNR / DFO - NEW BRUNSWICK STREAM HABITAT INVENTORY 0-50% UNDERCUT BANK at **APPENDIX 1** ., 5 100 H X Terrop = 16.86 °C Condu. = 36 us/on =0.030 ms/on (End Point GIS Map No. ROCK RUBBLE CRAVEL TDS = 0.023 3/L SUBSTRATE (%) WET CHANNEL ROCK BOULDER Date: 502/16 15 8 3 m P1 7 24 75 7 30 AVC WIDTH Start Point (m) 4 STM STREAM CHANNEL TYPE TYPE 9112 Hons. 3 N River WCJ No. VD(9-UNIT NO. 4. 74 REACH NO. 04-98 3 0

I OBSERVED ERVED	(reverse alde)	0	% OF POOLS IN SITE	-a - > 30%			a - > 50% b - < 50%	
44. COUD SPAWNING 65. GOOD NURSERY 64. ATLANTIC SALMON OBSERVED 47. BROOK TROUT OBSERVED	POOL RATING (reverse alde)	71	CRUTERIA NO	POOL DUPTR > Life	1 - Imtream Cover > 30% 2 - Instream Cover < 30%		POOL DEPTH 5 - 15m 3. Instream cover 5-30%	4 - Jostream Cover > 30%
		FLOW TYPE			 Survey stream 	2. Spring	3. Brook/River Iributary	4. Spring Seep
		SUBSTRATE		1. Bedrock, Ledge	2 Boulder = >461 mm 3 Rock = 180 - 460 mm	61	5. Gravel	7. Eines . 0.0005 • 0.05 mm
		CHANNEL TYPE		1. Main (if measurement refers to main area of fiver)	2. Side Channel (wahre diverted by islands)	 3. Split (if river is split into various different stream types) 	* 4. Bogan	*Specify Left (I), Right (R) or Middle (M)
	į			22 Wood Debris	23. Man-Made Dam	24. Natural Deadwater		
			POOLS	16. Eddy	19. Gabion	20. Log Shunture	21. Road Crussing	
	EAM TYPE		Q	14. Trench	15 Plunge	.9E	17. Bogan	
	STREAM TYPE			10. Midchannel	11. Convergence	12. Lateral	13. Beaver	
	1		ATER		7. Сћињ	8 Run	9. Rapid	
			FASTWATER	1. Falls	2. Calcade	3. RLffle (GR/RB)	4. RLffle (B/B)	5. Riffle (Sand)

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	TURBU-	-	_	-				-								
-	E FINE					-								-		
FOOL TAIL	MEAN SUBSTRATE	(cm)											8			
£	EMBEDDEDNESS (CRITERIA)	2: 20% - 35%	2014 - 2014 11 - 2 50%			-						Ň			COMMENTS	CATION
POOL RATING	(CRITERIA ON OTHER SUDE)	_	TELLER .											1	8	01)
		-	NO NO	+		1		-	-						- 140	0
	/ul) 1/4	_	CHANNEL	ξÿ												
		-	EL Wet	NCUNK N	53	& CBs		-		-						
DEFTH	(m) %	-	Ð	4. K	Y	75 62		-							-	_
		-	NEL Wet	GNO	arg	Sine			-		1	-				AVERAGE
	(m) %	_	Wet CHANNEL			8				-					dE (sec)	% WAY
	H	-		,											FLOAT TIME (ecc)	-
	б	(\/iku)														₩₩%
			ERODING													14 WAY
		RIGHT BANK (0-50%)	BARE ER			+									ENCIDE	(3m)
	(%)	RIGHT	STABLE	\parallel			*								CIENT	00TH) 0UGH)
	EROSION (%)	-	ERODÍNG		Ħ	\square	1								COEFFICIENT	(0.9 - SMOOTH) (0.6 - ROUGH)
ĸs		LITT BANK (0-50%)	RE ERO BLE			\square		-	-			-			uta -	METERS (m)
STREAM BANKS		LITTAN	BLE BARE STABLE	$\left \right $		+ +	-	-		+	-	-			AVERAGE DEFTH SUM/4	
S			ES STABLE				-	-				-			AVERAG	CENTIMETERS (cm)
			IBS TREES	5	15		·	-	-	-						-
	VEGETATION (%)	-	SEIS SHRUBS	20		2		-					-		Ē	YAW N
	VEGI	-	U CRASSES	8		8	-		-						DEPTH (cm)	14 WAY
		_	GROUND	$ 0\rangle$		$ \circ $										VAW A
	SHADE	(%) (%)		5	M	0									WET	(1)
W. SITE		EV POOLS	_	\ge	1	\mathbf{k}							_			TYPE
		_	RUN						_	-						
		(50m -														NON NON
	REACH	Ŋ.		2	0	m)									NO

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					Where: $W = width, D = depth, L = length, A la coefficient for the stream bottom$
					Where: W = width, D = depth, L = le
					W (m)x D (m)x A x L (m)
_	_			-	FORMULA (CMS)

* 2

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AL UNUSUAL STREM SICURING AL LARGE REDUCAD DEPOSIT AL LARGE REDUCAD DEPOSIT AL ANK REDSON - MODEX-TE AL ANK REDSON - MODEX-TE Z. STREM DIRECTION (RIR.A.F. ETC) AC ANTER REDSON - ALCORESIVE Z. CANNER REDSON - ALCORESIVE AC ACTURE REDSON - ALCORESON - ALCORESON - ALCORESON - ALCORESON AC ACTURE REDSON - ALCORESON		
CLARACTYOT DYTEAM EDGE A SELECTIVE CUT A SELECTIVE CUT A LUTTER STRIP PRESENC Z ELOSTON FROM ACAUCUTURE Z SUBSENCES ALM FORTED		
14 OLL 14. OLL 15. ACRICULTURE MASTE 16. FEALTH HAZARD		C NC T C
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R, RADAU CANSED BY; POLLUFION CAUSED BY; 9., FOOD PROCESSING INDUSTRY	0264N165 NONA 531 ++++	2 13 2 30 35/6
A WOOTY YEARS (PASTRO CT 10.9) A MANADE DAAL OBSTRUCT 10.9) A MANADE DAAL OBSTRUCT 10.9) A MANADE STOCK DAAL SHWMMING FOOL) S ROCK DAAL SHWMMING FOOL COST OF THE AND THE SHWMMING FOOL A MANADE SHALL	ORGHN/165. 770 N/A 5 3 2	2 2 20 3 5/6
1. ACTIVE BEAVER DAM 2. INACTIVE BEAVER DAM 2. INACTIVE BEAVER DAM	ید بر	WET CHANNEL ROCK
CHECKLIST DE LAND USE ATTRUBUTES COMMENTS	SUBSTRATE (%) (%) (%) (CTTERIA) (%) (CTTERIA) (%) (CTTERIA) (%) (CTTERIA) (%) (%) (CTTERIA) (%) (%) (%) (%) (%) (%) (%) (%	REACH UNIT STREAM CHANNEL LENGTH (m)
	DNR / DFO - NEW BRUNSWICK STREAM HABITAT INVENTORY End Point: End Point: Drainage Code: Drainage Code: CIS Map No.	04-98 River WC Start Point Start Point Dave AUG (1 /10
	FISH HABITAT SURVEY FORMS	2
Sind The S	APPENDIX 1	in when any
ye . Wilch	reduction the average to the	Mart Droken a
		11, 20° 10.
й. (н	1 112 Temp 21.25°C	

I OBSERVED ERVED	(reverse side)		% OF POOLS IN SITE	2.530W	b - > 10 to 30%		a - > 50%	
44. COOD SPANNINC 45. GOOD NURSERY 46. ATLANTIC SALMON OBSERVED 47. BROOK TROUT UBSERVED	POOL RATING (reverse side)		CRITERIA NO.	POOL DEFTH >1.5m	1 - Instream Cover > 30%		POOL DEPTH 5-15m 3. Instruction cover 5-30%	4 - Instream Cover > 30%
		FLOW TYPE			1. Survey stream	2. Spring	3. Brook/River Iributary	4. Spring Seep
		RATE			> 461 mm 160 - 460 mm	54 - 179 mun	2.6-53 mm 0.06-25 mm	0.0005 - 0 05 mm
		SUBSTRATE		 Bedrock, Ledge 	2, Boulder a 3. Rock	4. Rubble -	5. Gravel	7. Fines
		CHANNEL TYPE		1. Main (if measuryment refers to main area of river)	 2. Side Channel (water diverted by inhands) 	 3. Split (if river la split into various different stream types) 	* 4. Bogan	"Speedsy Left (L), Right (R) or Middle (M)
				22. Wood Debria	23 Mart-Made Dam	24. Natural Deadwater		
			POOLS	16 Eddy	19. Gablon	20 Log Structure	21. Road Crossing	
	AM TYPE		POC	14. French	15. Plunge	16,	17. Bogan	
	STREAM TYPE		10 Midchannel	11. Convergence	12. Lateral	13. Beaver	2	
			FASTWATER	A. Shaet (Indge)	7. Chute	8. Run	9. Rapid	
			FAST	1. Falls	2 Cascade	3. RIffle (GR/RB)	4. Riffie (B/B)	5. RHDe (Sand)

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	WRU-	LENCE												
	% FINE													
LOUL INL	MEAN SUBSTRATE	512.E (cm)				5	×					27	0	
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RATING	(CRITERIA ON OTHER SIDE	NO	1										CO	01)
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	_	EL Wet	S	5	2									
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		C (0 - 50%) ERODINC			1									I
		RICHT BANK (0-50%) BARE BARE ERG										ļ	ENG	(3m)
ŝ	EROSION (%)	STABLE								а 1			COEFFICIENT	(0.9 - SMODTH) (0.6 - ROUGH)
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ANKS		LETT BANK (0 - 50%)			1								strukte	METERS (m)
STREAM BANKS		STABLE S									-		AVERAGE DEFTH SUM/4	-
	-	TREES	\bigcirc	\cap	0								AVER	CENTIMETERS (cm)
	(9)	SHRURS TI	S S	10										WWAY C
	VEGETATION (%)	GRASSES SH	9	90 ²	905								DEPTH (cm)	-
	>	BARE GROUND GI	5 8	5	5					×			DEP	WAY NAY
-	SHADE		0	0	0				÷.					
		PDOLS		1	1								AM	(B)
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	SITE	(50m - Interval)												NO.
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A (CMS) * W [m0]X D [m1]X X [m1]A x [] [m2] Where: W = width, D = depth, L = length, A is coefficient for the stres

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APPENDIX 1

FISH HABITAT SURVEY FORMS

DNR / DFO - NEW BRUNSWICK

of	X	CHECKLIST OF LAND USE ATTRIBUTES (COMMENIS)	1. ACTIVE BEAVER DAM 2. INACTIVE BEAVER DAM	3. WOOIY DEBRIS (OBSTRUCTION) 4. MAN-MADE DAM OBSTRUCTION 5. KOCK DAM (SWIMMING POOL) 5. BRAIDID STREAM CHANNELS 7. OBSTRUCTION IN STREAM	8. ROAD FORD POLLUTION CAUSED BY: 9. POOD PROCESSING INDUSTRY	10 FOREST INDUSTRY 11. CAMPSTES OR RESIDENTIAL 12. MINNG 13. LITTER 14. OL	15. ACRICULTURE WASTE 16. HEALTH HAZARD 11. PEALER CONTROL PEALEM STOCE	18. SELECTIVE CUT 19. BUFFER STRIP PRESENT	20. CATTLE CROSSING 21. EROSION FROM AGRICULTURE 22. SUSPENDED SILT NOTED	23. UNUSUAL STREAM SCOURING 23. LARGE BEDLOAD DERGST 24. LARAR EQUINON - MODERATT 25. RANK EQUSION - RECESSIVE 27. STREAM DREDGING/RULLIDOZING	28, CRAVEL REMOVAL 29, CHANNELZATION (RIPRAP, ETC) 30, STREAM DIVERSION	31, WATER WITHDRAWAL 32, RECULATED STREAM FLOW 33, CAMPOLTAGE PRESENT 24 DECIDENTAL A DE 5	35, ACCESS - ATV'S 36, ACCESS - TRAILS 36, ACCESS - TRUK/CAR 30, ACCESS - TRUK/CAR 30, ACCESS - MIAT	39. ROAD CROSSING (BRIDGE) 40. ROAD CROSSING (CULVER'T)	41. BUATLANDING	42, ORGANIC LITTER 63, AQUATIC PLANTS ABUNDANT
		COMMENTS		-					-							
		EMBEDDEDNESS (CRITERIA) 1. < 2144,	PN (r)	N/A	N/A	N/À										
= 00 00 00 00 00		- SMO12	TYPE FLOW TIME TEMPACY	0 NTA	· \ \ 0											
Drainage Code:	Drainage Name: 716	LARGE WOODY DEBRIS	N	oz	Q	0	-									
NICK	Drainage	0 - 50 % DVERHANGING VEGETATION	2	3530 201	30 30	30 30	1.									
DNR / DFO - NEW BRUNSWICK SFREAM HABITAT INVENTORY		0-50 % UNDERCUT	L R	X Z	N/A	- th/N							_			
/ DFO - N		AVG DEPTH WET	E.	R	25	25										
DNR			FINES	<u>8</u>	00	2001										
End Point:	GIS Map No.		SAND	N	-			_		1.1						
ظ ا	GIS N	<u>ب</u>	GRAVEL					-								
1		SUBSTRATE (%)	RUBBLE													
	0		ER ROCK					+	_		_	_	_		-	_
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Star	Date:	LENGTH	MEL	N.C.	No.	S (B)		+	_				-			-
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7	unel:	CINIT CINITI							3			_			_	
04-98 River	No. Personnel: No.	REACH	2	4	R	3										
												6				

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SERVED	(abis store	W OF POOLS IN SITE	a-230%	· b = ≥ 10 to 30% c = < 10%		a - 2 50% b - < 50%		
44. GOOD SFAWNING 45. GOOD NURSERY 46. ATLANTIC SALMON ORSERVED 47. BROOK TEOUT OBSERVED	POOL RATING (revenue side)	CKITERIA NO.	POOL DEPTH 215m	1 - Instream Cover > 30% 2 - Instream Cover < 30%		POOL DEFTH 5-15m 3. Instrum cover 5-30%	4 - Instream Cover > 30%	
		FLOW LYPE		1. Survey stream	2. Spring	 Brook / River Tributary 	4. Spring Seep	
		SUBSTRATE		> 461 mm 180 - 460 mm	54 - 179 mm	2.6 - 53 mm 0.06 - 2.5 mm	0.0005 - 0.05 mm	
		solos	 Bedrock, Ledge 	2, Boulder = 3. Rock =	4. Rubble =	5. Gravel = 6. Sand =	7. Funes	
	Longer Hans, and had in a 1 Party	CHANNEL IYE	1. Main (if measurement refers to main arms of fiver)	 2. Side Channel (water diverted by islands) 	 3. Split (if river is split into various different stream types) 	- 4. Bogan	"Specify Left (1), Right (R.) or Middle (M)	
			22. Wood Dabras	23. Man-Made Dam	26. Natural Deadwater			
		POOLS	18. Eddy	197 Gabion	20. Log Structure	ZI. Road Croaring		
	STREAM TYPE	POC	14. Trench	15. Plunge	16.	17. Bogan		
2	STREA	*	10. Midchannel	11. Солуенденсе	12. Lateral	13. Boaver		
		FASTWATER	6. Sheer (ledge)	7. Chute	B. Run	9. Rapid		
		FASTW	L. Fulls	2 Concade	3. Riffle (CR/EB)	4. RIEDe (R/B)	S. RHDs (Sand)	

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TURBU-LENCE Mather Budlity C 19-98 C 105 0.075 9/2 0.105 M5/cm 105 0.075 9/2 24.406 64.42.02 % FINE MEAN SUBSTRATE SLZE (cm) POOL TAIL EMBEDDEDNESS ICRITERIAI 1: ≤ 20% 2: 20% - 35% 3: 35% - 50% 4: ≥ 50% COMMENTS (I OCATION) NO. LETTER POOL RATING (CRITERIA ON OTHER SIDEL MN 22' 12' 02' 02' 20,20 22 21 21 22 N/A fill 22, 20, 20, 20, 20, 21, 22, N/4 CHANNEL 3/4 (m) Wet CHANNEL NITH (m) % Wet AVERAGE CHANNEL to: [201 / 10] 218 (45 3 °0 pt. Wc (m) ½ % WAY FLOAT TIME (sec) Wet YAW 2 Hd S (Vam) YAW 1/1 ERODINK STABLE BARE ERODING RIGHT BANK (0-50%) (mg) (0.9 - 5MOOTH) (0.8 - ROUGH) COEFFICIENT EROSION (%) STABLE BARE ERC CENTIMETERS (cm) METERS (m) NVA NA NAN AVERAGE DEFTH SUMM STREAM BANKS X 12 21 TREES 17 2 SHRUBS YAW % S VEGETATION (%) HA IN GRASSES 20 E4 DEPTH (cm) VAW A BARE GROUND V4 WAY S SHADE (%) 60 N A 50 WET WTDTH (m) RIFFLEY POOLS RUN X Z F/N % SITE STREAM SITE (50m -Interval) UNIT NO REACH NO. REACH NC. 7 7 ∇

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