

---

<b>To:</b> Barry Turcotte Public Works Superintendent The Corporation of the Municipality of Temagami	<b>From:</b> Casandra DeForge Junior Environmental Scientist
<b>Re:</b> 2017 Strathy Landfill Surface Water Monitoring Program	<b>Date:</b> 31 May 2018 <b>Proj No:</b> 048-17-03

---

## **1 Introduction**

Story Environmental Inc. (“SEI”) has prepared the following memo for the 2017 Surface Water Monitoring Program for The Corporation of the Municipality of Temagami (“Temagami”) Strathy Landfill Site (“Site”). SEI was retained by Temagami to complete a surface water monitoring program at the Site in 2017.

## **2 Site Location**

The Site is located approximately 5 kilometers (“km”) west off of Highway 11. A map showing the Site location, Figure 2.1 is attached.

## **3 Methodology**

Site reconnaissance took place on 10 July 2017 to determine sample locations, two sample locations were established and sampled for general chemistry, metals, ammonia, nutrients, hardness, and alkalinity. Sample locations are illustrated in Figure 3.1, attached. The second monitoring event was completed at the same time as Temagami’s landfill monitoring programs for the Briggs and Sisk landfill sites on 5 October 2017.

The surface water samples were collected as single grab samples, with a triple rinsed 4 litre (“L”) beaker ensuring not to disturb sediments. SW2 was collected from the western side of a small pond at the northern section of the Site and SW1 was collected from a small stream to the southeast of the Site.

A YSI ProfessionalPlus multi-parameter meter was used to obtain field chemistry at both sample locations by placing the YSI directly into the stream and pond. The temperature, dissolved oxygen, and conductivity were recorded on a field sheet and the laboratory supplied sample bottles were filled using the water collected in the 4 L beaker and placed in a chilled cooler. The samples were then sent to an accredited laboratory for analysis.

Quality Assurance and Quality Control (“QA/QC”) was completed in the form of a blind field duplicate during the October sampling event at Briggs and Sisk landfills and therefore QA/QC was not completed at this site.

#### 4 Surface Water Monitoring Results

Two surface water samples were collected in both July and October of 2017. Analytical results for SW1 and SW2 for 2017 are provided in Table 4.1 and Table 4.2, attached. SEI compared the results to Provincial Water Quality Objectives ("PWQO"). For both SW1 and SW2 sites, boron and manganese concentrations from the July and October monitoring events were above PWQO. Without an established background of the surface water at this Site, it is difficult to determine if the elevated levels of boron and manganese concentrations are caused by landfill impacts or are naturally occurring. The laboratory Certificates of Analysis for SW1 and SW2 samples are provided in the Attachments.

#### 5 Conclusions

SW1 and SW2 sample locations had concentrations of boron and manganese above PWQO. Further monitoring is required at this Site to determine if the landfill is having an impact on the surface water. A background sample location should be established for comparison.

Prepared by:



---

Casandra DeForge, BSc  
Junior Environmental Scientist

Reviewed by:

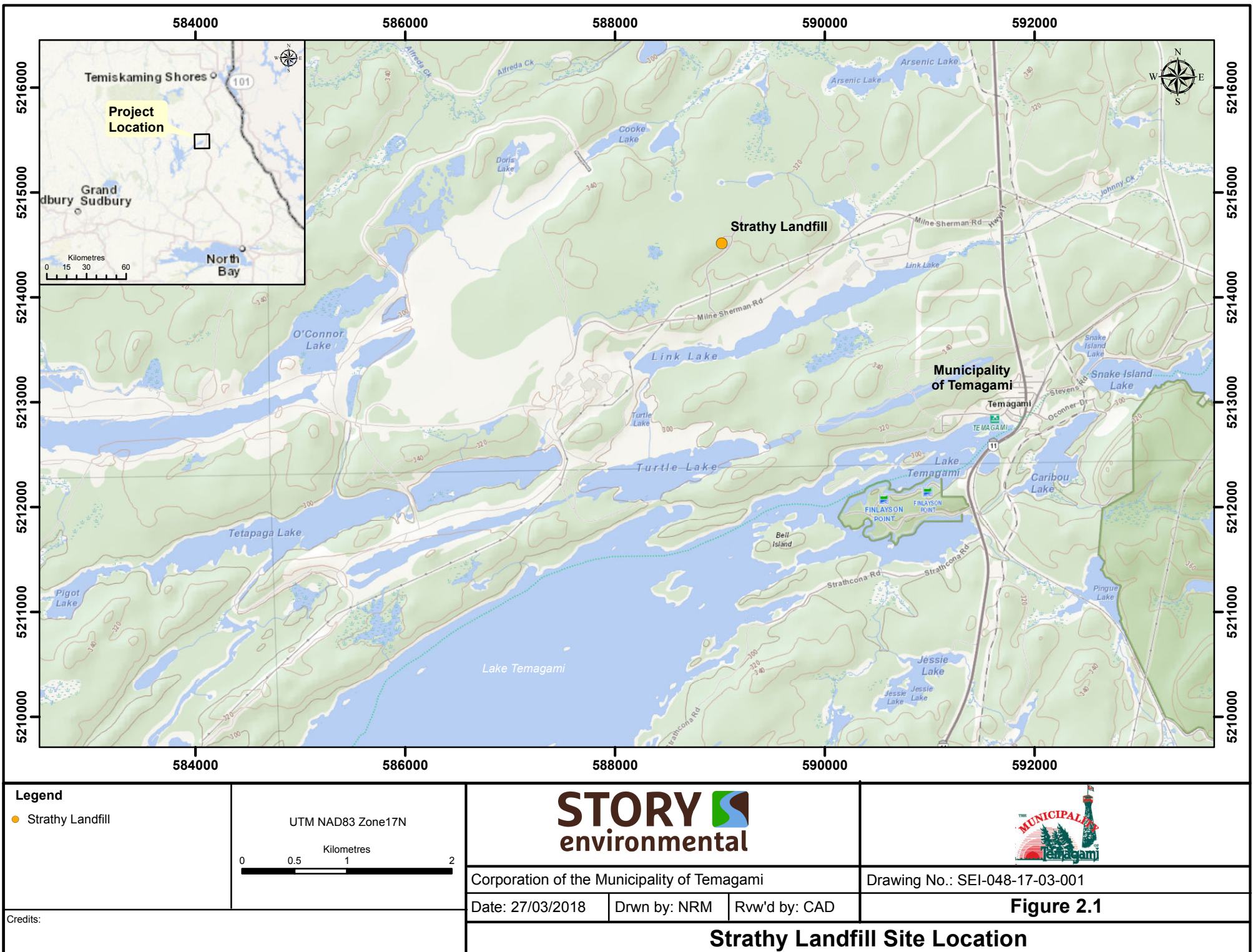


---

Maria Story, P.Eng.  
President**Attachments:**


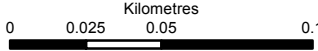


Figure 2.1	Strathy Landfill Site Location
Figure 3.1	Strathy Landfill Monitoring Locations
Table 4.1	Surface Water Monitoring Results for SW1
Table 4.2	Surface Water Monitoring Results for SW2

**Attachments**







<b>Legend</b>  Surface Water Sampling Locations	UTM NAD83 Zone17N 				
Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community		Corporation of the Municipality of Temagami Date: 27/03/2018	Drwn by: NRM	Rvw'd by: CAD	Drawing No.: SEI-048-17-03-002 <b>Figure 3.1</b>
<b>Strathy Landfill Monitoring Locations</b>					

**Table 4.1 Surface Water Monitoring Results for SW1**

Parameter	Units	PWQO	SW1	
			Jul-17	Oct-17
Field pH	standard units	6.5 to 8.5	7.3	7.4
Field Temperature	degrees celcius		17.8	11.9
Field Conductivity	uS/cm		333	408
Field Dissolved Oxygen	mg/L	5 to 8 <sup>2</sup>	5.33	7.74
Alkalinity (Total as CaCO <sub>3</sub> )	mg/L	<sup>3</sup>	140	180
Dissolved Chloride (Cl)	mg/L		8.2	13
Dissolved Organic Carbon	mg/L		11	9.6
Dissolved Sulphate (SO <sub>4</sub> )	mg/L		16	11
Hardness (CaCO <sub>3</sub> )	mg/L		150	190
Nitrate (N)	mg/L		0.2	0.2
Nitrite (N)	mg/L		<0.01	<0.01
Nitrate + Nitrite (N)	mg/L		0.2	0.2
Total Ammonia-N	mg/L		0.16	0.06
Total Dissolved Solids	mg/L		174	275
Total Kjeldahl Nitrogen (TKN)	mg/L		0.6	0.4
Total Phosphorus	mg/L	0.03	<0.02	<0.02
Total Aluminum (Al)	mg/L	0.075 <sup>4</sup>	0.018	0.071
Total Arsenic (As)	mg/L	0.005	0.001	0.002
Total Barium (Ba)	mg/L		0.018	0.024
Total Boron (B)	mg/L	0.2	0.24	0.27
Total Cadmium (Cd)	mg/L	0.0005	<0.0001	<0.0001
Total Calcium (Ca)	mg/L		45	51
Total Chromium (Cr)	mg/L	0.0089 <sup>5</sup>	<0.005	<0.005
Total Cobalt (Co)	mg/L	0.0009	0.0006	0.001
Total Copper (Cu)	mg/L	0.005	0.002	0.001
Total Iron (Fe)	mg/L	0.3	0.3	1.4
Total Lead (Pb)	mg/L	0.005	<0.0005	<0.0005
Total Magnesium (Mg)	mg/L		8.1	10.0
Total Manganese (Mn)	mg/L	0.001	1.1	3.0
Total Selenium (Se)	mg/L	0.1	<0.002	<0.002
Total Sodium (Na)	mg/L		11	15
Total Strontium (Sr)	mg/L		0.11	0.13
Total Vanadium (V)	mg/L		<0.0005	<0.0005
Total Zinc (Zn)	mg/L	0.03	<0.005	<0.005

**Notes:**

All units are mg/L unless noted otherwise; blank cells indicate that no data are available

1) PWQO = "Provincial Water Quality Objective". If both a PWQO and an Interim PWQO exist, the Interim PWQO was used for comparison purposes.

2) For cold water biota, Dissolved Oxygen Concentrations should not be less than: 8 mg/L at 0°C; 7 mg/L at 5°C; 6 mg/L at 10-15°C; and 5 mg/L at 20°C or warmer.

3) Alkalinity should not be decreased by more than 25% below the natural concentration.

4) Interim Provincial Water Quality Objective in clay-free samples, at pH>6.5 to 9.0.

5) PWQO for trivalent chromium, not hexavalent chromium.

Exceedances of PWQOs are highlighted in shaded cells.

**Table 4.2 Surface Water Monitoring Results for SW2**

Parameter	Units	PWQO	SW2	
			Jul-17	Oct-17
Field pH	standard units	6.5 to 8.5	8.2	7.6
Field Temperature	degrees celcius		26.5	14.5
Field Conductivity	uS/cm		256	304
Field Dissolved Oxygen	mg/L	5 to 8 <sup>2</sup>	8.65	6.77
Alkalinity (Total as CaCO <sub>3</sub> )	mg/L	<sup>3</sup>	110	140
Dissolved Chloride (Cl)	mg/L		<1.0	2.2
Dissolved Organic Carbon	mg/L		9	8.6
Dissolved Sulphate (SO <sub>4</sub> )	mg/L		23	20
Hardness (CaCO <sub>3</sub> )	mg/L		130	160
Nitrate (N)	mg/L		<0.10	<0.10
Nitrite (N)	mg/L		<0.01	<0.01
Nitrate + Nitrite (N)	mg/L		<0.10	<0.10
Total Ammonia-N	mg/L		<0.05	<0.05
Total Dissolved Solids	mg/L		164	240
Total Kjeldahl Nitrogen (TKN)	mg/L		0.4	0.4
Total Phosphorus	mg/L	0.03	<0.02	<0.02
Total Aluminum (Al)	mg/L	0.075 <sup>4</sup>	0.035	0.010
Total Arsenic (As)	mg/L	0.005	0.001	0.001
Total Barium (Ba)	mg/L		0.008	0.011
Total Boron (B)	mg/L	0.2	0.24	0.37
Total Cadmium (Cd)	mg/L	0.0005	<0.0001	<0.0001
Total Calcium (Ca)	mg/L		40	46
Total Chromium (Cr)	mg/L	0.0089 <sup>5</sup>	<0.005	<0.005
Total Cobalt (Co)	mg/L	0.0009	<0.0005	<0.0005
Total Copper (Cu)	mg/L	0.005	0.002	0.001
Total Iron (Fe)	mg/L	0.3	<0.10	<0.10
Total Lead (Pb)	mg/L	0.005	<0.0005	<0.0005
Total Magnesium (Mg)	mg/L		6.9	7.7
Total Manganese (Mn)	mg/L	0.001	0.026	0.033
Total Selenium (Se)	mg/L	0.1	<0.002	<0.002
Total Sodium (Na)	mg/L		2.8	4.2
Total Strontium (Sr)	mg/L		0.13	0.15
Total Vanadium (V)	mg/L		<0.0005	<0.0005
Total Zinc (Zn)	mg/L	0.03	<0.005	<0.005

**Notes:**

All units are mg/L unless noted otherwise; blank cells indicate that no data are available

1) PWQO = "Provincial Water Quality Objective". If both a PWQO and an Interim PWQO exist, the Interim PWQO was used for comparison purposes.  
mg/L at 20°C or warmer.

3) Alkalinity should not be decreased by more than 25% below the natural concentration.

4) Interim Provincial Water Quality Objective in clay-free samples, at pH>6.5 to 9.0.

5) PWQO for trivalent chromium, not hexavalent chromium.

Exceedances of PWQOs are highlighted in shaded cells.