

DATE March 26, 2014**PROJECT No.** 13-1122-0120**TO** Martin Bouwma
PWGSC**FROM** Stefano Marconetto**EMAIL** Stefano_Marconetto@golder.com**THUNDER BAY INTERNATIONAL AIRPORT FIREFIGHTING TRAINING AREA (FTA)
DESCRIPTION OF WASTE AND DEBRIS FOR REMOVAL AT ABANDONED DUMP SITE**

Golder Associates Ltd. (Golder) is pleased to provide Public Works and Government Services Canada (PWGSC) with the following technical memorandum which describes the nature and extent of waste observed during the field work activities conducted in August 2013 at the Thunder Bay International Airport, at the current and former firefighting training area (FTA and FFTA) shown on Figure 1.

During the site visit of August 7th and the field work activities carried out between August 19th and August 30th, debris was observed in the vegetated area located northwest of the fence and the FFTA. The debris visible at ground surface only represented an area of approximately 500 to 800 m² in size, located along a northwest facing slope which appeared to vary from 40 to 60 degrees from the horizontal, likely due to the accumulation of more debris in certain areas. The approximate limits of the debris observed at ground surface in August 2013, labeled as the abandoned dump site are shown on Figure 2.

The waste materials observed at the abandoned dump site consisted of empty metal drums of varying sizes (mainly 20 L pails). Based on the labels, the drums were designed to contain fire extinguishing agents, lubricants and oils: a description of the types of chemicals and products listed on the drums found at the site is provided in the table below. Other debris observed consisted of glass light fixtures, a portion of a metal culvert, metal strapping and wire, pieces of metal appliances (dryer and stove), wood and metal snow fencing, railway ties, concrete, plastic, and some rubber tires.

This debris is visible along the slope and at the base of the slope, near monitoring wells MW11-07 and MW11-06S/D. Limited amounts of debris and waste are present at the top of the slope. The largest pieces of debris consisting of parts of metal appliances and a portion of a culvert are located at the base of the slope. Additional photographs are provided in Attachment A.

Individual, empty orange steel drums labelled "liquid foam concentrate" (pictured below) which were observed at the dump site were also found partially buried and sporadically placed between MW11-06D/S and MW11-04.

On August 29, 2013, broken asphalt overgrown with vegetation was observed in the area northwest of MW11-02, within 10 metres of this monitoring well.



Table 1: Description of metal drums observed within the abandoned dump site

Product Name	Comment	
Deere and Company, Hy-GARD hydraulic oil	Patented in 1976 and renewed in 2006.	
Foam liquid concentrate, protein-based fire extinguishing chemicals, standard 28-GP-28A	Standard 28-GP-28A was published in 1977 by the Canadian General Standards Board. This standard was reportedly cancelled in 1999.	

Product Name	Comment	
<p>Potassium chloride dry chemical fire extinguishing agent, standard 28-GP-73(M)</p>	<p>This standard for fire extinguishing agents was previously registered with the Standards Council of Canada and its status now appears as "withdrawn" – published in 1975 then superseded by 28-GP-73 (M) which was canceled in June 1989 and replaced by CAN/ULC-S514-M88.</p>	

Product Name	Comment	
Phillips brand industrial oils, finishes for machined parts	Phillips merged with Conoco in 2002. The label on this drum only indicates the Phillips brand and may have been produced prior to the ConocoPhillips merge.	

The lateral extent and depth of the waste footprint within the abandoned dump site was investigated by the advancement of boreholes and shallow hand-dug test pits.

Evidence of waste materials was observed at depth in boreholes 13-01 to 13-03, which were advanced along the slope, within the visible waste footprint (Figure 2). The maximum depth to which waste and fill materials were observed was 3.2 mbgs at borehole BH13-01. The depth of waste and fill materials observed in BH13-02 and 13-03 was 0.91 mbgs and 0.2 mbgs, respectively. Borehole BH13-01 is located along the slope, where a portion of the waste on the slope has appeared to slump down or was pushed downslope, forming a relatively flat area, along the slope, and this may account for the thicker accumulation of waste and fill or re-worked materials. The trees growing in this area, downslope of borehole BH13-01, appear to be growing around the debris which has slumped down the slope. The fill material recovered from boreholes BH13-01 to BH13-03 within the waste footprint consisted of silty sand intermixed with roots, wood, ash and a granular blue/green/white synthetic material. The nature and depth of soil materials observed in the shallow test-pits advanced next to boreholes BH13-01 to BH13-03 were similar to the observations reported for these boreholes. In addition, fragments of metal, glass and plastics were noted in the shallow test pits. Based on the results of the waste characterization analysis on soil samples recovered from boreholes and test pits advanced within the waste footprint, the soil fill within the abandoned dump site is considered non-hazardous under Ontario Regulation 347 Waste Management, Environmental Protection Act, R.R.O. 1990 (Table 1).

No evidence of buried waste was observed during the advancement of boreholes 13-04 to 13-06, which are located at the top of the slope, outside of the southeast margin of the waste footprint visible at ground surface.

Limitations

The memorandum, which specifically includes figures and attachments, is based on data and information collected during the site assessment activities described herein, and is based solely on the conditions of the property at the time of the investigation, supplemented by information and data obtained by Golder Associates Ltd. as described in this memo. Any use which a third party makes of this report, or any reliance on, or decisions to be made based on it, are the responsibilities of such third parties. Golder accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

The content of this memorandum is based on information collected during the site visit, drilling and soil sampling activities, our present understanding of the site conditions, and our professional judgement in light of such information at the time of this memorandum. The site conditions between sampling locations have been inferred based on conditions observed at the sampling locations. Conditions may vary from these sample locations. Additional study, including further investigation, can reduce the inherent uncertainties associated with this type of study. However, it is never possible, even with exhaustive sampling and testing, to dismiss the possibility that part of a site may be contaminated or that additional waste or debris may exist at the site and remain undetected.

The services performed as described in this memorandum were conducted in a manner consistent with that level of care and skill normally exercised by other members of the engineering and science professions currently practicing under similar conditions, subject to the time limits and financial and physical constraints applicable to the services.

This report provides a professional opinion and therefore no warranty is expressed, implied, or made as to the conclusions, advice and recommendations offered in this report. This report does not provide a legal opinion regarding compliance with applicable laws.

The findings and conclusions of this memorandum are valid only as of the date of this document. If new information is discovered in future work, including excavations, borings, or other studies, Golder Associates Ltd. should be requested to re-evaluate the conclusions of this memorandum, and to provide amendments as required.

Closure

We trust the above meets with your current requirements. Should you have any comments, questions, or require additional information, please do not hesitate to contact the undersigned.



Stefano Marconetto, P.Eng.
Environmental Engineer



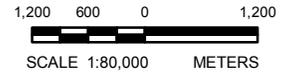
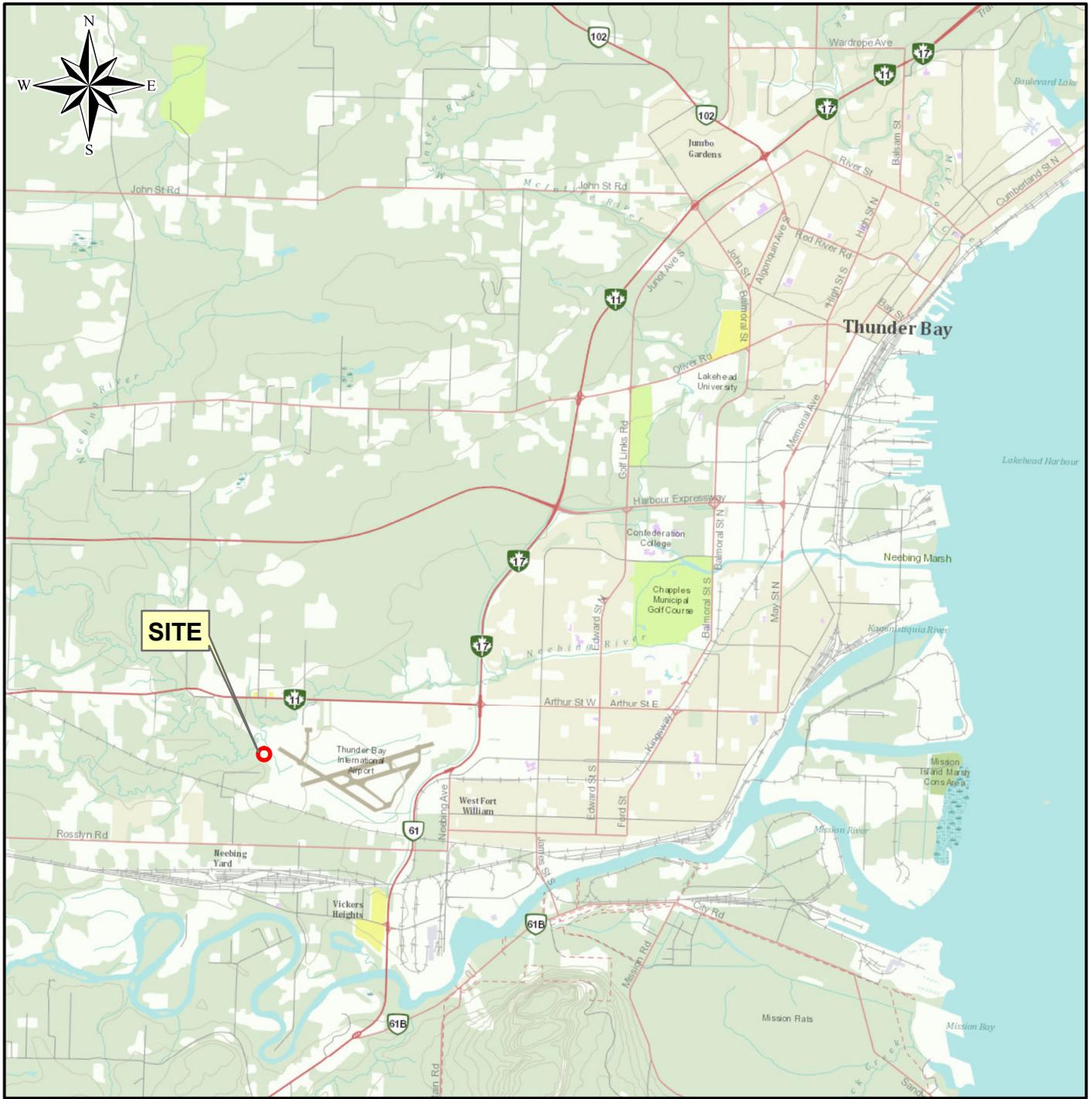
Eric Wilson, P.Eng., PMP
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NM/SM/TDR/EDW/hw

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Attachments: Figure 1 – Key Plan
Figure 2 – Site Plan
Table 1 – Leachate Quality of Soil in Waste Footprint
Attachment A – Site Photographs

Path: N:\Active\2013\1122 - Contaminated Lands\13-1122-0120 PWGSC ESA-RA Thunder Bay Airport\Spatial\IMMXDs\Reporting\Phase 1000\1311220120-1000-01.mxd



NOTE

THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LTD. PROJECT No. 13-1122-0120/1000.

REFERENCE

SERVICE LAYER CREDITS: SOURCES: ESRI, DELORME, NAVTEQ, TOMTOM, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), AND THE GIS USER COMMUNITY.
 DATUM: NAD 83, COORDINATE SYSTEM: UTM ZONE 16

	DATE	March 2014	TITLE	<h1 style="text-align: center;">KEY PLAN</h1>		
	DESIGN	SM				
	GIS	BR				
PROJECT No.	13-1122-0120	CHECK	NM	PROJECT FTA AT THUNDER BAY INTERNATIONAL AIRPORT THUNDER BAY, ONTARIO		
SCALE	AS SHOWN	REV.	0		REVIEW	EDW



LEGEND

- BOREHOLE LOCATION (DEPTH 1.2 mbgs)
- BOREHOLE LOCATION (DEPTH 1.8 mbgs)
- BOREHOLE LOCATION (DEPTH 3.7 mbgs)
- BOREHOLE/MONITORING WELL LOCATION (LOWER UNIT)
- BOREHOLE/MONITORING WELL LOCATION (UPPER UNIT)
- SEDIMENT AND SURFACE WATER SAMPLING LOCATION
- PREVIOUS BOREHOLE/MONITORING WELL LOCATION (NOT LOCATED)
- PREVIOUS MONITORING WELL LOCATION (LOCATED IN AUGUST 2013)
- APPROXIMATE LOCATION OF EMPTY 20 LITRE METAL PAIL (OBSERVED ON AUGUST 7, 2013)
- FENCE LINE
- FUEL LINES FROM AST TO FTA
- APPROXIMATE EXTENT OF ABANDONED DUMP SITE (OBSERVED ON AUGUST 7, 2013)
- CURRENT FTA



NOTE

1. DEPTHS ARE APPROXIMATE
2. mbgs: METRES BELOW GROUND SURFACE
3. THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LTD. REPORT NO. 13-1122-0120/1000.

REFERENCE

GOOGLE EARTH PRO, APRIL 21, 2010.
 AIRPORT BOUNDARY AND CONTOUR LINES FROM CADD FILE PROVIDED BY PUBLIC WORKS AND GOVERNMENT SERVICES CANADA, GEOMATICS SERVICES, TORONTO, ONTARIO, JULY 17, 2013.
 PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 16

PROJECT
**FTA AT THUNDER BAY INTERNATIONAL AIRPORT
 THUNDER BAY, ONTARIO**

TITLE
SITE PLAN

<p>Golder Associates Ottawa, Ontario</p>	PROJECT No. 13-1122-0120			SCALE AS SHOWN	REV. 0.0
	DESIGN	SM	Sept. 2013	<p>FIGURE 2</p>	
	GIS	BR/JEM	Sept. 2013		
	CHECK	NM	March 2014		
	REVIEW	EDW	March 2014		



Parameter	Unit	(2) (1) O.Reg 347	TP13-01	TP13-02	TP13-03
			27-Aug-2013	27-Aug-2013	27-Aug-2013
			TP13-1#1	TP13-2 #1	TP13-3#1
General Chemistry					
Fraction Organic Carbon	g/g	--	0.050	--	--
Moisture, Percent	%	--	--	--	--
pH	pH units	--	6.90	--	--
Total Organic Carbon	mg/kg	--	50000	--	--
Metals					
Arsenic	mg/l	2.5	<0.2	<0.2	<0.2
Barium	mg/l	100	0.5	0.6	<0.2
Boron	mg/l	500	0.3	0.2	<0.1
Cadmium	mg/l	0.5	0.08	0.12	<0.05
Chromium	mg/l	5	<0.1	<0.1	<0.1
Lead	mg/l	5	0.2	0.4	<0.1
Mercury	mg/l	0.1	<0.001	<0.001	<0.001
Selenium	mg/l	1	<0.1	<0.1	<0.1
Silver	mg/l	5	<0.01	<0.01	<0.01
Semi-VOCs					
1-Methylnaphthalene	ug/l	--	<0.2	<0.2	<0.2
2-Methylnaphthalene	ug/l	--	<0.2	<0.2	<0.2
Acenaphthene	ug/l	--	<0.2	<0.2	0.7
Acenaphthylene	ug/l	--	<0.2	<0.2	<0.2
Anthracene	ug/l	--	<0.2	<0.2	0.3
Benzo [b,j] fluoranthene	ug/l	--	<0.2	<0.2	<0.2
Benzo[a]anthracene	ug/l	--	<0.2	<0.2	<0.2
Benzo[a]pyrene	mg/l	0.001	<0.00004	<0.00004	<0.00004
Benzo[g,h,i]perylene	ug/l	--	<0.4	<0.4	<0.4
Benzo[k]fluoranthene	ug/l	--	<0.2	<0.2	<0.2
Chrysene	ug/l	--	<0.2	<0.2	<0.2
Dibenzo[a,h]anthracene	ug/l	--	<0.4	<0.4	<0.4
Fluoranthene	ug/l	--	<0.2	<0.2	0.2
Fluorene	ug/l	--	<0.2	<0.2	0.5
Indeno[1,2,3-cd]pyrene	ug/l	--	<0.4	<0.4	<0.4
Naphthalene	ug/l	--	0.3	<0.2	0.3
Phenanthrene	ug/l	--	0.6	<0.2	1.3
Pyrene	ug/l	--	<0.2	<0.2	<0.2
VOCs					
1,1-Dichloroethylene	mg/l	1.4	<0.020	<0.020	<0.020
1,2-Dichlorobenzene	mg/l	20	<0.050	<0.050	<0.050
1,2-Dichloroethane	mg/l	0.5	<0.050	<0.050	<0.050
1,4-Dichlorobenzene	mg/l	0.5	<0.050	<0.050	<0.050
Methyl Ethyl Ketone	mg/l	200	<1.0	<1.0	<1.0
Benzene	mg/l	0.5	<0.020	<0.020	<0.020
Carbon Tetrachloride	mg/l	0.5	<0.020	<0.020	<0.020
Chlorobenzene	mg/l	8	<0.020	<0.020	<0.020
Chloroform	mg/l	10	<0.020	<0.020	<0.020
Methylene Chloride	mg/l	5	<0.20	<0.20	<0.20
Tetrachloroethylene	mg/l	3	<0.020	<0.020	<0.020
Trichloroethene	mg/l	5	<0.020	<0.020	<0.020
Vinyl Chloride	mg/l	0.2	<0.020	<0.020	<0.020

Footnotes:

Tables should be read in conjunction with the accompanying document.

< value = Indicates parameter not detected above laboratory method detection limit.

> value = Indicates parameter detected above equipment analytical range.

-- Chemical not analyzed or criteria not defined.

Grey background indicates exceedances.

(1) O.Reg 347 Standards for leachate toxic soils

(2) Bold Font = Parameter concentration greater than O.Reg 347



ATTACHMENT A – SITE PHOTOGRAPHS



Photograph 1: View of culvert at the base of the slope and the abandoned dump site with monitoring wells MW11-06S/D in the foreground.



Photograph 2: Metal drum and parts of a washer and dryer at the base of the slope and the abandoned dump site, with monitoring well MW11-07 visible in the foreground.



Photograph 3: Metal and wood fencing located along the slope, within the abandoned dump site.



Photograph 4: Portion of the metal culvert visible with trees growing around the waste located along the slope.



Photograph 5: Orange drums previously containing fire extinguishing agents (liquid foam concentrate) which were observed in the main abandoned dump site. Up to 5 of these drums were also observed sporadically along an overgrown path between monitoring wells MW11-06D/S and MW11-04.



Photograph 6: Partially buried fragments of asphalt overgrown with vegetation observed in the area northwest of MW11-02, within 10 metres from this monitoring well.