



**SOIL SAMPLING PROGRAM
BUILDINGS 7, 10, 14, 17 AND 18 AAFC
CROPS AND LIVESTOCK RESEARCH CENTRE (CLRC)
440 UNIVERSITY AVENUE
CHARLOTTETOWN, QUEENS COUNTY, PEI
DFRP # 02024**

FINAL REPORT

Submitted to:
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Environmental Services
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Moncton, New Brunswick
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TE131002

EXECUTIVE SUMMARY

AMEC Environment & Infrastructure, a division of AMEC Americas Ltd. (AMEC) has completed a soil sampling program, on behalf of Public Works and Government Services Canada (PWGSC), at the Agriculture and Agri-Food Canada (AAFC) Crops and Livestock Research Centre (CLRC), located at 440 University Avenue, Charlottetown, Prince Edward Island (PEI). This investigation is focused specifically on five buildings located within the CLRC, as follows:

- Building 7 (5 car garage);
- Building 10 (pea viner);
- Building 14 (small equipment storage);
- Building 17 (apple house storage); and
- Building 18 (horticulture building).

AAFC are proposing to demolish the above noted buildings, possibly in 2013/2014. This investigation was intended to identify the presence or absence of soil contamination by lead or mercury in and around the building footprints due to peeling of lead-based paint from the exterior of the buildings.

Soil sampling to address potential concerns related to petroleum hydrocarbons underneath Buildings 7, 10, 14 and 18 was recommended following demolition activities due to health and safety concerns as some of the buildings are in poor condition. Therefore, this issue was not addressed under this contract.

The findings of this report are presented in Table 1.

Table 1 Summary Table of Findings Potential/Actual Areas of Concern

Assessment Findings				Trends and Observations Results of Intrusive Investigations
Source Description	Location	Contaminants of Concern	Media of Concern	
Paint samples from the exterior of the building exceeded guidelines for leachable lead.	Building 7 (5 Car Garage)	Lead	Soil	No exceedances of the Canadian Council of Ministers of the Environment (CCME) Commercial Soil Quality Guidelines (SQG) for lead or mercury in soil were noted.
Previous assessment did not reveal any evidence of contamination.	Building 10 (Pea Viner)	Lead	Soil	Two exceedances of CCME commercial SQG at the drip line were noted for lead. No exceedances of the CCME Commercial SQG for mercury in soil were noted.

Table 1 Summary Table of Findings Potential/Actual Areas of Concern

Assessment Findings				Trends and Observations Results of Intrusive Investigations
Source Description	Location	Contaminants of Concern	Media of Concern	
Lead-based paints were noted on the exterior of the building. No visual evidence of petroleum hydrocarbon impacts was observed.	Building 14 (Small Equipment Storage)	Lead	Soil	Three exceedances of the CCME commercial SQG at the drip line were noted for lead. No exceedances of the CCME Commercial guidelines for mercury in soil were noted.
Lead-based paints were noted on the exterior of the building. Petroleum hydrocarbons and polycyclic aromatic hydrocarbons concentrations in soil were within the applicable guidelines.	Building 17 (Apple House Storage)	Lead	Soil	Three exceedances of the CCME commercial SQG at the drip line were noted for lead. No exceedances of the CCME Commercial guidelines for mercury in soil were noted.
Lead-based paints were noted on the exterior walls of the building. Petroleum hydrocarbons in soil were within the applicable guidelines. Groundwater samples could not be collected during the previous HBMS/Limited Soil Sampling Program. Based on the low levels of hydrocarbons reported in soil at this location, the presence of petroleum hydrocarbons in groundwater at elevated levels was not anticipated to be a cause for concern.	Building 18 (Horticulture Building)	Lead, petroleum hydrocarbons	Soil and groundwater	Three exceedances of the CCME commercial SQG at the drip line were noted for lead. No exceedances of the CCME Commercial guidelines for mercury in soil were noted. The previously installed monitoring wells were dry at the time of sampling hence groundwater samples could not be collected during this assessment.

Soil lead concentrations at Buildings 14, 17, and 18 were below the CCME commercial SQG in samples collected 5 metres (m) from the buildings. Further horizontal delineation is required around Building 10 as well as beneath all five buildings after demolition.

The statements made in this Executive Summary are subject to the same limitations included in Section 4.0 (Closure), and are to be read in conjunction with the remainder of this report.

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1.0 INTRODUCTION

AMEC Environment & Infrastructure, a division of AMEC Americas Ltd. (AMEC), was commissioned by Marcia Johannesen, M.A.Sc., of Public Works and Government Services Canada (PWGSC), to complete a soil sampling program at the Agriculture and Agri-Food Canada (AAFC) Crops and Livestock Research Centre (CLRC), Charlottetown, Prince Edward Island (PEI) (Figure 1). A property plan is available in Figure 2.

AAFC are proposing to demolish five buildings at the CLRC in 2013/2014. Prior to the proposed demolition activities, AAFC requires an assessment of soil conditions in the footprint around each of the buildings.

1.1 Objectives

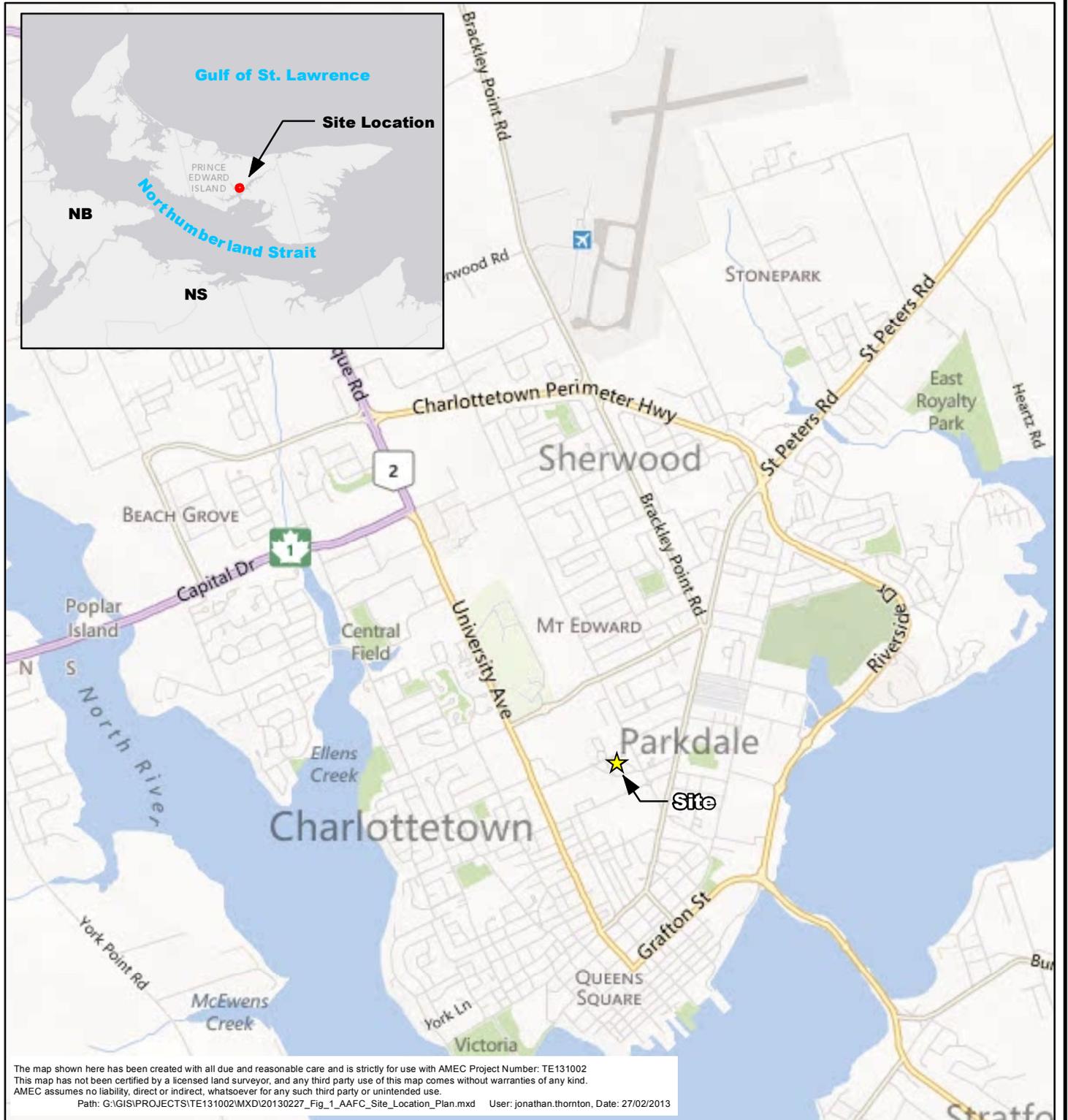
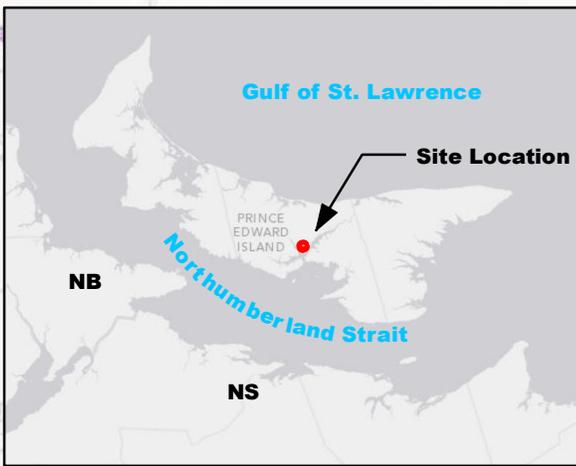
This work had the following general objectives:

- Review of relevant information from historical reports and laboratory results from previous sampling programs carried out at the noted buildings;
- Complete a soil sampling program to assess metals (lead and mercury) in soil in the footprint of and around Buildings 7, 10, 14, 17, and 18;
- Re-sample groundwater monitoring wells (if available) at Building 18 for petroleum hydrocarbon concentrations; and
- Provide a bound report including a discussion of findings, conclusions and recommendations, site drawings, and other attachments as required.

An assessment of the current status of the hazardous building materials in the buildings will be completed by others prior to demolition under a separate contract. Soil sampling to address potential concerns related to petroleum hydrocarbons underneath buildings 7, 10, 14 and 18 was recommended following demolition activities. Due to health and safety concerns (i.e., some of the buildings are in poor condition) intrusive investigations beneath the buildings was not addressed under this contract.

1.2 Assessment Standards

Soil results were compared to the Canadian Council of Ministers of the Environment (CCME) Soil Quality Guidelines (SQG) for the Protection of Environmental and Human Health, commercial land use and coarse soil texture (accessed on-line, last update October 2012). The selection of commercial SQG is consistent with previous reports and is based on the location of the buildings within a commercial area of the site (i.e., main operational area of the CLRC including AAFC facilities). The buildings are not sufficiently close to any agricultural fields such that impacts associated with lead-based paint from the buildings would impact any agricultural areas of the property.



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 Path: G:\GIS\PROJECTS\TE131002\MXD\20130227_Fig_1_AAFC_Site_Location_Plan.mxd User: jonathan.thornton, Date: 27/02/2013

CLIENT: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA		
PROJECT: SOIL SAMPLING PROGRAM AAFC CROPS AND LIVESTOCK RESEARCH CENTRE DFRP# 02024		
TITLE: SITE LOCATION PLAN		
AMEC Environment & Infrastructure A Division of AMEC Americas Ltd. 495 Prospect St, Suite 1 Fredericton, N.B., E3B 9M4 (P) 506-458-1000		
DWN BY:	DATUM:	DATE:
JT	UTM Zone 20	February, 2013
CHK BY:	PROJECTION:	PROJECT No:
TG	NAD83	TE131002
REV NO:	SCALE:	FIGURE:
N/A	1 : 42,000	1

SOURCE: Bing Maps Road
Bing Basemap

Legend

★ Site Location

1,000 500 0 1,000 Metres

Path: G:\GIS\PROJECTS\TE131002\MXD\20130227_Fig_2_AAFC_Building_Location_Plan.mxd User: jonathan.thornton Date: 27/02/2013 SOURCE: http://www.gov.bc.ca/gis/2000_Data_Base



Buildings
7 - Garage (5 Car)
10 - Pea Viner
14 - Small Equipment Storage
17 - Apple House
18 - Horticulture

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PROJECT:	SOIL SAMPLING PROGRAM AAFC CROPS AND LIVESTOCK RESEARCH CENTRE DFRP# 02024			DWN BY:	JT	DATUM:	UTM Zone 20	DATE:	February, 2013
TITLE:	BUILDING LOCATION PLAN			CHK BY:	TG	PROJECTION:	NAD83	PROJECT No:	TE131002
				REV NO:	N/A	SCALE:	1 : 1,200	FIGURE:	2

Legend	
	Building Number
	Property Boundary
	Building

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1.3 Background

1.3.1 Subject Property Description

The CLRC is bordered by Belvedere Avenue to the north, Mount Edward Road to the east, Confederation Trail to the west and Allen Street to the south in Charlottetown, Queens County, PEI and encompasses an area of approximately 63 acres. The site consists of a number of structures including farm buildings associated with agricultural research being carried out at the site as well as administration buildings and agricultural labs. The subject site is presently serviced with municipal water and sewer from the City of Charlottetown with power supplied by Maritime Electric Company, Limited.

This investigation is focused specifically on five buildings located within the CLRC, as follows:

- Building 7 (5 car garage);
- Building 10 (pea viner);
- Building 14 (small equipment storage);
- Building 17 (apple house storage); and
- Building 18 (horticulture building).

AAFC are proposing to demolish the above noted buildings, possibly in 2013/2014. This investigation was intended to identify the presence or absence of soil contamination by lead or mercury in and around the building footprints due to peeling of lead-based paint from the exterior of the buildings.

1.3.2 Summary of Previous Investigations

Hazardous building materials surveys (HBMSs), petroleum hydrocarbon assessments and limited soil sampling programs have been completed at several of the buildings. A summary of environmental information collected during recent environmental assessments include:

- Building 7 (5 car garage) - Paint samples from the exterior of the building exceeded the Transportation of Dangerous Goods Act (TDGA) guidelines for leachable lead.
- Building 10 (Pea Viner) - No evidence of contamination was identified during the assessment by MGI Limited in 2004.
- Building 14 (Small Equipment Storage) - Lead-based paints were noted on the exterior of the building. No visual evidence of petroleum hydrocarbon impacts was observed. It was recommended that soil beneath the slab be assessed for petroleum hydrocarbons following the building demolition.
- Building 17 (Apple House Storage) - Lead-based paints were noted on the exterior of the building. Petroleum hydrocarbons concentrations in soil were within the Atlantic PIRI Tier I criteria and polycyclic aromatic hydrocarbons were within the CCME Soil Quality guidelines for Residential/Parkland and Commercial/Industrial Sites.

- Building 18 (Horticulture Building) - Lead-based paints were noted on the exterior walls of the building. Petroleum hydrocarbons in soil were within the applicable guidelines. Monitoring wells installed to investigate potential petroleum hydrocarbon impacts associated with the former furnace oil underground storage tank (UST) did not recover following purging, therefore, no water could be collected during the previous HBMS/Limited Soil Sampling Program conducted by MGI in 2005. Based on the low levels of hydrocarbons reported in soil at this location, the presence of petroleum hydrocarbons in groundwater at elevated levels was not anticipated to be a cause for concern.

A list of the previous reports reviewed is provided in Section 5.0.

2.0 SUPPLEMENTAL ENVIRONMENTAL SITE INVESTIGATION

2.1 Scope of Work

A soil sampling program was carried out based on the following potential environmental concerns identified in the previous reports provided:

- Potential presence of lead and mercury impacts in soil associated with hazardous building materials; and
- Potential presence of petroleum hydrocarbons in groundwater at Building 18 associated with the former on-site UST.

2.2 Methodology

The surface soil sampling was completed on January 7 and 8, 2013 by Jean-Marc Noel and Chris Bruce from AMEC's Fredericton office.

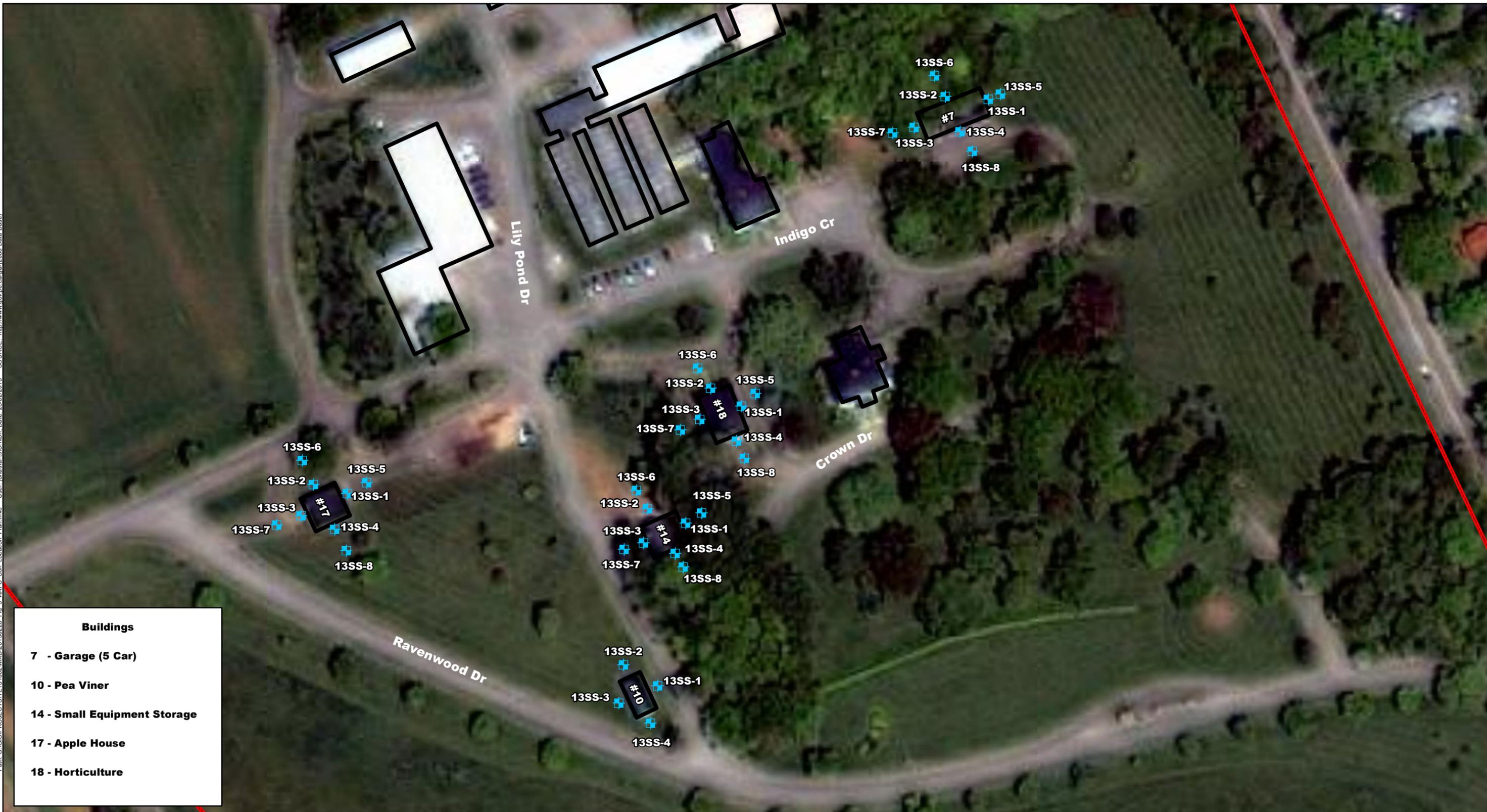
2.2.1 Sampling Program

Surface soil samples (0-0.15 m), were collected at each of the buildings to assess the potential for lead and mercury impacts in soil. In general, a surface soil sample was collected from each side of the building at the drip line and 5 m from the drip line. Nine (9) surface soil samples (including one field duplicate) were collected at the drip line and 5 m from the drip line at each of Buildings 14, 17 and 18. Eight (8) surface soil samples (including one field duplicate) were collected at the drip line and 5 m from the drip line at Building 7. One drip line sample was not available due to asphalt cover at Building 7. Four (4) surface soil samples were collected at the drip line at Building 10. Soil samples were not collected at 5 m from the drip line at Building 10 as no evidence of contamination was noted during the previous assessment. The surface soil samples were collected using a stainless steel hand auger at a depth of 0-0.15 m. The surface soil samples were submitted to Research and Productivity Council (RPC) in Fredericton, NB for analysis of lead and mercury. Field observations for soil are available in Appendix C.

Three monitoring wells (04MW1, 04MW2 and 04MW3) were previously installed at Building 18 (Horticulture Building). On January 8, 2013, the groundwater monitoring wells were located but noted to be dry during the monitoring event. Therefore, the proposed re-sampling of these monitoring wells could not be completed.

A sample location plan is available on Figure 3. Site photos are available on Figure 4 and Appendix A.

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Buildings
7 - Garage (5 Car)
10 - Pea Viner
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PROJECT: SOIL SAMPLING PROGRAM AAFC CROPS AND LIVESTOCK RESEARCH CENTRE DFRP# 02024	DWN BY: JT	DATUM: UTM Zone 20	DATE: February, 2013	
TITLE: SOIL SAMPLE LOCATION PLAN	CHK BY: TG	PROJECTION: NAD83	PROJECT No: TE131002	
	REV NO: N/A	SCALE: 1 : 1000	FIGURE: 3	

Legend

- Building Number
- Soil Sample
- Property Boundary
- Building



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Buildings
7 - Garage (5 Car)
10 - Pea Viner
14 - Small Equipment Storage
17 - Apple House
18 - Horticulture

CLIENT:	PUBLIC WORKS AND GOVERNMENT SERVICES CANADA			AMEC Environment & Infrastructure A Division of AMEC Americas Ltd. 495 Prospect St, Suite 1 Fredericton, N.B., E3B 9M4 (P) 506-458-1000					
PROJECT:	SOIL SAMPLING PROGRAM AAFC CROPS AND LIVESTOCK RESEARCH CENTRE DFRP# 02024			DWN BY:	JT	DATUM:	UTM Zone 20	DATE:	February, 2013
TITLE:	SOIL SAMPLE & PHOTO LOCATION PLAN			CHK BY:	TG	PROJECTION:	NAD83	PROJECT No:	TE131002
				REV NO:	N/A	SCALE:	1 : 1000	FIGURE:	4

Legend	
	Building Number
	Picture and Direction
	Soil Sample
	Property Boundary
	Building



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2.2.2 Sample Handling

Field sampling was conducted using AMEC's standard field protocols for subsurface investigations. All samples were placed in laboratory supplied bottles. The bottles were placed in a cooler with ice packs for transport back to the laboratory. To minimize the potential for cross-contamination, all sampling equipment was thoroughly rinsed between each sampling event. Dedicated (one pair per sample), disposable nitrile gloves were used throughout the soil sampling effort.

2.2.3 Field and Laboratory Program

The field and laboratory program is summarized in Table 2. Samples were submitted to the RPC laboratory in Fredericton, NB. RPC is a CALA-accredited (Canadian Association for Laboratory Accreditation) laboratory and has in-house Quality Assurance / Quality Control (QA/QC) programs to govern sample analysis, including replicates. Laboratory reports are presented in Appendix B.

Table 2 Field and Laboratory Program

Analytes	Matrix	Sample Locations	Samples Submitted	Sample IDs	QA/QC Samples		
					Original	Field Dup	Lab Dup
Lead and Mercury	Soil	35	39	Bld 7-13SS-1; (0-0.15m) to Bld 7-13SS-8; (0-0.15m)	Bld 7-13SS-1; (0-0.15m)	Bld 7-13SS-A; (0-0.15m)	Bld 7-13SS-3; (0-0.15m)
				Bld 10-13SS-1; (0-0.15m) to Bld 10-13SS-4; (0-0.15m)	---	---	---
				Bld 14-13SS-1; (0-0.15m) to Bld 14-13SS-8; (0-0.15m)	Bld 14-13SS-4; (0-0.15m)	Bld 14-13SS-A; (0-0.15m)	---
				Bld 17-13SS-1; (0-0.15m) to Bld 17-13SS-8; (0-0.15m)	Bld 17-13SS-7; (0-0.15m)	Bld 17-13SS-A; (0-0.15m)	Bld 17-13SS-6; (0-0.15m)
				Bld 18-13SS-1; (0-0.15m) to Bld 18-13SS-8; (0-0.15m)	Bld 18-13SS-2; (0-0.15m)	Bld 18-13SS-A; (0-0.15m)	Bld 18-13SS-1; (0-0.15m)

2.2.4 Quality Assurance/Quality Control

The QA/QC sampling was conducted on approximately 10% of parameters that were analyzed. The results of this testing were used to evaluate the reliability of the sampling. QA/QC results are provided in Section 2.6.

2.3 Results of Field Investigation

2.3.1 Field Observations

Pertinent field observations for soil samples are described in Table C1 (Appendix C).

2.4 Preliminary Site Exposure Scenario Assessment

Given site activities, the CCME Soil Quality Guidelines (SQGs) are most appropriate for evaluating metal concentrations at the site. There are no wells present on site, and none will likely be installed in the future. Therefore the site is considered non-potable. Lead and mercury concentrations presented in Table 3 are compared to CCME Commercial Soil Quality Guidelines to be consistent with past practice.

Mercury in Soil
<ul style="list-style-type: none">• 39 samples submitted, including 4 field duplicates.• No exceedances were noted for Hg when compared to CCME SQGs for commercial coarse-grained soil.

2.5 Laboratory Analytical Results for Soil

2.5.1 Lead in Soil

Laboratory analytical results for lead in soil are presented in Table 3. Concentrations of lead in soil exceeded the CCME Commercial SQGs in 12 of the soil samples submitted.

Soil Samples - Lead	
<ul style="list-style-type: none">• 39 submitted, including 4 field duplicates.• 12 exceeded the CCME commercial guidelines for lead (260 mg/kg).	
Exceedances	Ranges
<ul style="list-style-type: none">• 12 exceeded for Pb	<ul style="list-style-type: none">• [Pb] 8.6 - 2330mg/kg

Further details of exceedances are shown on Figure 5 and provided in Table 3.

2.5.2 Mercury in Soil

Laboratory analytical results for lead are presented in Table 3. No exceedances were noted for mercury when compared to CCME SQGs for commercial coarse-grained soil.

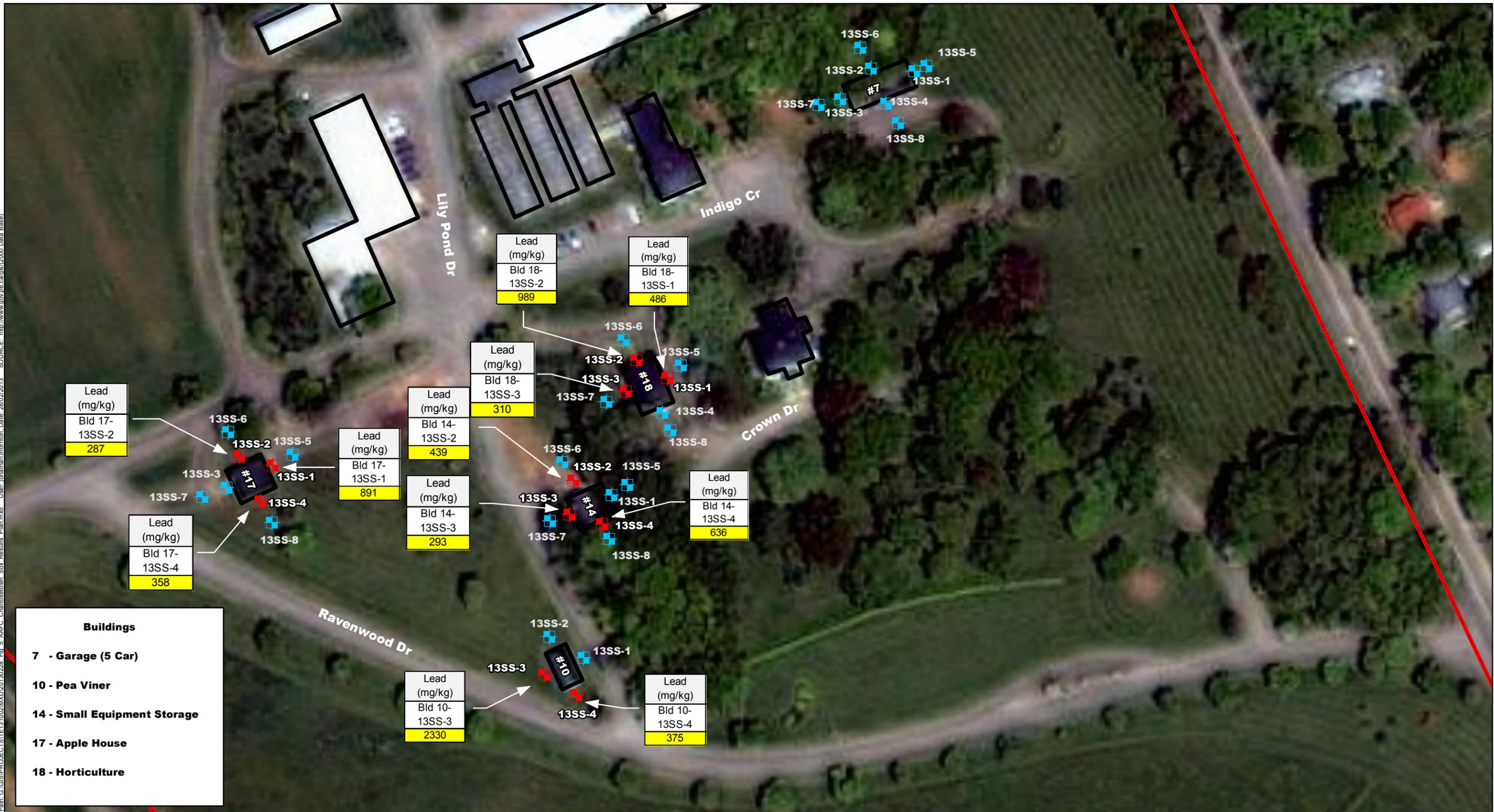
Soil Samples - Mercury	
<ul style="list-style-type: none">• 39 submitted, including 4 field duplicates.• 0 exceeded the CCME commercial guidelines for mercury (24 mg/kg).	
Exceedances	Ranges
<ul style="list-style-type: none">• 0 exceeded for Hg	<ul style="list-style-type: none">• [Hg] <0.01 – 21.5 mg/kg

Table 3 Lead and Mercury in Soil, CLRC, Charlottetown, PEI

Parameters					Lead	Mercury
					mg/kg	mg/kg
MDL (mg/kg)					0.5	0.1
Guidelines	CCME CSQGs Coarse-Grained Soil Commercial (mg/kg)				260	24
Location	Sample ID	Sample Depth (m)		Sample Date		
Building 7 (5 Car Garage)	Bld 7-13SS-1; (0-0.15m)	0-0.15	drip line	8-Jan-13	69.7	0.39
	Bld 7-13SS-A; (0-0.15m) dup of Bld 7-13SS-1 (0-0.15m)	0-0.15	---	8-Jan-13	63.6	0.31
	Bld 7-13SS-2; (0-0.15m)	0-0.15	drip line	8-Jan-13	112	0.2
	Bld 7-13SS-3; (0-0.15m)	0-0.15	drip line	8-Jan-13	44.3	0.28
	Lab Duplicate	---	---	8-Jan-13	44.7	0.31
	Bld 7-13SS-5; (0-0.15m)	0-0.15	5m from drip line at 13SS-1	8-Jan-13	57.1	0.11
	Bld 7-13SS-6; (0-0.15m)	0-0.15	5m from drip line at 13SS-2	8-Jan-13	238	0.15
	Bld 7-13SS-7; (0-0.15m)	0-0.15	5m from dripl ine at 13SS-3	8-Jan-13	45.9	0.2
Building 10 (Pea Viner)	Bld 7-13SS-8; (0-0.15m)	0-0.15	9m from drip line at 13SS-4	8-Jan-13	69.8	0.12
	Bld 10-13SS-1; (0-0.15m)	0-0.15	drip line	7-Jan-13	89.6	0.17
	Bld 10-13SS-2; (0-0.15m)	0-0.15	drip line	7-Jan-13	220	0.62
	Bld 10-13SS-3; (0-0.15m)	0-0.15	drip line	7-Jan-13	2330	0.83
Building 14 (Small Equipment Storage)	Bld 10-13SS-4; (0-0.15m)	0-0.15	drip line	7-Jan-13	375	0.26
	Bld 14-13SS-1; (0-0.15m)	0-0.15	drip line	8-Jan-13	8.6	0.1
	Bld 14-13SS-2; (0-0.15m)	0-0.15	drip line	8-Jan-13	439	0.15
	Bld 14-13SS-3; (0-0.15m)	0-0.15	drip line	8-Jan-13	293	0.2
	Bld 14-13SS-4; (0-0.15m)	0-0.15	drip line	8-Jan-13	636	0.32
	Bld 14-13SS-A; (0-0.15m) dup of Bld 14-13SS4 (0-0.15m)	0-0.15	---	8-Jan-13	223	0.19
	Bld 14-13SS-5; (0-0.15m)	0-0.15	5m from drip line at 13SS-1	8-Jan-13	168	0.26
	Bld 14-13SS-6; (0-0.15m)	0-0.15	5m from drip line at 13SS-2	8-Jan-13	137	0.08
	Bld 14-13SS-7; (0-0.15m)	0-0.15	5m from drip line at 13SS-3	8-Jan-13	74.4	0.39
Building 17 (Apple House Storage)	Bld 14-13SS-8; (0-0.15m)	0-0.15	5m from drip line at 13SS-4	8-Jan-13	139	0.15
	Bld 17-13SS-1; (0-0.15m)	0-0.15	drip line	8-Jan-13	891	21.5
	Bld 17-13SS-2; (0-0.15m)	0-0.15	drip line	8-Jan-13	287	0.26
	Bld 17-13SS-3; (0-0.15m)	0-0.15	drip line	8-Jan-13	23	0.07
	Bld 17-13SS-4; (0-0.15m)	0-0.15	drip line	8-Jan-13	358	0.16
	Bld 17-13SS-5; (0-0.15m)	0-0.15	5m from drip line at 13SS-1	8-Jan-13	76.9	0.26
	Bld 17-13SS-6; (0-0.15m)	0-0.15	5m from drip line at 13SS-2	8-Jan-13	143	0.17
	Lab Duplicate	---	---	8-Jan-13	156	0.17
	Bld 17-13SS-7; (0-0.15m)	0-0.15	5m from drip line at 13SS-3	8-Jan-13	54.7	0.08
	Bld 17-13SS-A; (0-0.15m) dup of Bld 17 13SS-7 (0-0.15m)	0-0.15	---	8-Jan-13	58.1	0.09
Building 18 (Horticulture Building)	Bld 17-13SS-8; (0-0.15m)	0-0.15	5m from drip line at 13SS-4	8-Jan-13	232	0.22
	Bld 18-13SS-1; (0-0.15m)	0-0.15	drip line	7-Jan-13	486	0.46
	Lab Duplicate	---	---	7-Jan-13	436	0.44
	Bld 18-13SS-2; (0-0.15m)	0-0.15	drip line	7-Jan-13	989	1.3
	Bld 18-13SS-A; (0-0.15m) dup of Bld 18-13SS-2 (0-0.15m)	0-0.15	---	7-Jan-13	891	1.2
	Bld 18-13SS-3; (0-0.15m)	0-0.15	drip line	7-Jan-13	310	0.16
	Bld 18-13SS-4; (0-0.15m)	0-0.15	drip line	7-Jan-13	25.3	0.04
	Bld 18-13SS-5; (0-0.15m)	0-0.15	5m from drip line at 13SS-1	7-Jan-13	42.8	0.07
	Bld 18-13SS-6; (0-0.15m)	0-0.15	5m from drip line at 13SS-2	7-Jan-13	72.8	0.14
	Bld 18-13SS-7; (0-0.15m)	0-0.15	5m from drip line at 13SS-3	7-Jan-13	27.1	< 0.01
Bld 18-13SS-8; (0-0.15m)	0-0.15	5m from drip line at 13SS-4	7-Jan-13	21.9	0.06	

Notes:
MDL: Method detection limit
<X: Below MDL
CCME: Canadian Council of Ministers of the Environment
CSQGs: Canadian Soil Quality Guidelines
Soil sample Bld 7-13SS-A; (0-0.15m) is blind field duplicate of soil sample Bld 7-13SS-1 (0-0.15m)
Soil sample Bld 14-13SS-A; (0-0.15m) is a blind field duplicate of soil sample Bld 14-13SS4 (0-0.15m)
Soil sample Bld 17-13SS-A; (0-0.15m) is a blind field duplicate of soil sample Bld 17 13SS-7 (0-0.15m)
Soil sample Bld 18-13SS-A; (0-0.15m) is a blind field duplicate of soil sample Bld 18-13SS-2 (0-0.15m)
Underlined and bold data exceed the CCME CSQG for a Commercial site

Path: G:\GIS\PROJECTS\TE131002\MXD\20130228_Fig 5_AAFRC_Charlottetown_Soil_Results_Plan.mxd User: jonathan.horton Date: 28/02/2013 SOURCE: http://www.gov.bc.ca/gov/2000_Data_Base



Buildings
7 - Garage (5 Car)
10 - Pea Viner
14 - Small Equipment Storage
17 - Apple House
18 - Horticulture

CLIENT: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA	AMEC Environment & Infrastructure A Division of AMEC Americas Ltd. 495 Prospect St, Suite 1 Fredericton, N.B., E3B 9M4 (P) 506-458-1000			
PROJECT: SOIL SAMPLING PROGRAM AAFC CROPS AND LIVESTOCK RESEARCH CENTRE DFRP# 02024	DWN BY: JT	DATUM: UTM Zone 20	DATE: February, 2013	
TITLE: SAMPLE RESULTS (EXCEEDANCES)	CHK BY: TG	PROJECTION: NAD83	PROJECT No: TE131002	
	REV NO: N/A	SCALE: 1 : 1000	FIGURE: 5	

Legend	
	Building Number
	Soil Sample > 260mg/kg
	Soil Sample < 260mg/kg
	Property Boundary
	Building

Parameter	CCME Commercial Guidelines
Lead	260 mg/kg



The map shown here has been created with all due and reasonable care and is strictly for use with AMEC Project Number: TE131002. This map has not been certified by a licensed land surveyor, and any third party use of this map comes without warranties of any kind. AMEC assumes no liability, direct or indirect, whatsoever for any such third party or unintended use.

2.6 Quality Assurance / Quality Control Discussion

QA/QC sampling consisted of the collection and analysis of approximately 10% of the samples for quality control (Table 4). This program permits the evaluation of the representativeness of the samples.

Table 4 QA/QC

Duplicate Type	Analysis	Range of %RPD	Number of Analytes within $\pm 40\%$ RPD	Acceptable Duplicate Correlation
Field Duplicates	Lead and Mercury (soil)	0 to 96%	12 of 14	Yes

In general, the duplicate results agree closely with their corresponding samples and confirm the representativeness of the sampling procedures. There are no firm guidelines for the degree of correlation expected between duplicates due to natural heterogeneity in soil and contaminant distribution. However, the values noted above are considered to indicate an acceptable duplicate correlation.

All individual parameters in the duplicates were classified the same (either above or below guidelines). The overall laboratory and field data quality is considered acceptable.

2.7 Contaminant Distribution

2.7.1 Lead in Soil

The magnitude of impacts are included in Table 5.

Table 5 Magnitude of Impact - Lead in Soil

Parameter	CCME Commercial SQG (mg/kg)	# of Samples Exceeding Criteria	Exceedance Factor	Trends
Lead	260	12	Bld 10-13SS-3; (0-0.15m) 9.0x Bld 10-13SS-4; (0-0.15m) 1.4x Bld 14-13SS-2; (0-0.15m) 1.7x Bld 14-13SS-3; (0-0.15m) 1.1x Bld 14-13SS-4; (0-0.15m) 2.4x Bld 17-13SS-1; (0-0.15m) 3.4x Bld 17-13SS-2; (0-0.15m) 1.1x Bld 17-13SS-4; (0-0.15m) 1.4x Bld 18-13SS-1; (0-0.15m) 1.9x Bld 18-13SS-2; (0-0.15m) 3.8x Dup Bld 18-13SS-2 (0-0.15m) 3.4x Bld 18-13SS-3; (0-0.15m) 1.2x	All exceedances of lead were at drip line locations during the 2013 field work by AMEC.

Table 6 summarises the extent of confirmed soil impacts associated with metals exceeding Commercial CCME SQGs.

Table 6 Extent of Contamination - Lead in Soil

Issue	Comment	Recommendation
Horizontal Extent of Contamination	Lead impacted soil was identified at several of the drip lines located at Buildings 10, 14, 17 and 18. Soil samples from beneath the buildings were not obtained due to building condition. Mercury exceedances in the soil samples were not noted. Impacts at the drip line of Building 10 are not delineated.	Horizontal delineation to be completed at Building 10 and beneath all buildings after building demolition.
Off site impacts?	No potential to impact off site properties. Lead impacts were not noted at the soil sampling locations 5 m from the drip lines.	None
Vertical Extent of Contamination	Lead impacted soil was noted to a depth of 0-0.15 m at the drip lines at Building 10, 14, 17 and 18.	Vertical delineation to be completed
Summary	Several of the drip lines located at Buildings 10, 14, 17 and 18 were noted to be impacted by lead. Further horizontal and vertical delineation is recommended.	Further delineation

3.0 CONCLUSIONS

Based on the information gathered and on observations made during this investigation, the Soil Sampling Program has revealed evidence of environmental contamination associated with the subject buildings. Results indicate that lead concentrations in soil exceed the CCME Commercial SQG at several of the drip lines at Buildings 10, 14, 17 and 18.

4.0 CLOSURE

This report was prepared by AMEC for PWGSC. The scope of the services performed may not be appropriate to satisfy the needs of other parties. Use or reliance of this report is not permitted without the expressed written consent of AMEC. Any use which another party makes of this report, or any reliance or decisions made based on it, are the sole responsibility of the other party. AMEC accepts no responsibility for damages, if any, suffered by any other party as a result of decisions made or actions based on this report.

The conclusions and recommendations presented represent the best judgment of the assessor based on current environmental standards and on the observed site conditions. Due to the nature of the investigation and the limited data available, the assessor cannot warrant against undiscovered environmental liabilities.

The conclusions are based on results from specific testing and/or sampling locations, and can only be extrapolated to an undefined limited area around these locations. The extent of the limited area depends on the soil and groundwater conditions, as well as the history of the site reflecting natural, construction and other activities. In addition, analysis has been carried out for a limited number of chemical parameters, and it should not be inferred that other chemical species are not present.

This Report is also subject to the further Standard Limitations contained in Appendix D.

The report was prepared by Tracey Germon, P.Geo.. Senior review was completed by David Rae, Ph.D., P.Geo.



Tracey Germon, P.Geo.
Environmental Geoscientist



David A. Rae, Ph.D., P.Geo.
Senior Review

5.0 REFERENCES

CCME, 2012. Canadian Environmental Quality Guidelines, Accessed on-line, last update October 2012. Canadian Council of Ministers of the Environment, Winnipeg, MN.

CCME (1999). Canadian Environmental Quality Guidelines. updated 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008 and 2010.

Conestoga-Rovers & Associated (2008). Phase I ESA Update. AAFC Crops and Livestock Research Centre, DFRP No. 2024, Charlottetown, PEI.

Jacques Whitford (2006). Decommissioning of Underground Storage Tanks (USTs)/Pump Island and Aboveground Storage Tanks (ASTs) – Agri-Food Canada – Home Farm Site, Charlottetown Research Station, Charlottetown, Queens County, PEI.

MGI Limited (2004). Hazardous Building Materials Survey with Recommendations for Building Demolition and Petroleum Hydrocarbon Impact Assessment Agriculture and Agri-Food Canada, Home Farm Property, Building 7 (5 Car Garage), Charlottetown, Queens County, PEI.

MGI Limited (2004). Hazardous Building Materials Survey with Recommendations for Building Demolition and Petroleum Hydrocarbon Assessment Agriculture and Agri-Food Canada, Home Farm Property, Building 10 (Pea Viner Storage), Charlottetown, Queens County, PEI.

MGI Limited (2004). Hazardous Building Materials Survey with Recommendations for Building Demolition and Petroleum Hydrocarbon Assessment Agriculture and Agri-Food Canada, Home Farm Property, Building 14 (Small Equipment Storage), Charlottetown, Queens County, PEI.

MGI Limited (2005). Hazardous Building Materials Survey with Recommendations for Building Demolition and Limited Soil Sampling and Follow up Soil Sampling Program Agriculture and Agri-Food Canada, Home Farm Property, Building 17 (Apple House), Charlottetown, Queens County, PEI.

MGI Limited (2005). Hazardous Building Materials Survey with Recommendations for Building Demolition and Limited Soil Sampling Program Agriculture and Agri-Food Canada, Home Farm Property, Building 18 (Horticulture Building), Charlottetown, Queens County, PEI.

APPENDIX A

SITE PHOTOGRAPHS



Photo 1: View of Building 7 (5 car garage) looking north (January 8, 2013).



Photo 2: View of Building 7 (5 car garage) and soil sampling locations looking south (January 8, 2013).



Photo 3: View of Building 10 (Pea Viner) looking northwest (January 7, 2013).



Photo 4: View of Building 10 (Pea Viner) looking southeast (January 7, 2013).



Photo 5: View of Building 14 (Small Storage Building) looking southeast (January 8, 2013).



Photo 6: View of Building 14 (Small Storage Building) looking northwest (January 8, 2013).



Photo 7: View of Building 17 (Apple Storage Building) looking southwest (January 8, 2013).



Photo 8: View of Building 17 (Apple Storage Building) looking north (January 8, 2013).



Photo 9: View of Building 18 (Horticulture Building) looking south (January 7, 2013).



Photo 10: View of Building 18 (Horticulture Building) looking northwest (January 7, 2013).

APPENDIX B

LABORATORY ANALYSIS REPORTS

Report ID: 148039-IAS
Report Date: 23-Jan-13
Date Received: 09-Jan-13

CERTIFICATE OF ANALYSIS

for
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Fredericton, NB E3B 9M4

rpc

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Tel: 506.452.1212
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Attention: Lynn Pilgrim

Project #: TE131002

Location: Charlottetown, PE

Analysis of Metals in Soil

Analytes:			Lead	Mercury
Units:			mg/kg	mg/kg
RL:			0.1	0.01
RPC Sample ID	Client Sample ID	Date Sampled		
148039-01	Bld 18-13SS-1; (0-0.15m)	7-Jan-13	486.	0.46
148039-01 Dup	Lab Duplicate	7-Jan-13	436.	0.44
148039-02	Bld 18-13SS-2; (0-0.15m)	7-Jan-13	989.	1.3
148039-03	Bld 18-13SS-3; (0-0.15m)	7-Jan-13	310.	0.16
148039-04	Bld 18-13SS-4; (0-0.15m)	7-Jan-13	25.3	0.04
148039-05	Bld 18-13SS-5; (0-0.15m)	7-Jan-13	42.8	0.07
148039-06	Bld 18-13SS-6; (0-0.15m)	7-Jan-13	72.8	0.14
148039-07	Bld 18-13SS-7; (0-0.15m)	7-Jan-13	27.1	< 0.01
148039-08	Bld 18-13SS-8; (0-0.15m)	7-Jan-13	21.9	0.06
148039-09	Bld 18-13SS-A; (0-0.15m)	7-Jan-13	891.	1.2
148039-10	Bld 17-13SS-1; (0-0.15m)	8-Jan-13	891.	21.5
148039-11	Bld 17-13SS-2; (0-0.15m)	8-Jan-13	287.	0.26
148039-12	Bld 17-13SS-3; (0-0.15m)	8-Jan-13	23.0	0.07
148039-13	Bld 17-13SS-4; (0-0.15m)	8-Jan-13	358.	0.16
148039-14	Bld 17-13SS-5; (0-0.15m)	8-Jan-13	76.9	0.26
148039-15	Bld 17-13SS-6; (0-0.15m)	8-Jan-13	143.	0.17
148039-15 Dup	Lab Duplicate	8-Jan-13	156.	0.17
148039-16	Bld 17-13SS-7; (0-0.15m)	8-Jan-13	54.7	0.08
148039-17	Bld 17-13SS-8; (0-0.15m)	8-Jan-13	232.	0.22
148039-18	Bld 17-13SS-A; (0-0.15m)	8-Jan-13	58.1	0.09

This report relates only to the sample(s) and information provided to the laboratory.

RL = Reporting Limit



A. Ross Kean, M.Sc.
Department Head
Inorganic Analytical Chemistry

SOIL METALS

Page 1 of 6



Peter Crowhurst, B.Sc., C.Chem
Analytical Chemist
Inorganic Analytical Chemistry

Report ID: 148039-IAS
 Report Date: 23-Jan-13
 Date Received: 09-Jan-13

CERTIFICATE OF ANALYSIS

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 www.rpc.ca

Attention: Lynn Pilgrim

Project #: TE131002

Location: Charlottetown, PE

Analysis of Metals in Soil

Analytes:			Lead	Mercury
Units:			mg/kg	mg/kg
RL:			0.1	0.01
RPC Sample ID	Client Sample ID	Date Sampled		
148039-19	Bld 14-13SS-1; (0-0.15m)	8-Jan-13	8.6	0.10
148039-20	Bld 14-13SS-2; (0-0.15m)	8-Jan-13	439.	0.15
148039-21	Bld 14-13SS-3; (0-0.15m)	8-Jan-13	293.	0.20
148039-22	Bld 14-13SS-4; (0-0.15m)	8-Jan-13	636.	0.32
148039-23	Bld 14-13SS-5; (0-0.15m)	8-Jan-13	168.	0.26
148039-24	Bld 14-13SS-6; (0-0.15m)	8-Jan-13	137.	0.08
148039-25	Bld 14-13SS-7; (0-0.15m)	8-Jan-13	74.4	0.39
148039-26	Bld 14-13SS-8; (0-0.15m)	8-Jan-13	139.	0.15
148039-27	Bld 14-13SS-A; (0-0.15m)	8-Jan-13	223.	0.19
148039-28	Bld 7-13SS-1; (0-0.15m)	8-Jan-13	69.7	0.39
148039-29	Bld 7-13SS-2; (0-0.15m)	8-Jan-13	112.	0.20
148039-30	Bld 7-13SS-3; (0-0.15m)	8-Jan-13	44.3	0.28
148039-30 Dup	Lab Duplicate	8-Jan-13	44.7	0.31
148039-31	Bld 7-13SS-5; (0-0.15m)	8-Jan-13	57.1	0.11
148039-32	Bld 7-13SS-6; (0-0.15m)	8-Jan-13	238.	0.15
148039-33	Bld 7-13SS-7; (0-0.15m)	8-Jan-13	45.9	0.20
148039-34	Bld 7-13SS-8; (0-0.15m)	8-Jan-13	69.8	0.12
148039-35	Bld 7-13SS-A; (0-0.15m)	8-Jan-13	63.6	0.31
148039-36	Bld 10-13SS-1; (0-0.15m)	7-Jan-13	89.6	0.17
148039-37	Bld 10-13SS-2; (0-0.15m)	7-Jan-13	220.	0.62

Report ID: 148039-IAS
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Fax: 506.452.0594
www.rpc.ca

Attention: Lynn Pilgrim

Project #: TE131002

Location: Charlottetown, PE

Analysis of Metals in Soil

Analytes:			Lead	Mercury
Units:			mg/kg	mg/kg
RL:			0.1	0.01
RPC Sample ID	Client Sample ID	Date Sampled		
148039-38	Bld 10-13SS-3; (0-0.15m)	7-Jan-13	2330	0.83
148039-39	Bld 10-13SS-4; (0-0.15m)	7-Jan-13	375.	0.26

SOIL METALS

Report ID: 148039-IAS
Report Date: 23-Jan-13
Date Received: 09-Jan-13

CERTIFICATE OF ANALYSIS

for

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General Report Comments

Samples were air dried and sieved at 2 mm. A portion of each was digested according to EPA Method 3050B. The resulting solutions were analyzed for Lead by ICP-MS. Mercury was analysed by Cold Vapour AAS.

COMMENTS

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Report ID: 148039-IAS
 Report Date: 23-Jan-13
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Project #: TE131002

Location: Charlottetown, PE

QA/QC Report

RPC Sample ID:			CRM011946	CRM011947	CRM011948	RB008806	RB008807	RB008808
Type:			CRM NIST2709a	CRM NIST2709a	CRM NIST2709a	Blank	Blank	Blank
Analytes	Units	RL						
Lead	mg/kg	0.1	10.4	10.1	10.0	< 0.1	< 0.1	< 0.1
Mercury	mg/kg	0.01	0.75	0.85	0.75	< 0.01	< 0.01	< 0.01

Report ID: 148039-IAS
Report Date: 23-Jan-13
Date Received: 09-Jan-13

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Methods

<u>Analyte</u>	<u>RPC SOP #</u>	<u>Method Reference</u>	<u>Method Principle</u>
EPA 3050B Digestion	4.M19	EPA 3050B	Nitric acid/Hydrogen Peroxide Digestion
Lead	4.M01/4.M29	EPA 200.8/EPA 200.7	ICP-MS/ICP-ES
Mercury	4.M53	EPA 245.5	Cold Vapor AAS

APPENDIX C
FIELD OBSERVATIONS

APPENDIX C**TABLE C1: SOIL SAMPLE DESCRIPTION**

SITE LOCATION: AAFC Charlottetown Research Centre		JOB #: TE131002
DATE: January 7-8, 2013		
Sample ID	Sample Depth (m)	Description
Bld 7-13SS-1	0 - 0.15	Sand, medium reddish brown; organics. Paint chips noted.
Bld 7-13SS-2	0 - 0.15	Sand, medium reddish brown; organics. Paint chips noted.
Bld 7-13SS-3	0 - 0.15	Sand, medium reddish brown; organics.
Bld 7-13SS-5	0 - 0.15	Sand, medium reddish brown; organics.
Bld 7-13SS-6	0 - 0.15	Sand, medium reddish brown; organics.
Bld 7-13SS-7	0 - 0.15	Sand, medium reddish brown; organics.
Bld 7-13SS-8	0 - 0.15	Sand and gravel, medium brown; organics. Glass noted.
Bld 10-13SS-1	0 - 0.15	Sand, medium to fine reddish brown; organics.
Bld 10-13SS-2	0 - 0.15	Sand, medium to fine reddish brown; organics. Paint chips noted.
Bld 10-13SS-3	0 - 0.15	Sand, medium reddish brown; organics. Paint chips noted.
Bld 10-13SS-4	0 - 0.15	Sand, medium to fine reddish brown; organics. Paint chips noted.
Bld 14-13SS-1	0 - 0.15	Sand, medium reddish brown; organics.
Bld 14-13SS-2	0 - 0.15	Sand and gravel, medium black brown. Paint chips noted.
Bld 14-13SS-3	0 - 0.15	Sand and gravel, medium reddish brown; organics. Paint chips noted.
Bld 14-13SS-4	0 - 0.15	Sand, some gravel, medium reddish brown; organics. Paint chips noted.
Bld 14-13SS-5	0 - 0.15	Sand, medium reddish brown; organics.
Bld 14-13SS-6	0 - 0.15	Sand, some gravel, medium reddish brown; organics.
Bld 14-13SS-7	0 - 0.15	Sand, medium reddish brown; organics.
Bld 14-13SS-8	0 - 0.15	Sand, fine to medium reddish brown; organics.
Bld 17-13SS-1	0 - 0.15	Sand, some gravel, medium reddish brown; organics. Paint chips noted.
Bld 17-13SS-2	0 - 0.15	Sand, medium reddish brown; organics. Paint chips noted.
Bld 17-13SS-3	0 - 0.15	Sand and gravel, medium reddish brown. Paint chips noted.

APPENDIX C**TABLE C1: SOIL SAMPLE DESCRIPTION**

SITE LOCATION: AAFC Charlottetown Research Centre		JOB #: TE131002
DATE: January 7-8, 2013		
Sample ID	Sample Depth (m)	Description
Bld 17-13SS-4	0 - 0.15	Sand and gravel, medium reddish brown. Paint chips noted.
Bld 17-13SS-5	0 - 0.15	Sand, medium reddish brown; organics.
Bld 17-13SS-6	0 - 0.15	Sand, some gravel, medium reddish brown; organics.
Bld 17-13SS-7	0 - 0.15	Sand, medium reddish brown; organics.
Bld 17-13SS-8	0 - 0.15	Sand and gravel, medium reddish brown.
Bld 18-13SS-1	0 - 0.15	Sand, medium to fine reddish brown; organics.
Bld 18-13SS-2	0 - 0.15	Sand, medium to fine brown; organics.
Bld 18-13SS-3	0 - 0.15	Sand, coarse reddish brown; organics.
Bld 18-13SS-4	0 - 0.15	Sand, medium reddish brown; organics.
Bld 18-13SS-5	0 - 0.15	Sand, medium to fine reddish brown; organics.
Bld 18-13SS-6	0 - 0.15	Sand, medium brown; organics.
Bld 18-13SS-7	0 - 0.15	Sand and gravel, medium brown.
Bld 18-13SS-8	0 - 0.15	Sand, medium reddish brown; organics.

APPENDIX D

LIMITATIONS

LIMITATIONS

1. The work performed in the preparation of this report and the conclusions presented are subject to the following:
 - (a) The Standard Terms and Conditions which form a part of our Professional Services Contract;
 - (b) The Scope of Services;
 - (c) Time and Budgetary limitations as described in our Contract; and
 - (d) The Limitations stated herein.
2. No other warranties or representations, either expressed or implied, are made as to the professional services provided under the terms of our Contract, or the conclusions presented.
3. The conclusions presented in this report were based, in part, on visual observations of the Site and attendant structures. Our conclusions cannot and are not extended to include those portions of the Site or structures, which are not reasonably available, in AMEC's opinion, for direct observation.
4. The environmental conditions at the Site were assessed, within the limitations set out above, having due regard for applicable environmental regulations as of the date of the inspection. A review of compliance by past owners or occupants of the Site with any applicable local, provincial or federal by-laws, orders-in-council, legislative enactments and regulations was not performed.
5. The Site history research included obtaining information from third parties and employees or agents of the owner. No attempt has been made to verify the accuracy of any information provided, unless specifically noted in our report.
6. Where testing was performed, it was carried out in accordance with the terms of our contract providing for testing. Other substances, or different quantities of substances testing for, may be present on Site and may be revealed by different or other testing not provided for in our contract.
7. Because of the limitations referred to above, different environmental conditions from those stated in our report may exist. Should such different conditions be encountered, AMEC must be notified in order that it may determine if modifications to the conclusions in the report are necessary.
8. The utilization of AMEC's services during the implementation of any remedial measures will allow AMEC to observe compliance with the conclusions and recommendations contained in the report. AMEC's involvement will also allow for changes to be made as necessary to suit field conditions as they are encountered.
9. This report is for the sole use of the party to whom it is addressed unless expressly stated otherwise in the report or contract. Any use which any third party makes of the report, in whole or the part, or any reliance thereon or decisions made based on any information or conclusions in the report is the sole responsibility of such third party. AMEC accepts no responsibility whatsoever for damages or loss of any nature or kind suffered by any such third party as a result of actions taken or not taken or decisions made in reliance on the report or anything set out therein.
10. This report is not to be given over to any third party for any purpose whatsoever without the written permission of AMEC.
11. Provided that the report is still reliable, and less than 12 months old, AMEC will issue a third-party reliance letter to parties that the client identifies in writing, upon payment of the then current fee for such letters. All third parties relying on AMEC's report, by such reliance agree to be bound by our proposal and AMEC's standard reliance letter. AMEC's standard reliance letter indicates that in no event shall AMEC be liable for any damages, howsoever arising, relating to third-party reliance on AMEC's report. No reliance by any party is permitted without such agreement.