CAO 04-2019
Appendix 3
Niagara District Airport
Phase II Environmental Assessment Report

NIAGARA DISTRICT AIRPORT

PHASE II ENVIRONMENTAL SITE ASSESSMENT

NIAGARA DISTRICT AIRPORT, 468 NIAGARA STONE ROAD, NIAGARA-ON-THE-LAKE

OCTOBER 11, 2017

PHASE II ENVIRONMENTAL SITE ASSESSMENT

NIAGARA DISTRICT AIRPORT, 468 NIAGARA STONE ROAD, NIAGARA-ON-THE-LAKE

NIAGARA DISTRICT AIRPORT

ENVIRONMENTAL SITE ASSESSMENT REPORT

PROJECT NO.: 171-08598-00 - 002
DATE: OCTOBER 11, 2017

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October 11, 2017

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Subject: **Phase II Environmental Site Assessment**
Niagara District Airport
468 Niagara Stone Road, Niagara-on-the-Lake, Ontario
Our Project # 171-08598-00 - 002

Dear Sir,

WSP Canada Inc. is pleased to provide our report documenting the findings of the Phase II Environmental Site Assessment (ESA) completed at the above-noted property.

The assessment was completed in general compliance with the Canadian Standards Association (CSA) Standard Z769-00 Phase II Environmental Site Assessment. The report describes the interpreted environmental conditions at the Site and provides conclusions for your consideration. It is understood that filing of a Record of Site Condition in accordance with Ontario Regulation 153/04 is not required for the subject property at this time.

We trust that this information is sufficient for your current needs. If you have any questions or require further information, please contact the undersigned.

Yours truly,

Rachel Bryan, M.A.Sc., P.Eng.
Project Engineer, Environment

David A. MacGillivray, M.A.Sc., P.Geo., P.Eng.
Senior Engineer, Environment

WSP ref.: 171-08598-00 - 002

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This report was prepared by WSP Canada Inc. (WSP) for the account of Niagara District Airport, in accordance with our proposal dated May 24, 2017. The disclosure of any information contained in this report is the sole responsibility of the intended recipient. The material in it reflects WSP's best judgement in light of the information available to it at the time of preparation. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. WSP accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report. This limitations statement is considered part of this report.

The original of the technology-based document sent herewith has been authenticated and will be retained by WSP for a minimum of ten years. Since the file transmitted is now out of WSP's control and its integrity can no longer be ensured, no guarantee may be given with regards to any modifications made to this document.

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1 EXECUTIVE SUMMARY

WSP was retained by Niagara District Airport (NDA) to conduct a Phase II Environmental Site Assessment (ESA) for the NDA property located at 468 Niagara Stone Road, Niagara-on-the-Lake, Ontario, herein referred to as the 'Site'. The Site consists of approximately 130 hectares (322 acres) of land on the north side of Niagara Stone Road (Highway 55), in the Town of Niagara-on-the-Lake, Ontario. The Site is situated approximately 1. 6 km east of the City of St. Catharines in an agricultural and rural residential area. The Site operates as a municipal airport including three runways, four taxiways, a terminal apron, terminal building, several aircraft hangars, maintenance facilities, and a refuelling area.

A Phase I ESA was recently completed by WSP for the Site for due diligence purposes prior to the potential sale of the property. The Phase I ESA recommended that a Phase II ESA was required to investigate soil and groundwater conditions in ten areas of potential environmental concern (APECs) identified on the Site. Contaminants of potential concern in soil and groundwater included petroleum hydrocarbons (PHCs), volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs), metals and inorganics, polychlorinated biphenyls (PCBs), and perfluoroalkylated substances (PFAS).

Intrusive soil sampling through the advancement of boreholes and groundwater sampling from pre-existing and newly installed monitoring wells were used to investigate the subsurface conditions at the Site. A total of 12 boreholes were advanced on the Site; seven were completed as monitoring wells. One pre-existing monitoring well was also sampled to assess groundwater quality in the fuel storage area.

The boreholes were advanced through a surface layer of either topsoil, sand and gravel, fill, or asphalt. Native silty clay to clayey silt glacial till (Halton Till) was encountered beneath the surface layer. The Halton Till unit extended to the maximum drilling depth of 7.6 mbgs. Regional geological mapping shows bedrock in the area consists of red shale of the Queenston Formation. The overburden drift thickness at the Site is estimated to range from approximately 21 to 30 m.

Shallow groundwater is present within the Halton Till and the inferred groundwater flow direction is to the north towards Lake Ontario.

A total of 25 soil samples and 11 groundwater samples (including duplicates) were submitted for laboratory analysis of contaminants of concern. Analytical results were compared to the Ministry of the Environment and Climate Change (MOECC) Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition for Industrial/Commercial/Community Property Use with medium and fine textured soils as outlined in the *Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act* (April 15, 2011), hereinafter referred to as the "Table 2 SCS".

Based on the results of the investigation, the following parameter exceedances were observed in the submitted soil and groundwater samples:

Soil

- Samples 17-01 S2 and 17-05 S2 exceeded the applicable Table 2 SCS for conductivity.

Groundwater

- Samples 17-01, 17-06 and 12-1 exceeded the applicable Table 2 SCS for cobalt;
- Samples 17-01, 17-10 and 12-1 exceeded the applicable Table 2 SCS for sodium;
- Sample 17-06 exceeded the applicable Table 2 SCS for selenium; and,
- Samples 17-01, 17-02, 17-05, 17-06, 17-10, 17-11 and 12-1 exceeded the applicable Table 2 SCS for uranium.

Based on the work completed, soil and groundwater quality on the Site do not meet the applicable Table 2 SCS. We note that proposed amendments to O. Reg. 153/04 may eliminate the need to address exceedances for conductivity in soil and sodium in groundwater related to the use of road salt.

The following recommendations are provided for your consideration:

- Additional soil sampling is recommended to characterize the imported fill material within APEC 9.
- The monitoring wells should be re-sampled to confirm the exceedances noted at the Site. We note that the exceedances in groundwater may be naturally occurring or related to road salting practices.
- The monitoring wells at the Site should be maintained in accordance with O. Reg. 903. If they are no longer in use, the monitoring wells should be decommissioned by a licenced well contractor in accordance with O. Reg. 903.

2 INTRODUCTION

2.1 INTRODUCTION

WSP was retained by Niagara District Airport (NDA) to conduct a Phase II Environmental Site Assessment (ESA) for the NDA property located at 468 Niagara Stone Road, Niagara-on-the-Lake, Ontario, herein referred to as the 'Site'. The Site consists of approximately 130 hectares (322 acres) of land on the north side of Niagara Stone Road (Highway 55), in the Town of Niagara-on-the-Lake, Ontario. The Site is situated approximately 1. 6 km east of the City of St. Catharines in an agricultural and rural residential area. The Site operates as a municipal airport including three runways, four taxiways, a terminal apron, terminal building, several aircraft hangars, maintenance facilities, and a refuelling area. The remainder of the NDA land is mainly vegetated with grasses, with minimal cultural meadow and thicket habitats. The vegetated area is regularly mowed and maintained as part of the standard airport operations. A Site location map is provided as Figure 1 and site features are shown on the Site Plan provided as Figure 2.

A Phase I ESA was recently completed by WSP for the Site (dated October 10, 2017) for due diligence purposes prior to the potential sale of the property. The Phase I ESA recommended that a Phase II ESA was required to investigate soil and groundwater conditions in ten areas of potential environmental concern (APECs) identified on the Site.

The Phase II ESA has been completed in general accordance with the Canadian Standards Association (CSA) Standard Z769-00, Phase II Environmental Site Assessment. This report has not been prepared to support a Record of Site Condition application for the Site.

2.2 BACKGROUND

A previous Phase I ESA identified ten APECs on the Site, as follows:

APEC	LOCATION OF APEC ON PROPERTY	CONTRIBUTING PCAS	CONTAMINANTS OF POTENTIAL CONCERN	MEDIA POTENTIALLY IMPACTED
1	Majority of Site	3. Airstrips and Hangars Operation	M&I PAHs PHCs VOCs	Soil and Groundwater
2	Vicinity of Building #11	24. Fire Training 34. Metal Fabrication	M&I PAHs PCBs PFAS PHCs VOCs	Soil and Groundwater
3	Refuelling Area	28. Gasoline and Associated Products Storage in Fixed Tanks	PHCs BTEX lead	Soil and Groundwater
4	East of refuelling area	30. Importation of Fill Material of Unknown Quality	M&I PAHs PCBs PHCs VOCs	Soil and Groundwater

APEC	LOCATION OF APEC ON PROPERTY	CONTRIBUTING PCAS	CONTAMINANTS OF POTENTIAL CONCERN	MEDIA POTENTIALLY IMPACTED
5	Southwest of Building # 2	30. Importation of Fill Material of Unknown Quality	M&I PAHs PCBs PHCs VOCs	Soil and Groundwater
6	Vicinity of Building #1	7. Boat Manufacturing	M&I PHCs VOCs	Soil and Groundwater
7	Former refuelling area, east of Building #1	28. Gasoline and Associated Products Storage in Fixed Tanks	PHCs BTEX lead	Soil and Groundwater
8	Vicinity of Building #6	27. Garages and Maintenance and Repair of Railcars, Marine Vehicles and Aviation Vehicles	M&I PHCs VOCs	Soil and Groundwater
9	Eastern portion of the Site on the south side of Runway 06-24	30. Importation of Fill Material of Unknown Quality	M&I PAHs PCBs PHCs VOCs	Soil and Groundwater
10	East of Building #11	28. Gasoline and Associated Products Storage in Fixed Tanks	PHCs BTEX	Soil and Groundwater

Notes:
PHCs – Petroleum hydrocarbons
BTEX – Benzene, toluene, ethylbenzene, xylenes
VOCs – Volatile organic compounds
PAHs – Polycyclic aromatic hydrocarbons
M&I – Metals and inorganic parameters
PCBs – Polychlorinated Biphenyls
PFAS – Perfluoroalkylated substances

2.3 CURRENT AND PROPOSED LAND USE

The Site currently operates as a municipal airport, which is considered an industrial land use under Ontario Regulation 153/04. We are not aware of any proposed change in land use at the Site.

2.4 SCOPE OF WORK

In general, the purpose of the Phase II ESA is to assess the subsurface soil and groundwater conditions at the Site in the ten APECs identified in the previous Phase I ESA.

The scope of work included the advancement of 12 boreholes and the installation of monitoring wells in seven of the boreholes on the Site. Drilling locations and APECs are shown on the site plan provided as Figure 3.

Monitoring wells 12-1 and 12-2, which were installed by Golder Associates in 2012 and are located within APEC 3, were also included in the monitoring program. Groundwater elevations were measured in both wells, and a sample was collected from well 12-1 and submitted for laboratory analysis.

2.5 APPLICABLE SITE CONDITION STANDARD

Analytical results were compared to the Ministry of the Environment and Climate Change (MOECC) Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition for Industrial/Commercial/Community Property Use with medium and fine textured soils, as outlined in the *Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act* (April 15, 2011), hereinafter referred to as the "Table 2 SCS". This evaluation standard for the Site was selected for comparison purposes based on the following:

- Six active water supply wells were identified within 250 m of the Site boundaries in the MOECC well records online database. The wells are used for domestic and livestock supply;
- The Site is currently developed for industrial use and there is no proposed change in land use;
- The nearest surface water course is a tributary of Eight Mile Creek and is located approximately 90 m north of the northwest corner of the Site. Several drainage ditches are located around the perimeter and through the center of the Site; however, these drains were constructed for storm water management and are not considered to be permanent water courses;
- The pH values reported from analysis of soil samples collected from the Site ranged from 7.32 to 7.91. These values were within the acceptable range to use the Table 2 SCS;
- Areas of natural significance were not identified on the Site or within 30 m of the Site boundaries; and,
- The Site is not considered to be a shallow soil property, as defined by O. Reg. 153/04.

3 PHASE II INVESTIGATION METHOD

3.1 GENERAL

Subsurface soil sampling and groundwater sampling from the boreholes advanced and the monitoring wells installed as part of the drilling investigation were used to investigate the subsurface conditions at the Site. Details of the investigation are described in the following sections. Drilling, soil sampling, and monitoring well installation activities were supervised by WSP field personnel. Field notes were recorded in a dedicated field book, which is retained on file.

The borehole/monitoring well locations are depicted on the Site Plans provided as Figures 2 and 3.

3.2 UTILITY LOCATES

Ontario One Call was contacted for the public utilities locates for the investigation. Buffalo Locating Inc. was retained by WSP to locate private utilities on-Site for the borehole locations included in the subsurface investigation work.

3.3 DRILLING

The drilling program was completed on July 7 and 10, 2017. Twelve (12) boreholes were advanced on the Site and monitoring wells were installed in seven of the boreholes to allow for groundwater sampling. Boreholes were advanced using a Geoprobe 7822 DT track-mounted drill rig provided by Landshark Drilling. The boreholes were advanced using the direct push method to a depth of 6.1 mbgs with the exception of 17-11, which was advanced to 7.6 mbgs. Seven of the boreholes were then drilled using 108-mm solid stem augers to facilitate the installation of monitoring wells. The remaining five boreholes were backfilled with bentonite pellets to surface.

3.4 SOIL SAMPLING

Continuous direct push soil sampling was conducted using a 32-mm diameter, 1.5-m long stainless steel continuous sampler equipped with disposable PVC liners.

Disposable nitrile gloves were used during sample collection to minimize the potential for cross-contamination. Soil samples were described in the field by WSP staff, and observations were recorded in a dedicated field book. Soil samples selected for chemical analysis were stored at a temperature of less than 10°C and handled under standard chain of custody procedures until received at the laboratory. The soil samples selected for laboratory submission were considered to be representative of worst-case conditions in the boreholes based on field screening results, the location of the APECs, and observations of olfactory and visual characteristics, if any.

A total of 25 soil samples, including six blind field duplicates, were submitted to the laboratory for chemical analysis, as summarized in the following table:

Table 3-1 Soil Samples Submitted for Chemical Analysis

SAMPLE ID	DEPTH (mbgs)	LABORATORY ANALYSES
17-01 S2 and duplicate 17-01 S20	0.76 - 1.52	PAHs, M&I
17-01 S5 and duplicate 17-01 S50	3.05 - 3.81	PHCs, VOCs
17-02 S2 and duplicate 17-02 S20 (PCBs only)	0.76 - 1.52	PAHs, M&I, PCBs
17-02 S8 and duplicate 17-02 S80 (PFAS only)	5.33 - 6.10	PHCs, VOCs, PFAS

SAMPLE ID	DEPTH (mbgs)	LABORATORY ANALYSES
17-03 S5	3.05 - 3.81	PHCs, VOCs, M&I
17-04 S1	0.00 - 0.76	M&I, PCBs
17-05 S2 and duplicate 17-05 S20 (M&I only)	0.76 - 1.52	PAHs, M&I
17-05 S3 and duplicate 17-05 S30 (PHCs and BTEX only)	3.05 - 3.81	PHCs, VOCs
17-06 S5	3.05 - 3.81	PHCs, BTEX, M&I
17-07 S4	2.29 - 3.05	PHCs, BTEX, M&I
17-08 S1	0.00 - 0.76	PHCs, VOCs, PAHs, M&I, PCBs
17-09 S2	0.76 - 1.52	PAHs, M&I
17-09 S7	4.57 - 5.33	PHCs, VOCs
17-10 S1	0.00 - 0.76	PAHs, M&I
17-10 S3	3.05 - 3.81	VOCs
17-10 S7	4.57 - 5.33	PHCs, BTEX
17-11 S2	0.76 - 1.52	PHCs, VOCs, PAHs, M&I, PCBs
17-12 S1	0.00 - 0.76	PAHs, PCBs
17-12 S2	0.76 - 1.52	PHCs, VOCs, M&I

3.5 FIELD SCREENING MEASUREMENTS

Soil samples collected from the boreholes were field screened for total organic vapours (TOV) using a photoionization detector calibrated to isobutylene. The TOV measurements are presented on the borehole logs included in Appendix A.

The field screening results showed generally low TOV readings in the boreholes, ranging from 0 to 5 ppm. Two samples (17-05 S3 and 17-10 S3) showed TOV readings above 20 ppm. These samples were submitted for laboratory analysis of VOCs.

3.6 GROUNDWATER MONITORING WELL INSTALLATION

Groundwater monitoring wells were installed on June 7 and 10, 2017 in seven of the boreholes advanced on the Site. Nitrile gloves were used to handle the well casings to minimize the potential for contamination during installation.

The monitoring wells were constructed using 51 mm Schedule 40 PVC risers and included a 3-m well screen (slot 10). Sand packs were placed in the annular space within the boreholes around the well screens from the bottom of the wells to approximately 0.3 m above the well screens. Bentonite hole plug seals were placed above the sand packs to a depth of 0.3 mbgs. The wells were completed with protective metal casings. The monitoring well construction details are shown on the borehole logs provided as Appendix A.

The monitoring wells were equipped with dedicated 4.3-mm inner diameter LDPE tubing and 4.8-mm inner diameter silicone tubing to facilitate well development and sampling with a peristaltic pump.

The monitoring wells installed at the Site need to be maintained in accordance with the Ontario Water Resources Act, O. Reg. 903. Once the wells are no longer required for monitoring or sampling purposes, these wells will need to be appropriately decommissioned by a licensed well contractor as required by O. Reg. 903.

3.7 GROUNDWATER SAMPLING

Groundwater samples were collected on July 24 and 25, 2017 from each of the seven newly-installed monitoring wells as well as pre-existing monitoring well 12-1. Groundwater sampling was conducted by low-flow sampling techniques using a peristaltic pump using ASTM D6771: Standard Practice for Low-Flow Purging and Sampling for Wells and Devices Used for Ground-Water Quality Investigations, as a general guide. The samples were collected directly into laboratory-supplied bottles, containing preservative where required, stored on ice and submitted under standard chain of custody procedures to the laboratory. Vials used for VOC/BTEX and PHC F1 analysis were filled to achieve zero headspace.

A total of 11 groundwater samples, including three blind field duplicate samples, were submitted to the laboratory for chemical analysis, as summarized in the following table:

Table 3-2 Groundwater Samples Submitted for Chemical Analysis

SAMPLE ID	LABORATORY ANALYSES
17-01	PHCs, VOCs, PAHs, M&I
17-02 and duplicate MW300 (PFAS only)	PHCs, VOCs, PAHs, M&I, PCBs, PFAS
17-03 and duplicate MW200 (PAHs and PCBs only)	PHCs, VOCs, PAHs, M&I, PCBs
17-05	PHCs, VOCs, M&I
17-06	PHCs, BTEX, M&I
17-10 and duplicate MW100	PHCs, VOCs, M&I
17-11	PHCs, VOCs, PAHs, M&I, PCBs
12-1	PHCs, BTEX, M&I

3.8 GROUNDWATER: FIELD MEASUREMENT OF WATER QUALITY PARAMETERS

The field groundwater quality measurements were obtained during low flow sampling. A YSI 556 multi-parameter flow-through cell was used to measure pH, conductivity, redox potential, dissolved oxygen and temperature in the field during low flow sampling. All measurements were recorded in the project field book, which is maintained on file. The groundwater samples collected were described as either clear and colourless or cloudy and brown with no odour detected or visible sheen.

3.9 ANALYTICAL TESTING

PFAS analysis was completed by ALS laboratory in Waterloo, Ontario.

All other laboratory analyses were completed by Maxxam Analytics (Maxxam) in Mississauga, Ontario.

ALS and Maxxam are certified by the Standards Council of Canada (SCC) and the Canadian Association for Laboratory Accreditation Inc. (CALA).

3.10 SURVEYING

Ground surface and top of pipe elevations and UTM coordinates of the monitoring wells and borehole locations were surveyed by WSP personnel using a Sokkia Network GCX2 Rover GPS unit on July 12, 2017.

4 PHASE II REVIEW AND EVALUATION

4.1 GEOLOGY

A brief summary of the subsurface conditions encountered at the Site is presented below. Detailed borehole logs are included in Appendix A.

The boreholes were advanced through a surface layer of either topsoil (17-01, 17-04, 17-05, 17-06, 17-07, 17-08, and 17-10), sand and gravel (17-02 and 17-03), fill (17-11 and 17-12), or asphalt (17-09). Native silty clay to clayey silt glacial till (Halton Till) was encountered beneath the surface layer. The Halton Till unit extended to the maximum drilling depth of 7.6 mbgs.

Regional geological mapping shows bedrock in the area consists of red shale of the Queenston Formation. The overburden drift thickness at the Site is estimated to range from approximately 21 to 30 m.

4.2 GROUNDWATER ELEVATIONS AND FLOW DIRECTION

Groundwater elevations were measured in the monitoring wells on July 24, 2017. The groundwater elevations and depths are summarized in the following table and presented on Figure 4. We note that the water levels measured in 17-02 and 17-06 were still rising and the reported levels in these wells do not represent static conditions.

Table 4-1 July 24, 2017 Groundwater Elevations

MONITORING WELL ID	TOP OF PIPE ELEVATION (mASL)	GROUND SURFACE ELEVATION (mASL)	DEPTH TO GROUNDWATER (mBGS)	GROUNDWATER ELEVATION (mASL)
17-01	98.713	97.83	1.88	95.95
17-02	98.567	97.64	3.94*	93.71
17-03	97.631	97.72	0.61	97.11
17-05	98.798	97.82	0.87	96.95
17-06	97.528	97.61	5.76*	91.86
17-10	98.761	97.77	2.22	95.55
17-11	97.632	96.72	0.98	95.74
12-1	97.468	97.67	0.56	97.11
12-2	97.107	97.36	0.47	96.89

Notes:
* value does not represent the static water level at this location.

Based on the topography of the Site, the direction of shallow groundwater flow is inferred to be to the north.

4.3 SOIL QUALITY

Laboratory analysis results for the submitted soil samples are summarized in the attached Table 1. Laboratory Certificates of Analysis are provided in Appendix B.

The following table summarizes the parameters that exceeded the applicable Table 2 SCS in the submitted soil samples. The exceedances are also depicted on Figure 5.

Table 4-2 Summary of Parameter Exceedances in Soil

SAMPLE ID	PARAMETER	UNITS	TABLE 2 SCS	MEASURED VALUE
17-01 S2	Conductivity	mS/cm	1.4	2
17-05 S2	Conductivity	mS/cm	1.4	2.3

4.4 GROUNDWATER QUALITY

Laboratory analysis results for the submitted groundwater samples are summarized in the attached Table 2. Laboratory Certificates of Analysis are provided in Appendix B.

The following table summarizes the parameters that exceeded the applicable Table 2 SCS in the submitted groundwater samples. The exceedances are also depicted on Figure 6.

Table 4-3 Summary of Parameter Exceedances in Groundwater

SAMPLE ID	PARAMETER	UNITS	TABLE 8 SCS	MEASURED VALUE
17-01	Cobalt Sodium Uranium	µg/L µg/L µg/L	3.8 490000 20	13 590000 69
17-02	Uranium	µg/L	20	55
17-05	Uranium	µg/L	20	69
17-06	Cobalt Selenium Uranium	µg/L µg/L µg/L	3.8 10 20	7.4 20 59
17-10	Sodium Uranium	µg/L µg/L	490000 20	680000 85
17-11	Uranium	µg/L	20	31
12-1	Cobalt Sodium Uranium	µg/L µg/L µg/L	3.8 490000 20	32 740000 100

4.5 QUALITY ASSURANCE AND QUALITY CONTROL RESULTS

Six blind duplicate soil samples and three blind duplicate groundwater samples were submitted for laboratory analysis. The calculated RPDs were assessed against the recommended performance criteria outlined in the 2011 Protocol.

The soil results indicated acceptable correlation between duplicate samples with the following exceptions:

— Barium concentrations of 100 and 180 µg/g were measured in duplicate samples 17-01 S2 and 17-01 S20 (RPD = 57%). Given that the barium concentration was below the applicable Table 2 SCS in both samples, it can be concluded with a reasonable level of confidence that the concentration of barium in soil at this location met the applicable Table 2 SCS despite some variability.

— Conductivity values of 2.3 and 0.94 mS/cm were measured in duplicate samples 17-05 S2 and 17-05 S20 (RPD = 84%). The applicable Table 2 SCS for conductivity is 1.4 µg/g. In this case, there is disagreement between the duplicate

samples as to whether the soil meets the applicable standard. For the purposes of this due diligence assessment we have considered this sample to exceed the Table 2 SCS.

The groundwater results indicated acceptable correlation between duplicate samples, and were therefore suitable for interpretation.

A trip blank (distilled water sample), prepared by the laboratory, travelled along with the groundwater samples and was analyzed by the laboratory for VOCs. All concentrations were below the RDL, indicating no contamination from the sample containers, preservatives, and transportation and storage conditions. The results also indicate that the laboratory instrument was not detecting false interference.

ALS and Maxxam also carried out internal QA/QC measures including process recoveries, blanks, and replicate samples. The laboratory QA/QC results are provided on the Certificates of Analysis in Appendix B. The results were acceptable and therefore suitable for interpretation.

5 DISCUSSION AND CONCLUSIONS

Based on the results of the investigation, the following conclusions are presented:

- Native soil at the Site consists of silty clay to clayey silt glacial till (Halton Till). The boreholes were terminated within the Halton Till unit at depths of 6.1 mbgs or 7.6 mbgs.
- At boreholes 17-11 and 17-12, 1.5 m and 2.4 m of imported fill material was observed overlying the native soil.
- Shallow groundwater was measured between depths of 0.47 and 5.76 mbgs and the groundwater flow direction is inferred to be to the north towards Lake Ontario.

Soil Quality

- The submitted soil samples met the applicable Table 2 SCS for the contaminants of concern with the exception the following two samples:
  - Samples 17-01 S2 and 17-05 S2, collected at a depth of 0.76 to 1.52 mbgs, exceeded the applicable Table 2 SCS for conductivity. These boreholes were located within APEC 1 (airstrips and hangars) and APEC 6 (boat manufacturing). The conductivity exceedances in these samples may be related to these activities or road salting practices.

Groundwater Quality

- Seven of the eight groundwater samples submitted for laboratory analysis exceeded the Table 2 SCS for one or more parameters. The following analysis and interpretation of the exceedances is provided:
  - Samples 17-01, 17-06 and 12-1 exceeded the applicable Table 2 SCS for cobalt. These wells are located on the south side of the Site, spread over a distance of approximately 590 m. The source of elevated cobalt in the groundwater is not known; it may be naturally occurring, or it may be an anthropogenic source such as aircraft and truck exhaust or industrial processes.
  - Samples 17-01, 17-10 and 12-1 exceeded the applicable Table 2 SCS for sodium. These wells are located on the south side of the Site, spread over a distance of approximately 630 m. The elevated sodium in groundwater may be caused by the application of road salt to paved surfaces on and around the Site.
  - Selenium was measured at a concentration of 20 µg/L in sample 17-06, exceeding the applicable Table 2 SCS of 10 µg/L. This well is located within APEC 7 (former refuelling area). The source of elevated selenium in the groundwater at this location is not known but it may be naturally occurring. Selenium is not considered to be a contaminant of concern related to fuel storage and handling activities, which occurred at this location. We note that with the exception of well 17-02, where selenium was measured at a concentration of 2.6 µg/L, selenium was not detected in any of the other monitoring wells on-site.
  - Uranium in groundwater exceeded the applicable Table 2 SCS of 20 µg/L at seven of the eight monitoring wells, with concentrations ranging from 31 to 100 µg/L. Well 17-03 was the only location that did not exceed the applicable standard. The source of elevated uranium in the groundwater is not known; however, given its widespread distribution across the Site, and the absence of any known anthropogenic sources, it is most likely naturally-occurring due to the dissolution of uranium bearing minerals in the soil.

Based on the work completed, soil and groundwater quality on the Site do not meet the applicable Table 2 SCS. We note that proposed amendments to O. Reg. 153/04 may eliminate the need to address exceedances for conductivity in soil and sodium in groundwater related to the use of road salt.

The following recommendations are provided for your consideration:

- Additional soil sampling is recommended to characterize the imported fill material within APEC 9.
- The monitoring wells should be re-sampled to confirm the exceedances noted at the Site. We note that the exceedances in groundwater may be naturally occurring or related to road salting practices.
- The monitoring wells at the Site should be maintained in accordance with O. Reg. 903. If they are no longer in use, the monitoring wells should be decommissioned by a licenced well contractor in accordance with O. Reg. 903.

6 LIMITATIONS

This report has been prepared for the addressee. Release to any other company, concern, or individual is solely the responsibility of the addressee. WSP reserves the right to amend and/or supplement this report in the event additional information, documentation or evidence becomes available.

The information and conclusions contained in this report are based upon work undertaken by trained professional and technical staff in accordance with generally accepted engineering and scientific practices current at the time the work was performed. Any use that a third party makes of this report, or any reliance on decisions made based on it, is the responsibility of such third parties. WSP accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made, or actions taken, based on this report.

Conclusions presented in this report should not be construed as legal advice and represent the best technical judgment of WSP staff. The conclusions are based on the Site conditions observed by WSP at the time the work was performed at the 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. Due to the nature of the investigation and the limited data available, WSP cannot warrant against undiscovered environmental liabilities or adverse impacts off-Site.

If any conditions become apparent that differ significantly from our understanding of conditions as presented in this report, we request that we be notified immediately to reassess the conclusions and recommendations provided herein.

7 QUALIFICATIONS OF THE ASSESSORS

Ms. Rachel Bryan, M.A.Sc., P.Eng., QP_{ESA}, is a Project Engineer in the Hamilton, Ontario office of WSP. She has experience in conducting Phase I and II Environmental Site Assessments on numerous residential, commercial, and industrial properties. Ms. Bryan also has experience in completing soil and groundwater contaminant delineation programs and is a Qualified Person (QP_{ESA}) with the MOECC under Ontario Regulation 153/04. She has also directed the implementation of soil remediation programs, verification sampling, and site restoration activities.

Mr. David A. MacGillivray, P.Eng., P.Geo., $QP_{ESA,RA}$, is the National Discipline Lead for Contaminated Lands and Environmental Site Assessments for WSP Canada. He is responsible for the operations of the environment group at WSP's Hamilton location. Mr. MacGillivray's career experience has included assignments involving Brownfields such as Phase One and Two ESAs, Record of Site Conditions, Risk Assessments, and Risk Management Plans. He has worked extensively in the area of groundwater resource development and groundwater impact assessment. Mr. MacGillivray also provides expertise in the completion of geotechnical and groundwater control studies for civil projects including subdivisions, transportation, buildings, and servicing. Mr. MacGillivray is a Qualified Person ($QP_{ESA,RA}$)with the Ministry of the Environment to complete Risk Assessments and submit Records of Site Condition under Ontario Regulation 153/04 (Brownfield Regulation).

8 BIBLIOGRAPHY

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