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Appendix 4
Niagara Central Dorothy Rungeling Airport
Phase II Environmental Assessment Report

PHASE II ENVIRONMENTAL SITE ASSESSMENT
NIAGARA CENTRAL DOROTHY RUNGELING AIRPORT
435 RIVER ROAD
PELHAM, ONTARIO

Submitted to:

NIAGARA CENTRAL DOROTHY RUNGELING AIRPORT
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Pelham, Ontario
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Submitted by:

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- Amec Foster Wheeler – 1 electronic copy.

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1.0 INTRODUCTION

Amec Foster Wheeler Environment & Infrastructure, a division of Amec Foster Wheeler Americas Limited (Amec Foster Wheeler), was retained by Mr. Richard Rybiak of Niagara Central Dorothy Rungeling Airport (the CLIENT or NCDRA) to conduct a Phase II Environmental Site Assessment (ESA) of the property located at 435 River Road in Pelham, Ontario (the Site). A key plan showing the location of the Site is provided in **Figure 1**. At the time of the Phase II ESA, the Site was owned by an airport commission consisting of four municipalities (Pelham, Welland, Port Colborne and Wainfleet). It was occupied by NCDRA, as well as various tenants including Niagara Sky Dive Centre Inc., the Royal Canadian Air Cadets (RCAC) and various private individuals which own the eleven (11) on-Site hangars. Reportedly, these private individuals rent the land from NCDRA and can construct, own and occupy the hangar structures. In addition, farmland around the perimeters of the Site are leased to neighbouring land owners for agricultural purposes, while a small area on the south side of the Site is leased to a weather company who utilizes this area as a weather recording station. **Figure 2** illustrates the lot configuration of the Site.

The CLIENT retained Amec Foster Wheeler to provide an evaluation of known and possible environmental issues at the Site for due diligence purposes prior to potentially transitioning ownership of the Site to the Regional Municipality of Niagara (RMON).

1.1 Background

Amec Foster Wheeler completed a Phase I ESA at the Site entitled, "*Phase I Environmental Site Assessment, Niagara Central Dorothy Rungeling Airport, 435 River Road, Pelham, Ontario" (Phase I ESA) draft report* dated October 5, 2017 and prepared for the Client (reference # TG171038). There were no changes in ownership or occupancy of the Site between completion of the Phase I and II ESAs.

The following conclusions were presented in the Phase I ESA:

Based on a review of the available information sources, including discussions with the Site representatives, it appears that the Site was utilized for agricultural purposes until the early 1940s when, during the Second World War, it was developed for the purposes of training RCAF pilots. After the war, the airport continued to be utilized for the training of private pilots and soon became a recreational and commercial airport facility. At the time of the reconnaissance, the Site was owned by an airport commission consisting of four municipalities (Pelham, Welland, Port Colborne and Wainfleet). It was occupied by NCDRA, as well as various tenants including Niagara Sky Dive Centre Inc., the RCAC and various private individuals which own the eleven (11) on-Site hangars. Reportedly, these private individuals rent the land from NCDRA and can construct, own and occupy the hangar structures. In addition, farmland around the perimeters of the Site are leased to neighbouring land owners for agricultural purposes, while a small area on the south side of the Site is leased to a weather company who utilizes this area as a weather recording station.

The following potentially significant environmental issues were identified concerning the Site:

- *The Site has been utilized as an airport facility since the early 1940s. As part of this activity, it is presumed that various fuel tanks (for fueling planes and building heating purposes) and maintenance chemicals have been present on the Site. Currently, there are three (3) aboveground storage tanks (ASTs) utilized for heating fuel and two (2) underground storage tanks (USTs) utilized for aviation fuel present at the Site.*

- *Falls Aviation Limited at the Site was listed as an industrial waste generator (ON6036283) for waste oils and lubricants (waste class 252) in 2003, 2004, 2010, 2011 and 2012. This is presumed to be associated with the plane maintenance and repair operations that occur at the Site.*

- *A maintenance shop was historically present (i.e., early 1940s to early 1970s) on the south side of the Site. Discussions with the Site representatives confirmed that this was a full mechanical garage with pits utilized for the purposes of servicing vehicles.*

- *Historically, barracks, along with an incinerator (which is still present) were also located at the Site. The historic heating fuel utilized in the barracks is unknown. Additionally, it is unknown what materials were historically incinerated in the incinerator.*

- *As per discussion with the Site representatives and the Ontario Spills database, a plane collision in October 2016 resulted in 2,400 pounds of aviation fuel being spilled to the ground. Based on the ERIS report and discussions with the Site representatives, all the spilled aviation fuel was contained and properly cleaned up; however, a report detailing the clean-up activities was not provided to Amec Foster Wheeler for review.*

- *Based on the original date of construction of Hangars 1 and 3 and the pump house (i.e., early 1940s), as well as Hangar 2 (i.e., 1970s), asbestos containing materials (ACMs), lead containing paint and polychlorinated biphenyls (PCBs) in fluorescent light ballasts may be present.*

Based on a review of the available information sources, the properties surrounding the Site have always been utilized for agricultural and residential purposes. Based on a review of the available information sources and on observations of current and historical surrounding properties (from publicly accessible locations), it is Amec Foster Wheeler's opinion that no significant environmental issues were identified concerning the Site's surrounding land use activities.

Based on the Phase I ESA completed by Amec Foster Wheeler, there is evidence of potential contamination associated with the Site. A Phase II ESA is recommended to address these potential concerns.

In addition, to address potential operational / management issues, Amec Foster Wheeler offers the following recommendation:

- *A Designated Substances Survey (DSS) is required if future repair, renovation or demolition activities are planned which could affect possible ACMs, LCPs and PCB containing fluorescent light ballasts. A DSS is required to fulfil the Owner's requirements under Section 30 of the Ontario Occupational Health and Safety Act, (the OHSA), Revised Statutes of Ontario 1990, (as amended). The building owner must provide the DSS report to all contractors working on the Property. Subsequently, all contractors must provide the DSS report to their subcontractors.*

1.2 Objective and Scope of Work

Amec Foster Wheeler's scope of work for the Phase II ESA included the drilling of seven boreholes (with associated soil sampling and analytical programs), installation of five ground water monitoring wells (with associated ground water sampling and analytical program) and collection of a surface soil sample, in an effort to determine Site characteristics and contaminants of potential concern (COPCs) including, metals, including hydrides, mercury, general inorganics (including electrical conductivity [EC], sodium adsorption ratio [SAR] and cyanide, free), fractionized petroleum hydrocarbons (PHCs) in the F1 to F4 ranges, volatile organic compounds (VOCs) or benzene, toluene, ethyl benzene and xylenes (collectively referred to as BTEX, a short list of VOC parameters typically associated with PHCs), polycyclic aromatic hydrocarbons (PAHs) and organochlorine pesticides (OCs). The surface sample, boreholes and monitoring wells were placed in exterior areas of the Site to address concerns identified in the Phase I ESA, as follows:

- BH/MW1 – in front (west) of old maintenance shop;
- BH/MW2 – behind the Air Cadets hangar, adjacent to a fuel oil aboveground storage tank (AST);
- BH/MW3 – in front (west) of current maintenance shop;
- BH/MW4 – adjacent to the Jet A fuel underground storage tanks (USTs);
- BH5 – adjacent to the east runway;
- BH/MW6 – on the abandoned (central) runway;
- BH7 – off the main (west) runway, in an area where a spill had previously occurred in October 2016; and
- SS101 – in the area of the former on-Site incinerator.

It is Amec Foster Wheeler's understanding that the Phase II ESA is not required for filing a Record of Site Condition (RSC) under Ontario Regulation 153/04 (*O. Reg. 153/04*, as amended). As such all work completed under this project was performed in general accordance with standard engineering practices and the following documents:

- Ministry of the Environment (MOE) document entitled "*Guide for Completing Phase Two Environmental Site Assessments under Ontario Regulation 153/04*" dated June 2011;

- Ministry of the Environment and Energy (MOEE) document entitled "*Guidance on Sampling and Analytical Methods for Use at Contaminated Sites in Ontario*", dated December 1996;

- MOE document entitled "*Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act*" issued by the Laboratory Services Branch of the MOE and dated March 9, 2004, amended as of July 1, 2011 (Analytical Protocol); and

- All analytical results were compared to the appropriate standards identified in the Ministry of the Environment and Climate Change (MOECC) document entitled; *"Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act"* dated April 15, 2011 (MOECC SCS).

All work completed during the Phase II ESA was carried out in accordance with the Terms of Reference as provided in Amec Foster Wheeler's proposal dated August 4, 2017 and signed by the Client on August 14, 2017. It must be noted that the scope of work completed by Amec Foster Wheeler, as part of this assessment, may not be sufficient (in and of itself) to meet the reporting requirements for the submission of a RSC in accordance with *O. Reg. 153/04*, as amended. If a RSC is an intended product of work conducted at the Site, further consultation and/or work is required.

2.0 WORK PROGRAM AND METHODOLOGY

This section describes the methods used during this subsurface investigation work, including all drilling, and soil and ground water sampling activities. Laboratory quality assurance/quality control (QA/QC) procedures are also discussed.

Borehole drilling, soil sampling and ground water monitoring well installation activities were undertaken on September 11 and 12, 2017. Ground water monitoring well development and sampling activities were undertaken between September 19 and 21, 2017.

All borehole and monitoring well locations in the investigation area are illustrated on **Figure 2**. The borehole locations were selected to address areas of potential environmental concern identified during the Phase I ESA, as noted in Section 1.1.

The borehole drilling, monitoring well installation and soil and ground water sampling procedures used are detailed below.

2.1 Field Preparation

2.1.1 Subsurface Utility Locates

The locations of all buried and overhead services were obtained prior to the initiation of the subsurface investigation. Peninsula Video and Sound (PVS), located some of the public utilities on-Site (telephone, natural gas, hydro), as per their contract with Ontario-One-Call and the service providers. Niagara Locates Inc., a specialist private utility locating firm, was retained to undertake the private subsurface utility locates (for utilities not located by the above-referenced service providers).

2.2 Subsurface Investigations and Soil Sampling

2.2.1 Borehole Drilling and Soil Sampling

Under the supervision of Amec Foster Wheeler, a total of seven boreholes were drilled and five ground water monitoring wells were installed on September 11 and 12, 2017 by Direct Environmental Drilling (DED) of St. Thomas, Ontario (MOE License Number 7320). The boreholes were advanced to a maximum depth of between 3.0 and 6.7 metres below ground surface (mbgs) using a Geoprobe 7822 DT track mounted drill rig. Continuous samples were obtained in 1.5 m intervals throughout the borehole advancement. Soil cuttings generated during the investigation were minimal and left on-Site in a 208 Litre (L) steel drum. The locations of the boreholes and monitoring wells are shown on **Figure 2**. Details of the borehole drilling, as well as soil sampling, are provided in the borehole logs in **Appendix A**. All drilling activities were completed under the supervision of Amec Foster Wheeler field staff.

2.2.2 Surface Soil Sampling

On September 11, 2013, Amec Foster Wheeler collected one (1) grab (discrete) surface soil sample (SS101) from the topsoil located in the immediate vicinity of the former on-Site incinerator. The approximate sampling location is shown on **Figure 2**. The soil sample was placed in a labeled, laboratory-provided container, and was stored on ice in an insulated cooler for shipment to the laboratory.

2.2.3 Field Screening Measurements

All soil samples collected during drilling were screened in the field for gross evidence of negative environmental impact including staining and odours. Soil sample headspace screening was also performed to facilitate sample selections for laboratory analysis and to provide an assessment of the vertical contaminant distributions at each location. The duplicate soil sample fractions were screened for combustible organic vapour (COV) and total organic vapour (TOV) concentrations using the sample headspace method. COV and TOV concentrations were measured using an RKI EAGLE 2™ combustible vapour analyzer equipped with dual sensors and calibrated to known hexane and isobutylene standards and operated in methane elimination mode. The RKI EAGLE 2™ can detect 0-11,000 parts per million (ppm) and 0-100 % Lower Explosive Limit (LEL) with an accuracy of ±5% and the calibration standard is Hexane. The equipment is calibrated every day prior to the commencement of fieldwork.

The TOV/COV screening measures the cumulative organic/combustible vapour present within sample headspace. TOV/COV results are semi-quantitative at best and are generally only used for relative sample comparison purposes when selecting samples from individual boreholes for laboratory analysis.

The soil vapour concentrations are included in the borehole logs in **Appendix A**.

2.2.4 Sample Logging and Handling

The soil samples retrieved during the field investigations were examined, classified, and logged per soil type, moisture content, colour, consistency, and presence of visual and/or olfactory indicators of negative impact.

All soil samples were collected in accordance with strict environmental sampling protocols to minimize loss of volatile organics and to ensure reliable and representative results. All soil sampling equipment was thoroughly decontaminated between soil sample locations to prevent potential cross-contamination. Decontamination activities included:

- Physical removal of any adhered debris;
- Wash/scrub in “Alconox” soap solution;

- Distilled water rinse; and
- Methanol rinse/air drying.

Soil samples were split into duplicate fractions upon recovery. The primary sample fractions were placed into glass jars with Teflon-lined lids supplied by the laboratory with no preservative and samples that were potentially going to be submitted for analysis for PHC F1 and VOC/BTEX were sampled using dedicated laboratory prepared syringes into a 40 milliLitre (mL) vial preserved with methanol and delivered to the laboratory within 48 hours. All samples were subsequently stored in coolers on ice for future potential laboratory analysis. The duplicate sample fractions were placed in resealable plastic sample bags. Each sample was labeled using a unique identifier (borehole of origin and depth interval below grade). All samples were delivered to the laboratory under continuous Chain of Custody documentation.

All laboratory chemical analyses were conducted by Paracel Laboratories Limited (Paracel), an ISO 17025-accredited laboratory located in Ottawa, Ontario, except for OCs. The OC samples were subcontracted by Paracel to Testmark Laboratories Ltd., an ISO 17025-accredited laboratory located in Garson, Ontario.

The criteria for the selection of soil samples for laboratory analysis were based visual/olfactory observations and TOV/COV readings. The soil samples were submitted for pH determination, and analysis of metals including hydrides, mercury, general inorganics (EC, SAR and cyanide, free), PHCs, VOCs or BTEX, PAHs and OCs. The specific borehole/monitoring well locations and depth intervals of samples selected for analysis and the parameters they were submitted for are included in the Tables appendix at the end of this report.

2.3 Monitoring Well Installations

Overburden monitoring wells were installed at five locations, BH/MW1, BH/MW2, BH/MW3, BH/MW4 and BH/MW6 (**Figure 2**). These wells were installed to obtain hydrogeologic and ground water quality information from the hydrostratigraphic zone. These locations were selected for the monitoring wells as they represent the areas on the Site with the highest potential for ground water impact (refer to Section 1.2).

The monitoring wells were constructed using 51-millimetre (mm) diameter, schedule 40, flush-joint threaded PVC monitoring well supplies. The wells were completed with a 3.05 m length of #10 mill slotted intake screen. The top of the intake screen was then extended to the ground surface using solid riser pipe. A silica sand filter pack was placed between the intake screen and the wall of the borehole. The filter pack was extended approximately 0.3 m above the top of the well screen. A bentonite seal was placed above the sand pack to surface. The wells were completed with flush mount protective casings. Details of the monitoring well construction are included in the borehole logs in **Appendix A**.

2.3.1 Well Development, Ground Water Level Measurement, Purging and Sampling

The ground water monitoring wells installed at the Site during the investigation were instrumented with dedicated Waterra™ foot valve inertial pumps fitted with polyethylene tubing to facilitate well development. The newly installed wells were developed on September 19, 2017 by purging three well volumes using dedicated instrumentation (i.e., foot valve and tubing) or by purging dry two times. The monitoring wells were subsequently purged using low flow sampling techniques on September 21, 2017 until various parameters (including pH, conductivity and temperature) had reached stabilization criteria. During development and purging, an oil/water interface meter was used to measure potential accumulations of Light Non-Aqueous Phase Liquids (LNAPL) or Dense Non-Aqueous Phase Liquids (DNAPL), and ground water levels in the well.

Following monitoring and purging activities, Amec Foster Wheeler collected a ground water sample from each monitoring well into labelled, laboratory-provided containers using the low flow sampling system with dedicated instrumentation. The samples were stored in a cooler on ice after collection and during transportation to the laboratory where they were delivered under continuous Chain of Custody documentation. The sampling methodology including jar, bottle and preservative requirements followed the Analytical Protocol.

The representative ground water samples collected during the investigation was submitted for laboratory analysis of suspect COPCs including metals, EC, SAR, PHCs, VOCs or BTEX and OCs. All laboratory chemical analyses were conducted by Paracel.

3.0 RESULTS OF THE FIELD INVESTIGATION

3.1 Site Geology

The subsurface conditions encountered at the Site are described in the borehole logs provided in **Appendix A**.

In general, the surficial conditions encountered at the Site during the borehole drilling program consisted of surface structure (asphalt over granular fill at BH6, topsoil at BH/MW2 and BH/MW5, and sandy gravel fill at all other boreholes) extending to depths between 0.1 and 0.3 mbgs, overlying a layer of fill to a maximum of 1.7 mbgs. The fill layer generally consisted of silty clay / clayey silt fill, with traces of fine to medium gravel, organics and/or silty sand, and black, grey or light brown seams. Pieces of brick were also observed in the fill in BH/MW4.

The fill was found to overly a native brown silty clay / clayey silt with traces of silty sand, fine to medium gravel, and/or organics, and grey, red or light brown seams to the maximum drilled depth of 6.7 mbgs.

All boreholes were open and dry upon completion of the drilling program. The ground water levels measured in the five monitoring wells prior to development ranged from 1.5 to 5.4 mbgs and prior to sampling ranged from 3.9 to 5.8 mbgs.

3.2 Field Measurements

3.2.1 Staining and Odours

Visual and/or olfactory evidence of petroleum hydrocarbon or any other chemical-like impact was not observed during the drilling program except for some dark staining (no odour detected) in BH/MW3 (0.1-1.5 mbgs). The dark staining was inferred to be natural organics (confirmed by laboratory analysis, refer to Section 5.1).

3.2.2 COV and TOV Concentrations

COV concentration headspace measurements recorded in the soil samples collected from the boreholes ranged from non-detectable to 70 parts per million (ppm) in all samples except for BH/MW3-4 and BH/MW6-4 (190 ppm and 260 ppm, respectively). TOV concentration headspace measurements recorded in the soil samples collected from the boreholes ranged from non-detectable to 2 ppm. The COV and TOV concentrations headspace measurements are summarized in the borehole logs in **Appendix A**.

It is Amec Foster Wheeler's opinion that the results of the screening program suggest a low potential for the presence of significant combustible soil headspace vapour levels in the soil/fill samples collected from the boreholes, except for BH/MW3-4 and BH/MW6-4, which had a slightly higher potential for the presence of significant combustible soil headspace vapour. Laboratory analysis was performed to confirm and quantify these results.

3.2.3 LNAPL and DNAPL

During the development, purging and sampling of the monitoring wells, no LNAPL or DNAPL were observed.

4.0 REGULATORY FRAMEWORK

The SCS applicable to the Site have been evaluated based on the following rationale:

- The Site is occupied by an airport, which is classified as industrial use in accordance with *O. Reg. 153/04*;

- Grain size analyses was completed on a representative sample of the soils encountered on-Site (a composite of BH/MW1-3, BH/MW3-1, BH/MW3-2). The results of the grain size analyses indicated the sample is classified as medium and fine grained (i.e., contains 50% or more by mass of particles that are smaller than 75 µm (*O. Reg. 153/04, s.42 (2)*) with 97% passing the 75 µm sieve. As such, the Site has been classified as having medium and fine textured soils;

- No wells are present on the Site; however, the Site is in a rural area where water service is not available, and based on a search of the MOECC interactive well record mapping tool completed for the Phase I ESA, domestic wells are present at various properties within 250 m of the Site. As such, the SCS for use in a potable ground water condition are applicable to the Site;

- In accordance with *O. Reg. 153/04*, the Site includes land that is within 30 m of a "water body" (i.e., Welland River);

- Based on the boreholes drilled for the Phase II ESA, the depth to bedrock is greater than 2 m; and

- The Site was evaluated against the criteria for *Environmentally Sensitive Areas*, as defined by *O. Reg. 153/04* as amended:

    - Soil pH values were reported between 7.2 and 7.6 in the four soil/fill samples submitted from the borehole samples. The reported soil pH for all soil samples was within 5.0 to 9.0 units for surface soil (surface to 1.5 mbgs) and 5.0 to 11.0 units for subsurface soil (below 1.5 mbgs) (**Table 2**).

    - The Site, and lands within 30 m of the Site, were assessed for *Areas of Natural Significance*, as defined by *O. Reg. 153/04* as amended. The Site is classified as an Area of Natural Significance as:

        - Based on a review of the Niagara Region Core Natural Heritage Map, lands to the northeast, northwest and southwest of the Site are identified as Core Natural Areas (*Environmental Conservation Areas* and *Environmental Protection Areas.*

- Based on a review of the Town of Pelham Official Plan, Schedule B, the lands noted above are identified as Provincially Significant Wetlands (PSW), and lands to the northwest and east of the Site area classified as Deer Wintering Areas (Significant Wildlife Habitat). The woodlot northwest of the Site was labelled *"Welland Airport Woodlot"*, and the lands south of the Site were identified as E.C. Brown Conservation Area.

Based on the above site characteristics (specifically, the presence of an Area of Natural Significance within 30 m of the Site), the SCS currently applicable to the Site, if a RSC were to be filed for the Site, are the Table 1 Full Depth Background Site Condition Standards, residential/parkland/institutional/industrial/commercial/community property use and medium and fine textured soils (Table 1 SCS). However, it is noted that all borehole/monitoring well locations are located greater than 30 m from any Areas of Natural Significance and greater than 30 m from any water body and there is no intent to file a RSC for the Site. As such, as this Phase II ESA is being completed for due diligence purposes, the results have been compared to the Table 2 Full Depth Generic Site Condition Standards in a Potable Ground Water Condition, industrial/commercial/community property use and medium and fine textured soils (Table 2 SCS). The results have also been compared to the Table 1 SCS for reference.

5.0 LABORATORY ANALYSES

5.1 Soil Sample Analyses

The results of the soil sample analyses, and their respective Tables 1 and 2 SCS, are summarized in **Tables 1 through 4**. The laboratory certificates of analysis are included in **Appendix B**.

The results of the analyses are summarized below:

- Seven samples from the borehole drilling program (BH/MW1-1c, B/H/MW2-1c, BH/MW2-4d, BH/MW4-1c and its field duplicate Dup B, BH5-1A and BH/MW6-1Bc) were submitted for pH determination. The pH ranged from 7.2 to 7.6 for surficial soils and was 7.6 for subsurface soils.

- Seven samples from the borehole drilling program (BH/MW1-1c, B/H/MW2-1c, BH/MW3-1c, BH/MW4-1c and its duplicate Dup B, BH5-1A, BH/MW6-1Bc) were submitted for EC and SAR analyses. EC and SAR were below the Table 2 SCS in all samples.

    - When compared to the Table 1 SCS, the following exceedance was identified:

        - EC in BH/MW6-1bc (943 microSiemens per centimetre [µS/cm]) versus the Table 1 SCS of 570 µS/cm.

- One sample from the borehole drilling program (BH/MW1-1c) was submitted for Cyanide, free analyses. Cyanide, free was not detected above the laboratory method detection limit (MDL) and was therefore below the Tables 1 and 2 SCS in this sample.

- Eight samples from the borehole drilling program (BH/MW1-1c, B/H/MW2-1c, BH/MW3-1c, BH/MW4-1c and its duplicate Dup B, BH5-1A, BH/MW6-1Bc, BH7-1bc) and one surface soil sample (SS101) were submitted for metals analyses. Concentrations of metals parameters were not detected above the laboratory MDLs and/or were below the Table 2 SCS in all samples with the following exceptions:

    - Lead in SS101 (257 micrograms per gram {µg/g}) versus the Table 2 SCS of 120 µg/g.

    - When compared to the Table 1 SCS, in addition to the lead noted above (Table 1 SCS for lead is also 120 µg/g), the following exceedances were identified:

        - Antimony in SS101 (5.2 µg/g versus the Table 1 SCS of 1.3 µg/g); and

        - Zinc in SS101 (327 µg/g versus the Table 1 SCS of 290 µg/g).

- Two samples from the borehole drilling program (BH/MW3-4d and BH/MW6-4d) were submitted for VOC analyses, five samples were submitted for PHC and BTEX analyses (BH/MW1-1d, BH/MW2-4d, BH/MW3-1d, BH/MW4-1d, BH7-1bd) and one sample (BH/MW4-2AD) was submitted for PHC analyses. Concentrations of PHC and VOC/BTEX parameters were not detected above the laboratory MDLs or were below the Table 2 SCS in all samples.
    - When compared to the Table 1 SCS, all submitted samples were below the Table 1 SCS for VOCs/BTEX, however, the following exceedances for PHCs were identified:
        - F3 and F4 range PHCs in BH/MW1-1d (307 µg/g and 149 µg/g respectively versus the Table 1 SCS of 240 µg/g and 120 µg/g, respectively); and
        - F4 range PHCs in BH/MW4-2AD (545 µg/g versus the Table 1 SCS of 120 µg/g).
- One surface sample (SS101) was submitted for PAH analyses. PAHs were not detected above the laboratory MDLs or were present at levels below the Tables 1 and 2 SCS.
- Three samples from the borehole drilling program (B/H/MW2-1d, BH/MW6-1A and BH7-1A) were submitted for OCs analyses. Concentrations of OCs parameters were not detected above the laboratory MDLs and were below the Tables 1 and 2 SCS in all samples.

5.2 Ground Water Sample Analyses

The results of the ground water sample analyses, and their respective Table 2 SCS, are summarized in **Tables 5 through 7**. The laboratory certificates of analysis are included in **Appendix B**.

The results of the analyses are summarized below:

- Five ground water samples (BH/MW1, BH/MW2, BH/MW3, BH/MW4 and BH/MW6) were submitted for metals analysis. Concentrations of metals parameters were not detected above the laboratory MDLs and/or were below the Table 2 SCS with the following exceptions:
    - Cobalt in BH/MW4 (6.2 micrograms per Litre [µg/L]) versus the Table 2 SCS of 3.8 µg/L;
    - Sodium in BH/MW6 (568,000 µg/L) versus the Table 2 SCS of 490,000 µg/L; and

- Uranium in BH/MW3, BH/MW4 and BH/MW6 (34.5, 35.4 and 36.6 µg/L respectively) versus the Table 2 SCS of 20 µg/L.

- When compared to the Table 1 SCS, in addition to the exceedances noted above (Table 1 SCS for cobalt and sodium are the same as Table 2 SCS; Table 1 SCS for uranium is 8.9 µg/L), the following exceedances were identified:

    - Uranium in BH/MW2 (19.5 µg/L) versus the Table 1 SCS of 8.9 µg/L.

- Four ground water samples (BH/MW2, BH/MW3, BH/MW4 and its field duplicate DUP A) were submitted for PHCs and VOCs analysis and an additional two ground water samples (BH/MW1 and BH/MW6) were submitted for PHC and BTEX analysis. Concentrations of PHC and VOC/BTEX parameters were not detected above the laboratory MDLs and were therefore below both the Tables 1 and 2 SCS in all samples.

- Five ground water samples (BH/MW1, BH/MW2, BH/MW3, BH/MW4 and BH/MW6) were submitted for OCs analysis. OCs were not detected above the laboratory MDL or were present at levels below both the Tables 1 and 2 SCS in all samples.

5.3 Quality Assurance Program

5.3.1 Accreditation

The analytical laboratory employed to perform the laboratory analyses (Paracel) is accredited by the Standards Council of Canada/Canadian Association for Laboratory Accreditation Standards in accordance with ISO/IEC 17025:2005 – *"General Requirements for the Competence of Testing and Calibration Laboratories"* for the tested parameters and has met the standards for proficiency testing developed by the Standards Council of Canada for parameters set out in the Soil, Ground Water and Sediment Standards.

5.3.2 Data Validation

Field QA/QC Program

The field QA/QC program consisted of analyzing one blind field duplicate soil sample for metals, pH, EC and SAR (Dup B, a field duplicate of BH/MW4-1c) and a blind field duplicate ground water sample for PHCs and VOCs (Dup A, a field duplicate of BH/MW4). The RPDs for the soil and ground water field duplicate samples were non-calculable or within acceptable limits except for EC in the BH/MW4-1c and Dup B (38% vs 10%). It is noted that the RPD values in the Analytical Protocol are for duplicate samples collected at the laboratory and are used for comparison to the RPDs calculated for field duplicates.

A field blank sample was submitted for analysis of VOCs. Field blanks are samples of laboratory provided reverse osmosis deionized (RODI) water, which is poured into a set of sample bottles at the same time and in the same general area as the samples are collected. The field blank is used to determine if there is presence of contamination because of field handling. The field blank was non-detectable for all parameters analyzed, indicating that the field activities did not bias the reported results.

A trip blank was submitted for analysis for VOCs. A trip blank is a sample of RODI water prepared and filled into the relevant sample bottles by the laboratory. The sample is sent with the bottle shipment, taken out to the field and then shipped back with the collected samples for analysis (not opened at any time by field staff). All parameters were found to be non-detectable in the trip blank.

A trip spike was submitted for analysis for VOCs. A trip spike is a sample of RODI water to which a known amount of analyte of interest and appropriate preservative has been added by the laboratory. This sample is also sent with the bottle shipment, taken out to the field and then shipped back with the collected samples for analysis (not opened at any time by field staff). The trip spike recoveries were considered within the acceptable ranges.

All fieldwork was conducted in accordance with the applicable sampling guidelines, which included dedicated sampling equipment, disposable gloves, and sample preservation, where required.

Laboratory QA/QC Program

All sample analyses were performed within the required sample/extract hold times.

The analytical results reported for all laboratory duplicate, blank and spike samples were acceptable except as specified on the laboratory certificates of analyses (**Appendix B**).

In general, no information provided in the QA/QC results for soil and ground water samples would impact the findings of the Phase II ESA.

6.0 CONCLUSIONS

The Phase II ESA included the drilling of seven boreholes, installation of five ground water monitoring wells (with associated sampling and analytical programs) and collection of one surface sample to determine Site characteristics and COPCs including, metals, general inorganics, PHCs, VOC/BTEX, PAHs and OCs. The surface sample, boreholes and monitoring wells were placed in exterior areas of the Site to address concerns identified in the Phase I ESA, as follows:

- BH/MW1 – in front (west) of old maintenance shop;
- BH/MW2 – behind the Air Cadets hangar, adjacent to a fuel oil AST;
- BH/MW3 – in front (west) of current maintenance shop;
- BH/MW4 – adjacent to the Jet A fuel USTs;
- BH5 – adjacent to the east runway;
- BH/MW6 – on the abandoned (central) runway;
- BH7 – off the main (west) runway, in an area where a spill had previously occurred; and
- SS101 – in the area of the former on-Site incinerator.

In general, the surficial conditions encountered at the Site during the borehole drilling program consisted of surface structure (asphalt over granular fill at BH6, topsoil at BH/MW2 and BH/MW5, and sandy gravel fill at all other boreholes) extending to depths between 0.1 and 0.3 mbgs, overlying a layer of fill to a maximum of 1.7 mbgs. The fill layer generally consisted of silty clay / clayey silt fill, with traces of fine to medium gravel, organics and/or silty sand, and black, grey or light brown seams. Pieces of brick were also observed in the fill in BH/MW4.

The fill was found to overly a native brown silty clay / clayey silt with traces of silty sand, fine to medium gravel, and/or organics, and grey, red or light brown seams to the maximum drilled depth of 6.7 mbgs. All boreholes were open and dry upon completion of the drilling program. The ground water levels measured in the five monitoring wells prior to development ranged from 1.5 to 5.4 mbgs and prior to sampling ranged from 3.9 to 5.8 mbgs.

Visual and/or olfactory evidence of petroleum hydrocarbon or any other chemical-like impact was not observed during the drilling program except for some dark staining (no odour detected) in BH/MW3 (0.1-1.5 mbgs). The dark staining was inferred to be natural organics (confirmed by laboratory analysis, refer to Section 5.1).

During the development, purging and sampling of the monitoring wells, no LNAPL or DNAPL were observed.

Based on the presence of an Area of Natural Significance within 30 m of the Site, the SCS currently applicable to the Site, if a RSC were to be filed for the Site, are the Table 1 Full Depth Background Site Condition Standards, residential/parkland/institutional/industrial/commercial/community property use and medium and fine textured soils (Table 1 SCS). However, it is noted that all borehole/monitoring well locations are located greater than 30 m from any Areas of Natural Significance and greater than 30 m from any water body and there is no intent to file an RSC for the Site. As such, as this Phase II ESA is being completed for due diligence purposes, the results have been compared to the Table 2 Full Depth Generic Site Condition Standards in a Potable Ground Water Condition, industrial/commercial/community property use and medium and fine textured soils (Table 2 SCS). The results have also been compared to the Table 1 SCS for reference.

The results of the soil and ground water chemical analyses indicated that the concentrations of all general inorganics, metals, PHC, VOC/BTEX, PAH and OC parameters in all samples were below the Table 2 SCS with the following exceptions:

- Lead in soil in surface samples SS101 (257 µg/g versus the Table 2 SCS of 120 µg/g). SS101 was a grab sample of topsoil collected near the on-Site incinerator representing a depth of 0 to 0.2 mbgs.
- Cobalt in ground water sample BH/MW4 (6.2 µg/L versus that Table 2 SCS of 3.8 µg/L);
- Sodium in ground water sample BH/MW6 (568,000 µg/L versus the Table 2 SCS of 490,000 µg/L); and
- Uranium in ground water samples BH/MW3, BH/MW4 and BH/MW6 (34.5, 35.4 and 36.6 µg/L respectively) versus the Table 2 SCS of 20 µg/L.

In addition to the above, the following additional exceedances were noted when the results were compared to the more stringent Table 1 SCS:

- EC in soil sample BH/MW6-1bc (943 µS/cm) versus the Table 1 SCS of 570 µS/cm;
- Antimony and zinc in surface soil sample SS101 (5.2 µg/g and 327 µg/g respectively, versus the Table 1 SCS of 1.3 µg/g and 290 µg/g, respectively);
- F3 and F4 range PHCs in soil sample BH/MW1-1d (307 µg/g and 149 µg/g respectively versus the Table 1 SCS of 240 µg/g and 120 µg/g, respectively);

- F4 range PHCs in soil sample BH/MW4-2AD (545 µg/g versus the Table 1 SCS of 120 µg/g); and

- Uranium in BH/MW2 (19.5 µg/L) versus the Table 1 SCS of 8.9 µg/L.

To determine the area of concern for elevated metals near the on-Site incinerator, Amec Foster Wheeler recommends the collection and submission of additional surface samples (both at surface and at depth for vertical delineation) for metals analyses. This would allow us to estimate a remediation area, if the Client elects to complete a remediation of the metal-impacted soils.

In addition, Amec Foster Wheeler recommends that additional intrusive investigations be completed in order to adequately address all of the potential environmental issues identified in the Phase I ESA. Additional boreholes with associated soil sampling and laboratory analysis are recommended in the following areas: in the vicinity of the existing USTs, in the general location of former ASTs or USTs (if these can be identified), within the footprint of the former maintenance shop (specifically in pits, previous oil or chemical storage locations and for general coverage), in the location of the former barracks, additional coverage in the area of the 2016 fuel spill, and for general coverage in the developed portions of the Site.

It has been Amec Foster Wheeler's experience on other properties near the Site that cobalt, sodium and uranium can be naturally elevated above the Tables 1 or 2 SCS in wells installed in native silty clay. As this is also the case at this Site, it is inferred that these metals in ground water are more likely naturally occurring rather than elevated because of on-Site activities.

It is our understanding that the CLIENT will review the findings of this Phase II ESA and determine the future course of action.

Should the ground water monitoring wells no longer be required, they must be maintained or abandoned in accordance with the requirements of Section 21(3) of Ontario Regulation 903 – Wells which states *"the well owner shall immediately abandon the well if it is not being used or maintained for future use as a well"*.

7.0 LIMITATIONS

This report was prepared for the exclusive use of Niagara Central Dorothy Rungeling Airport and is intended to provide a Phase II ESA of the property at 435 River Road, in Pelham, Ontario at the time of the Site visit. 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 the third party. Should additional parties require reliance on this report, written authorization from Amec Foster Wheeler will be required. With respect to third parties, Amec Foster Wheeler has no liability or responsibility for losses of any kind whatsoever, including direct or consequential financial effects on transactions or property values, or requirements for follow-up actions and costs.

The investigation undertaken by Amec Foster Wheeler with respect to this report and any conclusions or recommendations made in this report reflect Amec Foster Wheeler's judgment based on the Site conditions observed at the time of the Site inspections set out in this report and on information available at the time of preparation of this report. This report has been prepared for specific application to this Site and it is based, in part, upon visual observation of the Site, subsurface investigation at discrete locations and depths, and specific analysis of specific chemical parameters and materials during a specific time interval, all as described in this report. Unless otherwise stated, the findings cannot be extended to previous or future Site conditions, portions of the Site, which were unavailable for direct investigation, subsurface locations, which were not investigated directly, or chemical parameters, materials or analysis which were not addressed. Amec Foster Wheeler has used its professional judgment in analysing this information and formulating these conclusions.

Amec Foster Wheeler makes no other representations whatsoever, including those concerning the legal significance of its findings, or as to other legal matters touched on in this report, including, but not limited to, ownership of any property, or the application of any law to the facts set forth herein. With respect to regulatory compliance issues, regulatory statutes are subject to interpretation and change. Such interpretations and regulatory changes should be reviewed with legal counsel.

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

8.0 CLOSURE

We trust that the information presented in this report meets your current requirements. Should you have any questions, or concerns, please do not hesitate to contact the undersigned.

Yours truly,

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