

**COMMITTEE OF THE WHOLE MEETING  
DECEMBER 7, 2015**

**REPORT #DCAO-2015-13**

**TOTTENHAM AERODROME - PHASE 1 FILL QUALITY ASSESSMENT**

---

**RECOMMENDATION**

That report DCAO-2015-13 be received;

That the report *Review of Fill Importation, Sampling and Testing Protocol - Tottenham Airfield* prepared by WSP Canada Inc. be received;

That Council provide direction to staff with respect to any additional steps that Council deems necessary and appropriate to address previously raised concerns.

**OBJECTIVE**

The objective of this report is to present to Council the findings and opinions of WSP Canada Inc. (WSP). WSP were retained by the Town to review documentation in support of the fill sampling and testing protocol currently being followed by Tottenham Airfield Corporation (TAC) as well as to attend at the site to witness the process and finally, to provide an opinion on the reasonableness of the protocol.

**BACKGROUND**

At the July 13, 2015 meeting of Council the following motion was adopted:

*That Report#DCAO-2015-08 be received;*

*That the correspondence from Shari Elliott of Elliott & Elliott dated July 3, 2015 be received;*

*That the deputations of David Francis, Carmella Marshall, Michael Fleishman, Bruce Lyons and Amy DeRuyte be received;*

*And that the following resolution, as introduced by Councillor Harrison McIntyre, be recommended to Council for adoption:*

*WHEREAS the protection of water resources for residents is of vital importance;*

*WHEREAS the Tottenham Aerodrome commenced construction in 2012;*

*WHEREAS the opinion of the solicitor of the Town is that the Site Alteration By-Law 2010-021 can be applied to the Tottenham Aerodrome site;*

*WHEREAS other jurisdictions have experienced contamination in fill operations;*

*BE IT RESOLVED that Town staff be directed to request access to all fill protocol and sampling test records (the Records) kept by the owner of the Tottenham Aerodrome for inspection by the Town and its representatives;*

*AND FURTHER THAT the Town retain a qualified professional consultant to review the Records of the Tottenham Aerodrome operation and provide a report to the Town on the quality of fill placed by the owner and the potential for off-site human and environmental impacts;*

*AND FURTHER THAT upon receipt and review of the report by Council that Council may direct staff on any additional steps considered necessary and appropriate to confirm the quality of fill including borehole sampling and testing;*

*AND FURTHER THAT the owner of the Tottenham Aerodrome pays all costs associated with the foregoing;*

*AND FURTHER THAT the owner of the Tottenham Aerodrome enter into an agreement with the Town to ensure that all future fill placed on the site is clean and meets all appropriate Ministry of Environment and Climate Change standards.*

In alignment with Council's direction and through an informal Request for Proposal process, the Town retained the services of WSP Canada Inc. (WSP) to perform the following:

- Review twenty technical reports produced between March 1, 2013 and August 12, 2015 including:
  - Fill Quality Assurance Program (FQAP) reports
  - Audit Reports setting out results and recommendations flowing from document reviews and sampling/testing of fill pursuant to the FQAP
  - Incident reports setting out responses to violations discovered during the audits.
- Attend the site to witness and review the process being followed with respect to the importation of fill
- Provide an opinion as to whether the soil sampling, testing and reporting procedures are reasonable. WSP's report *Review of Fill Importation, Sampling and Testing Protocol* has been appended to this report as Attachment No. 1

## **COMMENTS AND CONSIDERATIONS**

Through a comprehensive review of the documents provided by TAC, WSP determined that while the FQAP appears to have been prepared in accordance with the guide *Management of Excess Soil - A Guide for Best Management Practices* produced by the

MOECC, there are several items that require clarification. To address these concerns, WSP has recommended the FQAP be updated to provide:

- a site-specific list of contaminants of concern to be analyzed during field auditing events,
- a rationale for the selection of the contaminants of concern, and a rationale for excluding contaminants from the list,
- a mechanism for updating the site-specific list of contaminants should the source(s) of the imported fill change,
- field quality assurance and quality control procedures used during auditing events, including obtaining random duplicate soil samples,
- audit metrics, including
  - a recommended auditing frequency,
  - a recommended number of test pits per audit,
  - a recommended number of samples per test pit, and
  - a mechanism for updating the audit metrics, should conditions warrant an update.
- Minimum information to be provided in each audit report and incident report, including
  - soil sample locations,
  - soil geodetic elevations, and
  - locations and elevations of the volume of imported soil that is the focus of the audit or incident report

Representatives of WSP attended the Tottenham Airfield site on the morning of October 30, 2015 to review the process currently being followed for the importation of fill. Following a review of a sample batch of documentation, WSP determined that sufficient information was present within the the provided documentation to match the analytical results with the incoming soil batch. WSP was then escorted around the site and witnessed quality assurance procedures, as well as a number of open test pits that were advanced during the most recent field audit conducted by TAC's geotechnical consultant. WSP also noted that an inspection of the fill importation area revealed no obvious evidence of organic contaminants such as water sheening or unusual odour. WSP's opinion is that the site appeared to be well organized and well managed and that the fill management process that was observed appeared to be reasonable.

WSP observed a number of groundwater-monitoring pendant wellheads near the west property line of the site. TAC advised that some of these wells has been installed in anticipation of beginning construction of the second runway, with a view to obtaining "baseline" environmental conditions for soil and groundwater. Notwithstanding this observation, WSP is recommending that a hydrogeological assessment of the site be prepared that considers:

- Available background information regarding site geology and hydrogeology. This will typically include a review of Ministry of the Environment and Climate Change

(MOECC) well records, published geological mapping, results of previous subsurface investigations that have been conducted in the area, and other published information such as sub-watershed studies. Given the residential development located to the west, it is anticipated that there will be significant information available within the MOECC water well records database.

- A detailed site inspection to confirm site topography, drainage conditions, and the surficial soil conditions at the site. The inspection will include an assessment of any potential hydrogeologically-sensitive areas on the site or in the immediate vicinity of the site.
- A conceptual hydrogeological model should be prepared which includes a summary of the regional groundwater flow direction and groundwater levels. The model would identify the depth, thickness, and extent of each aquifer and aquitard.
- An assessment of the potential impact of the fill placement on local water well supply and the shallow ground water system. An assessment of the attenuation of the potential contaminants of concern should be completed. The assessment should consider the potential for impact to the existing wells in the residential area located to the west of the site.

In addition, WSP is also recommending that a groundwater monitoring program be developed for the site. Groundwater monitoring wells should be installed in locations and depths based on the above noted hydrogeological assessment. Groundwater samples should be collected from the wells and analyzed for the contaminants of concern set out in the FQAP.

Staff in conjunction with the Town Solicitor are currently working with representatives of TAC in the development of a Site Plan Agreement and Fill Management Plan for Phase II of the proposed works. These recommendations will be identified in the Phase II agreement as required amendments to the FQAP and necessary steps to be taken prior to commencing phase II of the proposed works.

In keeping with the previously referenced motion, staff are now seeking Council's direction with respect to any additional steps that they deem necessary to address their concerns.

### **FINANCIAL CONSIDERATIONS**

This initial step undertaken by WSP is being funded from the Deputy CAO's budget for consultants. In keeping with Council's direction, Staff will be seeking reimbursement from TAC of all funds expended. Moving forward, WSP will also be retained to review and provide recommendations on all technical aspects of the Site Plan Agreement and Fill Management Plan for the proposed works at the Tottenham Airfield.

Respectfully submitted:



---

Blaine Parkin, P.Eng.  
Deputy CAO

Attachments:

- [TAC Fill Importation Review FINAL REPORT - Nov 2015 - WSP Canada](#)

**Approved By:**  
Brendan Holly

**Department:**  
CAO

**Status:**  
Approved - 03 Dec 2015

# REVIEW OF FILL IMPORTATION, SAMPLING AND TESTING PROTOCOL

TOTTENHAM AIRFIELD,  
8128 HIGHWAY 9, NEW TECUMSETH,  
ONTARIO

**Prepared for the Town of New Tecumseth**

Project No. 151-10367-00

November, 2015

## **FINAL REPORT**

—  
**WSP Canada Inc.**  
561 Bryne Drive, Units C & D  
Barrie, Ontario L4N 9Y3

Phone: +1 705-735-9771  
Fax: +1 705-735-6450  
**[www.wspgroup.com](http://www.wspgroup.com)**



---

## SUMMARY

WSP Canada Inc. (WSP) was retained by the Corporation of the Town of New Tecumseth (the Town) to review a fill importation, sampling and testing protocol developed for the Tottenham Airfield property located at 8128 Highway No. 9, New Tecumseth, Ontario (the Subject Property). WSP's Terms of Reference as developed by the Town were as follows:

1. Review twenty (20) technical reports produced between March 01, 2013 and August 12, 2015 concerning the fill management procedures developed for the Subject Property;
2. Attend the Subject Property to witness and review the process being followed with respect to the importation of fill; and
3. Provide an opinion as to whether the soil sampling, testing and reporting procedures put in place for the Subject Property are reasonable, when compared with current industry practices, and based on attendance at the Subject Property whether these procedures are being appropriately implemented.

WSP reviewed three (3) Fill Quality Assurance Program (FQAP) documents, fourteen (14) audits conducted under the FQAP, and three (3) incident reports prepared pursuant to FQAP requirements. WSP staff visited the Subject Property on October 30, 2015 and observed the fill importation processes currently in place.

While the FQAP appears to have been prepared in general accordance with *Management of Excess Soil – A Guide for Best Management Practices* (January, 2014), WSP's review has identified several items that require clarification. To address these items, WSP has the following recommendations:

1. The FQAP should be updated by a Qualified Person to provide:
  - a site-specific list of contaminants of concern to be analyzed during field auditing events,
  - a rationale for the selection of the contaminants of concern, and a rationale for excluding contaminants from the list,
  - a mechanism for updating the site-specific list of contaminants should the source(s) of the imported fill change,
  - field quality assurance and quality control procedures used during auditing events, including obtaining random duplicate soil samples,
  - audit metrics, including
    - a recommended auditing frequency,
    - a recommended number of test pits per audit,
    - a recommended number of samples per test pit, and
    - a mechanism for updating the audit metrics, should conditions warrant an update.
  - Minimum information to be provided in each audit report and incident report, including
    - soil sample locations,
    - soil geodetic elevations, and

- locations and elevations of the volume of imported soil that is the focus of the audit or incident report.
2. A hydrogeological assessment of the Subject Property should be prepared that considers:
    - Available background information regarding site geology and hydrogeology. This will typically include a review of Ministry of the Environment and Climate Change (MOECC) well records, published geological mapping, results of previous subsurface investigations that have been conducted in the area, and other published information such as sub-watershed studies. Given the residential development located to the west, it is anticipated that there will be significant information available within the MOECC water well records database.
    - A detailed site inspection to confirm site topography, drainage conditions, and the surficial soil conditions at the site. The inspection will include an assessment of any potential hydrogeologically-sensitive areas on the site or in the immediate vicinity of the site.
    - A conceptual hydrogeological model should be prepared which includes a summary of the regional groundwater flow direction and groundwater levels. The model would identify the depth, thickness, and extent of each aquifer and aquitard.
    - An assessment of the potential impact of the fill placement on local water well supply and the shallow ground water system. An assessment of the attenuation of the potential contaminants of concern should be completed. The assessment should consider the potential for impact to the existing wells in the residential area located to the west of the site.
  3. A groundwater monitoring program should be developed for the site. Groundwater-monitoring wells should be installed in locations and depths based on the above noted hydrogeological assessment. Groundwater samples should be collected from the wells and analyzed for the contaminants of concern set out in the FQAP.

WSP noted an instance where no mention was made of the final destination of soil excavated during an incident investigation involving hydrocarbon and metal-impacted soil. Under the FQAP this soil should have been transported back to the originating facility for further treatment, or if further treatment was not possible or not feasible, to a landfill site. The fate of this soil should be clarified and clearly documented.

The Subject Property appeared to be well-organized and well-managed based on WSP's site visit conducted on October 30, 2015. In WSP's opinion, the fill management process observed on October 30, 2015 appeared to be reasonable.

WSP understands that a site specific fill management agreement is currently being prepared by the Subject Property owner in conjunction with the Town of New Tecumseth. It was outside of the scope of WSP's assessment to review the details of this agreement. It is recommended that the above noted items be addressed and incorporated into this fill management agreement.



# TABLE OF CONTENTS

<b>1</b>	<b>INTRODUCTION.....</b>	<b>1</b>
<b>2</b>	<b>BACKGROUND.....</b>	<b>1</b>
<b>3</b>	<b>DOCUMENT REVIEW .....</b>	<b>2</b>
<b>3.1</b>	<b>FILL QUALITY ASSURANCE PROGRAM (FQAP) .....</b>	<b>2</b>
3.1.1	WSP ANALYSIS .....	4
<b>3.2</b>	<b>FILL QUALITY ASSURANCE PROGRAM AUDITS .....</b>	<b>5</b>
3.2.1	WSP ANALYSIS .....	6
<b>3.3</b>	<b>INCIDENT REPORTS .....</b>	<b>7</b>
3.3.1	WSP ANALYSIS .....	8
<b>4</b>	<b>SITE VISIT .....</b>	<b>8</b>
<b>5</b>	<b>CONCLUSIONS.....</b>	<b>9</b>
<b>6</b>	<b>CLOSURE.....</b>	<b>11</b>
<b>7</b>	<b>REFERENCES.....</b>	<b>12</b>

# 1 INTRODUCTION

WSP Canada Inc. (WSP) on September 17, 2015 was retained by the Corporation of the Town of New Tecumseth (the Town) to review a fill importation, sampling and testing protocol developed for the Tottenham Airfield property located at 8128 Highway No. 9, Tottenham, Ontario (the Subject Property). WSP's Terms of Reference as developed by the Town were as follows:

1. Review twenty (20) technical reports produced between March 01, 2013 and August 12, 2015 concerning the fill management procedures developed for the Subject Property;
2. Attend the Subject Property to witness and review the process being followed with respect to the importation of fill; and
3. Provide an opinion as to whether the soil sampling, testing and reporting procedures put in place for the Subject Property are reasonable, and based on attendance at the Subject Property whether these procedures are being implemented.

This document presents WSP's opinion with respect to the reasonableness of the soil sampling, testing and reporting procedures in place for the Subject Property, and whether those procedures are being followed. The scope of WSP's review was limited to the time period beginning at production of the first of the twenty (20) documents on March 01, 2013, and ending at WSP's attendance at the Subject Property on October 30, 2015.

## 2 BACKGROUND

The Subject Property is an operating private airfield known locally as the "Tottenham Airfield" and is referenced within the Canada Flight Supplement as "Tottenham/Volk, CPM5". The Subject Property contains as of November, 2015 an active turf runway approximately 820 metres long, along with an aircraft hangar and a number of auxiliary buildings and other associated infrastructure.

The Subject Property was purchased by TAC in May, 2012. TAC is improving the Subject Property by building two (2) new runways and two (2) new taxiways, along with eight (8) new aircraft hangars, a flight school building, and an office building. Construction of the new runways and taxiways requires large volumes of soil. Some of this soil is sourced from the Subject Property itself, but the majority of the soil is imported from offsite sources at an average rate of about 200 triaxle dumptrucks of soil per day. Potential offsite fill sources include licensed pits and quarries, soil recycling facilities, and sites that produce excess fill from activities such as building construction and underground utility construction. WSP's review of the documents provided by the Town suggested that most of the fill imported into the Subject Property was sourced from a number of soil recycling facilities under common ownership, with the balance of the imported soil obtained from a large public utility.

Importation of fill from sources other than licensed pits or quarries may present concerns related to soil quality. Some soil recycling facilities are licensed by the Ontario Ministry of the Environment and Climate Change (MOECC) to receive soil contaminated by a number of organic and inorganic chemicals and metals. These recycling facilities treat the soil to remove or reduce contaminant concentrations, then ship the treated soil to properties such as the Subject Property for use as fill. The importation of poor quality fill may pose an adverse risk to the natural environment.

The MOECC encourages reuse of excess soil for beneficial uses as long as such reuse can be done in a safe and sustainable way that protects human health and the environment. Soil recycling facilities allow beneficial reuse of excess soil that may otherwise be directed to landfill sites. The MOECC has responded to concerns about imported fill quality in part by producing a technical document called *Management of Excess Soil – A Guide for Best Management Practices* (January, 2014). This document does not carry force of law, and it is not a step-by-step list of procedures to be undertaken at each and every site in Ontario that imports fill from offsite sources. Rather, it is a technical framework intended for use by professionals engaged to develop site-specific technical programs for ensuring that imported soil will not cause an “adverse effect” such as contamination of a drinking water well. Such a technical program was developed for the Subject Property, and part of WSP’s scope of work was to review the program for reasonableness, and to review the work that was undertaken in support of the program.

### 3 DOCUMENT REVIEW

WSP reviewed twenty (20) documents provided by the Town concerning the fill management procedures developed for the Subject Property. The subject matter of these 20 documents may be subdivided as follows:

1. Three (3) “Fill Quality Assurance Program” (FQAP) reports setting out the procedures to be used for importing fill into the Subject Property;
2. Fourteen (14) audit reports setting out results and recommendations flowing from document reviews and sampling/testing of imported soil pursuant to the FQAP; and
3. Three (3) “Incident Reports” setting out responses to violations discovered during three (3) of the FQAP audits.

These documents were prepared by Cole Engineering Inc. (Cole), Peto MacCallum Limited (PML), and Tottenham Airfield Corporation Inc. (TAC). Each document is referenced at the end of this report.

WSP presents its observations and opinion first on the FQAP documents, followed by the detailed audits conducted in support of the FQAP, and finally on the three (3) incident reports prepared during the audit period of June 28, 2013 through July 15, 2015.

#### 3.1 FILL QUALITY ASSURANCE PROGRAM (FQAP)

The Fill Quality Assurance Program (FQAP) for the Subject Property was first published by Cole on March 01, 2013 (Cole, 2013a) and was subsequently updated by Cole for the 2014 audit period (Cole, 2014a). A third update to the FQAP was published in January, 2015 by TAC (TAC, 2015).

WSP reviewed the FQAP developed by Cole in 2013 (Cole, 2013a) and noted that the following elements were included:

1. The intended source of all imported fill was a soil recycling facility then known as “Greensoils” (now called GFL Environmental) located at 38 Fenmar Drive in Toronto.
2. Under the FQAP, Greensoils was responsible for all soil management activity, including importation of the fill. Greensoil’s responsibilities included:
  - Sampling all soil to be imported to the Subject Property,
  - Analyzing the soil samples for contaminants,

- Comparing the analytical results with standards set out under Table 2 (potable groundwater, commercial property, assuming coarse-textured soils) of the MOECC document *Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act* (Ontario Ministry of the Environment and Climate Change, April, 2011),
  - Ensuring that all soil to be exported from the Greensoils facility to the Subject Property met these standards, and
  - Forwarding to a “Designated Person” within the Subject Property copies of the analytical reports, along with “manifest tickets” for each load of exported soil.
3. The “Designated Person’s” responsibilities under the FQAP included
    - Receiving materials provided by Greensoils and maintaining a written log identifying soil loads corresponding with the laboratory certificates of analysis, and
    - Noting and recording the placement location for each load of soil imported into the Subject Property.
  4. Cole’s responsibilities under the FQAP included:
    - Conducting “quarterly” audits of the fill-importation process including
      - Reviewing all paperwork submitted by Greensoils and logged by the “Designated Person” to ensure information was available and correct, and
      - Conducting independent verification sampling of imported materials “if deemed necessary”.
  5. Imported soils found to contain contaminants exceeding MOECC Table 2 criteria were to “be removed by Greensoils”, but there was no explicit mention in the FQAP about Cole’s proposed involvement in these circumstances, and
  6. Monthly reports documenting soil importing procedures were to be prepared by Greensoils for review by Cole.

The FQAP was updated for the 2014 audit period (Cole, 2014a) with the following changes:

1. Imported soils containing contaminants exceeding MOECC Table 2 standards (potable water, commercial property, coarse-textured soils) and “deemed by the QP to be impacted” were to be removed from the Subject Property by Greensoils. This change effectively transferred decision-making authority from Greensoils to Cole with respect to deciding whether imported soil was contaminated and needed to be removed;
2. Responsibility for preparing the monthly reports was transferred from Greensoils to Hybrid Contracting, the onsite contractor retained by Greensoils to manage the imported soil within the Subject Property.

The FQAP was further updated for the 2015 audit period (TAC, 2015) with the following changes:

1. References to “Cole Engineering” were removed, and this update of the FQAP was delivered solely under TAC letterhead,
2. The “Designated Person” was assigned the additional responsibility of reviewing the incoming laboratory analysis results from Greensoils to “determine if the soil is suitable to be received”,
3. Audit frequency was increased from quarterly to monthly, and the audits were to be undertaken by a “properly-qualified environmental consultant”,
4. A detailed “Audit Sampling Protocol” was included which set out how soil samples were to be obtained from the Subject Property and analyzed for “Site Specific Parameters”, and

5. A detailed “Corrective Actions Protocol” was included which set out procedures to be followed upon discovery of an exceedance of MOECC Table 2 criteria (potable water, commercial property, coarse soil) within the imported soil.

The 2015 version of the FQAP (TAC, 2015) is the most-recent version made available to WSP for the purposes of this review, but it appears that another update to the FQAP has been published or will soon be published (PML, 2015e).

### 3.1.1 WSP ANALYSIS

While the FQAP appears to have been prepared in general accordance with *Management of Excess Soil – A Guide for Best Management Practices* (January, 2014), our review has identified several items that require clarification. The following section outlines our review and summarizes those areas where in WSP’s opinion further information is needed.

Soil quality standards were selected for the Subject Property based on appropriate considerations, including the fact that potable water is obtained from onsite wells that draw water from onsite aquifers. Table 2 soil standards for commercial properties were selected from *Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act* (Ontario Ministry of the Environment and Climate Change, April, 2011). These standards are adopted under Ontario Regulation 153/04 (as amended) *Records of Site Condition*. While the Subject Property is under federal jurisdiction and not subject to provincial regulations, applying the standards set out under O. Reg. 153/04 (as amended) is an appropriate approach.

MOECC Table 2 soil concentration standards are conservative risk-based contaminant concentrations that are not expected to cause an “adverse effect” if present in soil within a property that obtains its water supply from one or more onsite wells. Since these concentrations are intended to be conservative, exceedances of the standards will not necessarily result in an “adverse effect”, but a formal Site-Specific Risk Assessment would be required to conclusively demonstrate this. The FQAP contemplates removal of any soil found to exceed Table 2 (potable water, commercial property, coarse soil) concentration standards.

Provisions were made for analyzing soil at the source facility (Greensoils) prior to shipping the soil to the Subject Property, and provisions were made for removing from the Subject Property any soil found to exceed Table 2 standards. WSP notes however that the 2013 version of the FQAP placed the onus for removing any fill found to exceed Table 2 standards on Greensoils. It is unclear from the information reviewed whether Greensoils employed a Qualified Person to make such decisions. The 2014 FQAP update (Cole, 2014a) transferred this responsibility from Greensoils to Cole (as QP) which was appropriate.

While auditing approaches may vary slightly from audit to audit, it is better in WSP’s opinion to include in a FQAP a framework for how each audit will be conducted, and a framework for responding to concerns raised during an audit. These frameworks were not added to the FQAP until January, 2015 (TAC, 2015). WSP notes that Cole discussed auditing procedures in each of their individual audit reports (discussed later), but in WSP’s opinion it is better to incorporate these procedures at the FQAP level, and to leave any procedural adjustments for each individual audit report.

WSP’s review of the 2015 FQAP (TAC, 2015) revealed that in addition to Table 2 soil contaminant standards, provision was made for the use of MOECC Table 4 stratified standards. Table 4 stratified standards contain two (2) sets of contaminant concentration standards; one set applied to shallow surface soils up to 1.5 metres below surface, and another set to be applied to soils deeper than 1.5 metres. The contaminant standards for shallow soils are “more stringent” than the standards for deeper soils. The

more restrictive standards for shallow soils reflect the fact that humans, other animals and plants may come into direct contact with this soil. The less-stringent standards for deeper soils assume that there will be no such direct contact, but the standards are still protective of groundwater where local aquifers are used for potable purposes such as within the Subject Property. WSP considers the use of Table 4 stratified criteria appropriate in these circumstances, provided procedures are in place to ensure that soil deemed acceptable under MOECC Table 4 standards is not allowed through excavation or other method to encroach within 1.5 metres of any finished grade surface.

While selection of the soil contaminant standards to be applied to the Subject Property is in WSP's opinion appropriate, all three versions of the FQAP WSP reviewed were silent with respect to the specific chemical parameters that required analysis. The 2015 version of the FQAP (TAC, 2015) made reference to "Site Specific Parameters", but those parameters were not set out in the FQAP. Specific chemical parameters are discussed in the audit reports and incident reports WSP reviewed, but in WSP's opinion it is better to set out these parameters in the FQAP. Soil recycling facilities such as Greensoils receive impacted soil from many different sources, and these sources may use and/or produce contaminants including petroleum hydrocarbons, metals, polycyclic aromatic hydrocarbons (PAH), and various volatile and semi-volatile organic compounds among others. It is incumbent on the Qualified Person to assess the potential contaminant(s) that may be present in soil from a given source. Certain contaminants may be ruled out based on a number of risk assessment approaches and based on the QPs professional opinion, and the final list of contaminants to be analyzed can be arrived at following such an assessment. If this assessment was undertaken by the QPs involved with administering the FQAP within the Subject Property, no record of it was found by WSP in any of the FQAP versions reviewed, or within any of the audit reports and incident reports WSP reviewed. Arbitrary selection of contaminants to be analyzed may result in placement of contaminated soil within a property that goes undetected because the undetected contaminant(s) are not part of the analytical "package".

WSP recommends that the FQAP be updated to include:

1. A site-specific list of contaminants of concern to be analyzed during field auditing events;
2. A rationale for the selection of the contaminants of concern; and
3. Provision for updating the site-specific list of contaminants should the source(s) of the imported soil change.

### 3.2 FILL QUALITY ASSURANCE PROGRAM AUDITS

WSP reviewed fourteen (14) fill quality assurance program audits performed under the FQAP for the Subject Property. The first nine (9) audits were performed by Cole between June 28, 2013 and December 16, 2014, and the remaining five (5) audits were performed by PML between March 17, 2015 and July 15, 2015. Audit details including results of paperwork inspections, numbers of test pits and soil samples, and reported MOECC Table 2 exceedances are set out in Table 1.

A review of both Cole and PML audits suggest that the auditors were reviewing appropriate materials, including truck weigh scale tickets and laboratory certificates of analysis. While PML reported no violations during their document reviews, Cole reported a number of violations, including one audit that revealed multiple incidents of missing or incomplete laboratory certificates of analysis for incoming soil shipments (Cole, 2014b). The Cole auditor located the missing and incomplete analytical certificates, but a number of lead exceedances were noted in the incoming soil shipments, suggesting that lead-impacted soil had been accepted from Greensoils and placed within the Subject Property. Cole appropriately recommended an investigation that included follow-up sampling and excavation work (discussed later).

Field auditing of imported soil appeared to follow generally-accepted methods including excavation of test-pits and sampling using proper techniques. WSP notes that random duplicate samples were not obtained by either Cole or PML; this practice is required under O. Reg. 153/04 (as amended), and is good practice even when that regulation does not apply within a property such as the Subject Property. WSP notes that a significant number of samples contained reported contaminant concentrations equal to or very close to the MOECC Table 2 standard, and replicate samples would have been useful for deciding whether follow-up investigation was warranted or not.

The following analytical contaminant “package” was used by both Cole and PML for soil quality auditing purposes:

1. CCME F1-F4 petroleum hydrocarbons (found in refined petroleum products such as gasoline, diesel, fuel oil and aviation fuel);
2. Volatile Organic Compounds (VOCs);
  - VOCs include Benzene, Toluene, Ethylbenzene and Xylene isomers, collectively known by the acronym “BTEX”;
3. Metals and inorganics; and
4. Polychlorinated Biphenyls (PCBs).

### 3.2.1 WSP ANALYSIS

Soil auditing methods and practices in Ontario are not set out in prescriptive format. A Qualified Person is responsible for preparing a site-specific auditing program that adequately protects human health and the environment from potential risks presented by contaminated soil. A QP develops such a program having regard to factors such as

1. The type and concentration of contaminants that may be present;
2. The groundwater level within the property to be audited, including seasonal fluctuations;
3. The presence and depth of each aquifer and aquitard;
4. The depth of each stratigraphic soil unit and type of soil (sand, clay, glacial till, etc....); and
5. The volume of soil to be imported.

The QP will generate audit metrics that typically include

1. Number, depth, and spacing of test pits;
2. Frequency of test-pitting audits; and
3. The analytical “package” to be applied to each audit soil sample removed from the property being audited.

A review of Table 1 reveals a significant difference between the audit metrics used by Cole and those used by PML:

1. Cole conducted “quarterly” audit sampling of the Subject Property, while PML is conducting monthly audits,
2. Cole advanced three (3) test pits per audit, while PML is advancing ten (10) test pits per audit (with the exception of their March 17, 2015 audit where fill placements from the two preceding months were audited and 13 test pits were advanced), and

3. Cole obtained three (3) soil samples for analysis per auditing event (one per test pit), while PML is obtaining ten (10) soil samples per auditing event (one per test pit, with the exception of the March 17, 2015 audit where 13 samples were obtained).

The number of test pits advanced and the number of soil samples obtained for analysis is at the discretion of the Qualified Person, and it is presumed that both Cole and PML arrived at their respective metrics using what they each considered to be an appropriate risk management approach. It is noteworthy however that the PML approach resulted in a higher detection frequency for MOECC Table 2 contaminant exceedances than the Cole approach. This suggests that the higher auditing frequency and higher number of test pits and samples obtained per audit used by PML resulted in an increased frequency of detecting contaminant exceedances. It is possible that the lower auditing frequency and lower number of test pits and samples specified by Cole may have resulted in non-detection of contaminants.

Cole's audit reports specified locations for each soil sample using handheld GPS equipment, but no sample elevations relative to a fixed datum were reported. Furthermore, the location of each quarterly deposition of soil within the Subject Property was not provided by Cole. PML reported locations of their soil samples, and also reported elevations of each soil sample with respect to a fixed geodetic datum and provided drawings showing locations of test pits and the monthly soil deposition areas under investigation. It may be difficult to locate the volumes of soil within the Subject Property that were the subject of Cole's audit reports without elevation data and the location of the quarterly soil deposition that was audited.

WSP recommends that the FQAP be updated by a QP to include:

1. Provision for obtaining replicate soil samples during auditing events;
2. A rationale for the recommended audit metrics, including
  - audit frequency,
  - number of test pits per audit, and
  - number of samples per test pit.

The rationale should permit adjustment to the recommendations should the source(s) of the imported soil change; and

3. Minimum information to be provided in each audit report or incident report, including
  - soil sample locations,
  - soil sample geodetic elevations, and
  - locations and elevations of the volume of imported soil that is the focus of the audit.

### 3.3 INCIDENT REPORTS

WSP reviewed three (3) incident reports documenting Corrective Action taken under the FQAP for the Subject Property. Under the FQAP, the need for Corrective Action is triggered when the presence or possible presence of contaminants exceeding MOECC Table 2 standards (potable water, commercial property, coarse soil) is identified. All three incident reports were prepared by Cole. PML's audits also identified the need for Corrective Action (see Table 1), but no PML Incident Reports were reviewed by WSP. Incident Report details including the nature of the incident, incident response methods, and soil testing results are set out in Table 1.

Cole administered the following Corrective Action events under the FQAP:



1. Investigation of lead found at concentrations exceeding MOECC Table 2 standard during the 2013 Q4 audit of incoming soil shipment laboratory certificates of analysis (Incident Report No. 1, Cole, 2014d);
2. Investigation of F2 hydrocarbons, barium, lead and zinc found at concentrations exceeding MOECC Table 2 standards during the 2014 Q1 test-pit audit (Incident Report No. 2, Cole, 2014d); and
3. Investigation of MOECC Table 2 standard Electrical Conductivity (EC) exceedances found during the 2014 Q2 audit (Incident Report No. 3, Cole, 2014g).

Each incident response involved some or all of the following work:

1. Excavations to remove impacted soil and confirmatory sampling of the excavation floor and sidewalls;
2. Test pits designed to sample soil near samples that produced contaminant concentrations exceeding MOECC Table 2 standards (potable water, commercial property, coarse-grained soil) with a view to confirming the exceedances;
3. Test pits designed to sample surface soil above deep (greater than 1.5m below surface) samples that produced contaminant concentrations exceeding MOECC Table 2 standards (potable water, commercial property, coarse-grained soil) with a view to determining if MOECC Table 4 stratified criteria could be applied, or
4. A combination of these approaches.

In all three cases, Cole reported each incident was resolved to their satisfaction.

### 3.3.1 WSP ANALYSIS

In WSP's opinion, Cole's approach to each of these three incidents was reasonable. Impacted soil was delineated through excavations or test pits, and the soil was either removed or allowed to remain in place where it was shown by Cole that:

1. Additional sampling revealed no MOECC Table 2 standard exceedances; or
2. Additional sampling revealed that the use of MOECC Table 4 stratified standards for soil below 1.5 metres below grade was possible and appropriate.

WSP notes that with respect to Incident Report No. 2 (Cole, 2015b), no mention was made of the final destination of the excavated soil. Under the FQAP this soil should have been transported by GFL (formerly Greensoils) back to the GFL facility for further treatment, or if further treatment was not possible or not feasible, to a landfill site. The fate of this soil should be clarified.

## 4 SITE VISIT

The undersigned WSP authors visited the Subject Property on October 30, 2015. The purpose of the Site Visit as set out in the Town's Terms of Reference was to

1. Witness and review the process being followed with respect to the importation of fill, and
2. Provide an opinion as to whether the observed process was reasonable.

WSP arrived onsite at approximately 9:30AM on October 30, 2015 and met with Mr. Tony Musso, TAC's Site Manager. Also in attendance was TAC's solicitor Ms. Shari Elliot, TAC's current Qualified Person Ms. Melissa King, P. Geo., and TAC's FQAP Designated Person Ms. Elise Yaghdjian.

Ms. Elliot provided an historical background including events preceding and subsequent to TAC's purchase of the Subject Property in May, 2012.

WSP observed a number of binders within the Subject Property office; each binder containing information on truck loads arranged by batch number, as well as a corresponding Certificate of Analysis for each batch. WSP requested and was provided with an example batch. In WSP's opinion sufficient information was present within the provided documentation to match the analytical results with the incoming soil batch. The laboratory used by GFL (Paracel Laboratories Ltd.) is CALA-accredited, and no Table 2 standard exceedances were noted on the example batch reviewed by WSP. While the limited documentation reviewed by WSP appeared to be in order, a full FQAP audit was not within WSP's scope.

WSP was escorted around the Subject Property by TAC staff, who provided an overview of the quality assurance procedures used to manage importation of fill. WSP observed a number of signs at the entrance in both English and Punjabi prohibiting unauthorized dumping of waste. WSP observed a small trailer near the entrance that was occupied by a TAC employee who obtained paperwork from each truck and directed the truck driver to the soil dumping location(s). Inspection of the fill importation area revealed no obvious evidence of organic contaminants such as water sheening or unusual odour. WSP observed a number of open test pits and was advised by TAC staff that these had been advanced during the most recent field audit conducted by PML, and that the test pits would remain open until instructions to backfill (or other instructions) were received from PML.

A number of groundwater-monitoring pendant wellheads were observed by WSP near the main office building, and near the Subject Property's west property line. TAC advised that some of these wells had been installed in anticipation of beginning construction of the second runway, with a view to obtaining "baseline" environmental conditions for soil and groundwater.

The Subject Property appeared to be well-organized and well-managed. In WSP's opinion, the fill management process observed on October 30, 2015 appeared to be reasonable. WSP agrees with and encourages installation of groundwater-monitoring wells as part of the FQAP. Periodic analysis of groundwater samples obtained from these wells will provide additional assurance that the fill importation operations within the Subject Property are not causing an adverse effect.

## 5 CONCLUSIONS

WSP's Terms of Reference as provided by the Town of New Tecumseth were as follows:

1. Review twenty (20) technical reports produced between March 01, 2013 and August 12, 2015 concerning the fill management procedures developed for the Subject Property;
2. Attend the Subject Property to witness and review the process being followed with respect to the importation of fill; and
3. Provide an opinion as to whether the soil sampling, testing and reporting procedures put in place for the Subject Property are reasonable, and based on attendance at the Subject Property whether these procedures are being implemented.

While the FQAP appears to have been prepared in general accordance with *Management of Excess Soil – A Guide for Best Management Practices* (January, 2014), WSP's review has identified several items that require clarification. To address these items, WSP has the following recommendations:

1. The FQAP should be updated by a Qualified Person to provide:
  - a site-specific list of contaminants of concern to be analyzed during field auditing events,
  - a rationale for the selection of the contaminants of concern, and a rationale for excluding contaminants from the list,
  - a mechanism for updating the site-specific list of contaminants should the source(s) of the imported fill change,
  - field quality assurance and quality control procedures used during auditing events, including obtaining random duplicate soil samples,
  - audit metrics, including
    - a recommended auditing frequency,
    - a recommended number of test pits per audit,
    - a recommended number of samples per test pit, and
    - a mechanism for updating the audit metrics, should conditions warrant an update.
  - Minimum information to be provided in each audit report and incident report, including
    - soil sample locations,
    - soil geodetic elevations, and
    - locations and elevations of the volume of imported soil that is the focus of the audit or incident report.
2. A hydrogeological assessment of the Subject Property should be prepared that considers:
  - Available background information regarding site geology and hydrogeology. This will typically include a review of Ministry of the Environment and Climate Change (MOECC) well records, published geological mapping, results of previous subsurface investigations that have been conducted in the area, and other published information such as sub-watershed studies. Given the residential development located to the west, it is anticipated that there will be significant information available within the MOECC water well records database.
  - A detailed site inspection to confirm site topography, drainage conditions, and the surficial soil conditions at the site. The inspection will include an assessment of any potential hydrogeologically-sensitive areas on the site or in the immediate vicinity of the site.
  - A conceptual hydrogeological model should be prepared which includes a summary of the regional groundwater flow direction and groundwater levels. The model would identify the depth, thickness, and extent of each aquifer and aquitard.
  - An assessment of the potential impact of the fill placement on local water well supply and the shallow ground water system. An assessment of the attenuation of the potential contaminants of concern should be completed. The assessment should consider the potential for impact to the existing wells in the residential area located to the west of the site.
3. A groundwater monitoring program should be developed for the site. Groundwater-monitoring wells should be installed in locations and depths based on the above noted hydrogeological assessment. Groundwater samples should be collected from the wells and analyzed for the contaminants of concern set out in the FQAP.

WSP noted an instance where no mention was made of the final destination of soil excavated during an incident investigation involving hydrocarbon and metal-impacted soil. Under the FQAP this soil should have been transported back to the originating facility for further treatment, or if further treatment was not possible or not feasible, to a landfill site. The fate of this soil should be clarified and clearly documented.

The Subject Property appeared to be well-organized and well-managed based on WSP's site visit conducted on October 30, 2015. In WSP's opinion, the fill management process observed on October 30, 2015 appeared to be reasonable.

WSP understands that a site specific fill management agreement is currently being prepared by the Subject Property owner in conjunction with the Town of New Tecumseth. It was outside of the scope of WSP's assessment to review the details of this agreement. It is recommended that the above noted items be addressed and incorporated into this fill management agreement.

## 6 CLOSURE

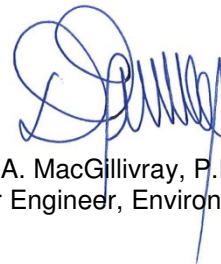
This report was prepared by Mr. Jay Dolan, P.Eng., Senior Engineer (Environment) and reviewed by Mr. David A. MacGillivray, Senior Engineer (Environment). Mr. Dolan has over 20 years of experience assessing, managing and remediating contaminated sites, and is a "Qualified Person" pursuant to Ontario Regulation 153/04 (as amended). Mr. MacGillivray, is the contaminated lands leader for WSP in Ontario and is responsible for the operations of the environment group at WSP's Hamilton location. He has 20 years of experience in the fields of environmental engineering, geotechnical engineering, and hydrogeology. 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.

Yours truly,

**WSP CANADA INC.**



Jay Dolan, P.Eng.  
Senior Engineer, Environment

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

## 7 REFERENCES

- Cole, 2013a. Fill Quality Assurance Program, Technical Memorandum No.1 – Audit Protocol, Tottenham Airfield Corporation Inc. Cole Engineering Group Ltd., March 01, 2013.
- Cole, 2013b. Audit Program for Imported Fill Materials EM13-0449, 2013 Quarterly Audit No. 2. Cole Engineering Group Ltd., October 29, 2013.
- Cole, 2013c. Audit Program for Imported Fill Materials EM13-0449, 2013 Quarterly Audit No. 3. Cole Engineering Group Ltd., October 29, 2013.
- Cole, 2014a. Audit Program for Imported Fill Materials EM13-0449, 2013 Spot Audit Report. Cole Engineering Group Ltd., March 10, 2014.
- Cole, 2014b. Audit Program for Imported Fill Materials EM13-0449, 2013 Quarterly Audit No. 4. Cole Engineering Group Ltd., March 10, 2014.
- Cole, 2014c. Audit Program for Imported Fill Materials EM13-0449, Incident Report No.1 – Response to 2013 Q4 Audit Findings. Cole Engineering Group Ltd., March 22, 2014.
- Cole, 2014d. Audit Program for Imported Fill Materials EM13-0449, 2014 Quarterly Audit No. 1. Cole Engineering Group Ltd., May 13, 2014.
- Cole, 2014e. Audit Program for Imported Fill Material to the Tottenham Airfield, 2013 Annual Report. Cole Engineering Group Ltd., May 26, 2014 (incorrectly noted as 2013 in report).
- Cole, 2014f. Fill Quality Assurance Program, Technical Memorandum No.1 – Audit Protocol, Tottenham Airfield Corporation Inc. Cole Engineering Group Ltd., March 01, 2013 updated June, 2014.
- Cole, 2014g. Audit Program for Imported Fill Materials EM13-0449, 2014 Quarterly Audit No. 2. Cole Engineering Group Ltd., August 19, 2014.
- Cole, 2014h. Audit Program for Imported Fill Material to the Tottenham Airfield, 2014 Quarterly Audit No. 3, Summary of Findings. Cole Engineering Group Ltd., December 05, 2014.
- Cole, 2015a. Audit Program for Imported Fill Materials EM13-0449, 2014 Quarterly Audit No. 4. Cole Engineering Group Ltd., January 28, 2015.
- Cole, 2015b. Audit Program for Imported Fill Materials EM13-0449, Incident Report No.2 – Response to 2014 Q1 Audit Findings. Cole Engineering Group Ltd., March 11, 2015.
- Cole, 2015c. Audit Program for Imported Fill Materials EM13-0449, Incident Report No.3 – Response to 2014 Q2 Audit Findings. Cole Engineering Group Ltd., March 18, 2015.
- PML, 2015a. Imported Fill Quality Assurance Program, Filling Period: January and February, Tottenham Airfield, 8128 Highway 9, New Tecumseth, Ontario. Peto MacCallum Ltd., June 26, 2015.
- PML, 2015b. Imported Fill Quality Assurance Program, Filling Period: March, Tottenham Airfield, 8128 Highway 9, New Tecumseth, Ontario. Peto MacCallum Ltd., July 02, 2015.

PML, 2015c. Imported Fill Quality Assurance Program, Filling Period: April, Tottenham Airfield, 8128 Highway 9, New Tecumseth, Ontario. Peto MacCallum Ltd., July 23, 2015.

PML, 2015d. Imported Fill Quality Assurance Program, Filling Period: May, Tottenham Airfield, 8128 Highway 9, New Tecumseth, Ontario. Peto MacCallum Ltd., July 24, 2015.

PML, 2015e. Imported Fill Quality Assurance Program, Filling Period: June, Tottenham Airfield, 8128 Highway 9, New Tecumseth, Ontario. Peto MacCallum Ltd., August 12, 2015.

TAC, 2015. Fill Quality Assurance Program, Tottenham Airfield Corporation Inc. Updated January, 2015. Tottenham Airfield Corporation Inc., January, 2015.

**Table 1: Summary of Fill Quality Assurance Program (FQAP) Audit Events and Incident Response Events (June 28, 2013 to July 15, 2015) – Tottenham Airfield, 8128 Highway 9, Tottenham, Ontario**

Report Reference	Report Type	Report Date	Field Audit Date(s)	Reported Document Review Results	Excavations and Test Pits Advanced During Audit or Incident Response Event	Soil Samples Obtained and Analyzed During Audit or Incident Response Event	MOECC Table 2 (Commercial) Exceedances Identified From Test Pit and/or Excavation Sampling	Recommendations, Action(s) Taken and Status
Cole, 2013b	2013 Q2 Audit	October 29, 2013	June 28, 2013	<ul style="list-style-type: none"> <li>Documents in order</li> <li>No written monthly report from Hybrid Contracting</li> </ul>	<ul style="list-style-type: none"> <li>3 Test Pits</li> <li>Depth range: 1.00 to 1.25 mbg</li> </ul>	<ul style="list-style-type: none"> <li>Three (3) samples (one per test pit)</li> </ul>	<ul style="list-style-type: none"> <li>No exceedances reported</li> </ul>	<ul style="list-style-type: none"> <li>QP recommended Hybrid Contracting be instructed to prepare monthly reports in accordance with the FQAP.</li> <li>Reports from Hybrid Contracting appear to have been delivered verbally to the QP and not in writing.</li> </ul>
Cole, 2013c	2013 Q3 Audit	October 29, 2013	September 27, 2013	<ul style="list-style-type: none"> <li>Minor administrative errors</li> </ul>	<ul style="list-style-type: none"> <li>3 Test Pits</li> <li>Depth range: 0.5 to 1.0 mbg</li> </ul>	<ul style="list-style-type: none"> <li>Three (3) samples (one per test pit)</li> </ul>	<ul style="list-style-type: none"> <li>No exceedances reported</li> </ul>	<ul style="list-style-type: none"> <li>Designated Person instructed by QP to keep data for each day in the same binder and not in different binders.</li> </ul>
Cole, 2014a	2013 Spot Audit	March 10, 2014	December 06, 2013	<ul style="list-style-type: none"> <li>One (1) missing laboratory certificate of analysis for incoming soil shipment</li> </ul>	<ul style="list-style-type: none"> <li>3 Test Pits</li> <li>Depth range: 0.5 to 1.0 mbg</li> </ul>	<ul style="list-style-type: none"> <li>Three (3) samples (one per test pit)</li> </ul>	<ul style="list-style-type: none"> <li>No exceedances reported</li> </ul>	<ul style="list-style-type: none"> <li>QP located missing laboratory Certificate of Analysis and placed in onsite binder.</li> <li>No MOECC Table 2 exceedances identified by QP in missing Certificate of Analysis.</li> </ul>
Cole, 2014b	2013 Q4 Audit	March 10, 2014	January 17, 2014	<ul style="list-style-type: none"> <li>Multiple incidents of missing or incomplete laboratory certificates of analysis for incoming soil shipments</li> </ul>	<ul style="list-style-type: none"> <li>3 Test Pits</li> <li>Each test pit to 1.0 mbg</li> </ul>	<ul style="list-style-type: none"> <li>Three (3) samples (one per test pit)</li> </ul>	<ul style="list-style-type: none"> <li>No exceedances reported</li> </ul>	<ul style="list-style-type: none"> <li>QP located missing laboratory certificates of analysis and placed in site binders.</li> <li>QP Identified four (4) MOECC Table 2 exceedances for lead after reviewing missing laboratory certificates of analysis.</li> <li>QP recommended follow-up sampling of soil placement areas where lead concentrations in incoming soil shipments were marginally over the MOECC Table 2 concentration limit.</li> <li>QP recommended excavation and removal of soil corresponding with incoming soil shipments that contained lead concentrations significantly over the MOECC Table 2 concentration limit.</li> <li>Action taken by QP set out in Cole, 2014c (Incident Report No. 1)</li> </ul>
Cole, 2014c	Incident Report No. 1	March 22, 2014	April 24, 2014	<ul style="list-style-type: none"> <li>No document review undertaken</li> </ul>	<ul style="list-style-type: none"> <li>One excavation measuring 18m long x 5m wide (depth may be 0.3 mbg but this is not clear)</li> <li>Six (6) test pits to depths of approximately 0.3 mbg</li> </ul>	<ul style="list-style-type: none"> <li>Six (6) test pit samples (one per pit)</li> <li>Ten (10) excavation floor and sidewall samples</li> </ul>	<ul style="list-style-type: none"> <li>No exceedances reported</li> </ul>	<ul style="list-style-type: none"> <li>Investigation of lead found at concentrations exceeding MOECC Table 2 standard during 2013 Q4 audit of incoming soil shipment laboratory certificates of analysis (Cole, 2014d).</li> <li>Soil corresponding with incoming shipments containing lead at concentrations significantly exceeding MOECC Table 2 criterion was excavated and removed from the property.</li> <li>QP sampled the resulting soil excavation floor and sidewalls and reported no MOECC Table 2 lead exceedances</li> <li>QP excavated six (6) test pits near locations corresponding with incoming soil shipments containing lead at concentrations marginally exceeding MOECC Table 2 criterion and obtained one (1) soil sample from each test pit.</li> <li>QP reported all six (6) soil samples contained lead at concentrations not exceeding the MOECC Table 2 criterion.</li> <li>QP deemed Incident No. 1 resolved.</li> </ul>
Cole, 2014d	2014 Q1 Audit	May 13, 2014	April 04, 2014	<ul style="list-style-type: none"> <li>Minor administrative errors</li> </ul>	<ul style="list-style-type: none"> <li>3 Test Pits</li> <li>Depth range: 2 to 5 mbg</li> </ul>	<ul style="list-style-type: none"> <li>Three (3) test pit samples (one per test pit)</li> </ul>	<ul style="list-style-type: none"> <li>F2 hydrocarbons</li> <li>Barium</li> <li>Lead</li> <li>zinc</li> </ul>	<ul style="list-style-type: none"> <li>QP recommended delineation, excavation and offsite removal of soil not meeting MOECC Table 2 criteria.</li> <li>Action taken by QP set out in Cole, 2015b (Incident Report No. 2).</li> </ul>
Cole, 2014g	2014 Q2 Audit	August 19, 2014	June 27, 2014	<ul style="list-style-type: none"> <li>Documents in order</li> </ul>	<ul style="list-style-type: none"> <li>3 Test Pits</li> <li>Depth range: 3 to 6 mbg</li> </ul>	<ul style="list-style-type: none"> <li>Three (3) test pit samples (one per test pit)</li> </ul>	<ul style="list-style-type: none"> <li>Electrical conductivity (EC)</li> </ul>	<ul style="list-style-type: none"> <li>QP recommended follow-up sampling and testing for EC of soil above a depth of 1.5 mbg directly above the samples below 1.5 mbg that produced excessive EC.</li> <li>If follow-up sampling above 1.5 mbg produced EC meeting MOECC Table 2 criterion, QP intended to apply MOECC Table 4 stratified criteria to soil below 1.5 mbg</li> <li>Action taken by QP set out in Cole, 2015c (Incident Report No. 3)</li> </ul>
Cole, 2014h	2014 Q3 Audit	December 05, 2014	October 03, 2014	<ul style="list-style-type: none"> <li>Minor administrative errors</li> </ul>	<ul style="list-style-type: none"> <li>3 Test Pits</li> <li>Depth range: 3 to 5 mbg</li> </ul>	<ul style="list-style-type: none"> <li>Three (3) test pit samples (one per test pit)</li> </ul>	<ul style="list-style-type: none"> <li>No exceedances reported</li> </ul>	<ul style="list-style-type: none"> <li>No action items or recommendations from QP.</li> </ul>
Cole, 2015a	2014 Q4 Audit	January 28, 2015	December 16, 2014	<ul style="list-style-type: none"> <li>Documents in order</li> </ul>	<ul style="list-style-type: none"> <li>3 Test Pits</li> <li>Depth range: 2 to 3 mbg</li> </ul>	<ul style="list-style-type: none"> <li>Three (3) test pit samples (one per test pit)</li> </ul>	<ul style="list-style-type: none"> <li>No exceedances reported</li> </ul>	<ul style="list-style-type: none"> <li>QP recommended more rigorous review by Designated Person of laboratory analytical results for incoming soil shipments.</li> </ul>

**Table 1: Summary of Fill Quality Assurance Program (FQAP) Audit Events and Incident Response Events (June 28, 2013 to July 15, 2015) – Tottenham Airfield, 8128 Highway 9, Tottenham, Ontario**

Report Reference	Report Type	Report Date	Field Audit Date(s)	Reported Document Review Results	Excavations and Test Pits Advanced During Audit or Incident Response Event	Soil Samples Obtained and Analyzed During Audit or Incident Response Event	MOECC Table 2 (Commercial) Exceedances Identified From Test Pit and/or Excavation Sampling	Recommendations, Action(s) Taken and Status
Cole, 2015b	Incident Report No. 2	March 11, 2015	June 27, 2014 December 16, 2014 February 11, 2015 February 20, 2015	<ul style="list-style-type: none"> <li>No document review undertaken</li> </ul>	<ul style="list-style-type: none"> <li>One excavation initially measuring 10m long x 6m wide x 3m deep</li> <li>Excavation expanded to 10m long x 12m wide x 3m deep</li> <li>Six (6) test pits to depths between 3 and 5 mbg</li> </ul>	<ul style="list-style-type: none"> <li>Forty-one (41) excavation floor and sidewall samples</li> <li>Twelve (12) test pit samples, two (2) from each test pit</li> </ul>	<ul style="list-style-type: none"> <li>One (1) lead exceedance</li> <li>F2 hydrocarbon exceedances found upon sampling initial excavation, no remaining F2 hydrocarbon exceedances after final expansion of initial excavation</li> </ul>	<ul style="list-style-type: none"> <li>Investigation of F2 hydrocarbons, barium, lead and zinc found at concentrations exceeding MOECC Table 2 standards during 2014 Q1 test-pit audit (Cole, 2014d).</li> <li>QP reported boron and zinc concentrations were below MOECC Table 2 criteria.</li> <li>QP reported a single lead exceedance found at a depth greater than 1.5 mbg. QP elected to apply MOECC Table 4 stratified criterion for lead to this sample instead of MOECC Table 2 criterion</li> <li>QP reported all other lead samples met MOECC Table 2 criterion.</li> <li>QP reported F2 hydrocarbon concentrations within samples removed from the final expanded excavation limits were below MOECC Table 2 criterion.</li> <li>QP deemed Incident No. 2 resolved based on application of MOECC Table 4 criteria to soil below 1.5 mbg.</li> </ul>
Cole, 2015c	Incident Report No. 3	March 18, 2015	December 16, 2014	<ul style="list-style-type: none"> <li>No document review undertaken</li> </ul>	<ul style="list-style-type: none"> <li>2 Test Pits</li> <li>Each test pit to 1.5 mbg</li> </ul>	<ul style="list-style-type: none"> <li>Two (2) samples, one from each test pit</li> </ul>	<ul style="list-style-type: none"> <li>No exceedances reported</li> </ul>	<ul style="list-style-type: none"> <li>Investigation of Electrical Conductivity (EC) exceedances of MOECC Table 2 standard found during 2014 Q2 audit (Cole, 2014g).</li> <li>Test pits advanced under QP supervision to depths of 1.5 mbg in the same locations as samples previously producing conductivity readings exceeding the MOECC Table 2 standard.</li> <li>Samples removed from these test pits by QP produced EC reading less than the MOECC Table 2 standard.</li> <li>QP assigned Table 4 stratified criteria to samples previously obtained below 1.5 mbg that produced EC readings over the MOECC Table 2 standard.</li> <li>QP deemed Incident No. 3 resolved based on application of MOECC Table 4 criteria to soil below 1.5 mbg.</li> </ul>
PML, 2015a	Spot Audit – January 2015 and February 2015 Fill Placement	June 26, 2015	March 17, 2015	<ul style="list-style-type: none"> <li>Documents in order</li> </ul>	<ul style="list-style-type: none"> <li>13 Test Pits</li> <li>Depth range: 1.0 to 3.2 mbg</li> </ul>	<ul style="list-style-type: none"> <li>Thirteen (13) samples, one from each test pit</li> </ul>	<ul style="list-style-type: none"> <li>F2 hydrocarbons</li> <li>lead</li> </ul>	<ul style="list-style-type: none"> <li>QP recommended re-sampling of the impacted areas, re-analysis of samples for the contaminants exceeding MOECC Table 2 criteria, calculating the average concentration value for both samples, and comparing the average values with applicable MOECC Table 2 criteria.</li> <li>WSP is unaware of the current status of this incident.</li> </ul>
PML, 2015b	Spot Audit – March 2015 Fill Placement	July 02, 2015	April 29, 2015	<ul style="list-style-type: none"> <li>Documents in order</li> </ul>	<ul style="list-style-type: none"> <li>10 Test Pits</li> <li>Depth range: 1.2 to 4.8 mbg</li> </ul>	<ul style="list-style-type: none"> <li>Ten (10) samples, one from each test pit</li> </ul>	<ul style="list-style-type: none"> <li>Lead</li> <li>Trichloroethylene (TCE)</li> <li>Free cyanide</li> </ul>	<ul style="list-style-type: none"> <li>QP recommended re-sampling of the impacted areas, re-analysis of samples for the contaminants exceeding MOECC Table 2 criteria, calculating the average concentration value for both samples, and comparing the average values with applicable MOECC Table 2 criteria.</li> <li>WSP is unaware of the current status of this incident.</li> </ul>
PML, 2015c	Spot Audit – April 2015 Fill Placement	July 23, 2015	June 04, 2015	<ul style="list-style-type: none"> <li>Documents in order</li> </ul>	<ul style="list-style-type: none"> <li>10 Test Pits</li> <li>Depth range: 3.8 to 5.0 mbg</li> </ul>	<ul style="list-style-type: none"> <li>Ten (10) samples, one from each test pit</li> </ul>	<ul style="list-style-type: none"> <li>No exceedances reported</li> </ul>	<ul style="list-style-type: none"> <li>No action items or recommendations from QP.</li> </ul>
PML, 2015d	Spot Audit – May 2015 Fill Placement	July 24, 2015	July 02, 2015	<ul style="list-style-type: none"> <li>Documents in order</li> </ul>	<ul style="list-style-type: none"> <li>10 Test Pits</li> <li>Depth range: 4.0 to 4.8 mbg</li> </ul>	<ul style="list-style-type: none"> <li>Ten (10) samples, one from each test pit</li> </ul>	<ul style="list-style-type: none"> <li>Lead</li> <li>Molybdenum</li> <li>Zinc</li> <li>F1 Hydrocarbons</li> </ul>	<ul style="list-style-type: none"> <li>QP recommended re-sampling of the impacted areas, re-analysis of samples for the contaminants exceeding MOECC Table 2 criteria, calculating the average concentration value for both samples, and comparing the average values with applicable MOECC Table 2 criteria.</li> <li>WSP is unaware of the current status of this incident.</li> </ul>
PML, 2015e	Spot Audit – June 2015 Fill Placement	August 12, 2015	July 15, 2015	<ul style="list-style-type: none"> <li>Documents in order</li> </ul>	<ul style="list-style-type: none"> <li>10 Test Pits</li> <li>Depth range: 4.4 to 4.7 mbg</li> </ul>	<ul style="list-style-type: none"> <li>Ten (10) samples, one from each test pit</li> </ul>	<ul style="list-style-type: none"> <li>No exceedances reported</li> </ul>	<ul style="list-style-type: none"> <li>No action items or recommendations from QP.</li> </ul>

**NOTES**

1. “QP” means “Qualified Person” pursuant to Ontario Regulation 153/04 (as amended) *Records of Site Condition*, and is either a licensed Professional Engineer (P.Eng.) or Professional Geoscientist (P.Geo.).
2. “MOECC Table 2” means Full Depth Generic Site Condition Standards in a Potable Groundwater Condition (commercial property, assuming coarse-textured soil) in *Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act* (Ontario Ministry of the Environment and Climate Change, April, 2011).
3. “MOECC Table 4” means Stratified Site Condition Standards in a Potable Groundwater Condition (commercial property, assuming coarse-textured soil) in *Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act* (Ontario Ministry of the Environment and Climate Change, April, 2011).
4. “mbg” means “metres below existing grade elevation” as of the “Field Audit Date(s)” shown. The grade elevation of the Tottenham Airfield runway increased throughout the audit period as loads of incoming fill were placed, graded and compacted.