

2015 ANNUAL REPORT

CERTIFICATE OF PROPERTY USE No. 0371-8TYQMY LANSDOWNE PARK – URBAN PARK (ZONE C) 945 BANK STREET (FORMERLY PART OF 945-1015 BANK STREET) OTTAWA, ONTARIO

Submitted to:

Ontario Ministry of the Environment and Climate Change Ottawa District Office 2430 Don Reid Drive Ottawa, Ontario K1H 1E1

Submitted by:

Amec Foster Wheeler Environment & Infrastructure A Division of Amec Foster Wheeler Americas Limited 300 – 210 Colonnade Road South Nepean, Ontario K2E 7L5

March 31, 2016

Project No. TZ10100106

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March 31, 2016

TZ10100106

Ontario Ministry of the Environment and Climate Change Ottawa District Office 2430 Don Reid Drive Ottawa, Ontario K1H 1E1

Attention: Steve Burns Ottawa District Manager

Dear Mr. Burns:

RE: 2015 Annual Report Certificate of Property Use (CPU) No. 0371-8TYQMY Lansdowne Park – Urban Park (Zone C) 945 Bank Street (Formerly Part of 945-1015 Bank Street), Ottawa, Ontario

Please find enclosed an electronic copy, in PDF format, of the 2015 Annual Report prepared in reference to the above noted property. The report has been prepared on behalf of the City of Ottawa to meet the annual reporting requirements stipulated under condition 4.2.10 of Certificate of Property Use No. 0371-8TYQMY.

Should you have any questions or require any additional information, please do not hesitate to contact the undersigned.

Yours truly,

AMEC Foster Wheeler Environment & Infrastructure, A Division of Amec Foster Wheeler Americas Limited

Kevin D. Hicks, M.Sc., P.Geo., QP_{ESA} Principal Hydrogeologist

Enclosure (1)

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VIA EMAIL



EXECUTIVE SUMMARY

Certificate of Property Use (CPU) No. 0371-8TYQMY was issued by the Ontario Ministry of Environment and Climate Change (MOECC) to the City of Ottawa (the "City") for the Lansdowne Park – Urban Park (Zone C) property located at 840 Queen Elizabeth Drive (formerly part of 945 - 1015 Bank Street) in Ottawa, Ontario (hereinafter referred to as the "CPU Property") on November 25, 2013.

Condition 4.2.10 of the CPU stipulates that an annual report shall be prepared each year to document the activities carried out by the Owner in relation to the Risk Management Measures (RMM) that have been implemented and are to be maintained at the CPU Property and submitted to the MOECC by March 31 of the following year. This report has been prepared by Amec Foster Wheeler Environment & Infrastructure, a division of Amec Foster Wheeler Americas Limited ("Amec Foster Wheeler"), on behalf of the City of Ottawa (the "City") to meet the annual reporting requirements for 2015 as stipulated by Condition 4.2.10 of the CPU.

The findings and results of the monitoring, sampling and inspection programs carried out in 2015 to meet the annual reporting requirements stipulated in the CPU are as follows:

- Inspections conducted as per the Inspection and Maintenance Plan (IMP) for the CPU Property indicated repairs to any of the Risk Management Measures (RMM) in place at the CPU Property were not required in 2015 therefore no such activities were undertaken in 2015;
- All groundwater samples collected from the monitoring well network located at the CPU property in 2015 as per the Groundwater Monitoring Program (GWMP) reported parameter concentrations below 2011 Table 3 Site Condition Standards (SCS) for residential / parkland / institutional property use and coarse textured soil, where established, and for ammonia, chloroform and iron, below the Property Specific Standards (PSS) derived from the Risk Assessment as provided in CPU 0371-8TYQMY;
- Methane concentrations measured at the landfill gas probes located at the CPU Property in 2015 as per the Methane Monitoring Program (MMP) were below the methane concentrations limits as outlined in O.Reg. 232/98 and the recommended methane alert levels provided in Procedure D-4-1: Assessing Methane Hazards from Landfill (MOE, 1987); and,
- No revisions were deemed necessary to the Soil Management Plan (SMP) or Health and Safety Plan (HASP).

Based on the results of the GWMP, MMP and IMP completed in 2015 no contingency measures or site restoration activities were deemed necessary at the CPU Property and therefore no such measures or activities were implemented in 2015



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Due to the technical nature of the appendices, these documents have not been translated or placed in an accessible format. However, the contents of the appendices are included in the report. Should you wish to view these documents in their original state, please make a request to <u>Kimberley.millar@ottawa.ca</u> (613) 580-2424 ext. 23416.

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LIST OF ACRONYMS AND ABBREVIATIONS

CCE	Central Canada Exhibition
COC	Contaminant of Concern
CSM	Conceptual Site Model
CPU	Certificate of Property Use
DO	Dissolved Oxygen
GWMP	Groundwater Monitoring Program
HASP	Health and Safety Plan
IMP	Inspection and Maintenance Plan
LFG	Landfill Gas
MMP	Methane Monitoring Plan
MOE	Ministry of the Environment
MOECC	Ministry of the Environment and Climate Change
OHSA	Occupational Health and Safety Act
ORP	Oxidation-Reduction Potential
OSEG	Ottawa Sports and Entertainment Group
PAH	Polynuclear Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyls
PHC	Petroleum Hydrocarbons
PSS	Property Specific Standards
PVC	Polyvinyl Chloride
QP	Qualified Person
RA	Risk Assessment
RMM	Risk Management Measure
RMP	Risk Management Plan
RSC	Record of Site Condition
SCS	Site Condition Standards
SMP	Soil Management Plan
SOP	Standards Operating Procedure
VOC	Volatile Organic Compound



1.0 INTRODUCTION

On November 25, 2013 Certificate of Property Use (CPU) No. 0371-8TYQMY was issued by the Ontario Ministry of Environment and Climate Change (MOECC), formerly the Ministry of the Environment (MOE) for the Lansdowne Park – Urban Park (Zone C) property located at 945 Bank Street (formerly part of 945 - 1015 Bank Street) in Ottawa, Ontario (hereinafter referred to as the "CPU Property"). A key plan showing the location of the CPU Property is provided on Figure 1.

The CPU Property is legally described as Part of Lots 20, 21 and 22 (Block 6), part of Lot 29 (Block 7) and part of O'Connor Street (Formerly Mary Street) (closed by Judge's Order Inst. LT1245216) on Plan 26085, part of Lots 57, 58, 59 and 60 and part of Lansdowne Avenue (closed by Judge's Order Inst. LT1245216) on Plan 35722, part of Lots 45 to 50 (Inclusive) on Plan 30307 and part of Lots I and K, Concession C (Rideau Front), Nepean, being Parts 1, 16, 17, 32 and 33 on Plan 4R-26535; City Of Ottawa and being all of PIN 04139-0264.

Condition 4.2.10 of the CPU stipulates that an annual report shall be prepared each year to document the activities carried out by the Owner in relation to the Risk Management Measures that have been implemented and are to be maintained at the CPU Property and submitted to the MOECC by March 31 of the following year. This report has been prepared by Amec Foster Wheeler Environment & Infrastructure, a division of Amec Foster Wheeler Americas Limited ("Amec Foster Wheeler"), on behalf of the City of Ottawa (the "City") to meet the annual reporting requirements stipulated by Condition 4.2.10 of CPU No. 0371-8TYQMY for 2015.

1.1 Background Information

Lansdowne Park, which also includes the former adjacent Sylvia Holden Commemorative Park, comprises an area of 15.64 hectares located on the east side of Bank Street in the Glebe neighbourhood of the City of Ottawa, Ontario. Lansdowne Park is bordered by Bank Street to the west, Holmwood Avenue to the north and Queen Elizabeth Driveway followed by the Rideau Canal to the east and south.

Lansdowne Park was a historic exhibition, sports and entertainment facility originally developed in the mid-1800s as an agricultural fairground. Through well over 100 years of continuous use the site has undergone numerous changes including both the site infrastructure and physiography.

In 2007 the City of Ottawa initiated a review to redevelop Lansdowne Park. The Ottawa Sports and Entertainment Group (OSEG) proposed a public-private partnership with the City to rebuild the stadium and redevelop Lansdowne Park. The redevelopment plan was initiated in 2012 and included three major components:

- Constructing a mixed-use area that includes retail, office, and residential property uses along the north and west portions of the site (Zone A);
- Refurbishing Frank Clair Stadium (sports stadium) / Civic Centre (arena complex) and relocating and refurbishing the Horticultural Building (Zone B); and,



• Creating a large urban park along the east and south portions of the site (Zone C).

The CPU Property (i.e., Zone C) portion of the redevelopment was completed in the summer of 2015. A generalized site plan depicting the redeveloped Lansdowne Park is provided on Figure 2.



2.0 CERTIFICATE OF PROPERTY USE

In recognition of the redevelopment to a more sensitive property use within Zone C, Amec Foster Wheeler (2012) submitted a Risk Assessment (RA) to the Environmental Assessment and Approvals Branch of the MOECC on March 16, 2012 in support of the filing of a Record of Site Condition (RSC). The RA (3678-8JPR93) was accepted by the Director in its letter to the City of Ottawa dated April 20, 2012. In recognition of its acceptance of the RA for Zone C, CPU No. 0371-8TYQMY was issued by the MOECC on November 25, 2013. CPU No. 0371-8TYQMY addresses the Risk Management Measures (RMM) to be implemented and maintained at the CPU Property to mitigate unacceptable risks to human health as described in the Risk Assessment (RA) and/or Part 4 of the CPU. The CPU also provides property-specific standards (PSS) for specific COC present in soil and groundwater beneath the CPU Property.

2.1 Risk Management Measures

The RMM to be implemented and maintained at the CPU Property are generalized as follows:

- 1. **Geotechnical Engineering:** Quality assurance and quality control for such earthworks as the placement and compaction of geotechnical materials and soils impacted by any COC shall be carried out by the representative of the geotechnical engineering firm responsible for the supervision of construction based on professional judgment.
- Former Easter Landfill: Construction of a non-woven geotextile marker horizon overlain by a combination soft soil and hard cap barrier, both extending 5 metres outward beyond the periphery of the Former Eastern Landfill. The hard cap shall consist of approved structural elements. The soft soil cap shall include 0.5 to 1.5 metres of clean soil meeting the Table 3 Site Conditions Standards (SCS) for residential / parkland / institutional property use.
- 3. East Berm: Construction of an earthen berm to contain contaminated soil excavated from Zone A. The berm shall be underlain by non-woven geotextile to demarcate the elevation above which impacted soils have been placed. The contoured surface of the impacted soils shall be covered with a non-woven geotextile to demarcate the zone of impacted soils present underneath and covered with a minimum of one metre of clean soil meeting the 2011 Table 3 SCS for residential / parkland / institutional property use and/or other approved structural elements.
- 4. Former McElroy Building: Construction of a non-woven geotextile marker horizon overlain by a combination soft soil and hard cap barrier over the east portion of the footprint of the Former McElroy Building. The hard cap shall consist of approved structural elements. The soft soil cap shall include 0.5 to 1.5 metres of clean soil meeting the 2011 Table 3 SCS for residential / parkland / institutional property use.
- 5. **Soil Management Plan:** Development and implementation of a Soil Management Plan (SMP) to establish best practices and procedures to mitigate adverse effects and potential exposure risks associated with the excavation, transportation, storage and handling of soil at the CPU Property. This includes earthworks undertaken during site redevelopment as



well as during any post-development construction activities while the RMM are required to be maintained in place.

- Health and Safety Plan: Development and implementation of a Health and Safety Plan (HASP) to provide guidance for the protection of workers from potential exposure to the COC known to be present at the CPU Property
- 7. **Groundwater Monitoring Program:** Development and implementation of a Ground Water Monitoring Program (GWMP), for a minimum of five years, to identify any changes in the hydrological components and groundwater quality resulting from implementation of the risk management measures and establishing trigger levels and contingency activities in the event that the monitoring results show any concentration(s) greater than the Property Specific Standards (PSS).
- 8. **Methane Monitoring Program:** Development and implementation of a Methane Monitoring Program (MMP), for a minimum of five years, to address the influence of seasonal variations on landfill gas concentrations in the vicinity of the Former Eastern Landfill and related RMM and establishing trigger levels and contingency activities in case monitoring results show any concentration greater than the Property Specific Standards that are or may be related to the production of landfill gas.
- Inspection and Maintenance Plan: Development and implementation of an Inspection and Maintenance Plan (IMP) to assess the integrity of the RMM on a routine and asneeded basis and identify any depreciation or failure of the RMM requiring repair or reinstatement.
- 10. **Annual Report:** An annual report shall be submitted to the MOECC by no later than March 31 of each year to document activities carried out by the Owner in relation to the RMM during the previous calendar year, including any activities in relation to: East Berm, Former Eastern Landfill, Former McElroy Building, SMP, HASP, GWMP, MMP and IMP.

A copy of the CPU is provided in Appendix A.



3.0 2015 RMM IMPLEMENTATION

3.1 East and South Berm RMM

The construction of the East Berm was initiated in the summer of 2012 using impacted soil, exceeding Table 3 SCS for residential / parkland / institutional property use, sourced from areas excavated to construct underground parking structures within Zones A and B development parcels. Following excavation, remediation of Zone A was completed to obtain a Record of Site Condition. Parameters present in soil in these areas exceeding the applicable Table 3 SCS included various metals, polycyclic aromatic hydrocarbons and petroleum hydrocarbons. Impacted soils which could not be accommodated in the East Berm were temporarily stockpiled within Zone C while awaiting placement in the South Berm, a western extension of the East Berm located south of the Stadium.

Construction of the South Berm began in the spring of 2013 using soil sourced from the temporary stockpile of contaminated soil as well as non-impacted soil sourced from areas excavated to construct the underground parking structures. Impacted soil that could not be accommodated in the berms due to on-site temporary storage/stockpile limitations or other site logistics were transported and disposed off-site in accordance with applicable legislation.

While constructing the East and South Berms the following RMM were implemented:

- The existing ground surface beneath the berms was prepared by removing the existing asphalt where present, levelling and covering by eight-ounce non-woven geotextile fabric. The geotextile was placed to demarcate the interface between clean and impacted soil and to mitigate the potential for soil mixing.
- Soil known or suspected of being impacted was placed, compacted and contoured to a maximum elevation of at least 1 metre less than the final design elevation of the berms.
- Impacted soil contained within the East and South Berm was covered by eight-ounce nonwoven geotextile fabric. The geotextile was installed per the manufacturer's instructions. At the toe of the berms, both the bottom and overlying geotextiles were placed in an anchor trench measuring 0.5 wide by 0.5 m deep. The anchor trench was then backfilled with clean sand. Based on a design slope of 3:1, the geotextile and impacted soil is set-back of approximately 2.56 metres from the toe of the berms.
- The geotextile overlying the impacted soil was covered with no less than 1 metre of clean fill (i.e., soil meeting *Table 3 Site Condition Standards in a Non-Potable Groundwater Condition Residential/Parkland/Institutional Property Use*), which includes an upper layer of topsoil sufficient to support landscaping needs.
- In areas where trees were planted, sufficient soil depth was maintained around the rooting zones such that the roots of the mature trees would not have the potential for penetrating the underlying geotextile. At a minimum, trees were planted on compacted soil to prevent downward growth of rootmass. No plant species with tap root systems were placed above or within 5 metres of any areas subject to soil capping.



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- To ensure that migration of contaminants does not occur, utility trenches installed through the area of impacted soil contained within the berms were sealed with clay plugs at the transition from impacted to non-impacted soils. The clay seals were constructed to a minimum thickness of 100 cm and extended from the base of the utility trench to the subbase.
- With respect to utility conduit materials, concrete or polyvinyl chloride (PVC) conduits are generally not affected by the COC at the site. Therefore, either concrete or PVC conduits were used as utility conduits at the site. Gaskets used to connect conduct pipe sections within the area of impact were composed of chemically resistant materials, such as nitrile or fluorocarbon.
- As-built surveys were made during construction of the berms to ensure compliance with the design requirements stipulated in the CPU and that the berms were constructed with the required minimum thicknesses of clean cover soil.
- The East and South Berms will be surveyed on an annual basis for two consecutive years following construction to assess any differential settlement or consolidation of materials that could result in unwanted thinning of the clean cover. The Survey will note and record any areas showing evidence of erosion of surficial soils, slope failure and/or soil caving. Any areas subject to settlement greater than 0.10 metres will be subject to restoration using clean fill/topsoil. The annual first survey of the berms will be conducted in the fall of 2015.
- The as-built survey and annual settlement/consolidation surveys will be maintained by the City per Section 3.12 of this Risk Management Plan.

The redevelopment construction works were completed at the CPU property in the summer of 2015 and inspections of the East and South Berms were subsequently conducted as part of the Inspection and Maintenance Plan developed for the Site in accordance with the requirements of Condition 4.2.8 of the CPU. Details of the inspections including photo logs are provided in the Risk Management Measures Inspection Logs in Appendix B. The extent of the RMM for the Berm areas is provided in Figure 3.

3.2 Former Eastern Landfill RMM

In the area of the former Eastern Landfill COC in soil requiring risk management included metals (e.g., lead, zinc, cadmium, etc.), petroleum hydrocarbons and PAH, in addition to putrescible and non-putrescible waste. Based on the pre-construction grades, the zone of waste / impacted soil extended from approximately 0.8 metres below ground surface to 4.8 mbgs. Potential risks were mitigated via capping the waste and impacted soil with non-woven geotextile that was overlain with a combination soft soil cap and hard cap. Construction activities within the inferred extent of the Eastern Landfill were initiated in September of 2013. Capping of the Eastern Landfill was conducted in successive stages due to limited availability of staging area at the site and included breaks during the winter months.



Utilities were installed prior to the installation of the overlying geotextile and capping materials. The extent of the former landfill was verified through visual inspection of deleterious materials in the soil and locating the physical limits of the former landfill observed as being the wood cribbing of the former inlet to the Rideau Canal. Final soft soil and hard caps placement over areas of the former Eastern Landfill was completed in the summer 2015. Excess impacted soil excavated during utility trenching and cap placement was transported and disposed off-site in accordance with applicable legislation.

The following RMM were implemented during the construction of the soft soil and hard caps over the Former Eastern Landfill:

- The existing surface cover consisting of asphalt and granular subbase was removed to the required depth. The surface was contoured to accommodate the final design grades and placement of eight-ounce non-woven geotextile fabric. The geotextile was placed to demarcate the separation between underlying waste / contaminated soil and the overlying soft soil and hard caps. The eight-ounce non-woven geotextile was extended a minimum of 5 metres beyond the limits of the Eastern Landfill.
- The geotextile was capped with a soft soil cover consisting of clean soil (i.e., soil meeting *Table 3 Site Condition Standards in a Non-Potable Groundwater Condition Residential/Parkland/Institutional Property Use*), a hard surface cap (i.e., asphalt, concrete or interlocking pavers and granular subbase), or a combination thereof. The thickness of the soft soil cap overlying the geotextile was determined based on landscaping needs but was not less than 500 millimetres inclusive of topsoil and grass sod. Examples of the different hard cap surface treatments include;
 - Concrete Unit Paving on Grade;
 - Granite Paving;
 - Reinforced and coloured asphalt paving;
 - Resilient Play Surface; and,
 - Refrigerated Concrete Slab for skating rink.
- Where features were constructed that penetrated the geotextile such as foundations for light standards or playground equipment, at the point of penetration, the geotextile was placed to extend 0.3 m up and around the penetration point.
- In areas where trees were planted, sufficient soil depth was maintained around the rooting zones such that the roots of the mature trees would not have the potential for penetrating the underlying geotextile. At a minimum, trees were planted on compacted soil to prevent downward growth of rootmass. No plant species with tap root systems were placed above or within 5 metres of any areas subject to soil capping.
- To ensure that migration of contaminants does not occur, utility trenches installed through the area of impacted soil contained within the berms were sealed with clay plugs at the transition from impacted to non-impacted soils. The clay seals were constructed to a minimum thickness of 100 cm and extended from the base of the utility trench to the subbase.



- With respect to utility conduit materials, concrete or PVC conduits are generally not affected by the COC at the site. Therefore, either concrete or PVC conduits were used as utility conduits at the site. Gaskets used to connect conduct pipe sections within the area of impact were composed of chemically resistant materials, such as nitrile or fluorocarbon.
- The on-site storm water management system includes an underground stormwater retention tank encroaching the western limit of the Eastern Landfill. The retention tank was installed such that the geotextile liner was placed along the side of the tank and secured in place with backfilled soil. Trenches for any storm sewers flowing into or out of the tank passing through the impacted soil were sealed as noted above. Soil excavated during the installation of the tank was managed as per the risk management plan.
- Once completed, the boundaries defined by the RMM developed for the Eastern Landfill were surveyed. An as-built drawing will be maintained by the City as per the risk management plan.

The redevelopment construction works were completed at the CPU property in the summer of 2015 and inspection of the former eastern landfill area were conducted as part of the Inspection and Maintenance Plan developed for the Site to satisfy the requirements of Condition 4.2.8 of the CPU. Details of the inspections including photo logs are provided in the Risk Management Measures Inspection Logs in Appendix B. The extent of the RMM for the former eastern landfill area is provided in Figure 3.

3.3 Former McElroy Building RMM

In the area of the former McElroy Building COC requiring risk management included polycyclic aromatic hydrocarbons in soil. Contaminants in soil were managed via covering the impacted soil with non-woven geotextile that was overlain with a combination soft soil cap and hard cap (i.e., soil and paving structures and granular subbase). In October 2014 a test pit sampling program was completed to further delineate the extent of the PAH impacted soil. The extent of the RMM was based on the refined extent of the impacted soil.

The following RMM were implemented during the construction of the soft and/or hard cap over the Former McElroy Building:

- The existing surface cover consisting of asphalt and granular subbase was removed to the required depth. The surface was contoured to accommodate the final design grades and placement of eight-ounce non-woven geotextile fabric. The geotextile was placed to demarcate the separation between underlying waste / contaminated soil and the overlying soft soil and hard caps. The eight-ounce non-woven geotextile was placed to extend a minimum of 5 metres beyond the limits of the define limits of the impacted soil.
- The geotextile was capped with a soft soil cover consisting of clean soil (i.e., soil meeting *Table 3 Site Condition Standards in a Non-Potable Groundwater Condition -Residential/Parkland/Institutional Property Use*), a hard surface cap (i.e., asphalt,



concrete or interlocking pavers and granular subbase), or a combination thereof. The thickness of the soft soil cap overlying the geotextile was determined based on landscaping needs but was not less than 500 millimetres inclusive of topsoil and grass sod.

- Where features were constructed that penetrated the geotextile such as foundations for light standards, at the point of penetration, the geotextile was placed to extend 0.3 m up and around the penetration point.
- In areas where trees were planted, sufficient soil depth was maintained around the rooting zones such that the roots of the mature trees would not have the potential for penetrating the underlying geotextile. At a minimum, trees were planted on compacted soil to prevent downward growth of rootmass. No plant species with tap root systems were placed above or within 5 metres of any areas subject to soil capping.
- To ensure that migration of contaminants does not occur, utility trenches installed through the area of impacted soil contained within the berms were sealed with clay plugs at the transition from impacted to non-impacted soils. The clay seals were a minimum of 100 cm thick and extended from the base of the utility trench to the sub-base.
- With respect to utility conduit materials, concrete or PVC conduits are generally not affected by the COC at the site. Therefore, either concrete or PVC conduits were used as utility conduits at the site. Gaskets used to connect conduct pipe sections within the area of impact were composed of chemically resistant materials, such as nitrile or fluorocarbon.
- Once completed, the boundaries defined by the risk management measures developed for the McElroy Building were surveyed. An as-built drawing will be maintained by the City as per the risk management plan.

Construction works were completed at the CPU property in the summer of 2015 and inspection of the former McElroy Building area were conducted as part of the Inspection and Maintenance Plan developed for the Site to satisfy the requirements of Condition 4.2.8 of the CPU. Details of the inspections including photo logs are provided in the Risk Management Measures Inspection Logs in Appendix B. The extent of the RMM for the former McElroy Building area is provided in Figure 3.



4.0 SOIL MANAGEMENT PLAN

A SMP was developed in support of the Lansdowne Park redevelopment project in February 2012. The SMP was revised in May 2014 (AMEC, 2014a) to meet Condition 4.2.5 of the CPU. The objectives of the SMP for the RA RSC Property are as follows:

- Ensure that contaminated soil and groundwater encountered during any earthworks are managed in compliance with all applicable environmental laws including a CPU specific to the RA RSC Property portion of the site. In this context, "contaminated" soil is interpreted to mean soil that does not meet the standards for soil as laid out in the 2011 MOE document entitled "Soil, Groundwater and Sediment Standards for Use under Part XV.1 of the Environmental Protection Act", Table 3 Full Depth Generic SCS in a Non-Potable Groundwater Condition for Residential/Parkland/Institutional (R/P/I) Land Use, coarse soil type (MOE 2011 Table 3 SCS);
- Provide a process to manage contaminated soil and/or groundwater, including any excess soil;
- Provide a contingency plan to identify and manage any unknown contamination identified during the construction process or produced due to a spill or release during construction;
- Support the execution of the site health and safety plan as it relates to the safety of the construction workforce and the neighbouring community where contamination is encountered;
- Outline the methodology and procedures to minimize dust created during the excavation, loading and importation, placement and compaction of soil;
- Outline the procedures for notification and reporting; and,
- Integrate into other management plans and procedures that could include quality, environmental management, emergency response, and sustainability.

The revised SMP to meet the requirements of Condition 4.2.5 of the CPU was submitted to the MOECC on June 2, 2014. The SMP was included in contract documents and provided to contractors during the redevelopment project and Amec Foster Wheeler was retained by the City to ensure implementation of the SMP during construction works. No changes or amendments to the SMP were made in 2015.



5.0 HEALTH AND SAFETY PLAN

The health and safety requirements mandated under the Occupational Health and Safety Act (OHSA), including the development and implementation of any Health and Safety Plan (HASP) is the responsibility of the Constructor deemed to be in charge of any works being undertaken at the site. This includes contractors retained by the owner working on its behalf. To assist contractors working at the CPU Property, a HASP addendum was developed to establish the health and safety requirements and provide guidance for the protection of workers from potential exposure to the COC known to be present at the CPU Property. The HASP addendum does not address other Health and Safety requirements.

The HASP addendum identifies the COC present at the CPU Property and the potential exposure pathways through which workers at the CPU Property may be exposed to those COC. Recommendations for personal protective equipment (PPE), personal hygiene and fugitive dust control are also provided in the addendum.

The HASP addendum was developed in July 2013 (AMEC, 2013). No changes or amendments to the HASP were made in 2015.



6.0 INSPECTION AND MAINTENANCE PLAN

An IMP outlining the monitoring program to be implemented at the site to satisfy the requirements of Condition 4.2.8 of the CPU was submitted to the MOECC on June 30, 2014 (AMEC, 2014b). The primary objectives of the IMP include, but are not necessarily limited to, addressing the following items:

- 1. Inspection and maintenance during construction activities;
- 2. Inspection frequencies and routine maintenance requirements for the non-woven geotextile, and for the final surfaces of each of the East Berm, the Former Eastern Landfill and the Former McElroy Building;
- 3. Event-specific inspection and maintenance;
- 4. Weather-related inspection and maintenance, and,
- 5. Non-routine and incident inspection and maintenance.

Construction works were completed at the CPU property in the summer of 2015 and inspection of the RMM, including the cap over the East Berm and its extension referred to as the South Berm as well as the cap over the former Eastern Landfill and former McElroy Building areas, were conducted as per the IMP.

The following inspections were conducted in 2015:

- 1. August 19, 2015 Weather-related inspection triggered after a rainfall event of 41.8 mm within a 48 hour period and included all RMM;
- September 14, 2015 Event and weather-related inspection triggered by an AC/DC concert held at TD Place and a cumulative rainfall event of 44.8 mm within a 48 hour period and included all RMM;
- October 7, 2015 Routine Fall inspection and Event-specific inspection triggered by the City Folk Festival which occupied most areas overlying the former Eastern Landfill and McElroy Building including the Great Lawn and included all RMM; and,
- 4. November 2, 2015 Event and weather-related inspection triggered by Light the Night Walk and a rainfall event of 31.6 mm within a 24 hour period of time and included all RMM.

Details of the inspections including photo logs are provided in the Risk Management Measures Inspection Logs in Appendix B.

No significant deterioration of the RMM that would result in an increase in potential risk to human health on the CPU property was observed during any of the inspections conducted in 2015. Areas of noted bare soil and minor erosion will be re-evaluated in 2016 and recommendations to restore the RMM in these areas will be made to the City if conditions deteriorate. No changes or amendments to the IMP were made in 2015.



7.0 GROUNDWATER MONITORING PROGRAM

A proposed GWMP outlining the proposed monitoring program to satisfy the requirements of Condition 4.2.7 of the CPU was submitted to the MOECC for its approval on September 2, 2014 (AMEC, 2014c). The primary objectives of the GWMP include, but are not necessarily limited to, addressing the following:

- 1. Identifying changes in the hydrological components having a direct interaction with the CPU Property soils including well water levels, groundwater flow details, infiltration rates and interflow details;
- 2. Identifying any changes in groundwater quality resulting from establishing the RMM;
- 3. Establishing the location and installation details of all groundwater monitoring wells to be included in the program;
- 4. Establishing the frequency of all groundwater sampling and monitoring events;
- Establishing an itemized list of chemical parameters to be analyzed at each monitoring well location, including those identified in Schedule 5, Column 2 – Indicator List for Groundwater and Leachate contained in the Landfill Standards: A Guideline on the Regulatory and Approval Requirements for New or Expanding Landfilling Sites (PIBS 7792e) published by the MOE and dated January 2012, as it may be amended from time to time; and,
- 6. Establishing trigger levels and contingency activities in the event that the monitoring results show any concentration(s) greater than the Property Specific Standards (PSS).

7.1 Ground Water Monitoring Well Construction

As per the GWMP, a total of twelve (12) monitoring (MW15-1 to MW15-12) were installed at strategic locations to facilitate monitoring and sampling of the near surface groundwater beneath the CPU Property. As the GWMP was designed to detect changes to both physical flow characteristics and groundwater quality, the monitoring well locations were selected in consideration of the groundwater flow patterns previously identified at the Site and the proposed locations of the RMM implemented at the Site. Monitoring locations were therefore established both upgradient and downgradient of the RMM as well as within the immediate areas of the RMM. The groundwater monitoring well locations are shown in Figure 4.

The ground water monitoring well construction details are summarized in Table 1. Monitoring wells were constructed by Strata Drilling Group in accordance with the monitoring wells construction details provided in the GWMP on October 21 to 23, 2015. Details of the borehole drilling and monitoring well construction are provided in the stratigraphic and instrumentation logs in Appendix C.

All groundwater monitoring wells installed at the Site were instrumented with dedicated Waterra inertial lift pumps and sufficient lengths of 12 mm inside diameter low density polyethylene (LDPE) tubing to facilitate well development and purging requirements. Following a minimum of 48 hours



after installation, each monitoring well was developed by extracting approximately five to ten well volumes to remove any residual sediment and/or drill cuttings introduced during the borehole drilling and well installation process, stabilize and grade the filter pack, improve connectivity between the well and the formation, and restore groundwater that may have been disturbed or otherwise altered during the drilling and well installation process. Once developed, the wells were instrumented with 6 mm inside diameter LDPE tubing to facilitate low-flow sampling using a peristaltic pump. Monitoring well development data is summarized in Table 2.

7.2 Ground Water Monitoring and Sampling

Groundwater monitoring was conducted on October 28, 2015 and included all monitoring wells installed at the CPU Property. In addition to these monitoring wells, five monitoring wells located on the National Capital Commission (NCC) property to the immediate east were also monitored. The static groundwater elevations recorded at the groundwater monitoring wells are summarized in Table 3. Groundwater was present at depths ranging from 3.037 metres below ground surface (mbgs) at MW09-3 to 5.314 mbgs at MW15-12. Water table elevations recorded at the monitoring wells varied between 59.948 metres above sea level (masl) at MW09-5 and 62.472 masl at MW09-2. A groundwater elevation contour plan for the October 28, 2015 monitoring event depicting the inferred groundwater flow pattern beneath the CPU Property is provided on Figures 6.

The groundwater flow pattern beneath the CPU Property appears to be similar to the conditions prior to re-development. Shallow groundwater, beneath the southern half of the CPU property, generally flows to the east and north-east in a quasi-inward radial flow pattern in the vicinity of the former McElroy Building. Mounding near the north-east corner of the CPU property results in localized outward radial flow to the west and south and is likely due to water originating from the portion of the Rideau Canal located north of the Site migrating within the fill materials placed within the former inlet of the Rideau Canal.

Nineteen samples including 12 samples collected from monitoring wells on the CPU Property and five monitoring wells on the adjacent NCC property were collected on October 29 and 30, 2015. Low-flow sampling techniques were utilized in order to minimize potential sample biasing due to sediment entrainment. Groundwater field parameters measured during sampling including pH, temperature, dissolved oxygen (DO), conductivity and oxidation-reduction potential (ORP) and general observations are provided in Table 4. Each of the groundwater samples collected was analyzed for the following COC: polynuclear aromatic hydrocarbons (PAH), petroleum hydrocarbons fractions F1 - F4 (PHC F1-F4), chloroform, metals and landfill leachate indicator parameters (alkalinity, ammonia, calcium, chloride, conductivity, iron, magnesium, nitrate (as N), pH, sodium, total dissolved solids (TDS), sulphate, biochemical oxygen demand (BOD), chemical oxygen demand (COD), dissolved organic carbon (DOC)).

Two (2) blind duplicate samples were also collected for analysis of one or more COC including PAHs, PHCs F1-F4, chloroform, metals, and landfill leachate indicator parameters. Sample DUP-1 is a blind duplicate of sample MW15-11 and sample DUP-2 is a blind duplicate of sample MW09-



6. Two (2) trip blank samples were employed, one on each of October 29 and 30, 2015 for analysis of chloroform to assess potential cross contamination during sample storage and transport.

Groundwater samples analyses were performed by Paracel Laboratories Ltd. of Ottawa, Ontario.

7.3 Groundwater Sample Analyses

Analytical results for groundwater samples collected from the monitoring wells located on the CPU Property were evaluated through comparison with the 2011 Table 3 SCS for residential / parkland / institutional property use and coarse textured soil, where established, and for ammonia, chloroform and iron, to the Property Specific Standards (PSS) derived from the Risk Assessment as provided in CPU 0371-8TYQMY. Analytical results for groundwater samples collected from the monitoring wells located on the NCC property were evaluated through comparison with the 2011 Table 3 SCS for residential / parkland / institutional property use and coarse textured soil, where established.

The results of the groundwater sample analyses, and their respective Table 3 SCS and Property Specific Standards (PSS) derived from the Risk Assessment are summarized in Table 5. Parameter exceeding their respective 2011 Table 3 SCS or PSS as applicable in the context of this report are shown on Figure 7.

Copies of the Certificates of Analysis issued by the laboratory are provided in Appendix D.

7.3.1 Petroleum Hydrocarbons

The results of the PHC F1 - F4 groundwater sample analyses and their respective Table 3 SCS are summarized in Table 5. PHCs were not detected in any of the groundwater samples. Based on the analytical method detection limits (MDL) reported by the laboratory, all samples are deemed to be below the applicable 2011 Table 3 SCS.

7.3.2 Chloroform

The results of the chloroform analyses and its respective 2011 Table 3 SCS and PSS are summarized in Table 5.

- Chloroform was detected in groundwater samples collected from one (1) monitoring well located on the CPU Property (MW15-2) and two (2) monitoring wells located on the NCC property (MW09-5 and MW09-6). Chloroform was also detected in the blind duplicate sample (Dup-2) collected at MW09-6;
- The concentration of chloroform in the groundwater sample collected from monitoring well MW15-2 located on the CPU Property was reported at 2.6 µg/L. This concentration is below the PSS of 22 µg/L;



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- The concentration of chloroform reported in groundwater sample collected from off-site monitoring well MW09-5 was reported at 23.5 µg/L thereby exceeding the 2011 Table 3 SCS of 2.4 µg/L; and,
- All other groundwater samples collected reported concentrations of chloroform below analytical MDL, and therefore below the applicable 2011 Table 3 SCS.

7.3.3 Polynuclear Aromatic Hydrocarbons

The results of the PAH analyses and their respective 2011 Table 3 SCS are summarized in Table 5. One or more PAH parameters were detected in eleven (11) of the groundwater samples collected including samples from seven monitoring wells on the CPU property and four monitoring wells on the adjacent NCC property. All of the groundwater samples reporting detectable concentrations for PAHs were below their respective 2011 Table 3 SCS. Samples reporting PAH concentrations below MDL are deemed to be below the applicable 2011 Table 3 SCS based on the MDLs reported by the laboratory.

7.3.4 Metals

The results of the metals analyses and their respective 2011 Table 3 SCS, where established, are summarized in Table 5. Five or more metals including antimony, arsenic, barium, boron, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, molybdenum, nickel, selenium, silver, sodium, uranium, vanadium, zinc were detected in each of the groundwater samples. All groundwater samples collected reported metals parameter concentrations below their respective 2011 Table 3 SCS where established or the PSS for iron.

7.3.5 General Inorganic Parameters

The results of the general inorganic parameter analyses, including those identified in Schedule 5, Column 2 – Indicator List for Groundwater and Leachate contained in the Landfill Standards: A Guideline on the Regulatory and Approval Requirements for New or Expanding Landfilling Sites (PIBS 7792e) are summarized in Table 5. With the exception of chloride, 2011 Table 3 SCS do not exist for these parameters. A PSS was developed for ammonia as it was identified as a COC resulting from former ice making plants at the former Curl-o-Drome and former McElroy Building. Neither of these parameters exceeded their 2011 Table 3 SCS or PSS.

The general inorganic parameter were analyzed primarily to assess potential changes to ground water quality resulting from the implementation of the RMM and redevelopment of the CPU Property. These parameters, for which the majority no 2011 Table 3 SCS exist, have been analyzed to facilitate the identification of any trends which may be indicative of the deterioration of groundwater quality resulting from the implementation of the RMM. As such, these data will be evaluated in future years to assess potential trends and changes in groundwater quality.



7.4 Laboratory QA/QC Program

7.4.1 Laboratory Accreditation

The analytical laboratory employed to perform the laboratory analyses is accredited by the Canadian Association for Laboratory Accreditation Inc. in accordance with ISO/IEC 17025:1999 – "General Requirements for the Competence of Testing and Calibration Laboratories" for the tested parameters.

7.4.2 Performance Criteria

The "Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the *Environmental Protection Act*" (the "Analytical Protocol"), March 9 2004 (amended July 1, 2011), establishes performance criteria for use when assessing the reliability of data reported by analytical laboratories. These include maximum hold times for the storage of samples/sample extracts between collection and analysis, specified/approved analytical methods, required field and/or laboratory quality assurance samples such as blanks and field and laboratory duplicates, specified recovery ranges for spiked samples and surrogates (compounds added to samples in known concentrations for calibration purposes), Reporting Limits (RL) and specified precision required when analyzing laboratory duplicate and spike/controlled reference material samples.

7.4.3 Data Validation

All samples/sample extracts were analyzed within their applicable hold times using approved analytical methods. The RLs, where established, were met for all tested parameters. Surrogate recoveries were within acceptable ranges in all cases, for all samples. Agreement between the corresponding datasets for the reference material samples, where applicable, and recoveries reported for spiked samples/blanks, where applicable, is acceptable. Laboratory duplicate samples reported results with acceptable relative percent differences (RPD), an exception being the ammonia duplicate pair reported on Certificates 1544375 and 1545012 for which the RPD was reported at 9.2% relative to the limit of 8%. The concentrations reported for the source and duplicate samples were less than 10 times the MDL and the results thus accepted by the laboratory. The analyses reported for BOD on Certificate 1545012 for samples collected on October 30, 2015 were noted to have been performed after the sample hold times were exceeded. This is not considered to have altered any decision making as the results reported for these samples were similar to the results reported on Certificate 1544375 for samples collected on October 29, 2015 from other wells within the monitoring well network.

7.4.4 Field QA/QC Samples

The results of the field duplicate sample analyses indicate that the sampling results are generally reproducible with relative percent differences (RPD) between the primary and duplicate samples reporting within acceptable ranges (i.e., < 40%) in all but two instances. Sample MW09-6 and its duplicate (Dup-2) collected on October 30, 2015 reported ammonia concentrations of 0.57 mg/L and 0.29 mg/L, respectively, thus yielding a RPD of 65.1% thus exceeding the recommended limit



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of 8%. These samples also reported total dissolved solids concentrations of 312 mg/L and 282 mg/L, respectively thus yielding a RPD of 10.1% thus marginally exceeding the recommended limit of 10%. Many of the primary and duplicate sample pairs reported non-detect concentrations or concentrations less than 10 times the laboratory MDL thus precluding meaningful RPD comparisons.

In summary, the analytical results reported for samples collected during this investigation are considered to have met the performance criteria of the Analytical Protocol.



8.0 METHANE MONITORING PROGRAM

A proposed MMP outlining the proposed monitoring program to satisfy the requirements of Condition 4.2.8 of the CPU was submitted to the MOECC for its approval on September 2, 2014 (AMEC, 2014d). The primary objectives of the MMP include, but are not necessarily limited to, addressing the following:

- 1. the influence of seasonal variations on landfill gas concentrations in the vicinity of the Former Eastern Landfill and related risk management measures at the Property;
- 2. location and installation details of all boreholes and landfill gas probes included in the program;
- 3. frequency of all sampling and monitoring events;
- 4. trigger levels and contingency activities in case monitoring results show any concentration greater than the PSS that are or may be related to the production of landfill gas; and,
- 5. the correlation between methane measured at the Property and changes in concentration for the chemical parameters identified in Schedule 5, Column 2 – Indicator List for Groundwater and Leachate contained in the Landfill Standards: A Guideline on the Regulatory and Approval Requirements for New or Expanding Landfilling Sites (PIBS 7792e) published by the MOECC and dated January 2012, as it may be amended from time to time.

The MMP shall be overseen by a Qualified Person (QP) as defined by O. Reg. 153/04.

8.1 Landfill Gas Probe Installations

As per the MMP, a total of ten (10) LFG probes were installed either independently (GP15-4 through GP15-7) or as a nested couplet with groundwater monitoring wells (GP15-1 through GP 15-3 and GP15-8 through GP15-10) to permit monitoring of LFG composition and subsurface pressure, to verify the current levels of methane in the subsoil environment and to identify areas of potential gas impingement. Each LFG probe was constructed as per the details provided in the MMP.

The locations of the landfill gas probes are shown on Figure 5 while the LFG probe construction details are provided on the stratigraphic and instrumentation logs in Appendix C.

8.2 LFG Regulatory Requirements

The concern with methane gas is that it creates an explosion hazard under certain conditions. Methane monitoring is therefore required to ensure that elevated methane concentrations are detected before they present an explosion hazard. The concentration level at which methane has the potential to explode is called the explosive limit. Methane is explosive when mixed with air at concentrations between 5% by volume in air (vol. %) and 15 vol. %. At concentrations below 5 vol. % and above 15 vol. %, methane is not explosive. Therefore, the Lower Explosive Limit (LEL)



of methane is 5 vol. % and the Upper Explosive Limit (UEL) is defined at 15 vol. %. Methane is lighter than air and is likely to dissipate unless trapped inside enclosed spaces.

Ontario Regulation 232/98 – Landfilling Sites, as amended ("O. Reg. 232/98"), provides threshold criteria for landfill gas concentrations at new or expanding landfill sites. While this regulation does not apply to the Eastern Landfill as it was closed before the regulation came into effect, the criteria outlined in O. Reg. 232/98 provide a basis for assessing the potential impacts due to landfill gas migration. The concentration limits specified in O.Reg. 232/98 are:

- Less than 2.5% methane by volume in the subsurface at the property boundary;
- Less than 1.0% methane by volume in any on-site building, and in the area immediately outside the foundation if the building or structure is accessible to any person or contains electrical equipment or a potential source of ignition; and,
- Less than 0.05% methane by volume in any off-site building, and in the area immediately outside the foundation if the building or structure is accessible to any person or contains electrical equipment or a potential source of ignition.

Guidance on assessment and management of methane gas is provided by the MOECC under *Guideline D-4: Land Use on or Near Landfills and Dumps* (revised April 1994) and Appendix A - Assessing Methane Hazards from Landfill Sites (Procedure D-4-1; November 1987) provided therein. In accordance with the Procedure D-4-1, methane cannot cause an explosion unless it enters an enclosed space and methane accumulates to a concentration above its LEL, and the gas has a high entry rate and high enough accumulation time, such that the methane concentration will be still above the LEL, after dilution by ventilation of the enclosed space. Procedure D-4-1 considers that methane concentrations in air (or in an enclosed space) greater than 20% LEL (equivalent to 1% by volume) may be associated with still higher concentrations, exceeding the LEL. Therefore, methane concentrations greater than 20% LEL warn of conditions which could potentially hazardous in enclosed structures and gas control systems should be designed to maintain methane concentrations below this level.

8.3 Landfill Gas Monitoring

Landfill gas monitoring was performed on October 28, 2015 concurrent with groundwater monitoring. Prior to monitoring, the condition of all LFG probes was verified in the field. Each LFG probe was inspected to determine its condition and whether or not it was capable of yielding LFG monitoring data representative of the subsurface conditions (i.e., the stopcock valve was in the closed position to prevent subsurface gas from readily venting via the LFG probe). Pressure measurements were taken prior to the gas composition measurement by connecting the hose barb on the stopcock to a magnehelic differential pressure gauge and opening the stopcock to record the pressure or vacuum on the pressure gauge.

Gas composition including percent by volume methane (CH₄), oxygen (O₂), carbon dioxide (CO₂) and balance gases and percentage of the lower explosive limit (%LEL) were measured using a Landtec GEM 2000 Landfill Gas Monitor. Initial, peak and stabilized gas readings were



measured. Initial readings were taken immediately after connecting the monitor to the LFG probe and opening the stopcock. Stabilized readings were taken after the probe had been purged a volume equal to one to three times the combined volume of the probe filter pack.

The results of the LFG monitoring program including LFG composition and subsurface pressure are summarized in Table 6 and are shown on Figure 8. One notable subsurface pressure of -1.0 was recorded at GP15-2 during the 2015 monitoring event. Stable methane concentrations were detected at the following four (4) LFG probe locations including: GP15-1 (0.1 vol. %), GP15-4 (0.9 vol. %), GP15-6 (0.5 vol. %) and GP15-8 (0.2 vol. %). Based on the methane concentrations noted above, the Site meets the on-site methane concentrations limits as outlined in O.Reg. 232/98 recommended methane levels and the alert provided in Procedure D-4-1.

8.4 Landfill Gas Data Analyses

Low level initial and stable methane concentrations measured on Site indicate that methane impacts are confined within the footprint of the former Eastern landfill (with the exception of GP15-1, which is slightly north of the former eastern landfill footprint). The methane concentrations recorded suggest that any methane present is closely associated with waste deposits and is likely present as pockets trapped beneath less permeable materials. The absence of measurable landfill gas pressures (with the exception of a slight vacuum measured at GP15-2) suggests that the subsurface methane is not likely to migrate beyond the immediate areas in which it is encountered. The lack of any detectable methane at the remaining five (5) LFG probes surrounding the former Eastern Landfill footprint indicates that the subsurface methane is not migrating beyond the eastern, southern or western boundaries of the landfill.



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9.0 CONTINGENCY MEASURES

Based on the results of the GWMP, MMP and IMP completed in 2015 no contingency measures were deemed necessary and therefore no such measures were implemented at the CPU Property in 2015.



10.0 CONCLUSIONS AND RECOMMENDATIONS

The findings and results of the monitoring, sampling and inspection programs carried out at the CPU Property in 2015 to meet the annual reporting requirements are as follows:

- Inspections conducted as per the IMP for the CPU Property indicated repairs to any of the RMM in place at the CPU Property were not required in 2015 therefore no such activities were undertaken in 2015;
- All groundwater samples collected from the monitoring well network located at the CPU property in 2015 as per the GWMP reported parameter concentrations below 2011 Table 3 SCS for residential / parkland / institutional property use and coarse textured soil, where established, and for ammonia, chloroform and iron, below the PSS derived from the Risk Assessment as provided in CPU 0371-8TYQMY;
- Methane concentrations measured at the landfill gas probes located at the CPU Property in 2015 as per the MMP were below the methane concentrations limits as outlined in O.Reg. 232/98 and the recommended methane alert levels provided in Procedure D-4-1: Assessing Methane Hazards from Landfill (MOE, 1987); and,
- No revisions to the SMP or HASP were deemed necessary in 2015.

Based on the results of the GWMP, MMP and IMP completed in 2015 no contingency measures or site restoration activities were deemed necessary at the CPU Property and therefore no such measures or activities were implemented in 2015.



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11.0 SITE RESTORATION ACTIVITIES

Based on inspections conducted as per the IMP no significant deterioration of the RMM was observed and therefore no site restoration activities were deemed necessary and therefore no such activities were undertaken at the CPU Property in 2015.



12.0 LIMITATIONS

This report was prepared for the exclusive use of the City of Ottawa for the property located at 840 Queen Elizabeth Drive in the City of Ottawa at the time of the site visit(s). 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 inspection(s) on the date(s) 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 analyses 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 E.



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13.0 CLOSURE

We trust the above information is satisfactory. If you have any questions, please do not hesitate to contact the undersigned.

Respectfully submitted,

Amec Foster Wheeler Environment & Infrastructure, A Division of Amec Foster Wheeler Americas Limited

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Kevin D. Hicks, M.Sc., P.Geo., QP_{ESA} Principal Hydrogeologist



14.0 REFERENCES

AMEC Environment & Infrastructure (2014d): Methane Monitoring Program, Certificate of Property Use 0371-8TYQMY, Lansdowne Park – Urban Park (Zone C), 945 Bank Street, Ottawa, Ontario; prepared for the City of Ottawa, August 2014.

AMEC Environment & Infrastructure (2014c): Groundwater Monitoring Program, Certificate of Property Use 0371-8TYQMY, Lansdowne Park – Urban Park (Zone C), 945 Bank Street, Ottawa, Ontario; prepared for the City of Ottawa, August 2014.

AMEC Environment & Infrastructure (2014b): Inspection and Maintenance Plan, Certificate of Property Use 0371-8TYQMY, Lansdowne Park – Urban Park (Zone C), 945 Bank Street, Ottawa, Ontario; prepared for the City of Ottawa, June 2014.

AMEC Environment & Infrastructure (2014a): Soil Management Plan, Certificate of Property Use 0371-8TYQMY, Lansdowne Park – Urban Park (Zone C), 945 Bank Street, Ottawa, Ontario; prepared for the City of Ottawa, May 2014.

AMEC Environment & Infrastructure (2013): Health and Safety Plan Addendum, Working with Contaminated Soil, Lansdowne Park, Ottawa, Ontario; prepared for the City of Ottawa, July 2013.

Ontario Ministry of the Environment (2011b): Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act, March 9, 2004, amended as of July 1, 2011, PIBS 4696e01.

Ontario Ministry of the Environment (2011a): Soil, Groundwater and Sediment Standards for Use under Part XV.1 of the Environmental Protection Act, April 15, 2011, PIBS # 7382e01.

Ontario Ministry of the Environment (1994): *Guideline D-4: Land Use on or Near Landfills and Dumps*, revised April 1994.

Ontario Ministry of the Environment (1987): Appendix A – Procedure D-4-1: Assessing Methane Hazards from Landfill Sites, November 1987, PIBS # 2158-01.

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Table 1. Groundwater Monitoring Well Construction Details

	MTM Co	ordinates					Borehole	and Ground	water Monito	ring Interval	Construction Data		
								Ton of		Depth to		IVAL	
			Date of	Well	Surface	Borehole	Bottom	Casing	Casing	Well	Well Screen	Screen	Geologic Media
Monitor Well I.D.	Easting	Northing	Construction (mm/dd/yy)	Constructed By	Elevation (m)	Depth (m)	Elevation (m)	Elevation (m)	Stick-up (m)	Screen (m)	Interval (m)	Length (m)	Intersected by Well Screen
MW15-1	368902.891	5029395.411	10/23/2015	AFW	65.492	6.096	59.396	65.409	-0.08	5.90	3.05 - 5.90	2.85	Overburden
MW15-2	368835.264	5029365.156	10/23/2015	AFW	65.228	6.707	58.521	65.085	-0.14	6.58	3.66 - 6.58	2.92	Overburden
MW15-3	368835.685	5029306.220	10/23/2015	AFW	65.067	6.707	58.360	64.899	-0.17	6.58	3.66 - 6.58	2.92	Overburden
MW15-4	368865.766	5029240.857	10/23/2015	AFW	65.319	6.096	59.223	65.256	-0.06	5.98	3.05 - 5.98	2.93	Overburden
MW15-5	368950.930	5029210.490	10/22/2015	AFW	64.924	6.096	58.828	64.895	-0.03	5.95	3.05 - 5.95	2.90	Overburden
MW15-6	368843.807	5029183.520	10/21/2015	AFW	64.680	5.182	59.498	64.615	-0.07	5.15	2.13 - 5.15	3.02	Overburden
MW15-7	368911.901	5029169.410	10/21/2015	AFW	64.513	6.096	58.417	64.431	-0.08	5.45	2.44 - 5.45	3.01	Overburden
MW15-8	368937.687	5029125.596	10/22/2015	AFW	64.898	6.096	58.802	64.815	-0.08	5.87	3.05 - 5.87	2.82	Overburden
MW15-9	368798.392	5029125.377	10/21/2015	AFW	65.253	6.096	59.157	65.148	-0.11	5.97	3.05 - 5.97	2.92	Overburden
MW15-10	368878.435	5029083.949	10/22/2015	AFW	65.043	6.096	58.947	64.979	-0.06	5.89	3.05 - 5.89	2.84	Overburden
MW15-11	368858.743	5028968.821	10/22/2015	AFW	64.571	6.096	58.475	64.447	-0.12	5.73	3.05 - 5.73	2.68	Overburden
MW15-12	368792.976	5028926.010	10/22/2015	AFW	65.596	6.707	58.889	65.498	-0.10	6.52	3.66 - 6.52	2.86	Overburden
MW09-1	368942.543	5029353.620	10/29/2009	Stantec	65.718	4.890	60.828	65.658	-0.06	4.49	1.90 - 4.49	2.59	Overburden
MW09-2	368953.240	5029331.603	10/29/2009	Stantec	65.667	4.890	60.777	65.601	-0.07	4.47	1.90 - 4.47	2.57	Overburden
MW09-3	368947.290	5029323.865	10/29/2009	Stantec	65.426	4.890	60.536	65.368	-0.06	4.53	1.90 - 4.53	2.63	Overburden
MW09-5	368959.684	5029265.393	10/29/2009	Stantec	65.108	6.110	58.998	65.061	-0.05	5.86	3.00 - 5.86	2.86	Overburden
MW09-6	368962.886	5029235.739	10/29/2009	Stantec	65.232	6.110	59.122	65.202	-0.03	5.98	3.00 - 5.98	2.98	Overburden
Notes:													

Survey Data Provided by City of Ottawa Surveys and Mapping Unit. All Elevation Referenced to Geodetic.



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Table 2. Monitoring	

Monitor			-	Well Develop	ment Details	
Well	Date	Depth to		Purge	Actual	
Location	(vvvv/mm/pp)	Bottom of	Depth to	Volume	Purge	
		Well	Water	Estimate	Volume	
		(mbtoc)	(mbtoc)	(T)	(T)	Remarks
MW15-1	27/10/2015	5.9	3.53	16-32	32	Grey, heavy silt, no sheen or odour.
MW15-2	27/10/2015	6.58	5.004	16-32	32	Brown, heavy silt, no sheen or odour.
MW15-3	27/10/2015	6.58	4.748	18-26	36	Brown, heavy silt, no sheen or odour.
MW15-4	27/10/2015	5.98	5.028	10-20	20	Brown, heavy silt, no sheen or odour.
MW15-5	27/10/2015	5.95	4.86	11-22	22	Brown, heavy silt, no sheen or odour.
MW15-6	27/10/2015	5.15	4.40	7-14	14	Brown, heavy silt, no sheen or odour.
MW15-7	27/10/2015	5.45	4.36	11-22	22	Brown, heavy silt, no sheen or odour.
MW15-8	27/10/2015	5.87	4.82	11-22	22	Brown, heavy silt, no sheen or odour.
MW15-9	27/10/2015	5.97	4.84	11-22	22	Brown, heavy silt, no sheen or odour.
MW15-10	27/10/2015	5.89	4.85	10-20	20	Brown, heavy silt, no sheen or odour.
MW15-11	27/10/2015	5.73	4.24	17-34	34	Brown, heavy silt, no sheen or odour.
MW15-12	27/10/2015	6.52	5.18	13-26	26	Brown, heavy silt, no sheen or odour.
N 10400						

Notes:

mbtoc = Metres Below Top of Casing. Monitoring wells developed by removing 5 time well bore volume. * Wells going dry were developed on multiple occasions. NR = Not recorded



					October 28, 2015	
	Ground		Bottom of Well			
	Surface	Top of Casing	Screen			Static
Monitoring Well I.D.	Elevation (masl)	Elevation (masl)	Elevation (mbtoc)	Depth to Water (mbtoc)	Depth to Water (mbgs)	Elevation (masl)
MW15-1	65.492	65.409	59.592	3.362	3.445	62.047
MW15-2	65.228	65.085	58.648	5.020	5.163	60.065
MW15-3	65.067	64.899	58.487	4.772	4.940	60.127
MW15-4	65.319	65.256	59.339	5.118	5.181	60.138
MW15-5	64.924	64.895	58.974	4.864	4.893	60.031
MW15-6	64.680	64.615	59.530	4.430	4.495	60.185
MW15-7	64.513	64.431	59.063	4.370	4.452	60.061
MW15-8	64.898	64.815	59.028	4.826	4.909	59.989
MW15-9	65.253	65.148	59.283	4.872	4.977	60.276
MW15-10	65.043	64.979	59.153	4.878	4.942	60.101
MW15-11	64.571	64.447	58.841	4.272	4.396	60.175
MW15-12	65.596	65.498	59.076	5.216	5.314	60.282
MW09-1	65.718	65.658	61.228	3.222	3.282	62.436
MW09-2	65.667	65.601	61.197	3.129	3.195	62.472
MW09-3	65.426	65.368	60.896	2.979	3.037	62.389
MW09-5	65.108	65.061	59.248	5.113	5.160	59.948
MW09-6	65.232	65.202	59.252	5.234	5.264	59.968
Notes:						

otion Data ĺ Č Tablo 2

masl = Metres Above Sea Level. mbtoc = Metres Below Top of Casing. mbgs = Metres Below Gorund Surface.



Table 4. Groundwater Field Parameter Data and Observations

		3	ater Level D	Data			Field Pa	rameters				aborat	tory Ar	alyse	Ş		
Monitoring Well I.D.	Sampling Date (mm/dd/yy)	Initial Depth to Water (mbtoc)	Final Depth to Water (mbtoc)	Total Drawdown (m)	Isobutylene Headspace Reading (ppm)	pH (pH units)	Cond. (mS/cm)	Dissolved Oxygen (DO)	Temp. (°C)	Oxidation Reduction Potential (ORP) (mV)	ьнс	НАЧ	slsteM	омо	Chloroform	General Observations	
MW15-1	10/30/15	3.468	3.472	0.004	0.2	6.87	2.496	1.05	13.69	-74.2	>	>	>	>	>	Cloudy brown, no sheen or odour.	
MW15-2	10/30/15	5.051	5.053	0.002	0.3	7.21	2.667	1.29	14.75	70.7	>	>	>	>	>	Cloudy brown, no sheen or odour.	
MW15-3	10/29/15	4.759	4.761	0.002	0.1	7.48	2.122	4.59	14.34	173.8	>	>	>	>	>	Brown, no sheen or odour.	
MW15-4	10/29/15	5.085	5.086	0.001	4.2	6.95	2.041	1.07	14.57	-70.8	>	>	>	>	>	Cloudy/clear, no sheen or odour.	
MW15-5	10/30/15	4.91	4.913	0.003	0.2	7.43	1.103	0.68	15.04	-135.1	>	>	>	>	>	Cloudy brown, no sheen or odour.	
MW15-6	10/29/15	4.419	4.419	0.000	0.2	6.99	5.333	2.18	14.34	272.1	>	>	>	>	>	Brown, no sheen or odour.	
MW15-7	10/29/15	4.379	4.38	0.001	0.6	6.86	1.923	1.09	13.69	211.3	>	>	>	>	>	Brown, no sheen or odour.	
MW15-8	10/30/15	4.875	4.879	0.004	0.2	7.53	1.085	3.36	14.16	140.1	~	>	>	>	>	Cloudy brown, no sheen or odour.	
MW15-9	10/29/15	4.871	4.872	0.001	0.1	7.21	4.941	4.23	13.87	261.9	~	`	>	>	>	Brown, no sheen or odour.	
MW15-10	10/29/15	4.878	4.879	0.001	0.2	7.21	4.941	4.23	13.87	261.9	~	`	>	>	>	Cloudy brown, no sheen or odour.	
MW15-11	10/29/15	4.276	4.276	0.000	0.3	7.22	1.360	2.33	15.2	263.6	~	>	>	>	>	Cloudy brown, no sheen or odour.	
MW15-12	10/29/15	5.215	5.215	0.000	0.4	7.25	1.333	4.82	14.42	312.8	~	`	>	>	>	Brown, no sheen or odour.	
MW09-1	10/30/15	3.34	3.62	0.280	0.0	6.73	1.020	1.19	12.28	39.8	>	>	>	>	>	Brown, no sheen or odour.	
MW09-2	10/30/15	3.221	3.35	0.129	0.0	6.71	0.832	3.16	13.36	105.2	~	>	>	>	>	Light grey, no sheen or odour.	
MW09-3	10/30/15	3.048	3.267	0.219	0.0	6.6	1.040	1.13	13.09	-7.5	~	`	>	>	>	Grey, no sheen or odour.	
MW09-5	10/30/15	5.142	5.143	0.001	0.0	8.08	0.311	1.73	15.46	262	~	>	>	>	>	Clear, no sheen or odour.	
MW09-6	10/30/15	5.265	5.267	0.002	0.0	7.41	0.749	3.58	15.28	270	>	>	>	>	>	Cloudy/clear, no sheen or odour.	
Notes:																T	

Water Level Data as Recorded During Low-Flow Sampling. Field Parameters Measured using a YSI 556 Multi-Parameter Water Quality Monitoring Instrument. mbtoc = Metres Below Top of Casing. PHC = Petroleum Hydrocarbons.

PAH = Polynuclear Aromatic Hydrocarbons. Metals = Sb, As, Ba, Be, B, Cd, Ca, Cr, Cr(vi), Co, Cu, Fe, Pb, Mg, Hg, Mo, Ni, Se, Ag, Na, Th, V, Zn GWC = General Water Chemistry (pH, alkalinity, ammonia, conductivity, chloride, nitrate, sulphate, biochemical oxygen demand [BOD], chemical oxygen demand [COD], dissolved orgainc carbon [DOC], total dissolved solids [TDS]).



Notes on Ground Water Analytical Summary Tables

All Units Reprorted in Micrograms per Litre (µg/L) or Milligrams per Litre (mg/L) as Indictaed

- MDL = Laboratory Analytical Method Detection Limit.
- RL = MOE 2011 Analytical Protocol Reporting Limit.
- DUP = Quality Assurance/Quality Control Duplicate Sample.
- RPD = Relative Percent Difference (Between Primary and Duplicate Samples).
- PHC = Petroleum Hydrocarbons.
- < = Less Than Laboratory Analytical Method Detection Limit.</p>
- N/A = Not Applicable.
- N/V = No Value. N/D = Not Developed.
- Parameter Concentration May Exceed EPA Table 3 Site Condition Standard for Non-Potable Groundwater Use due to Elevated MDL Reportd by the Laboratory. 55
- 183 Parameter Concentration Exceeds EPA Table 3 Site Condition Standard for Non-Potable Groundwater Use (Table 3).
- 2630 Parameter Concentration Exceeds Property Specific Standard as per Certificate of Property Use 0731-8TYQMY

a = For a Site to Meet This Standard There Must be no Evidence of Free Product, Including but not Limited to, Visible Petroleum Hydrocarbon Film or Sheen Present on Groundwater, Surface Water or in any Groundwater or Surface Water Samples.

b = The Methyl Naphthalene Standards are Applicable to Both 1-Methyl Naphthalene and 2-Methyl Naphthalene, with the Provision that if Both are Detected the Sum of the Two Must not Exceed the Standard.

2011 EPA Standards = Soil, Ground Water and Sediment Standards for Use under Part XV.1 of the Environmental Protection Act, Ontario Ministry of the Environment (MOE), April 15, 2011

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Matrix	Parameters	MDL	RL	2011 EPA (ull Depth Generic	Standards							Analytical	Results						
Terrent formation Image: product		Sample S: Property Labor Sam	-ocation tmple ID -ocation atory ID ole Date	Site Condition Standards Non-Potable Groundwater (Table 3)	Property Specific Standards (as per Certificate of Property Use 0371- 8TYOMY)	MW15-1 MW15-1 CPU Property 1545012-06 30/10/2015	MW15-2 MW15-2 CPU Property 1545012-07 30/10/2015	MW15-3 MW15-3 CPU Property 1544375-01 29/10/2015	MW15-4 MW15-4 CPU Property 1544375-02 29/10/2015	MW15-5 MW15-5 CPU Property 1545012-08 30/10/2015	MW15-6 MW15-6 CPU Property 1544375-03 29/10/2015	MW15-7 MW15-7 CPU Property 1544375-04 29/10/2015	MW15-7 MW15-7 MW15-7 CPU Property 1545012-11 30/10/2015	MW15-8 MW15-8 CPU Property 1545012-09 30/10/2015	MW15-9 MW15-9 CPU Property 1544375-05 29/10/2015	MW15-10 MW15-10 CPU Property 1544375-06 29/10/2015	MW15-11 MW15-11 CPU Property 1544375-07 29/10/2015	MW15-11 DUP-1 CPU Property 1544375-09 29/10/2015	MW15-11 Average
May (a) 1 · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · <th< th=""><th>General Inorganic Parameters (m</th><th>1/L)</th><th></th><th>(2000)</th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th></th<>	General Inorganic Parameters (m	1/L)		(2000)															
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Control. (a) (b) (b) (b) (b) (b) (b) (b) (b) (b) (b		0.01	• •		4.524	1.81	0.1	0.03	3.41	0.08	0.16	0.18		0.23	0.06	0.32	0.02	0.03	0.025
Open Open <th< td=""><td>Conductivity (µS/cm)</td><td>2</td><td>•</td><td></td><td></td><td>2280</td><td>2380</td><td>3590</td><td>1920</td><td>1090</td><td>5120</td><td>1960</td><td>B</td><td>1020</td><td>2190</td><td>3860</td><td>1330</td><td>1290</td><td>1310</td></th<>	Conductivity (µS/cm)	2	•			2280	2380	3590	1920	1090	5120	1960	B	1020	2190	3860	1330	1290	1310
Matrix Barry Matrix Statistics 1 C C C C C C C C C C C C C C C C C C C C C C C C C C C C C C C C C C C C C C C C C C C C C C C C C C C C C C C C C C C C C C C C C C C C C C C C C C C C <thc< th=""> C C C C C C C C C C C C C C C C C C C C C C C C C C C</thc<>	Chloride	-	-	2300		530	483	863	146	88	1410	182		84	324	1060	201	199	200
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State S	Sulphate	-	•			13	229	349	306	181	380	381		126	474	154	77	76	76.5
The control of the contro of the control of the control of the control of the control of t	Biological Oxygen Demand (BOD)	~	•			< 2 <	< 2 <	< 2	< 2	< 2	< 2	< 2		< 2	< 2	< 2	< 2	< 2	< 2
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Matrix functions I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I	Dissolved Organic Carbon	0.5	•			1.3	1./	0.8	3.6	3.5	0.8	2.4			1.2	6.1	1.8	1./	1./5
The contract of the cont	Volatile Organic Compounds (IId/		-		•	1120	0071	0077	0011	000	0040	1200		700	0/01	0447	140	0/0	607
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M. C. (10, 10, 10, 10, 10, 10, 10, 10, 10, 10,	Petroleum Hvdrocarbons (ua/L)																		
Prode (a): (a) (b) (c)	PHC F1 (C6 - C10)	25	25	750 ^d		< 25	< 25	< 25	< 25	< 25	< 25	< 25		< 25	< 25	< 25	< 25	< 25	< 25
Pricipation 10 00 00 00 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000	PHC F2 (>C10 - C16)	100	100	150 ^d		< 100	< 100	< 100	< 100	< 100	< 100	< 100		< 100	< 100	< 100	< 100	< 100	< 100
Metric (a) (a) (b) (c)	PHC F3 (>C16 - C34)	100	500	500 ^d	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100		< 100	< 100	< 100	< 100	< 100	< 100
Matrix function Image: product of the pro	PHC F4 (>C34)	100	500	500 ^d		< 100	< 100	< 100	< 100	< 100	< 100	< 100		< 100	< 100	< 100	< 100	< 100	< 100
Mathematication 0.0 1 0.0 1 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 <th< td=""><td>Polynuclear Aromatic Hydrocarbo</td><td>ns (µg/L)</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></th<>	Polynuclear Aromatic Hydrocarbo	ns (µg/L)																	
Mathematical and the second of the sec	Acenaphthene	0.05	-	600		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
memory method 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0<	Acenaphthylene	0.05	- 3	1.8		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	F	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Manualization 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01	Anthracene	0.05	0.1	2.4	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Discription 01 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1	Benzo(a)antintacene Renzo(a)nvrene	0.0	0.01	4./ 0.81	• •	< 0.01 < 0.01	0.02	0.04	< 0.01	< 0.01 < 0.01	< 0.01	0.02 < 0.01		0.02	< 0.01 ×	80.0 9 2	< 0.01	< 0.01	< 0.01 < 0.01
Display Display <t< td=""><td>Benzo(b)fluoranthene</td><td>0.01</td><td>0.1</td><td>0.75</td><td></td><td>< 0.01</td><td>0.04</td><td>0.14</td><td>< 0.01</td><td>< 0.01</td><td>< 0.01</td><td>< 0.01</td><td></td><td>0.1</td><td>< 0.01</td><td>0.26</td><td>< 0.01</td><td>< 0.01</td><td>< 0.01</td></t<>	Benzo(b)fluoranthene	0.01	0.1	0.75		< 0.01	0.04	0.14	< 0.01	< 0.01	< 0.01	< 0.01		0.1	< 0.01	0.26	< 0.01	< 0.01	< 0.01
Bernolly control 00 01 01 01 01 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 010 <th< td=""><td>Benzo(b+j)fluoranthene</td><td>0.05</td><td></td><td></td><td></td><td>< 0.05</td><td>0.05</td><td>0.14</td><td>< 0.05</td><td>< 0.05</td><td>< 0.05</td><td>< 0.05</td><td></td><td>0.16</td><td>< 0.05</td><td>0.35</td><td>< 0.05</td><td>< 0.05</td><td>< 0.05</td></th<>	Benzo(b+j)fluoranthene	0.05				< 0.05	0.05	0.14	< 0.05	< 0.05	< 0.05	< 0.05		0.16	< 0.05	0.35	< 0.05	< 0.05	< 0.05
Processimation 0.0 0.1 1 0.0 0.1 0.1 0.0 0.1 0.0 0.1 0.0 0.1 0.0 0.1 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 <t< td=""><td>Benzo(g,h,i)perylene</td><td>0.05</td><td>0.2</td><td>0.2</td><td></td><td>< 0.05</td><td>< 0.05</td><td>0.15</td><td>< 0.05</td><td>< 0.05</td><td>< 0.05</td><td>< 0.05</td><td></td><td>0.06</td><td>< 0.05</td><td>0.16</td><td>< 0.05</td><td>< 0.05</td><td>< 0.05</td></t<>	Benzo(g,h,i)perylene	0.05	0.2	0.2		< 0.05	< 0.05	0.15	< 0.05	< 0.05	< 0.05	< 0.05		0.06	< 0.05	0.16	< 0.05	< 0.05	< 0.05
	Benzo(k)fluoranthene	0.05	0.1	0.4		< 0.05	< 0.05	0.08	< 0.05	< 0.05	< 0.05	< 0.05		0.1	< 0.05	0.13	< 0.05	< 0.05	< 0.05
Mathematication 010 0.2 0.30 0.2 0.00 0.20 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00	Chrysene	0.05	0.1	1		< 0.05	< 0.05	0.12	< 0.05	< 0.05	< 0.05	< 0.05		0.1	< 0.05	0.31	< 0.05	< 0.05	< 0.05
International branch 0.0 0.0 0.0 0.0 0.0 0.0 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00	Dibenzo(a,n)anmracene Fluoranthene	0.0 0	7.0	130		0.0 ×	GU.U >	c0.0 >	GU.U 2	0.0 ×	0.0 ×	0.05 0.05		c 0.05	0.0 ×	0.00	c 0.0 >	< 0.05 × 0.05	0.0 v
Image: 1 0.0 0.2 0.0 0.0 0.0 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00	Fluorene	0.05	0.5	400		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
	Indeno(1,2,3,c,d)pyrene	0.05	0.2	0.2		< 0.05	< 0.05	0.11	< 0.05	< 0.05	< 0.05	< 0.05		0.07	< 0.05	0.14	< 0.05	< 0.05	< 0.05
Methomentales 2* 0.05 2 100 2 100 2 100 2 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.	Methylnaphthalene, 1- ^b	0.05	2	1800		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	I	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Maprimetere 106 1 2 100 1 2 100 1 2 100 1 2 100 1 2 100 1 0 2 100 1 0 2 10 1 0 1	Methylnaphthalene, 2- ^b	0.05	2	2000-	•	< 0.05	< 0.05	< 0.05	0.07	< 0.05	< 0.05	< 0.05	•	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Presentative 0.0 0.1 0.0 0.1 0.0 0.1 0.0 0.1 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 <	Naphthalene	0.05	5	1400		< 0.05	0.09	0.07	0.2	< 0.05	0.19	0.23		0.19	< 0.05	0.1	< 0.05	< 0.05	< 0.05
Memory Lut Lut <thlut< th=""> <thlut< <="" td=""><td>Phenanthrene</td><td>0.05</td><td>0.1</td><td>580</td><td></td><td>< 0.05</td><td>< 0.05</td><td>0.09</td><td>< 0.05</td><td>< 0.05</td><td>< 0.05</td><td>0.06</td><td>ı</td><td>< 0.05</td><td>< 0.05</td><td>0.46</td><td>< 0.05</td><td>< 0.05</td><td>< 0.05</td></thlut<></thlut<>	Phenanthrene	0.05	0.1	580		< 0.05	< 0.05	0.09	< 0.05	< 0.05	< 0.05	0.06	ı	< 0.05	< 0.05	0.46	< 0.05	< 0.05	< 0.05
Matrix Matrix 05 06 06 06 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05 < 05	Pyrene	0.01	0.2	68	,	< 0.01	0.09	0.2	GU.U	< 0.01	< 0.01	0.04		0.19	< 0.01	0.56	< 0.01	< 0.01	< 0.01
Appendix 1 1 2 2000 · 6 6 6 7 6 7 6 7 6 7 6 7 6 7 6 7 6 7 6 7 6 7 6 7 6 7 6 7 6 7 6 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 <th< td=""><td>Antimony</td><td>0.5</td><td>0.5</td><td>20000</td><td>-</td><td>< 0.5</td><td>< 0.5</td><td>< 0.5</td><td>0.6</td><td>< 0.5</td><td>< 0.5</td><td>< 0.5</td><td></td><td>< 0.5</td><td>< 0.5</td><td>< 0.5</td><td>< 0.5</td><td>< 0.5</td><td>< 0.5</td></th<>	Antimony	0.5	0.5	20000	-	< 0.5	< 0.5	< 0.5	0.6	< 0.5	< 0.5	< 0.5		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Arsenic	-	-	1900		<pre></pre>	<pre></pre>	<pre></pre>	10	< + 1	<1>	< + 1		1	<1>	< 1 <	< 1	< 1	< + +
	Barium	-	2	29000	-	662	191	207	146	96	232	139		58	67	276	118	116	117
	Beryllium	0.5	0.5	67		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Cadmium	2	0.5	45000		60 2	F0 >	44	101	40 <	00	64 1 0 1		30 < 0.1	102	0.1 0	21	28 < 0 1	C.12
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Calcium	100				142000	171000	276000	217000	85700	345000	218000		73800	180000	177000	115000	109000	112000
	Chromium	-	10	810	-	× ۲	۰ ۲	< + 1	<1	<1	< +	< ۲	1	۲ ۲	× ۲	۲ ۲	< 1	< + 1	< + 1
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	Chromium (VI)	10	10	140		< 10	< 10	< 10	< 10	< 10	< 10	< 10 <		< 10	< 10	< 10	< 10	< 10	< 10
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Cobalt	0.5	- 1	66		< 0.5	1.4	0.0	1.6	1.5	0.8	3.5		1.6	2.4	1.5	< 0.5	< 0.5	< 0.5
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	linn	100	, i	- 10	24240	13000	< 100 <	< 100	16800	< 100	< 100	< 100		< 100	< 100	< 100	< 100	< 100	< 100
Magnesium 200 - - 20500 22800 41500 36500 11300 45500 - 12700 26500 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 18800 <td>Lead</td> <td>0.1</td> <td>-</td> <td>25</td> <td></td> <td>< 0.1</td> <td>< 0.1</td> <td>< 0.1</td> <td>1.2</td> <td>0.2</td> <td>0.1</td> <td>< 0.1</td> <td></td> <td>0.2</td> <td>< 0.1</td> <td>0.1</td> <td>< 0.1</td> <td>< 0.1</td> <td>< 0.1</td>	Lead	0.1	-	25		< 0.1	< 0.1	< 0.1	1.2	0.2	0.1	< 0.1		0.2	< 0.1	0.1	< 0.1	< 0.1	< 0.1
	Magnesium	200				20500	22800	41500	36600	11300	45900	25600		12700	26500	26500	18800	18900	18850
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Mercury	0.1	0.1	0.29	T	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	I	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Note 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Molybdenum	0.5	0.5	9200	-	< 0.5	7.5	10.9	6.2	5.2	1.6	4.7	-	7.2	8.3	6.7	1.2	1.2	12
Mertion 01 03 15 - 01 03 15 - 01 03 15 - 01 03 15 - 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01	Nickel		. u	490 62		v v	т т	m c	ر n	N 7	m 7	ω 1		- `	ر ۱	۳ س	v v	v v	v v
Solution 200 5000 2300000 - 276000 148000 148000 148000 148000 148000 148000 148000 148000 148000 151000 - 27000 131000 13200 13200 13200 13200 13200 13200 13200 13200 13200 13200 13200 13200 13200 13200 13200 13200 13200 13200 13200 13200 13200 13200 13200 13200 13200 13200 13200 13200 13200 13200 13200 13200 13200 13200 13200 13200 13200 13200 13200 13200 13200 13200 13200 13200 13200 13200 13200 13200 13200 13200 13200 13200 13200 13200 13200 13200 13200 13200 13200 13200 13200 13200 13200 13200 13200 13200 13200 13200 13200	Silver	- 6	- ee	15		 0 × 1 0 × 	- 0 1	15	< 0.1	< 0 1	04			< 0 1	, 0	<pre></pre>	< 0.1	- 0 v	< 0 1
Thellum 01 05 510 - <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <01 <td>Sodium</td> <td>200</td> <td>5000</td> <td>2300000</td> <td></td> <td>276000</td> <td>278000</td> <td>418000</td> <td>146000</td> <td>118000</td> <td>656000</td> <td>151000</td> <td>-</td> <td>121000</td> <td>256000</td> <td>472000</td> <td>134000</td> <td>131000</td> <td>132500</td>	Sodium	200	5000	2300000		276000	278000	418000	146000	118000	656000	151000	-	121000	256000	472000	134000	131000	132500
Uranium 0.1 2 420 - <0.1 2.6 2.4 1.8 0.6 2.2 1.1 - 0.6 2.1 4.2 0.8 0.8 0.8 Vanadum 0.5 0.5 2.0 1 - 0.6 2.1 4.2 0.8 0.8 0.8 Vanadum 0.5 0.5 2.5 2.5 2.5 2.5 2.5 2.5 2.5 2.5 2.5 2	Thallium	0.1	0.5	510		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	I	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Vareaum Uo Uo Uo 20 20 20 40 40 40 400 400 400 400 400 4	Uranium	0.1	~ 5	420		 < 0.1 < 0.1 	2.6	2.4	1.8	0.6	2.2	1.1		0.6	2.1	4.2	0.8	0.8	0.8
	Vanadium Zinc	0.0	0.5 2	250		0.0 ×	4.0.5 20	< U.5 17	< U.5 74	0.0 v 7 v	۵.5 ۵	4.0 A A		< U.5 18	< U.>	0.7 8	< 0.5 < 5	< 0.5	< 0.5 < 11

Environment & Infrastructure

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Parameters	MDL	RL Fu	2011 EPA 5 2011 EPA 5 Il Depth Generic	Standards							Analytical Re	sults - µg/L					
L	Sample L Sai roperty L Labore Samp	ocation mple ID ocation tory ID le Date	Site Condition Standards Non-Potable Groundwater (Table 3)	Property Specific Standards (as per Certificate of Property Use 0371- arromy	MW15-11 RPD (%)	MW15-12 MW15-12 CPU Property 1544375-08 29/10/2015	MW09-1 MW09-1 NCC Property 1545012-01 30/10/2015	MW09-2 MW09-2 NCC Property 1545012-02 30/10/2015	MW09-3 MW09-3 NCC Property 1545012-03 30/10/2015	MW09-5 MW09-5 NCC Property 1545012-04 30/10/2015	MW09-6 MW09-6 NCC Property 1545012-05 30/10/2015	MW09-6 DUP-2 NCC Property 1545012-10 30/10/2015	MW09-6 Average	MW09-6 RPD (%)	Trip Blank 1544375-10 29/10/2015	Trip Blank 1545012-12 29/10/2015	
General Inorganic Parameters (mg	L)		le oren i	1													-
pH Alkalinity (CaCO3)	0.1 5	• •		•		7.9	7.2	7.4	7.1 518	7.6	7.8	7.8	7.8	17			
Ammonia	0.01			4.524	5 '	10.6	0.57	0.18	0.72	0.05	0.57	0.29	0.43	65.1			
Conductivity (µS/cm)	5		1		3.1	1120	950	786	1020	291	590	603	596.5	2.2	I	1	
Chloride	- 2		2300	-	1.0	105	14	54	26	~	22	22	22				
Niuate (N) Suibhate					- 1 3	184	< U.1 87	32	27	- 44	105	105	105				
Biological Oxygen Demand (BOD)	2				2	6 4	< 2	< 2	; œ	< 2	< 2	< 2	< 2				
Chemical Oxygen Demand (COD)	10					47	12	< 10	109	< 10	< 10	< 10	< 10				
Dissolved Organic Carbon	0.5	•	1	•	5.7	8.4	5.9	2.9	6.9	с,	2.9	2.9	2.9	101	1	1	
Volatile Organic Compounds (µg/L	2	'	'	•	0.7	710	4/0	212	040	6	210	707	167	0			
Chlaraform	0.5	-	2.4	22	•	< 0.5	< 0.5	< 0.5	< 0.5	23.5	0.8	0.6	0.7	,	< 0.5	< 0.5	
Petroleum Hydrocarbons (µg/L)																-	
PHC F1 (C6 - C10)	25	25	750 ^d			< 25	< 25	< 25	< 25	< 25	< 25	< 25	< 25				
PHC F2 (>C10 - C16)	100	100	150 ^d		-	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100		I		
PHC F3 (>C16 - C34)	100	500	500°			< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100				
PHC F4 (>C34) Definitelear Aromatic Hydrocarhor	001	200	-009	•	-	< 100	< 100	001 >	> 100	< 100	< 100	001 >	001 >				
Acenaphthene	0.05	+	600			< 0.05	< 0.05	< 0.05	0.07	< 0.05	< 0.05	< 0.05	< 0.05			•	_
Acenaphthylene	0.05	-	1.8		1	< 0.05	< 0.05	< 0.05	0.07	< 0.05	< 0.05	< 0.05	< 0.05		-	1	
Anthracene	0.05	0.1	2.4		-	< 0.05	< 0.05	< 0.05	0.06	< 0.05	< 0.05	< 0.05	< 0.05	-	-	-	
Benzo(a)anthracene Benzo(a)mirene	0.0	2.0	4./			<pre>< 0.01</pre>	< 0.01	<pre>> 0.01</pre>	0.09	0.01	× 0.01	0.01 10.01	< 0.01				
Benzo(b)fluoranthene	0.01	0.1	0.75			< 0.01	< 0.01	< 0.01	0.26	< 0.01	< 0.01	< 0.01	< 0.01				
Benzo(b+j)fluoranthene	0.05	•				< 0.05	< 0.05	< 0.05	0.39	< 0.05	< 0.05	< 0.05	< 0.05				
Benzo(g,h,i)perylene	0.05	0.2	0.2	-	-	< 0.05	< 0.05	< 0.05	0.2	< 0.05	< 0.05	< 0.05	< 0.05	'			
Chrysene	0.05	0.1	t			< 0.05	< 0.05	< 0.05	0.25	< 0.05	< 0.05	< 0.05	< 0.05				
Dibenzo(a,h)anthracene	0.05	0.2	0.52			< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05				
Fluoranthene	0.01	0.4	130			0.02	< 0.01	< 0.01	0.65	< 0.01	< 0.01	< 0.01	< 0.01				
Fluorene Indeno(1, 2, 3, c, d)nvrene	0.05	0.5	400			< 0.05	< 0.05	< 0.05	0.05	< 0.05	< 0.05	< 0.05	< 0.05				
Methylnaphthalene, 1- ^b	0.05	2	4.0			< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05				
Methylnaphthalene, 2- ^b	0.05	1 01	1800			< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05				
Naphthalene	0.05	5	1400			0.16	0.12	0.14	0.12	< 0.05	< 0.05	< 0.05	< 0.05				
Phenanthrene	0.05	0.1	580			< 0.05	< 0.05	< 0.05	0.19	< 0.05	< 0.05	< 0.05	< 0.05				
Pyrene	0.01	0.2	68	'	'	0.02	< 0.01	< 0.01	0.55	< 0.01	< 0.01	< 0.01	< 0.01				_
Metals (µg/L) Antimony	0.5	0.5	2000		-	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			-	_
Arsenic	-	-	1900		-	< 1	< 1 ×	× 1	 	< 1	< 1 >	<	< 1	-	I		
Barium	۲	2	29000	-	1.7	89	77	80	79	11	45	45	45	0:0			
Beryllium	0.5	0.5	67		' c	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	' c			
Cadmium	0.1	0.5	2.7		0.0	× 0.1	0.1	<0.1	< 0.1	<0.1 <	+ 0.1	< 0.5 < 0.5	< 0.5	°, '			
Calcium	100				5.4	114000	106000	110000	172000	31500	80600	83800	82200	3.9	I		
Chromium	- ;	9	810			£ 9	۰ ۲	v t	۲,	v t	۰ ۲	۲ ۲	۰ ۲				
Cnromium (vi) Cobalt	22	₽ ←	140			4 10 1 4	01.2	< 10 < 0.5	01.v	< 0.5	< 0.5< 0.5	< 10 < 0.5	10			• •	
Copper	0.5	- 2	87			4.3	<u></u> , –	< 0.5	< 0.5	< 0.5	0.6	1.2	0.9	,			
Iron	100		-	24240		< 100	438	540	1310	< 100	< 100	< 100	< 10				
Lead	0.1	-	25		, I	0.3	< 0.1	0.2	< 0.1	< 0.1	< 0.1	< 0.1	< 1		-	-	
Magnesium	200	- 6	- 0.0		0.5	17000	11600	13/00	20300	2970	10200	10100	26950	0.4			
Molvbdenum	0.5	0.5	9200			13.4	1.4	1.9	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5				
Nickel	-	-	490			-	د 1	v L	۰ ۲	۰ ۲	< 1 د	۰ ۲	< 1				
Selenium	-	5	63			۰ ۲	۰ ۲	۰ ۲	-	۰ ۲	۰ ۲	۰ ۲	-1		H		
Silver	0.1	0.3	1.5	-		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1				
Source Thallium	0.1	0.5	510		C.7	< 0.1	< 0.1	<pre>32100 < 0.1</pre>	>0.0 < 0.1	< 0.1	< 0.1	< 0.1	< 0.1	ī,			
Uranium	0.1	2	420			1.7	e	1.2	-	< 0.1	0.2	0.2	0.2		1		
Vanadium	0.5	0.5	250			1.3		0.5	1.2	< 0.5	< 0.5	< 0.5	< 0.5				
ZIIIC	0	0	0011			0	t	77	0 /	0	0 /	n					

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Table 6. La	ndfill Gas N	Ionitoring D	ata											
Monitor ID	MTM Co	ordinates	Ground	Screen		Monitoring			In-Sit	u Measurem	nents			
	Easting	Northing	Surface	Interval	Coologio	Date	2	ethane (CH,	(1	Carbon	Oxygen	Balance		
			Elevation	(mbgs)	Modia) %	(//)	% LEL	Dioxide	(%)	Gases - %	Relative	Commonte (Statue of Lan
			(masl)		Intersected		Initial	Long Term	Long Term	Long Term	Long Term	Long Term	Pressure	COMMENTS (Status Of Lan
					by Screen		and/or Peak	and/or Stable	and/or Stable	and/or Stable	and/or Stable	and/or Stable	Water)	
GP15-1	368878.435	5029083.949	65.043	1.524 - 3.05	Overburden	28-Oct-15	0.1	0.1	2.0	4.8	12.0	83.1	0.0	Good Condition
GP15-2	368835.264	5029365.156	65.228	1.52 - 3.05	Overburden	28-Oct-15	0.0	0.0	0.0	3.1	2.9	94.0	-1.0	Good Condition
GP15-3	368835.685	5029306.220	65.067	1.52 - 3.05	Overburden	28-Oct-15	0.0	0.0	0.0	0.4	20.9	78.8	0.0	Good Condition
GP15-4	368893.417	5029339.143		1.52 - 3.05	Overburden	28-Oct-15	0.9	0.9	19.0	8.6	0.0	90.5	0.0	Good Condition
GP15-5	368837.499	5029252.218		0.91 - 2.44	Overburden	28-Oct-15	0.0	0.0	0.0	3.4	14.3	82.3	0.0	Good Condition
GP15-6	368875.492	5029271.998		0.61 - 2.13	Overburden	28-Oct-15	0.5	0.5	11.0	5.1	0.1	94.4	0.0	Good Condition
GP15-7	368931.653	5029294.223		0.91 - 2.44	Overburden	28-Oct-15	0.0	0.0	1.0	6.4	3.5	90.1	0.0	Good Condition
GP15-8	368865.766	5029240.857	65.319	1.52 - 3.05	Overburden	28-Oct-15	0.3	0.2	3.0	6.0	5.3	89.2	0.0	Good Condition
GP15-9	368950.930	5029210.490	64.924	1.52 - 3.05	Overburden	28-Oct-15	0.0	0.0	0.0	6.3	15.3	78.5	0.0	Good Condition
GP15-10	368843.807	5029183.520	64.680	0.91 - 2.13	Overburden	28-Oct-15	0.0	0.0	0.0	5.2	7.6	87.3	0.0	Good Condition

GP15-10 Notes:

Relative pressure readings taken on 17 November 2015.

masl = Metres above sea level.

mbgs - Metres below ground surface.

Monitoring performed using a Landtec GEM 2000 Landfill Gas Analyzer.

>>> = Methane over Detectable Range of the Instrument.

Percent Methane by Volume Exceeds MOE Regulation 232/98 for Landfill Property Boundary Subsurface. <u>2.5</u>

Percent Methane by Volume Exceeds MOE Regulation 232/98 for Landfill On-Site Building or Foundation. Percent Methane by Volume Exceeds MOE Regulation 232/98 for Landfill Off-Site Building or Foundation.

0.05

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APPENDIX A

Certificate of Property Use

(Available upon request)



APPENDIX B

Risk Management Measures Inspection Logs



APPENDIX C

Stratigraphic and Instrumentation Logs

(Available upon request)



APPENDIX D

Laboratory Certificates of Analysis

(Available upon request)



APPENDIX E

Limitations



LIMITATIONS

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