2016 ANNUAL REPORT

CERTIFICATE OF PROPERTY USE No. 0371-8TYQMY
LANSDOWNE PARK – URBAN PARK (ZONE C)
450 QUEEN ELIZABETH DRIVEWAY
(PART OF 945 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
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March 15, 2017

Project No. TZ10100106

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March 15, 2017

TZ10100106

VIA EMAIL

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: 2016 Annual Report
Certificate of Property Use (CPU) No. 0371-8TYQMY
Lansdowne Park – Urban Park (Zone C)
450 Queen Elizabeth Driveway (Part of 945 Bank Street), Ottawa, Ontario

Please find enclosed an electronic copy, in PDF format, of the 2016 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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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 450 Queen Elizabeth Driveway (part of 945 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 that are to be maintained at the CPU Property, and the report 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 2016 as stipulated by Condition 4.2.10 of the CPU.

The findings and results of the monitoring, sampling and inspection programs carried out in 2016 to meet the annual reporting requirements are as follows:

- Inspections of the RMM implemented at the CPU Property were conducted in 2016 in accordance with the Inspection and Maintenance Plan (IMP). Visual inspections identified several areas of soil erosion throughout the South Berm area as evidenced by surface rutting, areas of soil washout, bare patches, and areas of sediment accumulation. The erosional areas are generally coincident with the findings of the post construction topographic surveys for the East and South Berms which identified 18 areas that require restoration of the clean soil cap due to a cover thickness of less than one metre. Restoration activities should not be limited to the areas identified above but should include any and all ruts present along the South Berm. The restoration activities should be completed in 2017 prior to surveying the East and South Berms for the second consecutive year;
- The 2016 groundwater monitoring and sampling programs were conducted on a semi-annual basis in accordance with the Groundwater Monitoring Plan (GWMP). One groundwater sample collected from MW15-10 in June 2016 reported a chloride concentration above the 2011 Table 3 Site Condition Standard (SCS). The chloride exceedance at monitoring well MW15-10 is inferred to be from road salting given its close proximity to the ring road bordering the great lawn as well as its location downgradient of an area of the East Berm that is used as a snow storage area during the winter. One sample collected from MW15-3 in October 2016 reported a concentration for petroleum hydrocarbon F3 fraction (PHC F3) exceeding the 2011 Table 3 SCS. The presence of PHC in any monitoring wells on the CPU property was not expected based on previous sampling; therefore a verification sample was collected on November 16, 2016. The result of the verification sample analysis confirmed the previously reported PHC F3 to be an anomaly with the verification sample concentration reporting below the 2011 Table 3 SCS. All other ground water samples collected from the monitoring well network located at the CPU property in 2016 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 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 2016 as per the Methane Monitoring Plan (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 the Health and Safety Plan (HASP).

Based on the results of the GWMP, MMP and IMP completed in 2016 no contingency measures were deemed necessary at the CPU Property and therefore no such measures or activities were implemented in 2016. Based on inspections conducted as per the IMP, no significant deterioration of the RMM that would result in an increase in potential risk to human health at the CPU property was observed and therefore no immediate site restoration activities were deemed necessary and therefore no such activities were undertaken at the CPU Property in 2016.

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LIST OF ACRONYMS AND ABBREVIATIONS

BOD	Biochemical Oxygen Demand
COC	Contaminant of Concern
COD	Chemical Oxygen Demand
CPU	Certificate of Property Use
DO	Dissolved Oxygen
DOC	Dissolved Organic Carbon
GWMP	Ground Water Monitoring Program
HASP	Health and Safety Plan
IMP	Inspection and Maintenance Plan
LFG	Landfill Gas
MDL	Method Detection Limit
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
QA/QC	Quality Assurance / Quality Control
QP	Qualified Person
RA	Risk Assessment
RL	Reporting Limit
RMM	Risk Management Measure
RMP	Risk Management Plan
RPD	Relative Percent Difference
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 450 Queen Elizabeth Driveway (part of 945 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 2016.

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 re-locating 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 contaminants of concern (COC) present in soil and ground water 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.
2. **Former Eastern 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 2011 Table 3 Site Conditions Standards (SCS) for residential / parkland / institutional property use as provided in *Soil, Ground Water and Sediment Standards for Use under Part XV.1 of the Environmental Protection Act* (MOE, 2011a).
3. **East Berm:** Construction of an earthen berm to contain impacted 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.

6. **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. **Ground Water 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 ground water 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 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 PSS that are or may be related to the production of landfill gas.
9. **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 as-needed 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 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 2011 Table 3 SCS for residential / parkland / institutional property use excavated from within Zone A. The impacted soil was excavated concurrently with the areas excavated to construct underground parking structure located within Zones A and B. Following removal of the impacted soil a generic RSC was obtained for Zone A. COC present in soil excavated from within Zone A exceeding the applicable 2011 Table 3 SCS included various metals, polycyclic aromatic hydrocarbons (PAH) and petroleum hydrocarbons (PHC). Impacted soil 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 impacted 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 was 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 non-woven 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 Ground Water 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.

- 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 soil. The clay seals were constructed to a minimum thickness of 100 cm and extended from the base of the utility trench to the sub-base.
- 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 soil, 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 first of these surveys was conducted in November of 2016.
- The as-built survey and annual settlement/consolidation surveys will be maintained by the City per Section 3.12 of the Risk Management Plan provided in Appendix I the Risk Assessment (AMEC, 2012).

In 2016, Amec Foster Wheeler conducted inspections of the RMM implemented in the area of the East and South Berms 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 Berm areas is provided on Figure 3.

3.2 Former Eastern Landfill RMM

In addition to putrescible and non-putrescible waste, COC in soil requiring risk management in the area of the former Eastern Landfill included various metals, PAH and PHC. Based on the pre-construction grades, the zone impacted soil and/or waste extended from approximately 0.8 metres below ground surface to 4.8 mbgs. Potential risks were mitigated via capping the impacted soil and waste with a combination soft soil cap and hard cap. A non-woven geotextile was place between the cap and the underlying impacted soil/waste to demarcate the transition between the two. Capping of the former Eastern Landfill was initiated in September 2013 and was conducted concurrently with the redevelopment construction activities. The capping was completed over several stages due to limited space availability during the construction works.
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 / impacted 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 former 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 Ground Water 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 soil. The clay seals were constructed to a minimum thickness of 100 cm 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.
- The on-site storm water management system includes an underground stormwater retention tank encroaching the western limit of the former 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 former Eastern Landfill were surveyed. An as-built drawing will be maintained by the City as per the risk management plan.

In 2016, Amec Foster Wheeler conducted inspections of the RMM implemented in the area of the former Eastern Landfill 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 on Figure 3.

3.3 Former McElroy Building RMM

In the area of the former McElroy Building COC requiring risk management included PAHs 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 / impacted 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 Ground Water 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 soil. 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.

In 2016, Amec Foster Wheeler conducted inspections of the RMM implemented in the area of the former McElroy Building 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 on 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 impacted soil and ground water 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, "impacted" soil is interpreted to mean soil that does not meet the standards for soil as laid out in the 2011 MOE document entitled "*Soil, Ground Water and Sediment Standards for Use under Part XV.1 of the Environmental Protection Act*", Table 3 Full Depth Generic SCS in a Non-Potable Ground Water Condition for Residential/Parkland/Institutional (R/P/I) Land Use, coarse soil type (2011 Table 3 SCS);
- Provide a process to manage impacted soil and/or ground water, 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 2016.

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 2016.

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.

In 2016 Amec Foster Wheeler conducted inspections, as per the IMP, of the RMM implemented at the CPU property including; prominent drainage features, 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.

The following inspections were conducted in 2016:

1. April 1, 2016 – Routine Spring Inspection and weather-related inspection, with recent significant rainfall events of 19.6 mm and 17.4 mm, that included all RMM;
2. June 13, 2016 – Weather-related inspection triggered after a rainfall event of 36.4 mm within a 24 hour period of time and included all RMM;
3. July 11, 2016 – Weather-related inspection triggered after a rainfall event of 33 mm within a 24 hour period of time and included all RMM;
4. July 15, 2016 – Weather-related inspection triggered after a rainfall event of 58.6 mm within a 24 hour period of time and included all RMM;
5. August 18, 2016 – Weather-related inspection triggered after a rainfall event of 26.4 mm within a 24 hour period of time and included all RMM;
6. September 11, 2016 – Event and weather-related inspection triggered by CityFolk Festival 2016 and after a rainfall event of 25 mm within a 24 hour period of time and included all RMM;
7. October 25, 2016 – Weather-related inspection triggered after a rainfall event of 26 mm within a 24 hour period of time and included all RMM; and,
8. November 2, 2015 – Routine Fall inspection that included all RMM.

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

In accordance with the RMP developed for the Site, a post construction topographic survey of the East and South Berms was conducted in 2016 to assess any differential settlement or consolidation of materials that could result in unwanted thinning of the clean soil cover. The as-built survey for the East and South Berms was completed in 2014 by Stantec and the initial settlement/consolidation survey was completed in November 2016 also by Stantec. Survey data from both instances were collected across a 5 metre square grid and measured at the same geographical locations to facilitate direct comparison of the individual data points. Both datasets were then compared and of the 670 survey points verified, only 18 indicated a potential differential settlement or consolidation of materials greater than 0.1 metres. These survey points are identified in the table below and their locations are shown on Figure 9.

Northing	Easting	2016 Elevation	2014 Elevation	Change In Elevation (m)
SOUTH BERM				
5028915.089	368751.202	68.338	68.446	0.108
5028922.578	368760.433	69.792	69.907	0.115
5028956.494	368814.429	69.959	70.079	0.120
5028930.996	368760.600	70.830	70.957	0.127
5028918.046	368755.513	68.616	68.744	0.128
5028919.545	368735.777	71.041	71.171	0.130
5028967.169	368835.944	66.975	67.109	0.134
5028922.405	368744.623	71.013	71.148	0.135
5028910.825	368740.735	68.281	68.420	0.139
5028927.170	368768.448	70.438	70.587	0.149
5028960.952	368803.910	70.987	71.138	0.151
5028923.367	368777.232	68.224	68.376	0.152
5028988.615	368828.923	70.915	71.068	0.153
5028928.961	368757.121	70.788	70.979	0.191
5028914.140	368707.477	71.025	71.227	0.202
5028916.896	368726.328	71.137	71.376	0.239
EAST BERM				
5029055.379	368841.796	73.073	73.219	0.146
5029040.598	368832.353	72.739	72.927	0.188

All but two of the points surveyed above were measured on the South Berm and are consistent with the minor ruts and soil erosion observed throughout this area during the 2015 and 2016 RMM inspections. No signs of erosion or ruts were observed at the points on the East Berm; however, a tree had been planted at one of the locations (5029040.598, 368832.353). Any areas of differential settlement or consolidation of materials greater than 0.1 metres shall be subject to restoration using clean fill/topsoil as well as additional seeding or placement of sod to prevent future erosion.

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 2016 and therefore no immediate actions were recommended throughout the year. No changes or amendments to the IMP were made in 2016.

7.0 GROUND WATER 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). Communication from the MOECC indicating that the City should proceed with the GWMP was provided in its letter to the City dated March 20, 2015. 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, ground water flow details, infiltration rates and interflow details;
2. Identifying any changes in ground water quality resulting from establishing the RMM;
3. Establishing the location and installation details of all ground water monitoring wells to be included in the program;
4. Establishing the frequency of all ground water sampling and monitoring events;
5. 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 PSS.

7.1 Ground Water Monitoring Well Construction

As per the GWMP, a total of twelve (12) monitoring wells (MW15-1 to MW15-12) were installed at strategic locations to facilitate monitoring and sampling of the near surface ground water beneath the CPU Property. As the GWMP was designed to detect changes to both physical flow characteristics and ground water quality, the monitoring well locations were selected in consideration of the ground water 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 ground water monitoring well locations are shown on Figure 4.

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

All ground water 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 period 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 ground water 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.

7.2 Ground Water Monitoring and Sampling

Ground water monitoring was conducted on May 30, 2016 and October 27, 2016 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 locations of the NCC monitoring wells are shown on Figure 4 and their construction details provided in Table 1.

The depths to ground water and the static ground water elevations recorded at the monitoring wells are summarized in Table 2. In the spring, ground water was present at depths ranging from 2.64 metres below ground surface (mbgs) at MW09-2 to 5.46 mbgs at MW15-2. Water table elevations recorded at the monitoring wells varied between 59.77 metres above sea level (masl) at MW15-2 and 63.03 masl at MW09-2. A ground water elevation contour plan for the May 30, 2016 monitoring event depicting the inferred ground water flow pattern beneath the CPU Property is provided on Figure 5a.

In the fall, ground water was present at depths ranging from 3.40 mbgs at MW09-2 to 5.36 mbgs at MW09-6. Water table elevations recorded at the monitoring wells varied between 59.84 masl at MW09-5 and 62.27 masl at MW09-2. A ground water elevation contour plan for the October 27, 2016 monitoring event depicting the inferred ground water flow pattern beneath the CPU Property is provided on Figure 5b.

The ground water flow patterns beneath the CPU Property, observed during the spring and fall monitoring events, appear to be similar to the conditions observed in the fall of 2015. Shallow ground water, 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.

Ground water samples were collected from each of the monitoring wells installed at the CPU Property. Groundwater samples were collected on May 30 and 31, 2016 during the spring sampling event and on October 27 and 28, 2016 during the fall sampling event. Samples were collected using low-flow sampling techniques were utilized in order to minimize potential sample

biasing due to sediment entrainment. Ground water field parameters measured during sampling including pH, temperature, dissolved oxygen (DO), conductivity and oxidation-reduction potential (ORP) and general observations are provided in Table 3. Each of the ground water samples collected was analyzed for the following COC: PAH, PHC F1 - F4, chloroform, metals and landfill leachate indicator parameters as 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) including 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). With the exception of chloride, 2011 Table 3 SCS do not exist for these landfill indicator 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. These parameters have been analyzed to facilitate the identification of any trends which may be indicative of the deterioration of ground water quality resulting from the implementation of the RMM. As such, these data will be evaluated beginning in 2017 to assess potential trends and changes in ground water quality.

One (1) blind duplicate sample was collected during each sampling event for analysis of one or more COC including PAHs, PHC F1-F4, chloroform, metals, and landfill leachate indicator parameters for quality assurance / quality control (QA/QC) purposes. Sample DUP-2 is a blind duplicate of sample MW15-7 for the spring sampling event and sample DUP-1 is a blind duplicate of sample MW15-12 for the fall sampling event. Two (2) trip blank samples were employed during each of the sampling events, one on each day of sampling for analysis of chloroform to assess potential cross contamination during sample storage and transport. One verification sample was also collected from MW16-3 in the fall on November 16, 2016 to verify the concentration of PHC F3 reported in the sample collected on October 28, 2016 at this location.

7.3 Ground Water Sample Analyses

Ground water sample analyses were performed by Paracel Laboratories Ltd. of Ottawa, Ontario. Analytical results for ground water 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 PSS derived from the Risk Assessment as provided in CPU 0371-8TYQMY.

The results of the spring and fall ground water sample analyses, and their respective 2011 Table 3 SCS and PSS derived from the Risk Assessment are summarized in Table 4a and 4b respectively. Parameters exceeding their respective 2011 Table 3 SCS or PSS as applicable in the context of this report are shown on Figure 6.

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

7.3.1 Spring Monitoring Event

Thirteen (13) ground water samples, including one blind QA/QC duplicate sample, were collected from on-Site monitoring wells in the spring on May 30 and 31, 2016. The results of the analysis are summarized in Table 4a.

7.3.1.1 Petroleum Hydrocarbons

PHC were not detected in any of the ground water 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.

7.3.1.2 Chloroform

The results of the chloroform analyses can be summarized as follows:

- Chloroform was detected in ground water samples collected from four (4) monitoring wells located on the CPU Property including MW15-2, MW15-3, MW15-6 and MW15-9;
- The concentration of chloroform in the ground water samples collected from monitoring wells MW15-2, MW15-3, MW15-6 and MW15-9 were reported at 2.1 µg/L, 1.0 µg/L, 1.3 µg/L and 1.4 µg/L respectively. These concentrations are below the 2011 Table 3 SCS of 2.4 µg/L; and,
- All other ground water samples collected reported concentrations of chloroform below analytical MDL, and therefore below the applicable 2011 Table 3 SCS.

7.3.1.3 Polynuclear Aromatic Hydrocarbons

One or more PAH parameters were detected in three (3) of the ground water samples collected from monitoring wells on the CPU property. All of the ground water 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 MDL reported by the laboratory.

7.3.1.4 Metals

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

7.3.1.5 General Inorganic Parameters

Chloride exceeded the 2011 Table 3 SCS at monitoring location MW15-10 during the spring monitoring event. No exceedances of PSS for ammonia were reported at the Site.

7.3.2 Fall Monitoring Event

Thirteen (13) ground water samples, including one blind QA/QC duplicate sample, were collected from on-Site monitoring wells in the fall on October 27 and 28, 2016. One verification sample was collected from MW15-3 on November 16, 2016 and submitted for PHC F2-F4 analysis to verify the initial findings reported for this location. The results of the analysis are summarized in Table 4b.

7.3.2.1 Petroleum Hydrocarbons

PHC F3 and F4 were detected at MW15-3 on October 28, 2016, at concentrations of 1,310 µg/L and 240 µg/L respectively, with F3 exceeding the 2011 Table 3 SCS of 500 µg/L. A second sample was collected from this location on November 16, 2016 and analysed for PHC F2-F4 with all fractions reporting below MDL. All other PHC parameters were not detected in any of the ground water samples. Based on the analytical MDL reported by the laboratory, all samples are deemed to be below the applicable 2011 Table 3 SCS.

7.3.2.2 Chloroform

The results of the chloroform analyses can be summarized as follows:

- Chloroform was detected in ground water samples collected from three (3) monitoring wells located on the CPU Property (MW15-2, MW15-3 and MW15-6);
- The concentration of chloroform in the ground water samples collected from monitoring wells MW15-2, MW15-3 and MW15-6 were reported at 1.6 µg/L, 0.9 µg/L and 1.3 µg/L respectively. These concentrations are below the 2011 Table 3 SCS of 2.4 µg/L; and,
- All other ground water samples collected reported concentrations of chloroform below analytical MDL, and therefore below the applicable 2011 Table 3 SCS.

7.3.2.3 Polynuclear Aromatic Hydrocarbons

Fluoranthene and pyrene were detected in the sample collected from MW15-8 at concentrations well below applicable 2011 Table 3 SCS. All other PAH parameters reported during the fall monitoring event reported concentrations below MDL. Concentrations below MDL are deemed to be below the applicable 2011 Table 3 SCS based on the MDL reported by the laboratory.

7.3.2.4 Metals

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

7.3.2.5 General Inorganic Parameters

Neither of these parameters exceeded their 2011 Table 3 SCS or PSS, where established, during the fall monitoring event.

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"), dated March 9 2004 (amended as of 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 with the exception of the chloroform trip blank, which exceeded its hold time reported on Certificate 1623214. A hold time exceedance for trip blanks does not preclude their validity provided the hold times for the samples were not exceeded and the trip blank has accompanied the samples at all times prior to receipt by the laboratory. Chloroform was not detected in the trip blank submitted in the spring.

RLs, where established, were met for all tested parameters with the exception of BOD in sample MW1-10 reported on Certificate 1644414 for which the RL was raised due to dilution based on preliminary COD screening results.

Surrogate recoveries were within acceptable ranges in all cases, for all samples with the exception of the spike recovery of calcium reported on Certificate 1623214. The laboratory reported that the batch was accepted based on other acceptable QC.

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), with exception of ammonia, BOD and COD duplicate pairs reported on Certificate 1623214 for which RPDs were reported at 17.7%, 30.1% and 22.1% relative to the recommended limits of 8%, 20% and 12% respectively. With regards to COD the concentrations reported for the source and duplicate samples were less than 10 times the MDL and the results thus accepted by the laboratory. RPDs for ammonia and BOD were accepted based on the remaining batch QA/QC being acceptable.

7.4.4 Field QA/QC Samples

The results of the field duplicate sample analyses indicate that the sampling results are generally reproducible with RPD between the primary and duplicate samples reporting within acceptable ranges (i.e., < 40%) in all but one instance. Sample MW16-7 and its duplicate (Dup-2) collected on June 31, 2016 reported ammonia concentrations yielding a RPD of 42.9% thus exceeding the recommended limit of 8%. These samples also reported chromium with a RPD of 28.6% and vanadium with a RPD of 34.3% exceeding their recommended limits of 20%. 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). Communication from the MOECC indicating that the City should proceed with the MMP was provided in its letter to the City dated March 20, 2015. 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 ground water 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 LFG probes are shown on Figure 7 while the LFG probe construction details are shown on the stratigraphic and instrumentation logs provided 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 former 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 a quarterly basis on February 23, May 10, August 12 and November 4, 2016. 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 (CH_4), oxygen (O_2), carbon dioxide (CO_2) and balance gases and percentage of the lower explosive limit (%LEL) were measured using a Landtec GEM 2000 Landfill Gas Monitor. The GEM 2000 was calibrated by the equipment

provider prior to use in the field. 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 5 and are shown on Figure 8. Two notable subsurface pressures of 1.0 were recorded at GP15-2 during the May 2016 monitoring event and GP15-10 during the August 2016 monitoring event. Stable methane concentrations were detected at the following five (5) LFG probe locations including: GP15-2 (0.1 vol. % in November), GP15-3 (0.1 vol. % in November), GP15-4 (0.7 vol. % in February, 0.1 vol. % in May and 0.2 vol. % in November), GP15-5 (0.1 vol. % in November) and GP15-6 (0.2 vol. % in May, 0.4 vol. % in August and 0.8 vol. % in November). Based on the methane concentrations noted above, the Site meets the on-site methane concentrations limits as outlined in O.Reg. 232/98 and the recommended methane alert levels provided in Procedure D-4-1.

8.4 Landfill Gas Data Analyses

The fairly consistent presence of low level initial and stable methane concentrations measured at GP15-4 and GP15-6 indicate that methane impacts are predominantly confined within the footprint of the former Eastern Landfill (with the exception of intermittent low levels measured at GP15-1, GP15-2, GP15-3 and GP15-5 which are outside 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 positive pressure measured at GP15-2 in May and GP15-10 in August) suggests that the subsurface methane is not likely to migrate beyond the immediate areas in which it is encountered. The inconsistent low levels of methane and lack of detectable methane in some cases at the LFG probes surrounding the former Eastern Landfill footprint indicates that the subsurface methane is not likely migrating beyond the boundaries of the former landfill.

9.0 CONTINGENCY MEASURES

Based on the results of the GWMP, MMP and IMP completed in 2016 no contingency measures were deemed necessary and therefore no such measures were implemented at the CPU Property in 2016.

10.0 SITE RESTORATION ACTIVITIES

Based on inspections conducted as per the IMP no significant deterioration of the RMM that would result in an increase in potential risk to human health on the CPU property was observed and therefore no immediate site restoration activities were deemed necessary and therefore no such activities were undertaken at the CPU Property in 2016.

Visual inspections undertaken in 2016 identified several areas of soil erosion throughout the South Berm area as evidenced by surface rutting, areas of soil washout, bare patches, and areas of sediment accumulation. These erosional areas are generally coincident with the findings of the post construction topographic surveys for the East and South Berms which identified 18 areas that require restoration of the clean soil cap due to a cover thickness of less than one metre. The areas are not considered to result in any increase in the levels of risk to potential receptors at the CPU Property, reparations to these areas should be undertaken in 2017 to prevent continued erosion due to loss of stabilizing vegetation in these areas.

11.0 CONCLUSIONS AND RECOMMENDATIONS

The findings and results of the monitoring, sampling and inspection programs carried out at the CPU Property in 2016 to meet the annual reporting requirements are as follows:

- Inspections of the RMM implemented at the CPU Property were conducted in 2016 in accordance with the Inspection and Maintenance Plan (IMP). Visual inspections identified several areas of soil erosion throughout the South Berm area as evidenced by surface rutting, areas of soil washout, bare patches, and areas of sediment accumulation. The erosional areas are generally coincident with the findings of the post construction topographic surveys for the East and South Berms which identified 18 areas that require restoration of the clean soil cap due to a cover thickness of less than one metre. Restoration activities should not be limited to the areas identified above but should include any and all ruts present along the South Berm. The restoration activities should be completed in 2017 prior to surveying the East and South Berms for the second consecutive year;
- The 2016 groundwater monitoring and sampling programs were conducted on a semi-annual basis in accordance with the Groundwater Monitoring Plan (GWMP). One groundwater sample collected from MW15-10 in June 2016 reported a chloride concentration above the 2011 Table 3 Site Condition Standard (SCS). The chloride exceedance at monitoring well MW15-10 is inferred to be from road salting given its close proximity to the ring road bordering the great lawn as well as it is location downgradient of an area of the East Berm that is used as a snow storage area during the winter. One sample collected from MW15-3 in October 2016 reported a concentration for PHC F3 exceeding the 2011 Table 3 SCS. The presence of PHC in any monitoring well on the CPU property was not expected based on previous sampling; therefore a verification sample was collected on November 16, 2016. The result of the verification sample analysis confirmed the previously reported PHC F3 to be an anomaly with the verification sample concentration reporting below the 2011 Table 3 SCS. All other ground water samples collected from the monitoring well network located at the CPU property in 2016 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 2016 as per the Methane Monitoring Plan (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 the Health and Safety Plan (HASP).

Based on the results of the GWMP, MMP and IMP completed in 2016 no contingency measures were deemed necessary at the CPU Property and therefore no such measures or activities were

implemented in 2016. Based on inspections conducted as per the IMP, no significant deterioration of the RMM that would result in an increase in potential risk to human health at the CPU property was observed and therefore no immediate site restoration activities were deemed necessary and therefore no such activities were undertaken at the CPU Property in 2016.

12.0 LIMITATIONS

This report was prepared for the exclusive use of the City of Ottawa for the property located at 450 Queen Elizabeth Driveway (part of 945 Bank Street) 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.

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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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): Ground Water 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.

AMEC Environment & Infrastructure (2012): Risk Assessment for Lansdowne Park & Sylvia Holden Commemorative Park, Ottawa, Ontario – Final; Submitted to the Director, Environmental Assessment and Approvals Branch, Ontario Ministry of the Environment, on Behalf of the City of Ottawa, April 30, 2012.

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, Ground Water 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.

Table 1. Ground Water Monitoring Well Construction Details

Monitor Well I.D.	MTM Coordinates		Date of Construction (mm/dd/yy)	Well Constructed By	Borehole and Groundwater Monitoring Interval Construction Data								
	Easting	Northing			Ground Surface Elevation (m)	Borehole Depth (m)	Borehole Bottom Elevation (m)	Top of Casing Elevation (m)	Casing Stick-up (m)	Depth to Bottom of Well Screen (m)	Well Screen Interval (masl)	Well Screen Length (m)	Geologic Media Intersected by Well Screen
MW15-1	368902.89	5029395.41	10/23/2015	AFW	65.492	6.10	59.39	65.409	-0.08	6.10	62.44 - 59.39	3.05	Loam/Sand
MW15-2	368835.26	5029365.16	10/23/2015	AFW	65.228	6.71	58.52	65.085	-0.14	6.71	61.57 - 58.52	3.05	Loamy Sand/Sand
MW15-3	368835.69	5029306.22	10/23/2015	AFW	65.067	6.71	58.36	64.899	-0.17	6.71	61.41 - 58.36	3.05	Fill/Sand
MW15-4	368865.77	5029240.86	10/23/2015	AFW	65.319	6.10	59.22	65.256	-0.06	6.10	62.27 - 59.22	3.05	Fill No Recovery
MW15-5	368950.93	5029210.49	10/22/2015	AFW	64.924	6.10	58.82	64.895	-0.03	6.10	61.87 - 58.82	3.05	Sand
MW15-6	368843.81	5029183.52	10/21/2015	AFW	64.680	5.18	59.50	64.615	-0.07	5.18	62.55 - 59.50	3.05	Fill/Sand
MW15-7	368911.90	5029169.41	10/21/2015	AFW	64.513	6.10	58.41	64.431	-0.08	5.48	62.08 - 59.03	3.05	Fill/Sand
MW15-8	368937.69	5029125.60	10/22/2015	AFW	64.898	6.10	58.80	64.815	-0.08	6.10	61.85 - 58.80	3.05	Fill/Sand
MW15-9	368798.39	5029125.38	10/21/2015	AFW	65.253	6.10	59.15	65.148	-0.11	6.10	62.20 - 59.15	3.05	Fill/Sand/Loamy Sand
MW15-10	368878.44	5029083.95	10/22/2015	AFW	65.043	6.10	58.94	64.979	-0.06	6.10	61.99 - 58.94	3.05	Fill/Sand
MW15-11	368858.74	5028968.82	10/22/2015	AFW	64.571	6.10	58.47	64.447	-0.12	6.10	61.52 - 58.47	3.05	Fill/Sand
MW15-12	368792.98	5028926.01	10/22/2015	AFW	65.596	6.71	58.89	65.498	-0.10	6.71	61.94 - 58.89	3.05	Fill/Sand/Loamy Sand
MW09-1	368942.54	5029353.62	10/29/2009	Stantec	65.718	4.89	60.83	65.658	-0.06	4.89	63.88 - 60.83	3.05	Silty Sand
MW09-2	368953.24	5029331.60	10/29/2009	Stantec	65.667	4.89	60.78	65.601	-0.07	4.89	63.83 - 60.78	3.05	Silty Sand
MW09-3	368947.29	5029323.87	10/29/2009	Stantec	65.426	4.89	60.54	65.368	-0.06	4.89	63.59 - 60.54	3.05	Silty Sand
MW09-5	368959.68	5029265.39	10/29/2009	Stantec	65.108	6.10	59.01	65.061	-0.05	6.10	62.06 - 59.01	3.05	Sand
MW09-6	368962.89	5029235.74	10/29/2009	Stantec	65.232	6.10	59.13	65.202	-0.03	6.10	62.18 - 59.13	3.05	Silty Sand/Sand

Notes:
Survey Data Provided by City of Ottawa Surveys and Mapping Unit.
All Elevation Referenced to Geodetic.
masl = Metres Above Sea Level.

Table 2. Ground Water Measurement and Elevation Data

Monitoring Well I.D.	Ground Surface Elevation (masl)	Top of Casing Elevation (masl)	Bottom of Well Screen Elevation (mbtoc)	May 30, 2016			October 27, 2016		
				Depth to Water (mbtoc)	Depth to Water (mbgs)	Static Elevation (masl)	Depth to Water (mbtoc)	Depth to Water (mbgs)	Static Elevation (masl)
MW15-1	65.492	65.409	59.392	2.677	2.760	62.732	3.825	3.908	61.584
MW15-2	65.228	65.085	58.518	5.315	5.458	59.770	5.123	5.266	59.962
MW15-3	65.067	64.899	58.357	5.040	5.208	59.859	4.868	5.036	60.031
MW15-4	65.319	65.256	59.219	4.515	4.578	60.741	4.760	4.823	60.496
MW15-5	64.924	64.895	58.824	4.935	4.964	59.960	4.971	5.000	59.924
MW15-6	64.680	64.615	59.500	4.575	4.640	60.040	4.515	4.580	60.100
MW15-7	64.513	64.431	59.033	4.426	4.508	60.005	4.461	4.543	59.970
MW15-8	64.898	64.815	58.798	4.845	4.928	59.970	4.921	5.004	59.894
MW15-9	65.253	65.148	59.153	4.999	5.104	60.149	4.970	5.075	60.178
MW15-10	65.043	64.979	58.943	4.885	4.949	60.094	4.967	5.031	60.012
MW15-11	64.571	64.447	58.471	4.209	4.333	60.238	4.368	4.492	60.079
MW15-12	65.596	65.498	58.886	5.120	5.218	60.378	5.320	5.418	60.178
MW09-1	65.718	65.658	60.828	2.674	2.734	62.984	3.384	3.444	62.274
MW09-2	65.667	65.601	60.777	2.572	2.638	63.029	3.335	3.401	62.266
MW09-3	65.426	65.368	60.536	2.607	2.665	62.761	3.391	3.449	61.977
MW09-5	65.108	65.061	59.008	5.198	5.245	59.863	5.220	5.267	59.841
MW09-6	65.232	65.202	59.132	5.297	5.327	59.905	5.330	5.360	59.872

Notes:
masl = Metres Above Sea Level.
mbtoc = Metres Below Top of Casing.
mbgs = Metres Below Ground Surface.

Table 3. Ground Water Field Parameter Data and Observations

Monitoring Well ID	Sampling Date (mm/dd/yy)	Water Level Data			Field Parameters						Laboratory Analyses					General Observations
		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. (ºC)	Oxidation Reduction Potential (ORP) (mV)	PHC	PAH	Metals	GWC	Chloroform	
MW15-1	05/31/16	2.630	2.660	0.030	0.0	6.91	2.504	0.56	11.17	-69.0	✓	✓	✓	✓	✓	Clear, no sheen or odour.
	10/28/16	3.800	3.825	0.025	0.0	6.69	1.764	0.68	13.94	-41.6	✓	✓	✓	✓	✓	Brown, no sheen or odour.
MW15-2	05/31/16	5.305	5.313	0.008	2.0	7.39	2.048	4.72	11.55	55.7	✓	✓	✓	✓	✓	Cloudy, no sheen or odour.
	10/28/16	5.123	5.139	0.016	2.0	7.04	1.899	4.45	13.68	129.4	✓	✓	✓	✓	✓	Cloudy, no sheen or odour.
MW15-3	05/31/16	5.029	5.038	0.009	0.0	7.28	2.672	5.74	13.13	37.8	✓	✓	✓	✓	✓	Brown, no sheen or odour.
	10/28/16	4.868	4.882	0.014	0.0	7.06	3.054	3.87	13.57	114.8	✓	✓	✓	✓	✓	Cloudy, no sheen or odour.
MW15-4	05/31/16	4.385	4.654	0.269	3.0	6.99	1.413	0.59	12.30	-51.4	✓	✓	✓	✓	✓	Rusty brown, no sheen or odour.
	10/28/16	4.760	4.771	0.011	0.0	6.92	1.418	0.70	15.90	-93.7	✓	✓	✓	✓	✓	Brown, no sheen or odour.
MW15-5	05/31/16	4.915	4.930	0.015	1.0	6.88	2.072	1.74	12.59	104.0	✓	✓	✓	✓	✓	Cloudy, no sheen or odour.
	10/28/16	4.971	4.980	0.009	1.0	6.67	1.535	0.81	12.04	285.3	✓	✓	✓	✓	✓	Clear, no sheen or odour.
MW15-6	05/31/16	4.558	4.565	0.007	2.0	7.12	4.616	3.18	11.48	101.4	✓	✓	✓	✓	✓	Clear, no sheen or odour.
	10/28/16	4.515	4.534	0.019	0.0	6.87	4.154	4.28	13.16	266.8	✓	✓	✓	✓	✓	Cloudy, no sheen or odour.
MW15-7	05/31/16	4.415	4.418	0.003	1.0	6.77	1.813	4.00	10.53	116.9	✓	✓	✓	✓	✓	Clear, no sheen or odour.
	10/28/16	4.461	4.475	0.014	0.0	6.62	1.395	2.02	11.68	277.2	✓	✓	✓	✓	✓	Cloudy/clear, no sheen or odour.
MW15-8	05/31/16	4.838	4.848	0.010	1.0	7.24	1.318	4.77	12.25	115.2	✓	✓	✓	✓	✓	Clear, no sheen or odour.
	10/28/16	4.921	4.931	0.010	0.0	7.04	0.210	7.66	13.13	204.9	✓	✓	✓	✓	✓	Cloudy/clear, no sheen or odour.
MW15-9	05/31/16	4.999	5.007	0.008	0.0	7.23	2.116	7.04	13.40	134.6	✓	✓	✓	✓	✓	Clear, no sheen or odour.
	10/27/16	4.970	4.970	0.000	0.0	7.27	2.066	4.44	14.68	199.3	✓	✓	✓	✓	✓	Brown, no sheen or odour.
MW15-10	05/31/16	4.880	4.892	0.012	0.0	6.25	9.436	0.49	13.25	131.4	✓	✓	✓	✓	✓	Cloudy, no sheen or odour.
	10/27/16	4.967	4.967	0.000	0.0	6.16	8.394	0.29	15.58	201.0	✓	✓	✓	✓	✓	Cloudy, no sheen or odour.
MW15-11	05/31/16	4.201	4.202	0.001	0.0	7.50	1.027	3.77	14.12	120.8	✓	✓	✓	✓	✓	Clear, no sheen or odour.
	10/27/16	4.368	4.368	0.000	0.0	7.09	1.062	1.45	14.92	253.7	✓	✓	✓	✓	✓	Clear, no sheen or odour.
MW15-12	05/31/16	5.114	5.116	0.002	0.0	7.31	1.868	7.15	11.65	127.2	✓	✓	✓	✓	✓	Cloudy, no sheen or odour.
	10/27/16	5.320	5.320	0.000	1.0	6.89	0.833	1.72	14.13	303.1	✓	✓	✓	✓	✓	Cloudy/clear, no sheen or odour.

Notes:
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 organic carbon [DOC], total dissolved solids [TDS]).

Notes on Ground Water Analytical Summary Tables

All Units Reported in Micrograms per Litre (µg/L) or Milligrams per Litre (mg/L) as Indicated .

RDL = Laboratory Analytical Method Reporting 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).

* Denotes Recommended RPD Alert Criterion Exceeded, However, Parameter Concentration Less than 10 Times Laboratory RDL.

PHC = Petroleum Hydrocarbons.

< = Less Than Laboratory Analytical Method Detection Limit.

N/A = Not Applicable.

N/V = No Value.

N/D = Not Developed.

55	Parameter Concentration May Exceed EPA Table 3 Site Condition Standard for Non-Potable Groundwater Use due to Elevated MDL Reported by the Laboratory.
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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Table 4a. Summary of Ground Water Analyses - Spring 2016

Parameters	RDL	RL	2011 EPA Standards		Analytical Results													
Sample Location			Full Depth Generic Site Condition Standards	Property Specific Standards (as per Certificate of Property Use 0371-8TYQMY)	MW15-1	MW15-2	MW15-3	MW15-4	MW15-5	MW15-6	MW15-7	MW15-7	MW15-7	MW15-7	MW15-8	MW15-9	MW15-10	MW15-11
Sample ID					MW15-1	MW15-2	MW15-3	MW15-4	MW15-5	MW15-6	MW15-7	DUP-2	Average	RPD	MW15-8	MW15-9	MW15-10	MW15-11
Property Location					CPU Property	CPU Property	CPU Property	CPU Property	CPU Property	CPU Property	CPU Property	CPU Property		(%)	CPU Property	CPU Property	CPU Property	CPU Property
Laboratory ID			Non-Potable Groundwater (Table 3)		1623214-01	1623214-02	1623214-03	1623214-04	1623214-05	1623214-06	1623214-07	1623214-13			1623214-08	1623214-09	1623214-10	1623214-11
Sample Date					5/31/2016	5/31/2016	5/31/2016	5/31/2016	5/31/2016	5/31/2016	5/31/2016	5/31/2016	5/31/2016	5/31/2016	5/31/2016	5/31/2016	5/31/2016	5/31/2016
General Inorganic Parameters (mg/L)																		
pH (pH units)	0.1	-	-	-	7.3	7.6	7.6	7.5	7.4	7.4	7.4	7.4	7.4	0.0	7.7	7.8	7.2	7.9
Alkalinity (CaCO3)	5	-	-	-	378	221	255	487	442	264	355	357	356	0.6	360	246	212	257
Ammonia	0.01	-	-	4.524	1.72	0.15	0.29	2.84	0.41	0.16	0.34	0.22	0.28	42.9	0.32	0.10	0.55	0.10
Conductivity (µS/cm)	5	-	-	-	2800	2280	3080	1550	2420	5210	2130	2110	2120	0.9	1420	2440	7980	1270
Chloride	1	1	2300	-	648	278	687	103	351	1400	235	237	236	0.8	158	291	**2410**	158
Nitrate (N)	0.1	0.1	-	-	< 0.1	3.4	5.5	< 0.1	0.1	6.2	8.3	8.0	8.15	3.7	0.9	4.9	1.6	1.1
Sulphate	1	-	-	-	126	600	258	230	329	499	410	406	408	1.0	170	575	390	139
Biological Oxygen Demand (BOD)	2	-		-	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	-	< 2	< 2	< 2	< 2
Chemical Oxygen Demand (COD)	10	-	-	-	27	36	24	32	39	40	18	19	19	5.4	< 10	14	113	11
Dissolved Organic Carbon	0.5	-	-	-	2.7	1.6	1.4	5.6	5.1	2.3	4.7	3.9	4.3	18.6	2.2	1.5	7.3	1.5
Hardness	-	-	-	-	559	836	649	590	660	1160	799	816	808	2.1	413	745	1390	326
Total Dissolved Solids	10	-	-	-	1590	1590	1880	956	1510	3400	1410	1380	1395	2.2	830	1620	5380	688
Volatile Organic Compounds (µg/L)																		
Chloroform	0.5	1	2.4	22	< 0.5	2.1	1.0	< 0.5	< 0.5	1.3	< 0.5	< 0.5	< 0.5	-	< 0.5	1.4	< 0.5	< 0.5
Petroleum Hydrocarbons (µg/L)																		
PHC F1 (C6 - C10)	25	25	750[a]	-	< 25	< 25	< 25	< 25	< 25	< 25	< 25	< 25	< 25	-	< 25	< 25	< 25	< 25
PHC F2 (>C10 - C16)	100	100	150[a]	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	-	< 100	< 100	< 100	< 100
PHC F3 (>C16 - C34)	100	500	500[a]	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	-	< 100	< 100	< 100	< 100
PHC F4 (>C34)	100	500	500[a]	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	-	< 100	< 100	< 100	< 100
Polynuclear Aromatic Hydrocarbons (µg/L)																		
Acenaphthene	0.05	1	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
Acenaphthylene	0.05	1	1.8	-	< 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
Anthracene	0.05	0.1	2.4	-	< 0.01	< 0.01	0.04	< 0.01	0.05	< 0.01	< 0.01	< 0.01	< 0.01	-	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)anthracene	0.01	0.2	4.7	-	< 0.01	< 0.01	0.06	< 0.01	0.07	< 0.01	< 0.01	< 0.01	< 0.01	-	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	0.01	0.01	0.81	-	< 0.01	< 0.01	0.08	< 0.01	0.08	< 0.01	< 0.01	< 0.01	< 0.01	-	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	0.01	0.1	0.75	-	< 0.05	< 0.05	0.07	< 0.05	0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(g,h,i)perylene	0.05	0.2	0.2	-	< 0.05	< 0.05	0.06	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(k)fluoranthene	0.05	0.1	0.4	-	< 0.05	< 0.05	0.09	< 0.05	0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	< 0.05	< 0.05	< 0.05	< 0.05
Chrysene	0.05	0.1	1	-	< 0.05	< 0.05	0.08	< 0.05	0.08	< 0.05	< 0.05	< 0.05	< 0.05	-	< 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	< 0.05	-	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	0.01	0.4	130	-	< 0.01	< 0.01	0.15	< 0.01	0.19	< 0.01	< 0.01	< 0.01	< 0.01	-	0.08	< 0.01	< 0.01	< 0.01
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	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	< 0.05	< 0.05	< 0.05	< 0.05
Methylnaphthalene, 1-[b]	0.05	2	1800	-	< 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
Methylnaphthalene, 2-[b]	0.05	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
Naphthalene	0.05	2	1400	-	< 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
Phenanthrene	0.05	0.1	580	-	< 0.05	< 0.05	0.08	< 0.05	0.12	< 0.05	< 0.05	< 0.05	< 0.05	-	< 0.05	< 0.05	< 0.05	< 0.05
Pyrene	0.01	0.2	68	-	< 0.01	< 0.01	0.14	< 0.01	0.15	< 0.01	< 0.01	< 0.01	< 0.01	-	0.07	< 0.01	< 0.01	< 0.01
Metals (µg/L)																		
Antimony	0.5	0.5	20000	-	< 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
Arsenic	1	1	1900	-	< 1	< 1	< 1	3	< 1	< 1	< 1	< 1	< 1	-	< 1	< 1	< 1	< 1
Barium	1	2	29000	-	675	109	110	59	90	135	93	92	93	1.1	89	50	225	89
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
Boron	10	10	45000	-	40	48	28	64	64	36	48	48	48	0.0	38	49	19	19
Cadmium	0.1	0.5	2.7	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	0.5	< 0.1
Calcium	100	-	-	-	174000	245000	208000	186000	214000	380000	270000	275000	272500	1.8	128000	227000	452000	97600
Chromium	1	10	810	-	5	3	6	2	4	8	4	3	3.5	28.6*	2	4	6	4
Chromium (VI)	10	10	140	-	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	-	< 10	< 10	< 10	< 10
Cobalt	0.5	1	66	-	< 0.5	< 0.5	< 0.5	0.8	1.4	0.7	0.5	0.6	0.55	18.2	< 0.5	4.1	1.7	< 0.5
Copper	0.5	5	87	-	5.0	3.7	6.0	1.6	6.7	11.9	4.2	4.2	4.2	0.0	4.2	4.7	16.3	2.2
Iron	100	-	-	24240	12400	< 100	< 100	7720	< 100	< 100	< 100	< 100	< 100	-	< 100	< 100	< 100	< 100
Lead	0.1	1	25	-	< 0.1	< 0.1	< 0.1	0.3	< 0.1	0.1	< 0.1	< 0.1	< 0.1	-	0.1	< 0.1	0.1	< 0.1
Magnesium	200	-	-	-	30000	54400	31600	30500	30800	52000	30500	31400	30950	2.9	22600	43400	63900	20000
Mercury	0.1	0.1	0.29	-	< 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
Molybdenum	0.5	0.5	9200	-	< 0.5	2.7	0.7	1.7	1.0	< 0.5	0.9	1.1	1	20.0	0.7	6.3	< 0.5	0.7
Nickel	1	1	490	-	4	6	6	7	9	11	8	8	8	0.0	5	19	15	3
Selenium	1	5	63	-	< 1	2	2	< 1	< 1	< 1	< 1	< 1	< 1	-	< 1	1	< 1	< 1
Silver	0.1	0.3	1.5	-	< 0.1	0.2	0.2	< 0.1	< 0.1	0.2	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1
Sodium	200	5000	2300000	-	33900	17000	38000	9980	54200	64100	13600	13900	13750	2.2	12800	25400	105000	10900
Thallium	0.1	0.5	510	-	< 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
Uranium	0.1	2	420	-	< 0.1	2.3	1.5	1.0	1.0	2.9	1.2	1.1	1.2	8.7	0.9	2.6	1.4	0.7
Vanadium	0.5	0.5	250	-	4.7	1.7	1.9	6.0	5.8	1.8	4.1	2.9	3.5	34.3*	2.7	1.3	1	1.4
Zinc	5	5	1100	-	6	7	< 5	77	9	5	< 5	< 5	< 5	-	13	16	8	< 5

Table 4a. Summary of Ground Water Analyses - Spring 2016

Parameters	RDL	RL	2011 EPA Standards		Analytical Results													
Sample Location			Full Depth Generic Site Condition Standards	Property Specific Standards (as per Certificate of Property Use 0371-8TYQMY)	Trip Blank													
Sample ID																		
Property Location			Non-Potable Groundwater (Table 3)															
Laboratory ID					1623214-14													
Sample Date					5/31/2016													
General Inorganic Parameters (mg/L)																		
pH (pH units)	0.1	-	-	-	-													
Alkalinity (CaCO3)	5	-	-	-	-													
Ammonia	0.01	-	-	4.524	-													
Conductivity (µS/cm)	5	-	-	-	-													
Chloride	1	1	2300	-	-													
Nitrate (N)	0.1	0.1	-	-	-													
Sulphate	1	-	-	-	-													
Biological Oxygen Demand (BOD)	2	-		-	-													
Chemical Oxygen Demand (COD)	10	-	-	-	-													
Dissolved Organic Carbon	0.5	-	-	-	-													
Hardness	-	-	-	-	-													
Total Dissolved Solids	10	-	-	-	-													
Volatile Organic Compounds (µg/L)																		
Chloroform	0.5	1	2.4	22	< 0.5													
Petroleum Hydrocarbons (µg/L)																		
PHC F1 (C6 - C10)	25	25	750[a]	-	-													
PHC F2 (>C10 - C16)	100	100	150[a]	-	-													
PHC F3 (>C16 - C34)	100	500	500[a]	-	-													
PHC F4 (>C34)	100	500	500[a]	-	-													
Polynuclear Aromatic Hydrocarbons (µg/L)																		
Acenaphthene	0.05	1	600	-	-													
Acenaphthylene	0.05	1	1.8	-	-													
Anthracene	0.05	0.1	2.4	-	-													
Benzo(a)anthracene	0.01	0.2	4.7	-	-													
Benzo(a)pyrene	0.01	0.01	0.81	-	-													
Benzo(b)fluoranthene	0.01	0.1	0.75	-	-													
Benzo(g,h,i)perylene	0.05	0.2	0.2	-	-													
Benzo(k)fluoranthene	0.05	0.1	0.4	-	-													
Chrysene	0.05	0.1	1	-	-													
Dibenzo(a,h)anthracene	0.05	0.2	0.52	-	-													
Fluoranthene	0.01	0.4	130	-	-													
Fluorene	0.05	0.5	400	-	-													
Indeno(1,2,3,c,d)pyrene	0.05	0.2	0.2	-	-													
Methylnaphthalene, 1-[b]	0.05	2	1800	-	-													
Methylnaphthalene, 2-[b]	0.05	2		-	-													
Naphthalene	0.05	2	1400	-	-													
Phenanthrene	0.05	0.1	580	-	-													
Pyrene	0.01	0.2	68	-	-													
Metals (µg/L)																		
Antimony	0.5	0.5	20000	-	-													
Arsenic	1	1	1900	-	-													
Barium	1	2	29000	-	-													
Beryllium	0.5	0.5	67	-	-													
Boron	10	10	45000	-	-													
Cadmium	0.1	0.5	2.7	-	-													
Calcium	100	-	-	-	-													
Chromium	1	10	810	-	-													
Chromium (VI)	10	10	140	-	-													
Cobalt	0.5	1	66	-	-													
Copper	0.5	5	87	-	-													
Iron	100	-	-	24240	-													
Lead	0.1	1	25	-	-													
Magnesium	200	-	-	-	-													
Mercury	0.1	0.1	0.29	-	-													
Molybdenum	0.5	0.5	9200	-	-													
Nickel	1	1	490	-	-													
Selenium	1	5	63	-	-													
Silver	0.1	0.3	1.5	-	-													
Sodium	200	5000	2300000	-	-													
Thallium	0.1	0.5	510	-	-													
Uranium	0.1	2	420	-	-													
Vanadium	0.5	0.5	250	-	-													
Zinc	5	5	1100	-	-													

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Table 4b. Summary of Ground Water Analyses - Fall 2016

Parameters	RDL	RL	2011 EPA Standards: Full Depth Generic Site Condition Standards	2011 EPA Standards: Property Specific Standards (as per Certificate of Property Use 0371-8TYQMY)	Analytical Results													
Sample Location / Sample ID / Property Location / Laboratory ID / Sample Date			Non-Potable Groundwater (Table 3)		MW15-1 MW15-1 CPU Property 1645002-01 10/28/2016	MW15-2 MW15-2 CPU Property 1645002-02 10/28/2016	MW15-3 MW15-3 CPU Property 1645002-03 10/28/2016	MW15-3 MW15-3 CPU Property 1647139-01 11/15/2016	MW15-4 MW15-4 CPU Property 1645002-04 10/28/2016	MW15-5 MW15-5 CPU Property 1645002-05 10/28/2016	MW15-6 MW15-6 CPU Property 1645002-06 10/28/2016	MW15-7 MW15-7 CPU Property 1645002-07 10/28/2016	MW15-8 MW15-8 CPU Property 1645002-08 10/28/2016	MW15-9 MW15-9 CPU Property 1644414-01 10/27/2016	MW15-10 MW15-10 CPU Property 1644414-02 10/27/2016	MW15-11 MW15-11 CPU Property 1644414-03 10/27/2016	MW15-12 MW15-12 CPU Property 1644414-04 10/27/2016	MW15-12 Dup-1 CPU Property 1644414-05 10/27/2016
General Inorganic Parameters (mg/L)																		
pH (pH units)	0.1	-	-	-	7.2	7.4	7.6	-	7.5	7.4	7.5	7.5	7.8	7.6	6.8	7.6	7.7	7.7
Alkalinity (CaCO3)	5	-	-	-	410	277	249	-	623	516	299	373	218	252	277	300	278	278
Ammonia	0.01	-	-	4.524	1.38	0.06	0.02	-	2.95	0.46	0.02	0.04	0.01	0.03	1.18	< 0.01	0.03	0.02
Conductivity (µS/cm)	5	-	-	-	2340	2050	3910	-	1840	2070	5810	2030	1000	2540	7740	1430	1050	1050
Chloride	1	1	2300	-	482	370	927	-	117	195	1740	291	108	416	2250	197	112	111
Nitrate (N)	0.1	0.1	-	-	< 0.1	3.3	6.2	-	< 0.1	0.6	4.1	1.9	0.9	2.9	0.5	1.3	0.2	0.2
Sulphate	1	-	-	-	38	179	321	-	268	343	450	256	140	503	513	132	104	102
Biological Oxygen Demand (BOD)	2	-		-	< 2	< 2	< 2	-	< 2	3	< 2	< 2	3	< 2	< 20	< 2	< 2	< 2
Chemical Oxygen Demand (COD)	10	-	-	-	21	< 10	26	-	31	N/A	31	< 10	21	< 10	113	< 10	< 10	< 10
Dissolved Organic Carbon	0.5	-	-	-	4	2.5	1.6	-	9.7	N/A	2.7	3	5.1	2.4	15	2.2	2.6	2.8
Hardness	-	-	-	-	463	453	906	-	788	533	913	736	309	660	1256	377	248	243
Total Dissolved Solids	10	-	-	-	1210	1110	2280	-	1080	1210	3250	1170	522	1670	5170	758	574	574
Volatile Organic Compounds (µg/L)																		
Chloroform	0.5	1	2.4	22	< 0.5	1.6	0.9	-	< 0.5	< 0.5	1.3	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Petroleum Hydrocarbons (µg/L)																		
PHC F1 (C6 - C10)	25	25	750[a]	-	< 25	< 25	< 25	-	< 25	< 25	< 25	< 25	< 25	< 25	< 25	< 25	< 25	< 25
PHC F2 (>C10 - C16)	100	100	150[a]	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100
PHC F3 (>C16 - C34)	100	500	500[a]	-	< 100	< 100	**1310**	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100
PHC F4 (>C34)	100	500	500[a]	-	< 100	< 100	240	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100
Polynuclear Aromatic Hydrocarbons (µg/L)																		
Acenaphthene	0.05	1	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
Acenaphthylene	0.05	1	1.8	-	< 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
Anthracene	0.05	0.1	2.4	-	< 0.01	< 0.01	< 0.01	-	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)anthracene	0.01	0.2	4.7	-	< 0.01	< 0.01	< 0.01	-	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	0.01	0.01	0.81	-	< 0.01	< 0.01	< 0.01	-	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	0.01	0.1	0.75	-	< 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
Benzo(g,h,i)perylene	0.05	0.2	0.2	-	< 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
Benzo(k)fluoranthene	0.05	0.1	0.4	-	< 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
Chrysene	0.05	0.1	1	-	< 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
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	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	0.01	0.4	130	-	< 0.01	< 0.01	< 0.01	-	< 0.01	< 0.01	< 0.01	< 0.01	0.12	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
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	< 0.05	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Methylnaphthalene, 1-[b]	0.05	2	1800	-	< 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
Methylnaphthalene, 2-[b]	0.05	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
Naphthalene	0.05	2	1400	-	< 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
Phenanthrene	0.05	0.1	580	-	< 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
Pyrene	0.01	0.2	68	-	< 0.01	< 0.01	< 0.01	-	< 0.01	< 0.01	< 0.01	< 0.01	0.11	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Metals (µg/L)																		
Antimony	0.5	0.5	20000	-	< 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
Arsenic	1	1	1900	-	< 1	< 1	< 1	-	5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Barium	1	2	29000	-	637	91	190	-	189	130	180	114	63	76	329	107	60	59
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
Boron	10	10	45000	-	66	53	42	-	91	90	62	58	29	83	51	37	41	43
Cadmium	0.1	0.5	2.7	-	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.4	< 0.1	< 0.1	< 0.1
Calcium	100	-	-	-	147000	146000	295000	-	254000	177000	305000	245000	98200	218000	409000	116000	78600	76300
Chromium	1	10	810	-	11	8	7	-	7	8	9	10	6	7	14	7	5	5
Chromium (VI)	10	10	140	-	< 10	< 10	< 10	-	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Cobalt	0.5	1	66	-	< 0.5	< 0.5	< 0.5	-	0.6	1.3	1.7	< 0.5	< 0.5	3	1.2	< 0.5	< 0.5	< 0.5
Copper	0.5	5	87	-	< 0.5	6.5	2.9	-	< 0.5	4.1	5	49.4	3.8	7.2	10	62.2	2.2	2.4
Iron	100	-	-	24240	7960	< 100	< 100	-	10700	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100
Lead	0.1	1	25	-	< 0.1	0.2	< 0.1	-	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	0.2	< 0.1	< 0.1
Magnesium	200	-	-	-	23100	21500	40900	-	37400	22200	36900	30100	15400	28100	56900	21100	12500	12700
Mercury	0.1	0.1	0.29	-	< 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
Molybdenum	0.5	0.5	9200	-	1.4	7.7	3	-	3.3	< 0.5	< 0.5	< 0.5	2.3	6	1.2	0.9	0.9	0.8
Nickel	1	1	490	-	< 1	1	2	-	2	4	8	3	< 1	10	7	2	1	1
Selenium	1	5	63	-	< 1	2	1	-	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Silver	0.1	0.3	1.5	-	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
Sodium	200	5000	2300000	-	293000	227000	514000	-	135000	272000	893000	166000	102000	307000	1080000	137000	115000	109000
Thallium	0.1	0.5	510	-	< 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
Uranium	0.1	2	420	-	< 0.1	1.9	1.7	-	1	1	3.1	0.6	0.3	2.7	2.8	0.8	0.4	0.4
Vanadium	0.5	0.5	250	-	3.9	2.1	1.8	-	4.8	4.5	2	3	1.6	5.1	7.7	5.6	5.5	5.6
Zinc	5	5	1100	-	< 5	< 5	< 5	-	12	7	< 5	< 5	< 5	< 5	19	< 5	7	11

Table 4b. Summary of Ground Water Analyses - Fall 2016

Parameters	RDL	RL	2011 EPA Standards		Analytical Results													
Sample Location			Full Depth Generic Site Condition Standards	Property Specific Standards (as per Certificate of Property Use 0371-8TYQMY)	MW15-12	MW15-12	Trip Blank	Trip Blank										
Sample ID					Average	RPD (%)	1644414-06	1645002-09										
Property Location			Non-Potable Groundwater (Table 3)															
Laboratory ID																		
Sample Date					10/27/2016	10/27/2016	10/27/2016	10/28/2016										
General Inorganic Parameters (mg/L)																		
pH (pH units)	0.1	-	-	-	7.7	0	-	-										
Alkalinity (CaCO3)	5	-	-	-	278	0	-	-										
Ammonia	0.01	-	-	4.524	0.025	-	-	-										
Conductivity (µS/cm)	5	-	-	-	1050	0	-	-										
Chloride	1	1	2300	-	112	0.9	-	-										
Nitrate (N)	0.1	0.1	-	-	0.2	-	-	-										
Sulphate	1	-	-	-	103	1.9	-	-										
Biological Oxygen Demand (BOD)	2	-		-	< 2	-	-	-										
Chemical Oxygen Demand (COD)	10	-	-	-	< 10	-	-	-										
Dissolved Organic Carbon	0.5	-	-	-	2.7	7.4	-	-										
Hardness	-	-	-	-	245	2.0	-	-										
Total Dissolved Solids	10	-	-	-	574	0.0	-	-										
Volatile Organic Compounds (µg/L)																		
Chloroform	0.5	1	2.4	22	< 0.5	-	ND (0.5)	ND (0.5)										
Petroleum Hydrocarbons (µg/L)																		
PHC F1 (C6 - C10)	25	25	750[a]	-	< 25	-	-	-										
PHC F2 (>C10 - C16)	100	100	150[a]	-	< 100	-	-	-										
PHC F3 (>C16 - C34)	100	500	500[a]	-	< 100	-	-	-										
PHC F4 (>C34)	100	500	500[a]	-	< 100	-	-	-										
Polynuclear Aromatic Hydrocarbons (µg/L)																		
Acenaphthene	0.05	1	600	-	< 0.05	-	-	-										
Acenaphthylene	0.05	1	1.8	-	< 0.05	-	-	-										
Anthracene	0.05	0.1	2.4	-	< 0.01	-	-	-										
Benzo(a)anthracene	0.01	0.2	4.7	-	< 0.01	-	-	-										
Benzo(a)pyrene	0.01	0.01	0.81	-	< 0.01	-	-	-										
Benzo(b)fluoranthene	0.01	0.1	0.75	-	< 0.05	-	-	-										
Benzo(g,h,i)perylene	0.05	0.2	0.2	-	< 0.05	-	-	-										
Benzo(k)fluoranthene	0.05	0.1	0.4	-	< 0.05	-	-	-										
Chrysene	0.05	0.1	1	-	< 0.05	-	-	-										
Dibenzo(a,h)anthracene	0.05	0.2	0.52	-	< 0.05	-	-	-										
Fluoranthene	0.01	0.4	130	-	< 0.01	-	-	-										
Fluorene	0.05	0.5	400	-	< 0.05	-	-	-										
Indeno(1,2,3,c,d)pyrene	0.05	0.2	0.2	-	< 0.05	-	-	-										
Methylnaphthalene, 1-[b]	0.05	2	1800	-	< 0.05	-	-	-										
Methylnaphthalene, 2-[b]	0.05	2		-	< 0.05	-	-	-										
Naphthalene	0.05	2	1400	-	< 0.05	-	-	-										
Phenanthrene	0.05	0.1	580	-	< 0.05	-	-	-										
Pyrene	0.01	0.2	68	-	< 0.01	-	-	-										
Metals (µg/L)																		
Antimony	0.5	0.5	20000	-	< 0.5	-	-	-										
Arsenic	1	1	1900	-	< 1	-	-	-										
Barium	1	2	29000	-	60	1.7	-	-										
Beryllium	0.5	0.5	67	-	< 0.5	-	-	-										
Boron	10	10	45000	-	42	4.8	-	-										
Cadmium	0.1	0.5	2.7	-	< 0.1	-	-	-										
Calcium	100	-	-	-	77450	3.0	-	-										
Chromium	1	10	810	-	5	0.0	-	-										
Chromium (VI)	10	10	140	-	< 10	-	-	-										
Cobalt	0.5	1	66	-	< 0.5	-	-	-										
Copper	0.5	5	87	-	2.3	8.7	-	-										
Iron	100	-	-	24240	< 100	-	-	-										
Lead	0.1	1	25	-	< 0.1	-	-	-										
Magnesium	200	-	-	-	12600	1.6	-	-										
Mercury	0.1	0.1	0.29	-	< 0.1	-	-	-										
Molybdenum	0.5	0.5	9200	-	0.9	11.8	-	-										
Nickel	1	1	490	-	1	0.0	-	-										
Selenium	1	5	63	-	< 1	-	-	-										
Silver	0.1	0.3	1.5	-	< 0.1	-	-	-										
Sodium	200	5000	2300000	-	112000	5.4	-	-										
Thallium	0.1	0.5	510	-	< 0.1	-	-	-										
Uranium	0.1	2	420	-	0.4	0.0	-	-										
Vanadium	0.5	0.5	250	-	5.6	1.8	-	-										
Zinc	5	5	1100	-	9	-	-	-										

Table 5. Landfill Gas Monitoring Data

Monitor ID	MTM Coordinates		Ground Surface Elevation (masl)	Screen Interval (mbgs)	Geologic Media Intersected by Screen	Monitoring Date	In-Situ Measurements							Comments (Status of Landfill Gas Probes)
	Easting	Northing					Methane (CH_4)			Carbon Dioxide (%)	Oxygen (%)	Balance Gases (%)	Relative Pressure (Inches of Water)	
							% v/v		% LEL					
							Initial and/or Peak	Long Term and/or Stable	Long Term and/or Stable	Long Term and/or Stable	Long Term and/or Stable	Long Term and/or Stable		
GP15-1	368878.435	5029083.949	65.043	1.52 - 3.05	Overburden	23-Feb-16	0.0	0.0	0.0	6.2	4.3	89.5	0.0	Good Condition
						10-May-16	0.1	0.0	1.0	6.9	0.8	92.2	0.0	Good Condition
						12-Aug-16	0.0	0.0	0.0	4.1	15.8	79.9	0.0	Good Condition
						4-Nov-16	0.0	0.0	0.0	8.5	4.2	86.9	0.0	Good Condition
GP15-2	368835.264	5029365.156	65.228	1.52 - 3.05	Overburden	23-Feb-16	0.0	0.0	0.0	1.5	16.2	82.1	0.2	Good Condition
						10-May-16	0.0	0.0	0.0	1.4	14.2	84.3	1.0	Good Condition
						12-Aug-16	0.0	0.0	0.0	3.0	6.2	90.8	0.2	Good Condition
						4-Nov-16	0.1	0.1	1.0	3.9	3.7	92.4	0.2	Good Condition
GP15-3	368835.685	5029306.220	65.067	1.52 - 3.05	Overburden	23-Feb-16	0.0	0.0	0.0	0.1	21.7	78.3	0.0	Good Condition
						10-May-16	0.0	0.0	0.0	0.6	19.1	80.2	0.0	Good Condition
						12-Aug-16	0.0	0.0	0.0	3.0	13.7	83.1	0.0	Good Condition
						4-Nov-16	0.1	0.1	1.0	0.5	20.4	78.9	0.0	Good Condition
GP15-4	368893.417	5029339.143	-	1.52 - 3.05	Overburden	23-Feb-16	0.7	0.7	13.0	6.9	0.2	92.2	0.0	Good Condition
						10-May-16	0.2	0.1	4.0	5.4	0.0	94.4	0.0	Good Condition
						12-Aug-16	0.0	0.0	0.0	14.0	1.6	84.6	0.0	Good Condition
						4-Nov-16	0.3	0.2	5.0	10.5	0.0	89.1	0.0	Good Condition
GP15-5	368837.499	5029252.218	-	0.91 - 2.44	Overburden	23-Feb-16	0.0	0.0	0.0	1.9	19.2	78.7	0.0	Good Condition
						10-May-16	0.0	0.0	0.0	2.3	16.3	81.4	0.0	Good Condition
						12-Aug-16	0.0	0.0	0.0	5.1	8.3	86.5	0.0	Good Condition
						4-Nov-16	0.1	0.1	2.0	4.9	12.1	83.0	0.0	Good Condition
GP15-6	368875.492	5029271.998	-	0.61 - 2.13	Overburden	23-Feb-16	0.0	0.0	0.0	0.8	17.5	81.5	0.0	Good Condition
						10-May-16	0.3	0.2	5.0	3.2	0.0	96.5	0.0	Good Condition
						12-Aug-16	0.6	0.4	7.0	6.4	0.1	93.0	0.2	Probe submerged in water, drained
						4-Nov-16	0.8	0.8	16.0	5.4	0.0	93.7	0.0	Good Condition
GP15-7	368931.653	5029294.223	-	0.91 - 2.44	Overburden	23-Feb-16	-	-	-	-	-	-	-	Could Not Locate
						10-May-16	0.0	0.0	0.0	1.0	16.6	82.6	0.0	Good Condition
						12-Aug-16	0.0	0.0	0.0	5.5	14.1	80.2	0.0	Good Condition
						4-Nov-16	0.0	0.0	0.0	5.1	0.4	94.2	0.1	Good Condition
GP15-8	368865.766	5029240.857	65.319	1.52 - 3.05	Overburden	23-Feb-16	0.0	0.0	0.0	3.0	12.3	84.4	0.0	Good Condition
						10-May-16	0.0	0.0	0.0	4.4	8.9	86.2	0.2	Good Condition
						12-Aug-16	0.0	0.0	0.0	10.3	2.3	87.2	0.0	Good Condition
						4-Nov-16	0.0	0.0	0.0	5.4	9.1	85.4	0.0	Good Condition
GP15-9	368950.930	5029210.490	64.924	1.52 - 3.05	Overburden	23-Feb-16	-	-	-	-	-	-	-	Could Not Locate
						10-May-16	0.0	0.0	0.0	3.2	15.4	81.0	0.0	Good Condition
						12-Aug-16	0.0	0.0	0.0	5.5	14.9	79.4	0.0	Good Condition
						4-Nov-16	0.0	0.0	0.0	4.5	17.0	78.3	0.0	Good Condition
GP15-10	368843.807	5029183.520	64.680	0.91 - 2.13	Overburden	23-Feb-16	0.0	0.0	0.0	4.0	13.1	83.0	0.0	Good Condition
						10-May-16	0.0	0.0	0.0	2.7	7.5	89.8	0.0	Good Condition
						12-Aug-16	0.0	0.0	0.0	8.2	7.1	84.7	1.0	Probe submerged in water, drained
						4-Nov-16	0.0	0.0	2.0	6.4	9.6	84.0	0.0	Good Condition

Notes:
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.

2.5	Percent Methane by Volume Exceeds MOE Regulation 232/98 for Landfill Property Boundary Subsurface.
1	Percent Methane by Volume Exceeds MOE Regulation 232/98 for Landfill On-Site Building or Foundation.
0.05	Percent Methane by Volume Exceeds MOE Regulation 232/98 for Landfill Off-Site Building or Foundation.

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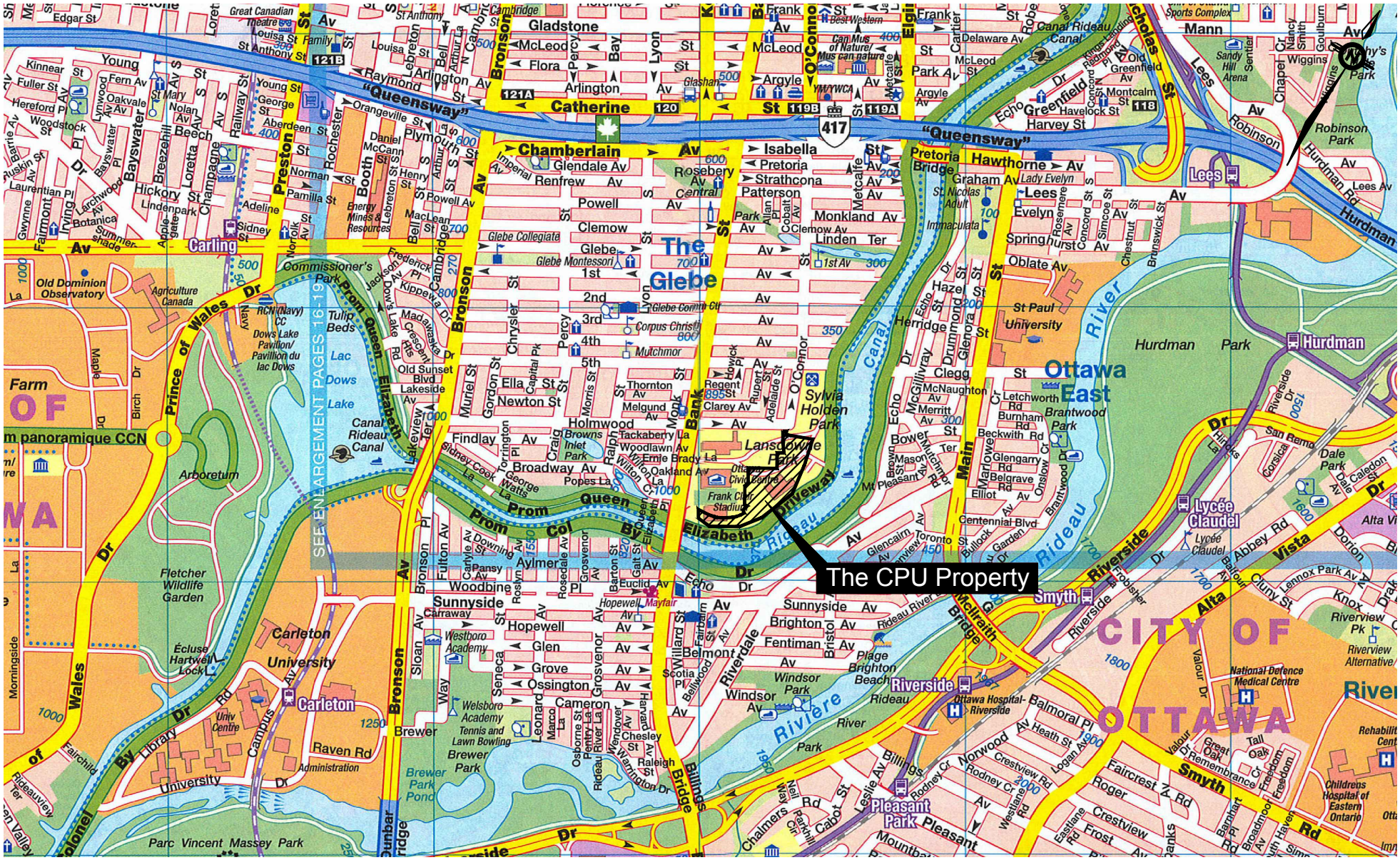

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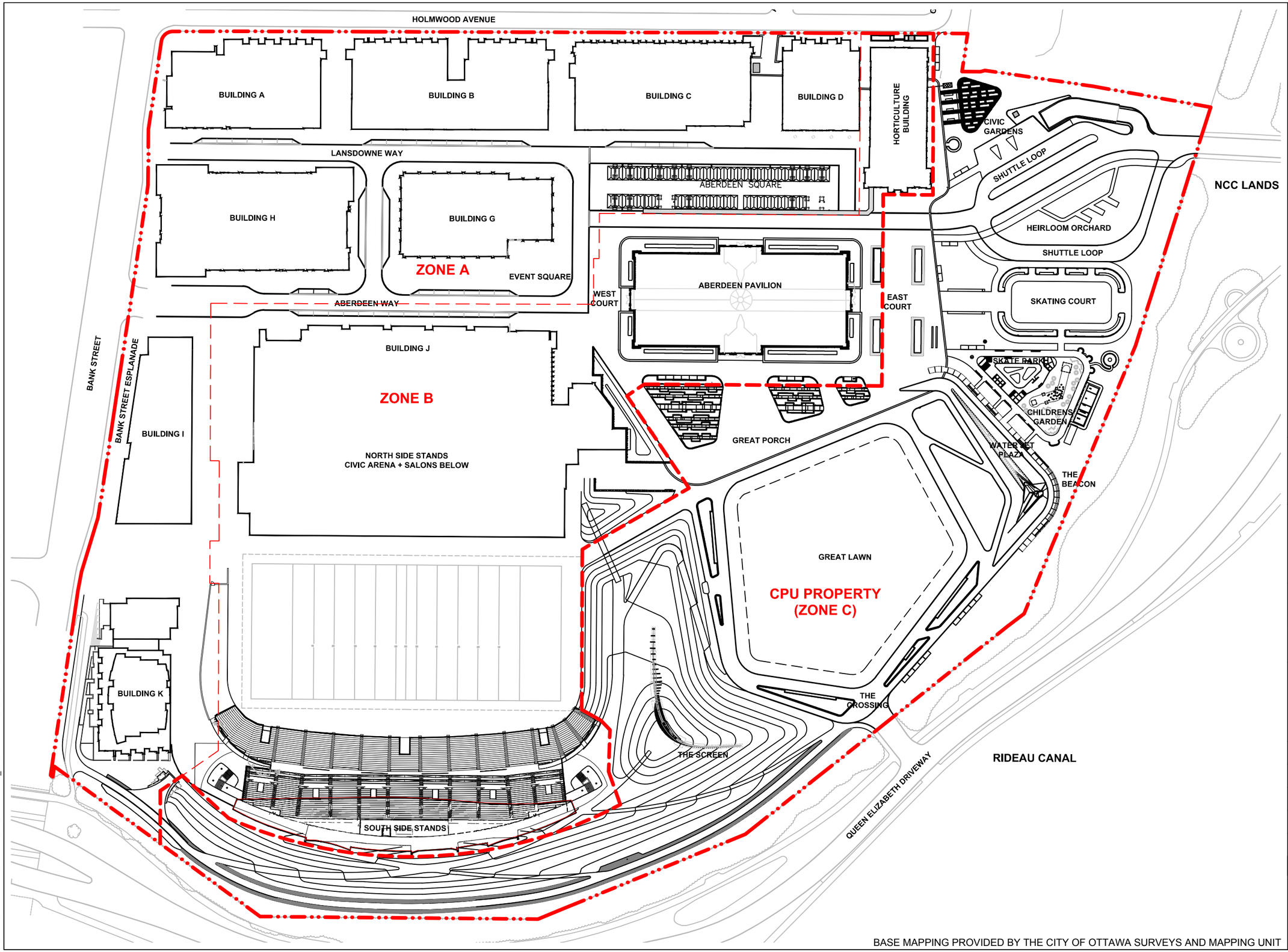
	DATE: MARCH 2017	PROJECT NO: TZ10100106	FIGURE NO: 1
	DRAWN BY: JFT CHECKED BY: KDH	SCALE: 1 : 20,000	



LEGEND

- LANSDOWNE PARK PROPERTY BOUNDARY
- URBAN PARK (ZONE C) BOUNDARY
- ZONES A-B BOUNDARY

15 0 15 30 45
METRES

amec foster wheeler

TITLE:

GENERALIZED SITE PLAN

PROJECT:

2016 ANNUAL REPORT

LANSDOWNE PARK - CPU PROPERTY
450 QUEEN ELIZABETH DRIVEWAY
OTTAWA, ONTARIO

CLIENT:

Ottawa

DESIGNED BY:	KDH
DRAWN BY:	JFT
CHECKED BY:	KDH
DATE:	MARCH 2017
SCALE:	1 : 1,600
PROJECT NO:	TZ10100106
FIGURE NO:	2

BASE MAPPING PROVIDED BY THE CITY OF OTTAWA SURVEYS AND MAPPING UNIT

P:\2010\TZ10100106 - CPU IMPLEMENTATION\05_CAD\CPU - ANNUAL REPORT\2016\CPU - ANNUAL REPORT 2016.DWG

HOLMWOOD AVENUE

BUILDING A

BUILDING B

BUILDING C

BUILDING D

HORTICULTURE BUILDING

CIVIC GARDENS

SHUTTLE LOOP

LANSDOWNE WAY

ABERDEEN SQUARE

NCC LANDS

BUILDING H

BUILDING G

ZONE A

EVENT SQUARE

HEIRLOOM ORCHARD

SHUTTLE LOOP

ABERDEEN PAVILION

WEST COURT

EAST COURT

SKATING COURT

ABERDEEN WAY

BANK STREET

BANK STREET ESPLANADE

BUILDING J

SKATE PARK

FORMER EASTERN LANDFILL

ZONE B

CHILDRENS GARDEN

GREAT PORCH

WATERJET PLAZA

BUILDING I

NORTH SIDE STANDS
CIVIC ARENA + SALONS BELOW

THE BEACON

GREAT LAWN

CPU PROPERTY (ZONE C)

FORMER MCELROY BUILDING

BUILDING K

THE CROSSING

EAST BERM

THE SCREEN

RIDEAU CANAL

SOUTH SIDE STANDS

QUEEN ELIZABETH DRIVEWAY

SOUTH BERM

BASE MAPPING PROVIDED BY THE CITY OF OTTAWA SURVEYS AND MAPPING UNIT

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LEGEND

- LANSDOWNE PARK PROPERTY BOUNDARY
- URBAN PARK (ZONE C) BOUNDARY
- EXTENT OF NON-WOVEN GEOTEXTILE AND SOFT SOIL OR HARD CAP
- LOCATION OF CLAY SEAL IN SUBSURFACE UTILITY
- PERIMETER DRAINAGE SWALE
- UNDERGROUND STORMWATER TANK

15 0 15 30 45
METRES

amec foster wheeler

TITLE:

RISK MANAGEMENT MEASURES

PROJECT:

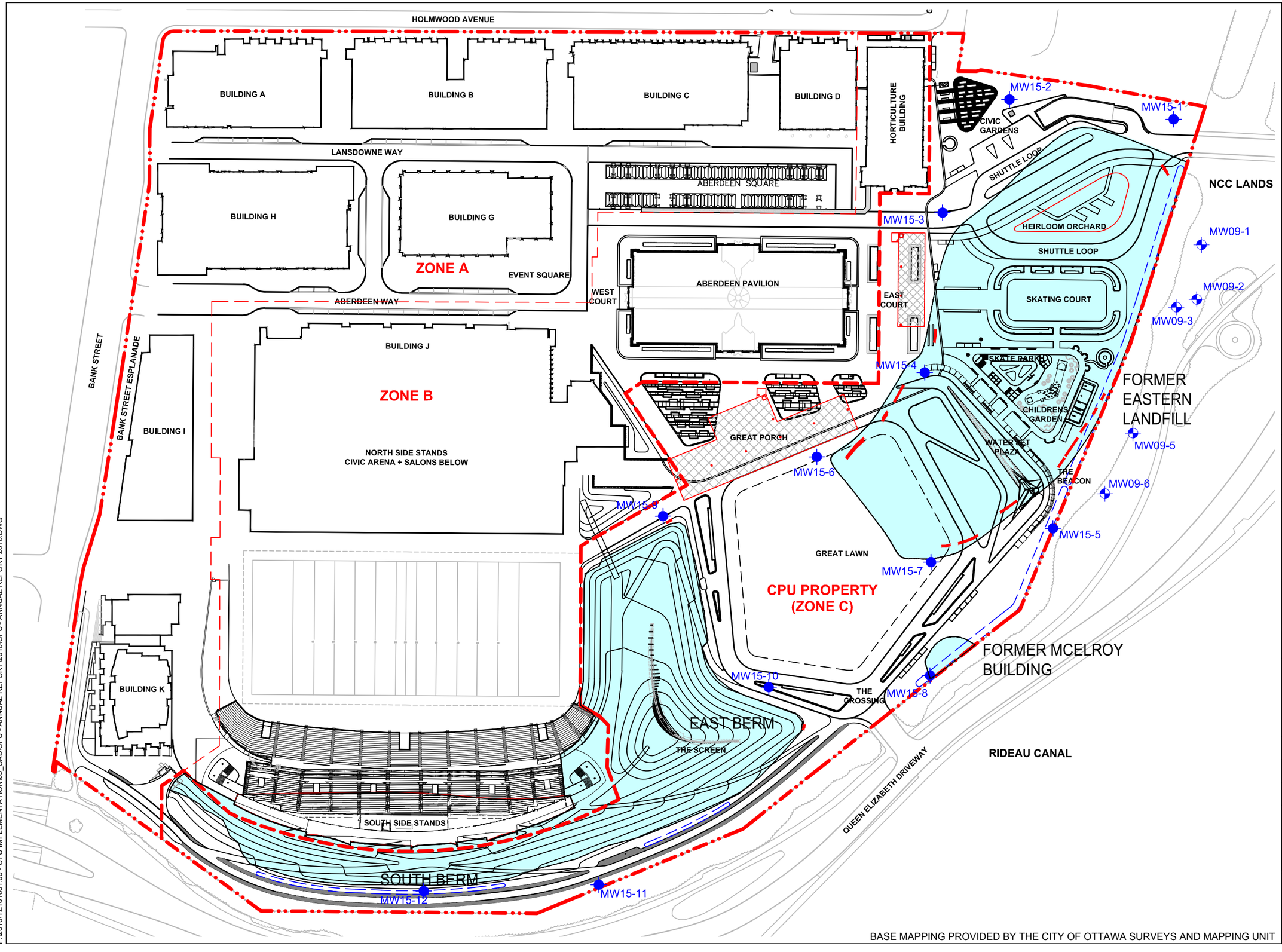
2016 ANNUAL REPORT

LANSDOWNE PARK - CPU PROPERTY
450 QUEEN ELIZABETH DRIVEWAY
OTTAWA, ONTARIO

CLIENT:

Ottawa

DESIGNED BY:	KDH
DRAWN BY:	JFT
CHECKED BY:	KDH
DATE:	MARCH 2017
SCALE:	1 : 1,600
PROJECT NO:	TZ10100106
FIGURE NO:	3



LEGEND

- LANSDOWNE PARK PROPERTY BOUNDARY
- URBAN PARK (ZONE C) BOUNDARY
- EXTENT OF NON-WOVEN GEOTEXTILE AND SOFT SOIL OR HARD CAP
- LOCATION OF CLAY SEAL IN SUBSURFACE UTILITY
- PERIMETER DRAINAGE SWALE
- UNDERGROUND STORMWATER TANK
- MW9-6 NCC PROPERTY GROUND WATER MONITORING WELL
- MW15-5 ON-SITE GROUND WATER MONITORING WELL

15 0 15 30 45
METRES

BASE MAPPING PROVIDED BY THE CITY OF OTTAWA SURVEYS AND MAPPING UNIT

amec foster wheeler

TITLE:
GROUND WATER MONITORING WELL LOCATION PLAN

PROJECT:
2016 ANNUAL REPORT
LANSDOWNE PARK - CPU PROPERTY
450 QUEEN ELIZABETH DRIVEWAY
OTTAWA, ONTARIO

CLIENT:
Ottawa

DESIGNED BY:	KDH
DRAWN BY:	JFT
CHECKED BY:	KDH
DATE:	MARCH 2017
SCALE:	1 : 1,600
PROJECT NO:	TZ10100106
FIGURE NO:	4

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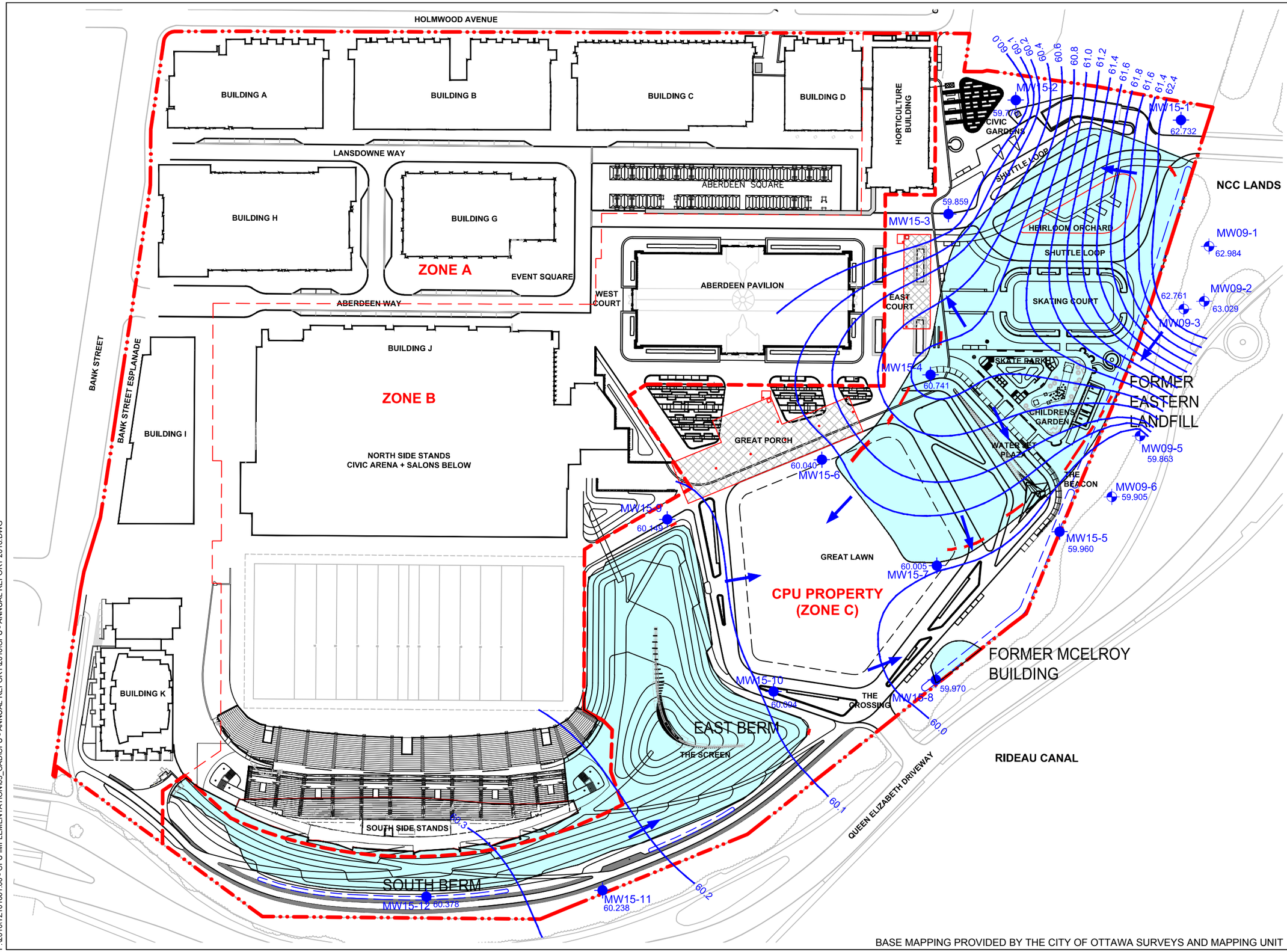

LEGEND

- LANSDOWNE PARK PROPERTY BOUNDARY
- URBAN PARK (ZONE C) BOUNDARY
- EXTENT OF NON-WOVEN GEOTEXTILE AND SOFT SOIL OR HARD CAP
- LOCATION OF CLAY SEAL IN SUBSURFACE UTILITY
- PERIMETER DRAINAGE SWALE
- UNDERGROUND STORMWATER TANK
- MW9-6 NCC PROPERTY GROUND WATER MONITORING WELL
- MW15-5 ON-SITE GROUND WATER MONITORING WELL
- GROUND WATER ELEVATION CONTOUR
- INFERRED DIRECTION OF GROUND WATER FLOW

amec foster wheeler

TITLE:

GROUND WATER ELEVATION CONTOUR PLAN - MAY 30, 2016

PROJECT:

2016 ANNUAL REPORT

LANSDOWNE PARK - CPU PROPERTY
450 QUEEN ELIZABETH DRIVEWAY
OTTAWA, ONTARIO

CLIENT:

Ottawa

DESIGNED BY:	KDH
DRAWN BY:	JFT
CHECKED BY:	KDH
DATE:	MARCH 2017
SCALE:	1 : 1,600
PROJECT NO:	TZ10100106
FIGURE NO:	5a

BASE MAPPING PROVIDED BY THE CITY OF OTTAWA SURVEYS AND MAPPING UNIT

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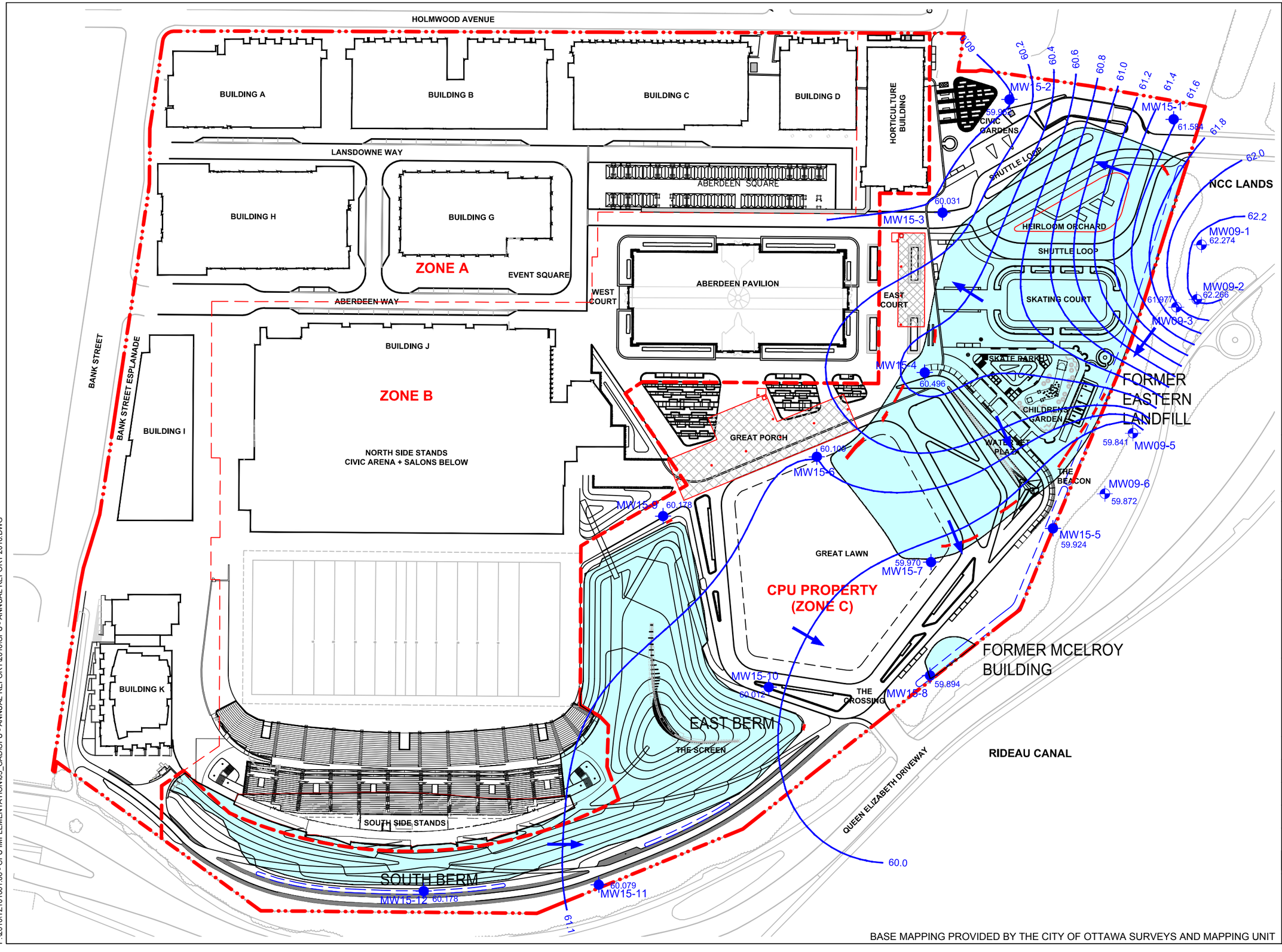

LEGEND

- LANSDOWNE PARK PROPERTY BOUNDARY
- URBAN PARK (ZONE C) BOUNDARY
- EXTENT OF NON-WOVEN GEOTEXTILE AND SOFT SOIL OR HARD CAP
- LOCATION OF CLAY SEAL IN SUBSURFACE UTILITY
- PERIMETER DRAINAGE SWALE
- UNDERGROUND STORMWATER TANK
- MW9-6 NCC PROPERTY GROUND WATER MONITORING WELL
- MW15-5 ON-SITE GROUND WATER MONITORING WELL
- GROUND WATER ELEVATION CONTOUR
- INFERRED DIRECTION OF GROUND WATER FLOW

15 0 15 30 45
METRES

amec foster wheeler

TITLE:

GROUND WATER ELEVATION CONTOUR PLAN - OCTOBER 27, 2016

PROJECT:

2016 ANNUAL REPORT

LANSDOWNE PARK - CPU PROPERTY
450 QUEEN ELIZABETH DRIVEWAY
OTTAWA, ONTARIO

CLIENT:

Ottawa

DESIGNED BY:	KDH
DRAWN BY:	JFT
CHECKED BY:	KDH
DATE:	MARCH 2017
SCALE:	1 : 1,600
PROJECT NO:	TZ10100106
FIGURE NO:	**5b**

BASE MAPPING PROVIDED BY THE CITY OF OTTAWA SURVEYS AND MAPPING UNIT

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HOLMWOOD AVENUE

BUILDING A

BUILDING B

BUILDING C

BUILDING D

HORTICULTURE BUILDING

LANSDOWNE WAY

BUILDING H

BUILDING G

ABERDEEN SQUARE

ZONE A

EVENT SQUARE

ABERDEEN WAY

WEST COURT

ABERDEEN PAVILION

EAST COURT

BANK STREET

BANK STREET ESPLANADE

BUILDING J

ZONE B

BUILDING I

NORTH SIDE STANDS
CIVIC ARENA + SALONS BELOW

GREAT PORCH

BUILDING K

SOUTH SIDE STANDS

SOUTH BERM

EAST BERM

THE SCREEN

GREAT LAWN

CPU PROPERTY
(ZONE C)

MW15-1

MW15-2

MW15-3

MW15-4

MW15-5

MW15-6

MW15-7

MW15-8

MW15-9

MW15-10

MW15-11

MW15-12

CIVIC GARDENS

SHUTTLE LOOP

HEIRLOOM ORCHARD

SHUTTLE LOOP

SKATING COURT

SKATE PARK

CHILDRENS GARDEN

WATER JET PLAZA

THE BEACON

THE CROSSING

NCC LANDS

FORMER EASTERN LANDFILL

FORMER MCELROY BUILDING

MW09-1

MW09-2

MW09-3

MW09-5

MW09-6

QUEEN ELIZABETH DRIVEWAY

RIDEAU CANAL

MW15-10	Conc (µg/L)	Conc (µg/L)	SCS
Parameter	31-May-16	27-Nov-16	(µg/L)
Chloride	**2410**	2250	2300

BASE MAPPING PROVIDED BY THE CITY OF OTTAWA SURVEYS AND MAPPING UNIT

LEGEND

- LANSDOWNE PARK PROPERTY BOUNDARY
- URBAN PARK (ZONE C) BOUNDARY
- EXTENT OF NON-WOVEN GEOTEXTILE AND SOFT SOIL OR HARD CAP
- LOCATION OF CLAY SEAL IN SUBSURFACE UTILITY
- PERIMETER DRAINAGE SWALE
- UNDERGROUND STORMWATER TANK
- MW9-6 NCC PROPERTY GROUND WATER MONITORING WELL
- MW15-5 ON-SITE GROUND WATER MONITORING WELL

15 0 15 30 45
METRES

amec foster wheeler

TITLE:

GROUND WATER ANALYTICAL EXCEEDANCES

PROJECT:

2016 ANNUAL REPORT

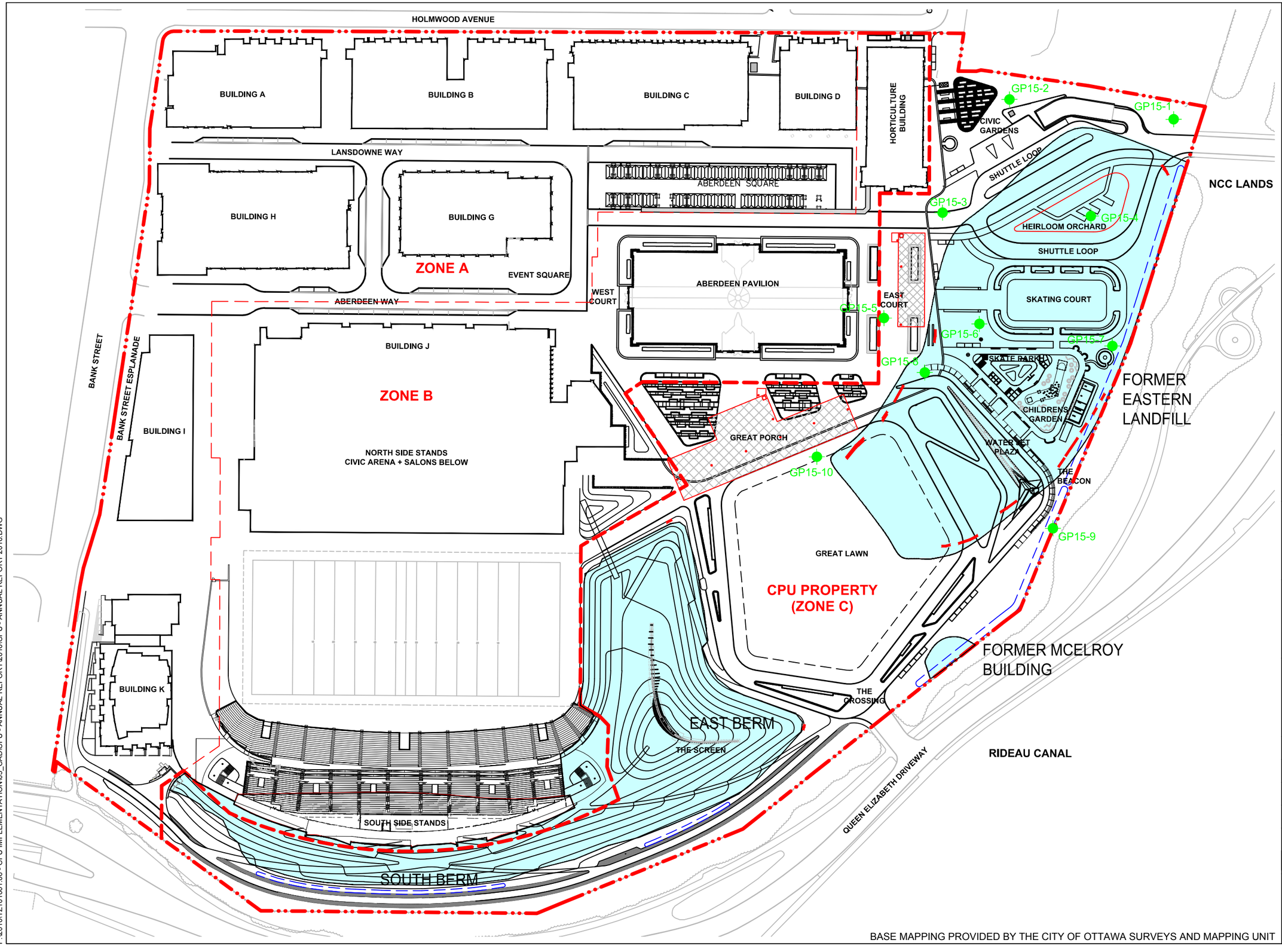
LANSDOWNE PARK - CPU PROPERTY
450 QUEEN ELIZABETH DRIVEWAY
OTTAWA, ONTARIO

CLIENT:

Ottawa

DESIGNED BY:	KDH
DRAWN BY:	JFT
CHECKED BY:	KDH
DATE:	MARCH 2017
SCALE:	1 : 1,600
PROJECT NO:	TZ10100106
FIGURE NO:	6

P:\2010\TZ10100106 - CPU IMPLEMENTATION\05_CAD\CPU - ANNUAL REPORT\2016\CPU - ANNUAL REPORT 2016.DWG



LEGEND

- LANSDOWNE PARK PROPERTY BOUNDARY
- URBAN PARK (ZONE C) BOUNDARY
- EXTENT OF NON-WOVEN GEOTEXTILE AND SOFT SOIL OR HARD CAP
- LOCATION OF CLAY SEAL IN SUBSURFACE UTILITY
- PERIMETER DRAINAGE SWALE
- UNDERGROUND STORMWATER TANK
- GP15-1 LANDFILL GAS PROBE

15 0 15 30 45
METRES

amec foster wheeler

TITLE:

LANDFILL GAS PROBE LOCATION PLAN

PROJECT:

2016 ANNUAL REPORT

LANSDOWNE PARK - CPU PROPERTY
450 QUEEN ELIZABETH DRIVEWAY
OTTAWA, ONTARIO

CLIENT:

Ottawa

DESIGNED BY:	KDH
DRAWN BY:	JFT
CHECKED BY:	KDH
DATE:	MARCH 2017
SCALE:	1 : 1,600
PROJECT NO:	TZ10100106
FIGURE NO:	7

BASE MAPPING PROVIDED BY THE CITY OF OTTAWA SURVEYS AND MAPPING UNIT

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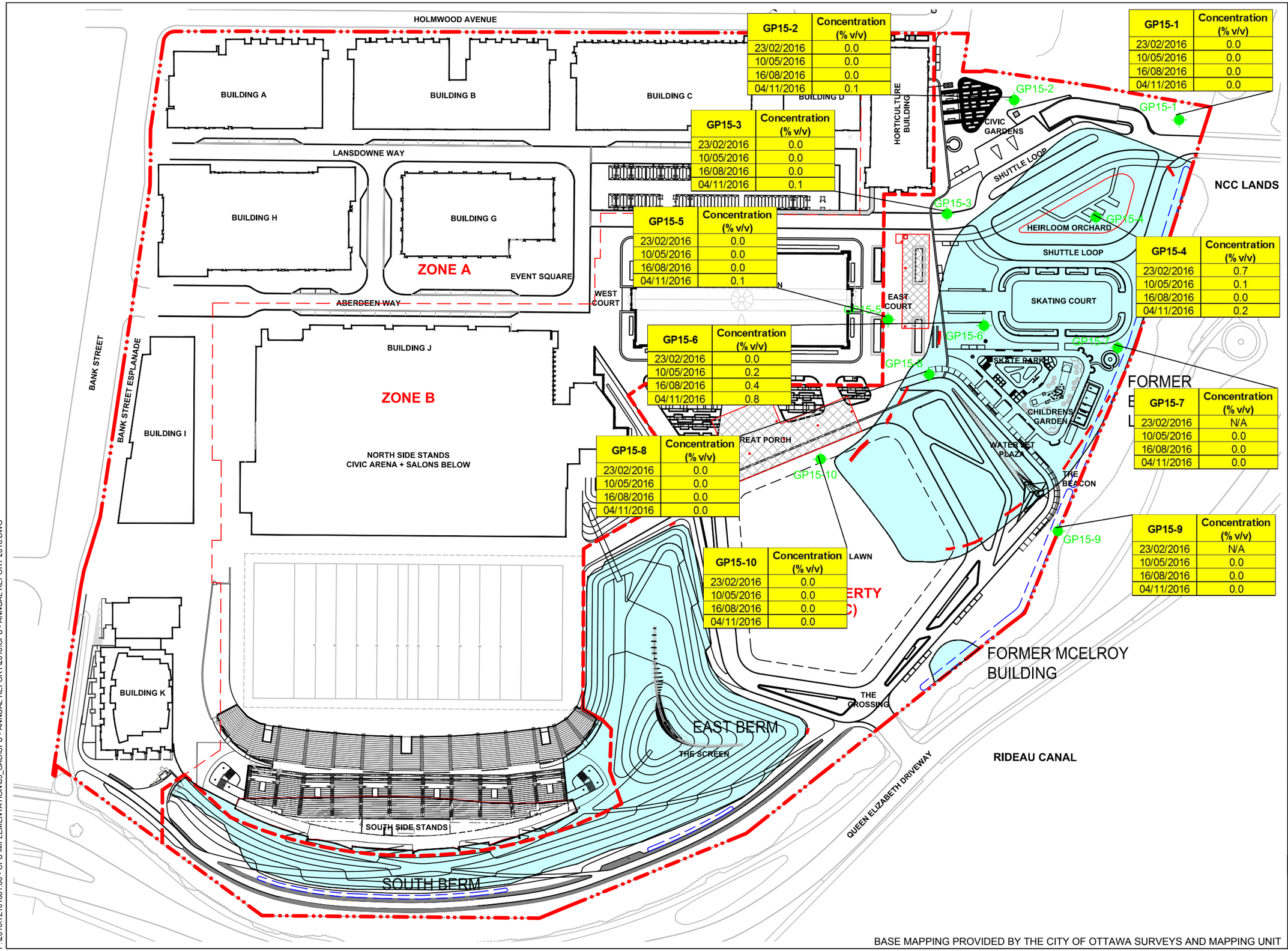

GP15-2	Concentration (% v/v)
23/02/2016	0.0
10/05/2016	0.0
16/08/2016	0.0
04/11/2016	0.1

GP15-1	Concentration (% v/v)
23/02/2016	0.0
10/05/2016	0.0
16/08/2016	0.0
04/11/2016	0.0

GP15-3	Concentration (% v/v)
23/02/2016	0.0
10/05/2016	0.0
16/08/2016	0.0
04/11/2016	0.1

GP15-5	Concentration (% v/v)
23/02/2016	0.0
10/05/2016	0.0
16/08/2016	0.0
04/11/2016	0.1

GP15-4	Concentration (% v/v)
23/02/2016	0.7
10/05/2016	0.1
16/08/2016	0.0
04/11/2016	0.2

GP15-6	Concentration (% v/v)
23/02/2016	0.0
10/05/2016	0.2
16/08/2016	0.4
04/11/2016	0.8

GP15-7	Concentration (% v/v)
23/02/2016	N/A
10/05/2016	0.0
16/08/2016	0.0
04/11/2016	0.0

GP15-8	Concentration (% v/v)
23/02/2016	0.0
10/05/2016	0.0
16/08/2016	0.0
04/11/2016	0.0

GP15-9	Concentration (% v/v)
23/02/2016	N/A
10/05/2016	0.0
16/08/2016	0.0
04/11/2016	0.0

GP15-10	Concentration (% v/v)
23/02/2016	0.0
10/05/2016	0.0
16/08/2016	0.0
04/11/2016	0.0

LEGEND

- LANSDOWNE PARK PROPERTY BOUNDARY
- URBAN PARK (ZONE C) BOUNDARY
- EXTENT OF NON-WOVEN GEOTEXTILE AND SOFT SOIL OR HARD CAP
- LOCATION OF CLAY SEAL IN SUBSURFACE UTILITY
- PERIMETER DRAINAGE SWALE
- UNDERGROUND STORMWATER TANK
- GP15-1 LANDFILL GAS PROBE

15 0 15 30 45
METRES

amec foster wheeler

TITLE:
SUBSURFACE METHANE CONCENTRATIONS AT LANDFILL GAS PROBES

PROJECT:
2016 ANNUAL REPORT
LANSDOWNE PARK - CPU PROPERTY
450 QUEEN ELIZABETH DRIVEWAY
OTTAWA, ONTARIO

CLIENT:
Ottawa

DESIGNED BY:	KDH
DRAWN BY:	JFT
CHECKED BY:	KDH
DATE:	MARCH 2017
SCALE:	1 : 1,600
PROJECT NO:	TZ10100106
FIGURE NO:	8

BASE MAPPING PROVIDED BY THE CITY OF OTTAWA SURVEYS AND MAPPING UNIT

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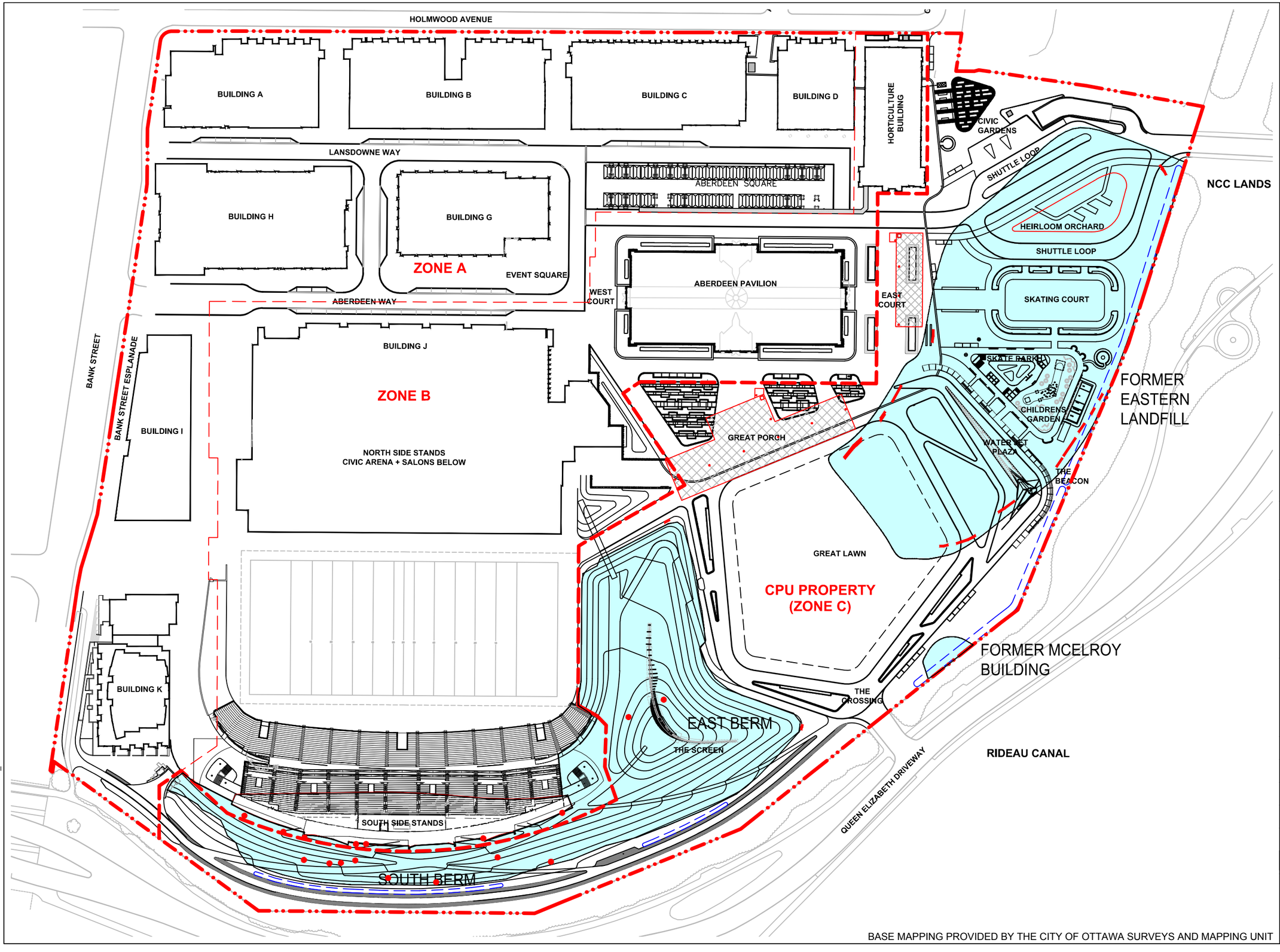

LEGEND

- LANSDOWNE PARK PROPERTY BOUNDARY
- URBAN PARK (ZONE C) BOUNDARY
- EXTENT OF NON-WOVEN GEOTEXTILE
- LOCATION OF CLAY SEAL IN SUBSURFACE UTILITY
- PERIMETER DRAINAGE SWALE
- UNDERGROUND STORMWATER TANK
- 2016 SURVEY POINT WITH GRADE CHANGE >0.1 M BELOW POST BERM CONSTRUCTION SURVEY

15 0 15 30 45
METRES

amec foster wheeler

TITLE:

2016 TOPOGRAPHIC SURVEY COMPARISON WITH POST BERM CONSTRUCTION SURVEY

PROJECT:

2016 ANNUAL REPORT

LANSDOWNE PARK - CPU PROPERTY
450 QUEEN ELIZABETH DRIVEWAY
OTTAWA, ONTARIO

CLIENT:

Ottawa

DESIGNED BY:	KDH
DRAWN BY:	JFT
CHECKED BY:	KDH
DATE:	MARCH 2017
SCALE:	1 : 1,000
PROJECT NO:	TZ10100106
FIGURE NO:	9

BASE MAPPING PROVIDED BY THE CITY OF OTTAWA SURVEYS AND MAPPING UNIT

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APPENDIX A

Certificate of Property Use

APPENDIX B

Risk Management Measures Inspection Logs

APPENDIX C

Stratigraphic and Instrumentation Logs

APPENDIX D

Laboratory Certificates of Analysis

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.