2017 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
A Division of Amec Foster Wheeler Americas Limited
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March 20, 2018

Project No. TZ10100106

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March 20, 2018

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: 2017 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 2017 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 2017 as stipulated by Condition 4.2.10 of the CPU.

The findings and results of the monitoring, sampling and inspection programs carried out at the CPU Property in 2017 to meet the annual reporting requirements are as follows:

Inspections of the RMM implemented at the CPU Property were conducted in 2017 in accordance with the IMP. The construction of temporary grandstand on the East Berm required the excavation of several hundred shallow hand-dug holes to permit the placement of level footing plates to support the footings of the grandstand. These excavations were made into a large portion of the clean soil cap covering the East Berm. Observations made during the temporary grandstand construction indicated that the excavated holes did not exceed a depth of 1.0 m and that the geotextile used as a demarcation layer was not encountered in any of the excavations.

Visual inspections of other RMM at the Site identified several areas of soil erosion throughout the South Berm area as evidenced by surface rutting, areas of washed out soil, bare patches, and areas of sediment accumulation. The erosional areas are generally coincident with the findings of the post construction topographic surveys conducted in 2016 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 slated to take place on the East and South Berms in 2018 should not be limited to the areas identified above, but should include any and all ruts and other depressions caused by weathering and/or construction activities. Restoration activities should be conducted with the guidance of a surveying crew to ensure desired elevations are attained and the required minimum 1.0 m thickness of clean soil cover is restored. A post restoration survey should be conducted of both the East and South Berms to fulfill the requirements of the Risk Management Plan (RMP) of a second survey following construction to assess any differential settlement or consolidation of materials that could result in thinning of the clean cover.

The 2017 groundwater monitoring and sampling program was conducted on a semi-annual basis in accordance with the Groundwater Monitoring Plan (GWMP). Results of the groundwater monitoring inferred ground water flow patterns beneath the CPU Property similar to those

observed during previous monitoring events conducted in 2015 and in 2016. Shallow ground water, beneath the southern half of the CPU property, generally flows to the east and northeast in a quasi-inward radial flow pattern in the vicinity of the former McElroy Building. Mounding near the northeast corner of the CPU property results in localized outward radial flow to the west and south and is likely due to leakage from the Rideau Canal migrating to the west within the historic fill materials placed within the former inlet of the Rideau Canal that extends beneath the CPU Property.

All ground water samples collected from the monitoring well network located at the CPU property in 2017 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 2017 as per the Methane Monitoring Plan (MMP) were below the methane concentrations limits as outlined in *Ontario Regulation 232/98 – Landfilling Sites*, as amended ("O.Reg. 232/98") and the recommended methane alert levels provided in *Procedure D-4-1: Assessing Methane Hazards from Landfill* (MOE, 1987).

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 2017 no contingency measures were deemed necessary at the CPU Property and therefore no such measures or activities were implemented in 2017. 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 2017.

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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
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	Quality Assurance
QC	Quality Control
QP	Qualified Person
RA	Risk Assessment
RDL	Reporting Detection Limit
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 Instrument LT1245216) on Plan 26085, part of Lots 57, 58, 59 and 60 and part of Lansdowne Avenue (closed by Judge's Order Instrument 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 (RMM) that have been implemented and are to be maintained at the CPU Property and submitted to the MOECC by March 31 of the following year. This report has been prepared by Amec Foster Wheeler Environment & Infrastructure, a division of Amec Foster Wheeler Americas Limited ("Amec Foster Wheeler"), on behalf of the City of Ottawa (the "City") to meet the annual reporting requirements stipulated by Condition 4.2.10 of CPU No. 0371-8TYQMY for 2017.

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 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 2017, 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 include 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 placed 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 2017, 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 2017, 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 2017.

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 2017.

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 2017 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 2017:

1. May 30, 2017 – Routine spring and weather-related inspection, following a significant rainfall event on May 29 of 29.2 mm, that included all RMM;
2. July 12, 2017 – Event specific and weather-related inspection, triggered by Canada Day festivities as well as rainfall events of 52.6 mm between July 1 and 2 and 43.8 mm between July 7 and 9, that included all RMM;
3. August 11, 2017 – Weather-related inspection, triggered after rainfall events of 54.2 mm between July 13 and 14 and 79.0 mm on July 24, that included all RMM;
4. August 31, 2017 – Event specific and weather-related inspection, triggered by a Guns N' Roses concert at TD Place on August 21 as well as a rainfall event of 30.2 mm on August 22, that included all RMM;
5. September 19 through October 27, 2017 – A total of 15 inspections were conducted during the construction of temporary seating constructed over the majority of the East Berm and included the inspection of the clean soil cap covering the East Berm;
6. September 26, 2017 – Event specific inspection, following the Ottawa CityFolk Festival held between September 13 and 17, which included all RMM; and,
7. November 7, 2017 – Routine fall and weather-related inspection, following significant rainfall events of 102.6 mm recorded between October 28 and 30 as well as 41.8 mm recorded between November 1 and 3, that included all RMM.

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

In a letter to the City of Ottawa, dated September 15, 2017, the MOECC acknowledged the City of Ottawa's letter of intent to install a temporary grandstand on the East Berm. The letter acknowledges that the City of Ottawa will require that the installation of the temporary grandstand be overseen by a qualified environmental consulting firm with knowledge and familiarity with the terms and conditions of the CPU and that the installation method will protect the underlying geotextile layer. The MOECC also requested written confirmation that the geotextile and clean soil cap have been returned to a condition consistent with the CPU specifications post final inspection of the reinstatement activities as well as reporting of the construction works and reinstatement activities to be included in the 2017 and 2018 annual CPU reports.

Construction of the temporary grandstand began on September 19, 2017. Construction activities involving excavation into the clean soil cap covering the East Berm were completed by October 27, 2017. These included the hand excavation of shallow holes into the clean soil cap to provide a flat surface on which to place the footing plates. The footing plates measured 0.9 m by 0.8 m and based on a 3:1 slope for the berm, the excavations were not expected to penetrate the geotextile. Amec Foster Wheeler was retained by Lansdowne Stadium Limited Partnership Ltd. to perform periodic inspections throughout the construction period to document the construction activities, and in particular, to determine if the geotextile demarcation layer was encountered at any of the excavated holes, and if so, to identify areas where the geotextile would require reinstatement. Inspections performed did not identify any excavations that had penetrated or damaged the underlying geotextile. Pieces of geotextile were observed in some of the excavations but in all cases were encountered above 1.0 m in depth and therefore inferred to be above the demarcation layer. At each of these locations, the area was further hand excavated to confirm the pieces as individual pieces mixed in with the clean fill and not a part of the 1.0 m demarcation layer. Access to the area immediately surrounding and beneath the temporary grandstand was restricted by temporary fencing erected around the area. Details of the inspections including photo logs are provided in Appendix B.

Reinstatement of the clean soil cap overlying the East Berm is scheduled for spring 2018 at which time inspections and surveying will be conducted to confirm the RMM has been reinstated in accordance with the CPU. As such, the planned restoration of the East and South Berm areas, where differential settlement or consolidation of materials greater than 0.1 metres were identified during the 2016 survey, were delayed until 2018 to coincide with restoration of the areas disturbed by the construction of the temporary grandstand.

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 2017 and therefore no immediate actions were recommended throughout the year. No changes or amendments to the IMP were made in 2017.

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 April 28, June 16 and October 23, 2017 and included all monitoring wells installed at the CPU Property, with the exception of MW15-6 which was not accessible during the June 16 monitoring event. In addition to these monitoring wells, five monitoring wells located on the National Capital Commission (NCC) property to the immediate east were also monitored during the April 28 and October 23 monitoring events. 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 2.71 metres below ground surface (mbgs) at MW09-3 to 5.91 mbgs at MW15-12. Water table elevations recorded at the monitoring wells varied between 59.43 metres above sea level (masl) at MW09-5 and 62.83 masl at MW09-2. A ground water elevation contour plan for the April 28, 2017 monitoring event depicting the inferred ground water flow pattern beneath the CPU Property is provided on Figure 5a.

In the summer, ground water was present at depths ranging from 2.65 mbgs at MW15-1 to 5.04 mbgs at MW15-2. Water table elevations recorded at the monitoring wells varied between 60.19 masl at MW15-2 and 62.84 masl at MW15-1. A ground water elevation contour plan for the June 16, 2017 monitoring event depicting the inferred ground water flow pattern beneath the CPU Property is provided on Figure 5b.

In the fall, ground water was present at depths ranging from 3.30 mbgs at MW09-3 to 5.18 mbgs at MW15-12. Water table elevations recorded at the monitoring wells varied between 60.04 masl at MW09-5 and 62.36 masl at MW09-1. A ground water elevation contour plan for the October 23, 2017 monitoring event depicting the inferred ground water flow pattern beneath the CPU Property is provided on Figure 5c.

The inferred ground water flow patterns beneath the CPU Property observed during the spring, summer and fall monitoring events are similar to those observed during previous monitoring events conducted in 2015 and in 2016. Shallow ground water beneath the southern half of the CPU property generally flows to the east and northeast in a quasi-inward radial flow pattern in the vicinity of the former McElroy Building. Mounding near the northeast 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.

Groundwater samples were collected on April 28 during the spring sampling event and on October 24, 26 and 27, 2017 during the fall sampling event. Ground water samples were collected from each of the monitoring wells installed at the CPU Property with the exception of monitoring wells MW15-6 and MW15-10 during the April 28 sampling event due to insufficient water. Follow up attempts were made and samples collected from these monitoring wells during the summer on June 16, 2017 from MW15-10 and on September 6, 2017 from MW15-6. A ground water samples could not be collected from monitoring well MW15-4 during the fall sampling event due to insufficient water level.

Groundwater samples were collected using low-flow sampling techniques 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 made during sampling 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.

Two (2) blind duplicate samples were 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. Samples DUP-1 and DUP-2 are blind duplicate samples of MW15-9 and MW15-2 respectively for the spring sampling event and samples DUP-1 and DUP-2 are blind duplicate samples of MW15-9 and MW15-1 for the fall sampling event. One (1) trip blank sample was employed during the spring sampling event and two (2) trip blanks were used during the fall sampling event, for analysis of chloroform to assess potential cross contamination during sample storage and transport.

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 MOECC recently released the document entitled *Guidance for Addressing Chloroform at a Record of Site Condition Property* ("Chloroform Guidance"). The purpose of the document is to provide guidance which can be used by Qualified Persons (QP) and property owners where a RSC is being sought under O.Reg. 153/04 at a property and when addressing chloroform in soil and/or ground water where the source of the chloroform is from a treated municipal water supply.

The Chloroform Guidance states that if two criteria can be met and documented in the Conceptual Site Model (CSM) as part of a RA and/or RSC submission, then the applicable SCS for chloroform need not be considered to be exceeded. The two criteria are:

1. The source of chloroform is only associated with water from a treated municipal water supply; and,
2. All soil and ground water concentrations are numerically equal to or lower than the values listed in Table A of this guidance.

As the chloroform ground water impacts identified beneath the CPU Property were attributed to leaking municipal infrastructure, the ground water value for chloroform provided in Table A of the Chloroform Guidance has been adopted for the CPU property replacing the Table 3 SCS. The ground water value for chloroform for non-potable ground water situations, residential / parkland / institutional property use, and coarse textured soil is 240 µg/L.

The results of the spring/summer 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.

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

7.3.1 Spring/Summer Monitoring Event

Fourteen (14) ground water samples, including two blind QA/QC duplicate sample, were collected from on-Site monitoring wells in the spring on April 28 and in the summer on June 16 (MW15-10) and September 6, 2017 (MW15-6). 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 reporting detection limits (RDL) reported by the laboratory, all samples are deemed to be below the applicable 2011 Table 3 SCS.

7.3.1.2 Chloroform

Chloroform was detected in one (1) ground water sample collected from MW15-3, located on the CPU Property, at a concentration of 0.8 µg/L and therefore below the applicable Table A Chloroform Guidance value of 240 µg/L. All other ground water samples collected reported concentrations of chloroform below analytical RDL. Samples reporting chloroform concentrations below RDL are deemed to be below the applicable 2011 Table 3 SCS based on the RDL reported by the laboratory.

7.3.1.3 Polynuclear Aromatic Hydrocarbons

Twelve (12) PAH parameters were detected in the ground water sample collected from monitoring well MW15-10, located on the CPU property. All of the reported detectable concentrations for PAHs were below their respective 2011 Table 3 SCS. Samples reporting PAH concentrations below RDL are deemed to be below the applicable 2011 Table 3 SCS based on the RDL reported by the laboratory.

7.3.1.4 Metals

Up to sixteen (16) metals, including six or more of antimony, arsenic, barium, boron, calcium, cadmium, chromium, cobalt, copper, iron, lead, magnesium, mercury, molybdenum, nickel, selenium, 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

None of these parameters exceeded their 2011 Table 3 SCS or PSS, where established, during the spring/summer monitoring event.

7.3.2 Fall Monitoring Event

Thirteen (13) ground water samples, including two blind QA/QC duplicate sample, were collected from on-Site monitoring wells in the fall on October 24, 26 and 27, 2017. The results of the analysis are summarized in Table 4b.

7.3.2.1 Petroleum Hydrocarbons

PHC were not detected in any of the ground water samples. Based on the analytical RDL reported by the laboratory, all samples are deemed to be below the applicable 2011 Table 3 SCS.

7.3.2.2 Chloroform

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/Dup-2 at reported concentrations of 1.4 µg/L, 1.0 µg/L, 0.7 µg/L and 0.8/0.7 µg/L, respectively. These

concentrations are below the applicable Table A Chloroform Guidance value of 240 µg/L. All other ground water samples collected reported concentrations of chloroform below analytical RDL, and therefore below the applicable Table A Chloroform Guidance value of 240 µg/L.

7.3.2.3 Polynuclear Aromatic Hydrocarbons

Fluoranthene and pyrene were detected in samples collected from MW15-1 and MW15-5 and seven other PAH parameters were detected in the sample collected from MW15-1, all of which reported concentrations below their respective 2011 Table 3 SCS. All other PAH parameters reported during the fall monitoring event reported concentrations below RDL. Concentrations below RDL are deemed to be below the applicable 2011 Table 3 SCS based on the RDL reported by the laboratory.

7.3.2.4 Metals

Up to ten (10) metals including three or more of barium, boron, calcium, cobalt, copper, iron, magnesium, molybdenum, nickel, selenium, sodium, uranium 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

None of these parameters exceeded their 2011 Table 3 SCS or PSS, where established, during the fall monitoring event.

7.4 Field Quality Assurance Program

7.4.1 Field Duplicates

Field duplicates consist of samples collected at the same time and location placed into separate containers and are submitted for laboratory analysis to evaluate laboratory precision and field sampling and handling procedures, as well as to assess potential sample heterogeneity. For water samples, duplicate are prepared by alternately filling the sample bottles. The relative percent difference (RPD) is defined as the absolute value of the variation between a sample and its duplicate, when compared to the average concentration of the original and the duplicate. It is used to assess the validity of the field and laboratory analytical procedures. Meaningful RPDs can only be calculated if concentrations of a parameter are greater than the analytical RDL in both the primary and duplicate samples. Lower precision in the RPD calculation is expected when concentrations are less than ten (10) times the RDL.

The results of the groundwater field duplicate sample analyses indicate that the sampling results are generally reproducible. In most cases RPDs for the primary and duplicate samples could not be calculated as results were either below MDL or were less than ten times the reported MDL and thus not considered statistically significant. Where RPD was calculated values were within the acceptable limits with few exceptions. In those cases, one of duplicate sample pairs reported

non-detect concentrations or concentrations less than 10 times the laboratory RDL thus precluding meaningful RPD comparisons.

7.4.2 Trip Blanks

Trip blanks, also known as travel blanks, are employed to assess potential cross contamination of volatile organic compounds from other samples, ambient conditions, or other sources during sample storage and shipment prior to receipt at the laboratory. Trip blanks consist of analyte free media (soil or water) prepared and placed in the sample storage and shipping cooler by the laboratory, taken to the site, and returned unopened to the laboratory with the samples submission.

Trip blanks employed during the spring and fall sampling programs reported non-detect concentrations for chloroform. PHC F1 was not analyzed in the trip blanks, however PHC F1 was not detected in any of the samples collected at the Site during either sampling event.

7.5 Laboratory QA/QC Program

7.5.1 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.

7.5.2 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.

7.5.3 Laboratory Data Validation

All samples/sample extracts were analyzed within their applicable hold times using approved analytical methods. RLs, where established, were met for all tested parameters. Elevated RDLs were for BOD in sample MW15-9 and its duplicate sample and sample MW15-12 reported on Certificate 1718037 and in sample MW15-10 reported on Certificate 1725040. The RDLs were 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 potassium and silver reported on Certificate 1718037, barium and boron reported on Certificate 1743286, sodium reported on Certificate 1743465 and boron reported on Certificate 1743566. The laboratory reported that the batches were 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 RPDs, with exception of ammonia and boron duplicate pairs reported on Certificate 1718037, ammonia and DOC duplicate pairs reported on Certificate 1736257 and antimony duplicate pairs reported on Certificate 1718037. In all cases, the concentrations reported for the source and duplicate samples were less than 10 times the RDL and the results thus accepted by the laboratory.

7.6 QA/QC Summary

In summary, the laboratory and field QA/QC data indicate that the groundwater data have met the performance criteria of the Analytical Protocol and have not been biased or compromised in any way. The analytical results are thus considered to be representative of the site conditions and can be relied upon in the context of this report and its intended objectives.

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 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 6 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 14, April 25, July 21 and October 23, 2017. 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 7. Stable methane concentrations were detected at the following seven (7) LFG probe locations including: GP15-1 (0.1 vol. % in February and October), GP15-2 (0.1 vol. % in October), GP15-3 (0.1 vol. % in February), GP15-4 (0.4 vol. % in February, 0.5 vol. % in April and 0.1 vol. % in October), GP15-5 (0.1 vol. % in February), GP15-6 (0.1 vol. % in February, 0.8 vol. % in April, 0.3 vol. % in July and 0.1 vol. % in October) and GP15-7 (0.1 vol. % in October). 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 and intermittent low levels reported at GP15-7 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 negative pressure measured at GP15-2, GP15-4 and GP15-9 in February) 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 2017 no contingency measures were deemed necessary and therefore no such measures were implemented at the CPU Property in 2017.

10.0 SITE RESTORATION ACTIVITIES

Temporary grandstand were constructed over a portion of the East Berm to increase seating capacity of TD Place for sporting events taking place in the fall and winter of 2017 including the Canadian Football League 2017 Grey Cup football game and the National Hockey League 100 Outdoor Classic hockey game. The temporary grandstand construction required the excavation of hundreds of shallow hand-dug holes to permit the installation of level footing plates to support the superstructure for the grandstand. Amec Foster Wheeler was retained by Lansdowne Stadium Limited Partnership Ltd. to conduct inspections of the clean soil cap on the East Berm during the construction activities. Observations made during construction of the temporary grandstand indicated that the excavated holes did not exceed a depth of 1.0 m and that the geotextile used as a demarcation layer was not encountered at any of the excavations. Access to the area immediately surrounding and beneath the temporary grandstand was restricted by temporary fencing erected around the area. The temporary grandstand was to be disassembled during the winter and restoration activities are planned for the spring of 2018.

With regards to other areas of the Site, visual inspections undertaken in 2017 were similar to those of 2016 with respects to several areas of soil erosion identified 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 conducted in 2016 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 identified during the survey that require restoration are shown on Figure 8. The areas are not considered to result in any increase in the levels of risk to potential receptors at the CPU Property, therefore reparations to these areas were delayed until 2018 to include those areas of the East Berm disturbed by the construction of the temporary grandstand.

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 2017.

11.0 CONCLUSIONS AND RECOMMENDATIONS

The findings and results of the monitoring, sampling and inspection programs carried out at the CPU Property in 2017 to meet the annual reporting requirements are as follows:

- Inspections of the RMM implemented at the CPU Property were conducted in 2017 in accordance with the IMP. The construction of temporary grandstand on the East Berm required the excavation of several hundred shallow hand-dug holes to permit the placement of level footing plates to support the footings of the grandstand. These excavations were made into a large portion of the clean soil cap covering the East Berm. Observations made during the temporary grandstand construction indicated that the excavated holes did not exceed a depth of 1.0 m and that the geotextile used as a demarcation layer was not encountered in any of the excavations.
- Visual inspections of other RMM at the Site identified several areas of soil erosion throughout the South Berm area as evidenced by surface rutting, areas of washed out soil, bare patches, and areas of sediment accumulation. The erosional areas are generally coincident with the findings of the post construction topographic surveys conducted in 2016 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 slated to take place on the East and South Berms in 2018 should not be limited to the areas identified above, but should include any and all ruts and other depressions caused by weathering and/or construction activities. Restoration activities should be conducted with the guidance of a surveying crew to ensure desired elevations are attained and the required minimum 1.0 m thickness of clean soil cover is restored. A post restoration survey should be conducted of both the East and South Berms to fulfill the requirements of the RMP of a second survey following construction to assess any differential settlement or consolidation of materials that could result in thinning of the clean cover.
- The 2017 groundwater monitoring and sampling program was conducted on a semi-annual basis in accordance with the GWMP. Results of the groundwater monitoring inferred ground water flow patterns beneath the CPU Property similar to those observed during previous monitoring events conducted in 2015 and in 2016. Shallow ground water, beneath the southern half of the CPU property, generally flows to the east and northeast in a quasi-inward radial flow pattern in the vicinity of the former McElroy Building. Mounding near the northeast corner of the CPU property results in localized outward radial flow to the west and south and is likely due to leakage from the Rideau Canal migrating to the west within the historic fill materials placed within the former inlet of the Rideau Canal that extends beneath the CPU Property.
- All ground water samples collected from the monitoring well network located at the CPU property in 2017 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 2017 as per the MMP were below the methane concentrations limits as outlined in O.Reg. 232/98 and the recommended methane alert levels provided in Procedure D-4-1: Assessing Methane Hazards from Landfill (MOE, 1987).
- No revisions were deemed necessary to the SMP or the HASP.

Based on the results of the GWMP, MMP and IMP completed in 2017 no contingency measures were deemed necessary at the CPU Property and therefore no such measures or activities were implemented in 2017. 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 2017.

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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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.

Ontario Ministry of the Environment and Climate Change (undated): Guidance for Addressing Chloroform at a Record of Site Condition Property.

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.
AFW = Amec Foster Wheeler.

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)	April 28, 2017			June 16, 2017			October 23, 2017		
				Depth to Water (mbtoc)	Depth to Water (mbgs)	Static Elevation (masl)	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	3.845	3.928	61.564	2.565	2.648	62.844	3.325	3.408	62.084
MW15-2	65.228	65.085	58.518	5.618	5.761	59.467	4.895	5.038	60.190	4.912	5.055	60.173
MW15-3	65.067	64.899	58.357	5.379	5.547	59.520	4.636	4.804	60.263	4.675	4.843	60.224
MW15-4	65.319	65.256	59.219	3.735	3.798	61.521	3.915	3.978	61.341	4.872	4.935	60.384
MW15-5	64.924	64.895	58.824	5.385	5.414	59.510	4.596	4.625	60.299	4.772	4.801	60.123
MW15-6	64.680	64.615	59.500	5.022	5.087	59.593	N/A	N/A	N/A	4.320	4.385	60.295
MW15-7	64.513	64.431	59.033	4.894	4.976	59.537	4.081	4.163	60.350	4.261	4.343	60.170
MW15-8	64.898	64.815	58.798	5.329	5.412	59.486	4.495	4.578	60.320	4.635	4.718	60.180
MW15-9	65.253	65.148	59.153	5.490	5.595	59.658	4.629	4.734	60.519	4.764	4.869	60.384
MW15-10	65.043	64.979	58.943	5.370	5.434	59.609	4.530	4.594	60.449	4.642	4.706	60.337
MW15-11	64.571	64.447	58.471	4.820	4.944	59.627	3.867	3.991	60.580	4.147	4.271	60.300
MW15-12	65.596	65.498	58.886	5.809	5.907	59.689	4.786	4.884	60.712	5.080	5.178	60.418
MW09-1	65.718	65.658	60.828	2.909	2.969	62.749	-	-	-	3.301	3.361	62.357
MW09-2	65.667	65.601	60.777	2.770	2.836	62.831	-	-	-	3.295	3.361	62.306
MW09-3	65.426	65.368	60.536	2.651	2.709	62.717	-	-	-	3.240	3.298	62.128
MW09-5	65.108	65.061	59.008	5.635	5.682	59.426	-	-	-	5.020	5.067	60.041
MW09-6	65.232	65.202	59.132	5.755	5.785	59.447	-	-	-	5.139	5.169	60.063

Notes:
masl = Metres Above Sea Level.
mbtoc = Metres Below Top of Casing.
mbgs = Metres Below Ground Surface.
N/A = Not Accessible

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)	Specific Condutance (uS/cm)	Dissolved Oxygen (DO)	Temp. (°C)	Oxidation Reduction Potential (ORP) (mV)	PHC	PAH	Metals	GWC	Chloroform	
MW15-1	04/28/17	3.845	4.101	0.256	0.0	6.82	1605	0.69	11.24	43.9	✓	✓	✓	✓	✓	Clear, no sheen or odour.
	10/24/17	3.375	3.280	0.095	-	6.84	2100	0.49	15.5	-55.8	✓	✓	✓	✓	✓	Brown, no sheen or odour.
MW15-2	04/28/17	5.618	5.625	0.007	1.0	7.1	988	6.78	9.87	286	✓	✓	✓	✓	✓	Clear, no sheen or odour.
	10/24/17	4.916	4.911	0.005	-	7.18	1797	3.46	15.4	84.6	✓	✓	✓	✓	✓	Clear, no sheen or odour.
MW15-3	04/28/17	5.379	5.382	0.003	0.0	6.91	2301	4.94	12.15	284.4	✓	✓	✓	✓	✓	Clear, no sheen or odour.
	10/24/17	4.713	4.711	0.002	0.0	6.11	3241	51.5	15.6	372.8	✓	✓	✓	✓	✓	Clear, no sheen or odour.
MW15-4	04/28/17	3.735	3.711	-0.024	0.0	-	1484	1.05	8.25	-	✓	✓	✓	✓	✓	Brown, no sheen or odour. Water level rose as water was pumped.
	10/26/17	4.805	5.140	0.335	2.0	-	-	-	-	-	×	×	×	×	×	Insufficient water in well to collect sample or YSI data.
MW15-5	04/28/17	5.385	5.405	0.020	1.0	-	1425	3.78	11.49	-	✓	✓	✓	✓	✓	Clear, no sheen or odour.
	10/26/17	4.828	4.816	0.012	0.0	6.58	1935	0.69	13.1	16.5	✓	✓	✓	✓	✓	Cloudy, no sheen or odour.
MW15-6	04/28/17	5.014	-	-	-	-	-	-	-	-	×	×	×	×	×	Insufficient water in well to collect sample or YSI data.
	09/06/17	4.088	-	-	-	-	-	-	-	-	✓	✓	✓	✓	✓	Drawdown > 0.3 m, cloudy, no sheen or odour.
	10/26/17	4.372	4.363	0.009	0.0	6.89	5302	0.76	15.5	112.6	✓	✓	✓	✓	✓	Clear, no sheen or odour.
MW15-7	04/28/17	4.894	4.900	0.006	1.0	6.61	1815	3.96	10.17	320.8	✓	✓	✓	✓	✓	Clear, no sheen or odour.
	10/26/17	4.317	4.312	0.005	0.0	6.96	1367	1.44	13.7	142.1	✓	✓	✓	✓	✓	Clear, no sheen or odour.
MW15-8	04/28/17	5.329	5.340	0.011	0.0	7.07	1034	4.46	11.75	315.6	✓	✓	✓	✓	✓	Clear, no sheen or odour.
	10/27/17	4.801	4.798	0.003	0.0	7.42	1164	3.56	13.7	215.3	✓	✓	✓	✓	✓	Clear, no sheen or odour.
MW15-9	04/28/17	5.490	5.501	0.011	0.0	6.83	7121	6.8	12.59	292.1	✓	✓	✓	✓	✓	Clear, no sheen or odour.
	10/26/17	4.824	4.821	0.003	0.0	7.03	2095	6.24	15.40	176.5	✓	✓	✓	✓	✓	Clear, no sheen or odour.
MW15-10	04/28/17	5.370	5.800	0.430	0.0	6.59	5717	6.65	11.86	336.2	×	×	×	×	×	Drawdown > 0.3 m, purged dry after stabilization.
	06/16/17	4.530	4.560	0.030	-	6.36	5047	1.38	12.85	255.4	✓	✓	✓	✓	✓	Clear, no sheen or odour.
	10/26/17	4.740	-	-	-	-	-	-	-	-	✓	✓	✓	✓	✓	Drawdown > 0.3 m, purged dry and sampled the following day.
MW15-11	04/28/17	4.820	4.825	0.005	0.0	7.21	2092	4.65	12.46	313.6	✓	✓	✓	✓	✓	Clear, no sheen or odour.
	10/27/17	4.240	4.239	0.001	0.0	7.33	1358	1.97	15.6	213.8	✓	✓	✓	✓	✓	Clear, no sheen or odour.
MW15-12	04/28/17	5.809	5.815	0.006	0.0	7.03	5417	7.43	10.57	310.3	✓	✓	✓	✓	✓	Cloudy, no sheen or odour.
	10/27/17	5.189	5.185	0.004	0.0	7.17	1500	3.25	14.4	224.6	✓	✓	✓	✓	✓	Cloudy, 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.

- = Not Analyzed or No Published Value.

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.

c = Value adopted from Table A of Guidance for Addressing Chloroform at a Record of Site Condition Property (MOECC, undated).

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/Summer 2017

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	MW15-2	MW15-2	MW15-2	MW15-3	MW15-4	MW15-5	MW15-6	MW15-7	MW15-8	MW15-9	MW15-9	MW15-9
Sample ID					MW15-1	MW15-2	DUP-2	Average	RPD	MW15-3	MW15-4	MW15-5	MW15-6	MW15-7	MW15-8	MW15-9	DUP-1	Average
Property Location			Non-Potable Groundwater (Table 3)		CPU Property	CPU Property	CPU Property		(%)	CPU Property	CPU Property	CPU Property	CPU Property	CPU Property	CPU Property	CPU Property	CPU Property	
Laboratory ID					1718037-01	1718037-02	1718037-12			1718037-03	1718037-04	1718037-05	1736257-01	1718037-06	1718037-07	1718037-08	1718037-11	
Sample Date					4/28/2017	4/28/2017	4/28/2017			4/28/2017	4/28/2017	4/28/2017	9/6/2017	4/28/2017	4/28/2017	4/28/2017	4/28/2017	
General Inorganic Parameters (mg/L)																		
pH (pH units)	0.1	-	-	-	7	7.3	7.6	7.5	4.0%	7.5	7.2	7.2	7.2	7.2	7.5	7.4	7.5	7.5
Alkalinity (CaCO3)	5	-	-	-	400	278	279	279	0.4%	261	556	475	314	387	390.0	285	284	285
Ammonia	0.01	-	-	4.524	1.11	0.03	0.18	0.11	142.9%*	0.1	3.2	0.58	0.03	0.08	0.2	0.32	0.27	0.30
Conductivity (µS/cm)	5	-	-	-	2210	1310	1440	1375	9.5%	3200	2200	1850	5480	2400	1450.0	7590	7470	7530
Chloride	1	1	2300	-	492	130	135	133	3.8%	782	201	142	1630	473	136.0	2150	2130	2140
Nitrate (N)	0.1	0.1	-	-	< 0.1	2.2	2.1	2.2	4.7%	5.8	< 0.1	0.6	3.1	2.8	1.4	3.9	3.7	3.8
Sulphate	1	-	-	-	70	250	243	247	2.8%	244	502	402	446	220	220.0	896	863	880
Biological Oxygen Demand (BOD)	2	-	-	-	4	< 2	< 2	< 2	-	< 2	< 2	< 2	< 2	< 2	< 2	< 20	< 20	< 20
Chemical Oxygen Demand (COD)	10	-	-	-	14	< 10	13	< 12	-	14	32	23	45	25	16.0	115	108	112
Dissolved Organic Carbon	0.5	-	-	-	3.1	2.1	3	2.6	35.3%	1.6	8.3	5.5	2.1	6	2.7	3.6	3.9	3.8
Hardness	-	-	-	-	456	561	582	572	3.7%	726	983	583	1090	839	555.0	2000	2050	2025
Total Dissolved Solids	10	-	-	-	1270	868	854	861	1.6%	2010	1540	1260	3750	1600	902.0	5370	5500	5435
Volatile Organic Compounds (µg/L)																		
Chloroform	0.5	1	240 [c]	22	< 0.5	< 0.5	< 0.5	< 0.5	-	0.8	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Petroleum Hydrocarbons (µg/L)																		
PHC F1 (C6 - C10) [a]	25	25	750	-	< 25	< 25	< 25	< 25	-	< 25	< 25	< 25	< 25	< 25	< 25	< 25	< 25	< 25
PHC F2 (>C10 - C16) [a]	100	100	150	-	< 100	< 100	< 100	< 100	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100
PHC F3 (>C16 - C34) [a]	100	500	500	-	< 100	< 100	< 100	< 100	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100
PHC F4 (>C34) [a]	100	500	500	-	< 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	< 0.01	< 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	< 0.01	< 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	< 0.01	< 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	2.2	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Arsenic	1	1	1900	-	< 1	< 1	< 1	< 1	-	< 1	2	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Barium	1	2	29000	-	651	177	175	176	1.1%	171	49	159	195	121	105.0	90	93	92
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	-	36	34	40	37	16.2%	31	77	66	76	52	42.0	100	109	105
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	< 0.1	< 0.1
Calcium	100	-	-	-	147000	189000	196000	192500	3.6%	238000	318000	203000	356000	289000	183000.0	647000	663000	655000
Chromium	1	10	810	-	< 1	1	1	1	0.0%	< 1	< 1	< 1	1	< 1	< 1	1	1	1
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	< 0.5	-	< 0.5	2.4	< 0.5	2.4	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Copper	0.5	5	87	-	< 0.5	0.5	3.4	1.95	148.7%*	0.8	0.6	2.8	3.1	1.8	1.2	1.2	1.1	1.15
Iron	100	-	-	24240	13100	< 100	< 100	< 100	-	< 100	10500	< 100	< 100	< 100	< 100	< 100	< 100	< 100
Lead	0.1	1	25	-	< 0.1	< 0.1	0.3	0.3	-	< 0.1	0.3	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Magnesium	200	-	-	-	21600	21400	22400	21900	4.6%	31700	46100	18500	48700	28600	23900.0	93800	96500	95150
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	3.2	2.9	3.05	9.8%	0.6	1.5	1.5	0.9	0.9	< 0.5	7.2	7.1	7.15
Nickel	1	1	490	-	< 1	< 1	< 1	< 1	-	< 1	6	2	19	1	1.0	3	3	3
Selenium	1	5	63	-	< 1	< 1	< 1	< 1	-	2	< 1	< 1	< 1	< 1	< 1	1	2	1.5
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	-	290000	66600	64100	65350	3.8%	407000	156000	215000	769000	198000	104000	968000	977000	972500
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	2.2	1.9	2.1	14.6%	1.5	1.2	1	4.8	0.9	0.9	4.9	5	5.0
Vanadium	0.5	0.5	250	-	< 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
Zinc	5	5	1100	-	< 5	< 5	15	15	-	7	398	< 5	10	< 5	8	< 5	< 5	< 5

Table 4a. Summary of Ground Water Analyses - Spring/Summer 2017

Parameters	RDL	RL	2011 EPA Standards		Analytical Results													
Sample Location Sample ID Property Location Laboratory ID Sample Date			Full Depth Generic Site Condition Standards Non-Potable Groundwater (Table 3)	Property Specific Standards (as per Certificate of Property Use 0371-8TYQMY)	MW15-9 RPD (%)	MW15-10 MW15-10 CPU Property 1725040-01 6/16/2017	MW15-11 MW15-11 CPU Property 1718037-09 4/28/2017	MW15-12 MW15-12 CPU Property 1718037-10 4/28/2017	Trip Blank Trip Blank 1718037-13 4/21/2017									
General Inorganic Parameters (mg/L)																		
pH (pH units)	0.1	-	-	-	1.3%	6.9	7.5	7.4	-									
Alkalinity (CaCO3)	5	-	-	-	0.4%	310	277	256	-									
Ammonia	0.01	-	-	4.524	16.9%	< 0.01	0.03	0.05	-									
Conductivity (µS/cm)	5	-	-	-	1.6%	6760	2660	6850	-									
Chloride	1	1	2300	-	0.9%	1950	603	1960	-									
Nitrate (N)	0.1	0.1	-	-	5.3%	1.3	1.3	2	-									
Sulphate	1	-	-	-	3.8%	667	242	938	-									
Biological Oxygen Demand (BOD)	2	-	-	-	-	< 12	< 2	< 20	-									
Chemical Oxygen Demand (COD)	10	-	-	-	6.3%	119	21	81	-									
Dissolved Organic Carbon	0.5	-	-	-	8.0%	19.1	2.6	3.1	-									
Hardness	-	-	-	-	2.5%	1360	685	1470	-									
Total Dissolved Solids	10	-	-	-	2.4%	4740	1610	4640	-									
Volatile Organic Compounds (µg/L)																		
Chloroform	0.5	1	240 [c]	22	-	< 0.5	< 0.5	< 0.5	< 0.5									
Petroleum Hydrocarbons (µg/L)																		
PHC F1 (C6 - C10) [a]	25	25	750	-	-	< 25	< 25	< 25	-									
PHC F2 (>C10 - C16) [a]	100	100	150	-	-	< 100	< 100	< 100	-									
PHC F3 (>C16 - C34) [a]	100	500	500	-	-	< 100	< 100	< 100	-									
PHC F4 (>C34) [a]	100	500	500	-	-	< 100	< 100	< 100	-									
Polynuclear Aromatic Hydrocarbons (µg/L)																		
Acenaphthene	0.05	1	600	-	-	< 0.05	< 0.05	< 0.05	-									
Acenaphthylene	0.05	1	1.8	-	-	< 0.05	< 0.05	< 0.05	-									
Anthracene	0.05	0.1	2.4	-	-	0.01	< 0.01	< 0.01	-									
Benzo(a)anthracene	0.01	0.2	4.7	-	-	0.05	< 0.01	< 0.01	-									
Benzo(a)pyrene	0.01	0.01	0.81	-	-	0.06	< 0.01	< 0.01	-									
Benzo(b)fluoranthene	0.01	0.1	0.75	-	-	0.06	< 0.05	< 0.05	-									
Benzo(g,h,i)perylene	0.05	0.2	0.2	-	-	0.07	< 0.05	< 0.05	-									
Benzo(k)fluoranthene	0.05	0.1	0.4	-	-	< 0.05	< 0.05	< 0.05	-									
Chrysene	0.05	0.1	1	-	-	0.07	< 0.05	< 0.05	-									
Dibenzo(a,h)anthracene	0.05	0.2	0.52	-	-	0.07	< 0.05	< 0.05	-									
Fluoranthene	0.01	0.4	130	-	-	0.06	< 0.01	< 0.01	-									
Fluorene	0.05	0.5	400	-	-	0.06	< 0.05	< 0.05	-									
Indeno(1,2,3,c,d)pyrene	0.05	0.2	0.2	-	-	0.07	< 0.05	< 0.05	-									
Methylnaphthalene, 1- [b]	0.05	2	1800	-	-	< 0.05	< 0.05	< 0.05	-									
Methylnaphthalene, 2- [b]	0.05	2		-	-	< 0.05	< 0.05	< 0.05	-									
Naphthalene	0.05	2	1400	-	-	< 0.05	< 0.05	< 0.05	-									
Phenanthrene	0.05	0.1	580	-	-	0.06	< 0.05	< 0.05	-									
Pyrene	0.01	0.2	68	-	-	0.06	< 0.01	< 0.01	-									
Metals (µg/L)																		
Antimony	0.5	0.5	20000	-	-	< 0.5	< 0.5	< 0.5	-									
Arsenic	1	1	1900	-	-	< 1	< 1	< 1	-									
Barium	1	2	29000	-	3.3%	457	205	145	-									
Beryllium	0.5	0.5	67	-	-	< 0.5	< 0.5	< 0.5	-									
Boron	10	10	45000	-	8.6%	47	33	87	-									
Cadmium	0.1	0.5	2.7	-	-	0.7	< 0.1	< 0.1	-									
Calcium	100	-	-	-	2.4%	451000	218000	471000	-									
Chromium	1	10	810	-	0.0%	1	< 1	2	-									
Chromium (VI)	10	10	140	-	-	< 10	< 10	< 10	-									
Cobalt	0.5	1	66	-	-	1.7	< 0.5	< 0.5	-									
Copper	0.5	5	87	-	8.7%	6.5	< 0.5	0.8	-									
Iron	100	-	-	24240	-	< 100	< 100	< 100	-									
Lead	0.1	1	25	-	-	0.2	< 0.1	< 0.1	-									
Magnesium	200	-	-	-	2.8%	55900	34000	72100	-									
Mercury	0.1	0.1	0.29	-	-	0.2	< 0.1	< 0.1	-									
Molybdenum	0.5	0.5	9200	-	1.4%	0.7	0.5	< 0.5	-									
Nickel	1	1	490	-	0.0%	3	< 1	< 1	-									
Selenium	1	5	63	-	66.7%*	< 1	< 1	1	-									
Silver	0.1	0.3	1.5	-	-	< 0.1	< 0.1	< 0.1	-									
Sodium	200	5000	2300000	-	0.9%	1140000	297000	969000	-									
Thallium	0.1	0.5	510	-	-	< 0.1	< 0.1	< 0.1	-									
Uranium	0.1	2	420	-	2.0%	2.6	1	2.6	-									
Vanadium	0.5	0.5	250	-	-	0.5	< 0.5	< 0.5	-									
Zinc	5	5	1100	-	-	6	< 5	< 5	-									

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Table 4b. Summary of Ground Water Analyses - Fall 2017

Parameters	RDL	RL	2011 EPA Standards		Analytical Results													
			Full Depth Generic Site Condition Standards	Property Specific Standards (as per Certificate of Property Use 0371-8TYQMY)	MW15-1 MW15-1 CPU Property 1743286-01 10/24/2017	MW15-1 DUP-1 CPU Property 1743286-03 10/24/2017	MW15-1 Average CPU Property	MW15-2 RPD (%)	MW15-2 MW15-2 CPU Property 1743286-02 10/24/2017	MW15-3 MW15-3 CPU Property 1743465-01 10/26/2017	MW15-5 MW15-5 CPU Property 1743465-02 10/26/2017	MW15-6 MW15-6 CPU Property 1743465-03 10/26/2017	MW15-7 MW15-7 CPU Property 1743465-04 10/26/2017	MW15-8 MW15-8 CPU Property 1743566-01 10/27/2017	MW15-9 MW15-9 CPU Property 1743566-02 10/26/2017	MW15-9 DUP-2 CPU Property 1743566-06 10/26/2017	MW15-9 Average CPU Property	MW15-9 RPD (%)
Sample Location / Sample ID / Property Location / Laboratory ID / Sample Date			Non-Potable Groundwater (Table 3)															
General Inorganic Parameters (mg/L)																		
pH (pH units)	0.1	-	-	-	7.3	7.5	7.4	2.7%	7.7	7.8	7.6	7.6	7.6	7.6	7.9	7.9	7.9	0.0%
Alkalinity (CaCO3)	5	-	-	-	440	439	440	0.2%	292	251	400	334	389	307	302	302	302	0.0%
Ammonia	0.01	-	-	4.524	1.23	1.24	1.2	0.8%	0.02	0.04	0.17	0.04	0.04	0.1	0.03	0.04	0.04	28.6%
Conductivity (µS/cm)	5	-	-	-	2400	2370	2385	1.3%	2070	3820	2480	6370	1710	1460	2420	2450	2435	1.2%
Chloride	1	1	2300	-	562	540	551	4.0%	445	1030	416	1870	236	203	358	361	360	0.8%
Nitrate (N)	0.1	0.1	-	-	< 0.1	< 0.1	< 0.1	-	4.4	5.8	0.5	3.8	1.4	1.6	2.9	2.9	2.9	0.0%
Sulphate	1	-	-	-	44	44	44	0.0%	167	278	380	442	177	211	502	525	514	4.5%
Biological Oxygen Demand (BOD)	2	-	-	-	< 2	< 2	< 2	-	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	-
Chemical Oxygen Demand (COD)	10	-	-	-	< 10	16	< 13	-	< 10	< 10	23	< 10	37	23	< 10	< 10	< 10	-
Dissolved Organic Carbon	0.5	-	-	-	2.1	2.6	2.35	21.3%	1	1.6	6.7	4.2	4.1	3.1	3.9	2.9	3.4	29.4%
Hardness	-	-	-	-	415	414	415	0.2%	449	753	566	867	520	349	-	-	-	-
Total Dissolved Solids	10	-	-	-	1300	1290	1295	0.8%	1210	2370	1190	3770	954	876	1520	1540	1530	1.3%
Volatile Organic Compounds (µg/L)																		
Chloroform	0.5	1	240 [c]	22	< 0.5	< 0.5	< 0.5	-	1.4	1	< 0.5	0.7	< 0.5	< 0.5	0.8	0.7	0.8	13.3%
Petroleum Hydrocarbons (µg/L)																		
PHC F1 (C6 - C10) [a]	25	25	750	-	< 25	< 25	< 25	-	< 25	< 25	< 25	< 25	< 25	< 25	< 25	< 25	< 25	-
PHC F2 (>C10 - C16) [a]	100	100	150	-	< 100	< 100	< 100	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	-
PHC F3 (>C16 - C34) [a]	100	500	500	-	< 100	< 100	< 100	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	-
PHC F4 (>C34) [a]	100	500	500	-	< 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	-
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	-
Anthracene	0.05	0.1	2.4	-	< 0.01	0.05	0.03	-	< 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	0.07	0.04	-	< 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	0.07	0.04	-	< 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	0.08	0.07	-	< 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	0.06	0.06	-	< 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	-
Chrysene	0.05	0.1	1	-	< 0.05	0.11	0.11	-	< 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	-
Fluoranthene	0.01	0.4	130	-	0.08	0.23	0.155	-	< 0.01	< 0.01	0.09	< 0.01	< 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	-
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	-
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	-
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	-
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	-
Phenanthrene	0.05	0.1	580	-	< 0.05	0.11	0.08	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-
Pyrene	0.01	0.2	68	-	0.07	0.21	0.14	-	< 0.01	< 0.01	0.08	< 0.01	< 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	-
Arsenic	1	1	1900	-	< 1	< 1	< 1	-	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	-
Barium	1	2	29000	-	544	559	552	2.7%	121	211	120	219	102	78	39	39	39	0.0%
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	-
Boron	10	10	45000	-	70	71	70.5	1.4%	50	36	63	60	54	50	61	54	58	12.2%
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	< 0.1	-
Calcium	100	-	-	-	135000	135000	135000	0.0%	147000	244000	187000	296000	176000	110000	-	-	-	-
Chromium	1	10	810	-	< 1	< 1	< 1	-	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	-
Chromium (VI)	10	10	140	-	< 10	< 10	< 10	-	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	-
Cobalt	0.5	1	66	-	< 0.5	< 0.5	< 0.5	-	< 0.5	< 0.5	0.9	3	< 0.5	< 0.5	6.1	6	6.1	1.7%
Copper	0.5	5	87	-	< 0.5	< 0.5	< 0.5	-	2.2	1.5	4.7	3.8	2.5	2.1	4.9	4.9	4.9	0.0%
Iron	100	-	-	24240	11500	11600	11550	0.9%	< 100	< 100	< 100	< 100	< 100	< 100	-	-	-	-
Lead	0.1	1	25	-	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	-
Magnesium	200	-	-	-	19000	19000	19000	0.0%	19700	35100	24000	31100	19500	18100	-	-	-	-
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	-
Molybdenum	0.5	0.5	9200	-	< 0.5	< 0.5	< 0.5	-	8.5	0.8	21.3	1.1	0.8	0.8	6.6	6.6	6.6	0.0%
Nickel	1	1	490	-	< 1	< 1	< 1	-	< 1	< 1	3	20	2	1	26	26	26	0.0%
Selenium	1	5	63	-	< 1	< 1	< 1	-	2	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	-
Sodium	200	5000	2300000	-	300000	302000	301000	0.7%	230000	484000	303000	1040000	131000	134000	322000	298000	310000	7.7%
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	-
Uranium	0.1	2	420	-	< 0.1	< 0.1	< 0.1	-	1.8	1.4	0.9	4.4	0.6	0.6	3.6	3.6	3.6	0.0%
Vanadium	0.5	0.5	250	-	< 0.5	< 0.5	< 0.5	-	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	-
Zinc	5	5	1100	-	< 5	< 5	< 5	-	< 5	< 5	< 5	< 5	< 5	8	6	< 5	< 6	-

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Table 4b. Summary of Ground Water Analyses - Fall 2017

Parameters	RDL	RL	2011 EPA Standards		Analytical Results														
Sample Location Sample ID Property Location Laboratory ID Sample Date			Full Depth Generic Site Condition Standards Non-Potable Groundwater (Table 3)	Property Specific Standards (as per Certificate of Property Use 0371-8TYQMY)	MW15-10 MW15-10 CPU Property 1743566-03 10/27/2017	MW15-11 MW15-11 CPU Property 1743566-04 10/27/2017	MW15-12 MW15-12 CPU Property 1743566-05 10/27/2017	TRIP BLANK 1743465-07 10/24/2017	TRIP BLANK 1743566-07 10/26/2017									
General Inorganic Parameters (mg/L)																			
pH (pH units)	0.1	-	-	-	7	7.7	7.8	-	-										
Alkalinity (CaCO3)	5	-	-	-	345	325	315	-	-										
Ammonia	0.01	-	-	4.524	0.07	0.06	0.06	-	-										
Conductivity (µS/cm)	5	-	-	-	3970	1590	1660	-	-										
Chloride	1	1	2300	-	994	271	308	-	-										
Nitrate (N)	0.1	0.1	-	-	1.7	1.5	0.4	-	-										
Sulphate	1	-	-	-	436	133	153	-	-										
Biological Oxygen Demand (BOD)	2	-	-	-	< 2	< 2	< 2	-	-										
Chemical Oxygen Demand (COD)	10	-	-	-	63	12	< 10	-	-										
Dissolved Organic Carbon	0.5	-	-	-	18.7	3.4	3.2	-	-										
Hardness	-	-	-	-	573	345	310	-	-										
Total Dissolved Solids	10	-	-	-	2370	874	944	-	-										
Volatile Organic Compounds (µg/L)																			
Chloroform	0.5	1	240 [c]	22	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5										
Petroleum Hydrocarbons (µg/L)																			
PHC F1 (C6 - C10) [a]	25	25	750	-	< 25	< 25	< 25	-	-										
PHC F2 (>C10 - C16) [a]	100	100	150	-	< 100	< 100	< 100	-	-										
PHC F3 (>C16 - C34) [a]	100	500	500	-	< 100	< 100	< 100	-	-										
PHC F4 (>C34) [a]	100	500	500	-	< 100	< 100	< 100	-	-										
Polynuclear Aromatic Hydrocarbons (µg/L)																			
Acenaphthene	0.05	1	600	-	< 0.05	< 0.05	< 0.05	-	-										
Acenaphthylene	0.05	1	1.8	-	< 0.05	< 0.05	< 0.05	-	-										
Anthracene	0.05	0.1	2.4	-	< 0.01	< 0.01	< 0.01	-	-										
Benzo(a)anthracene	0.01	0.2	4.7	-	< 0.01	< 0.01	< 0.01	-	-										
Benzo(a)pyrene	0.01	0.01	0.81	-	< 0.01	< 0.01	< 0.01	-	-										
Benzo(b)fluoranthene	0.01	0.1	0.75	-	< 0.05	< 0.05	< 0.05	-	-										
Benzo(g,h,i)perylene	0.05	0.2	0.2	-	< 0.05	< 0.05	< 0.05	-	-										
Benzo(k)fluoranthene	0.05	0.1	0.4	-	< 0.05	< 0.05	< 0.05	-	-										
Chrysene	0.05	0.1	1	-	< 0.05	< 0.05	< 0.05	-	-										
Dibenzo(a,h)anthracene	0.05	0.2	0.52	-	< 0.05	< 0.05	< 0.05	-	-										
Fluoranthene	0.01	0.4	130	-	< 0.01	< 0.01	< 0.01	-	-										
Fluorene	0.05	0.5	400	-	< 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	-	-										
Methylnaphthalene, 1- [b]	0.05	2	1800	-	< 0.05	< 0.05	< 0.05	-	-										
Methylnaphthalene, 2- [b]	0.05	2		-	< 0.05	< 0.05	< 0.05	-	-										
Naphthalene	0.05	2	1400	-	< 0.05	< 0.05	< 0.05	-	-										
Phenanthrene	0.05	0.1	580	-	< 0.05	< 0.05	< 0.05	-	-										
Pyrene	0.01	0.2	68	-	< 0.01	< 0.01	< 0.01	-	-										
Metals (µg/L)																			
Antimony	0.5	0.5	20000	-	< 0.5	< 0.5	< 0.5	-	-										
Arsenic	1	1	1900	-	< 1	< 1	< 1	-	-										
Barium	1	2	29000	-	113	94	80	-	-										
Beryllium	0.5	0.5	67	-	< 0.5	< 0.5	< 0.5	-	-										
Boron	10	10	45000	-	41	33	36	-	-										
Cadmium	0.1	0.5	2.7	-	< 0.1	< 0.1	< 0.1	-	-										
Calcium	100	-	-	-	189000	106000	99100	-	-										
Chromium	1	10	810	-	< 1	< 1	< 1	-	-										
Chromium (VI)	10	10	140	-	< 10	< 10	< 10	-	-										
Cobalt	0.5	1	66	-	0.7	< 0.5	< 0.5	-	-										
Copper	0.5	5	87	-	4.9	0.7	1.3	-	-										
Iron	100	-	-	24240	< 100	< 100	< 100	-	-										
Lead	0.1	1	25	-	< 0.1	< 0.1	< 0.1	-	-										
Magnesium	200	-	-	-	24400	19700	15100	-	-										
Mercury	0.1	0.1	0.29	-	< 0.1	< 0.1	< 0.1	-	-										
Molybdenum	0.5	0.5	9200	-	< 0.5	0.7	0.9	-	-										
Nickel	1	1	490	-	4	< 1	< 1	-	-										
Selenium	1	5	63	-	< 1	< 1	< 1	-	-										
Silver	0.1	0.3	1.5	-	< 0.1	< 0.1	< 0.1	-	-										
Sodium	200	5000	2300000	-	576000	145000	178000	-	-										
Thallium	0.1	0.5	510	-	< 0.1	< 0.1	< 0.1	-	-										
Uranium	0.1	2	420	-	1.9	1.1	0.8	-	-										
Vanadium	0.5	0.5	250	-	< 0.5	< 0.5	< 0.5	-	-										
Zinc	5	5	1100	-	< 5	< 5	< 5	-	-										

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	14-Feb-17	0.1	0.1	1.0	3.3	10.1	86.4	0.0	Good Condition
						25-Apr-17	0.0	0.0	0.0	6.4	2.8	90.7	0.0	Good Condition
						21-Jul-17	0.0	0.0	0.0	7.7	12.6	79.7	0.0	Good Condition
						23-Oct-17	0.1	0.1	0.0	1.6	19.8	78.5	0.0	Good Condition
GP15-2	368835.264	5029365.156	65.228	1.52 - 3.05	Overburden	14-Feb-17	0.0	0.0	0.0	0.5	18.1	81.4	-0.5	Good Condition
						25-Apr-17	0.0	0.0	0.0	1.0	13.6	85.4	0.0	Good Condition
						21-Jul-17	0.0	0.0	0.0	3.6	7.2	88.8	0.0	Good Condition
						23-Oct-17	0.1	0.1	1.0	1.5	16.1	82.2	0.0	Good Condition
GP15-3	368835.685	5029306.220	65.067	1.52 - 3.05	Overburden	14-Feb-17	0.1	0.1	1.0	0.0	21.5	78.4	0.0	Good Condition
						25-Apr-17	0.0	0.0	0.0	0.3	20.5	79.2	0.0	Good Condition
						21-Jul-17	0.0	0.0	0.0	2.4	15.6	82.0	0.0	Good Condition
						23-Oct-17	0.1	0.0	0.0	0.4	20.9	78.6	0.0	Good Condition
GP15-4	368893.417	5029339.143	-	1.52 - 3.05	Overburden	14-Feb-17	0.4	0.4	7.0	2.9	10.5	86.1	-0.2	Good Condition
						25-Apr-17	0.5	0.5	11.0	6.0	0.0	93.5	0.0	Good Condition
						21-Jul-17	0.0	0.0	0.0	12.5	1.8	85.7	0.0	Good Condition
						23-Oct-17	0.1	0.1	1.0	5.0	15.2	79.8	0.0	Good Condition
GP15-5	368837.499	5029252.218	-	0.91 - 2.44	Overburden	14-Feb-17	0.1	0.1	1.0	0.0	21.6	78.3	0.0	Good Condition
						25-Apr-17	0.0	0.0	0.0	2.5	16.6	80.9	0.0	Good Condition
						21-Jul-17	0.0	0.0	0.0	4.4	10.1	85.4	0.0	Good Condition
						23-Oct-17	0.1	0.0	0.0	1.8	18.1	80.0	0.0	Good Condition
GP15-6	368875.492	5029271.998	-	0.61 - 2.13	Overburden	14-Feb-17	0.1	0.1	1.0	0.0	21.6	78.3	0.0	Good Condition
						25-Apr-17	0.8	0.8	16.0	3.3	0.0	95.9	0.0	Good Condition
						21-Jul-17	0.3	0.3	6.0	5.7	0.0	94.0	0.0	Good Condition
						23-Oct-17	0.1	0.1	2.0	1.5	15.9	82.4	0.0	Good Condition
GP15-7	368931.653	5029294.223	-	0.91 - 2.44	Overburden	14-Feb-17	0.0	0.0	0.0	4.9	10.4	84.7	0.0	Good Condition
						25-Apr-17	0.0	0.0	0.0	2.2	7.1	90.7	0.0	Good Condition
						21-Jul-17	0.0	0.0	0.0	6.9	0.0	93.1	0.0	Good Condition
						23-Oct-17	0.1	0.1	2.0	3.5	14.1	82.2	0.0	Good Condition
GP15-8	368865.766	5029240.857	65.319	1.52 - 3.05	Overburden	14-Feb-17	-	-	-	-	-	-	-	Could Not Locate
						25-Apr-17	0.0	0.0	0.0	2.9	10.1	86.9	0.0	Good Condition
						21-Jul-17	0.0	0.0	0.0	8.8	5.7	85.5	0.0	Good Condition
						23-Oct-17	0.0	0.0	0.0	2.6	15.8	81.6	0.0	Good Condition
GP15-9	368950.930	5029210.490	64.924	1.52 - 3.05	Overburden	14-Feb-17	0.0	0.0	0.0	2.3	17.5	80.2	-0.1	Good Condition
						25-Apr-17	0.0	0.0	0.0	1.5	16.3	82.2	0.0	Good Condition
						21-Jul-17	0.0	0.0	0.0	8.0	10.4	81.6	0.0	Good Condition
						23-Oct-17	0.0	0.0	0.0	0.4	21.1	78.4	0.0	Good Condition
GP15-10	368843.807	5029183.520	64.680	0.91 - 2.13	Overburden	14-Feb-17	-	-	-	-	-	-	-	Could Not Locate
						25-Apr-17	0.0	0.0	0.0	2.4	5.5	92.1	0.0	Good Condition
						21-Jul-17	0.0	0.0	0.0	7.3	3.1	89.7	0.0	Good Condition
						23-Oct-17	0.0	0.0	0.0	0.0	21.6	78.3	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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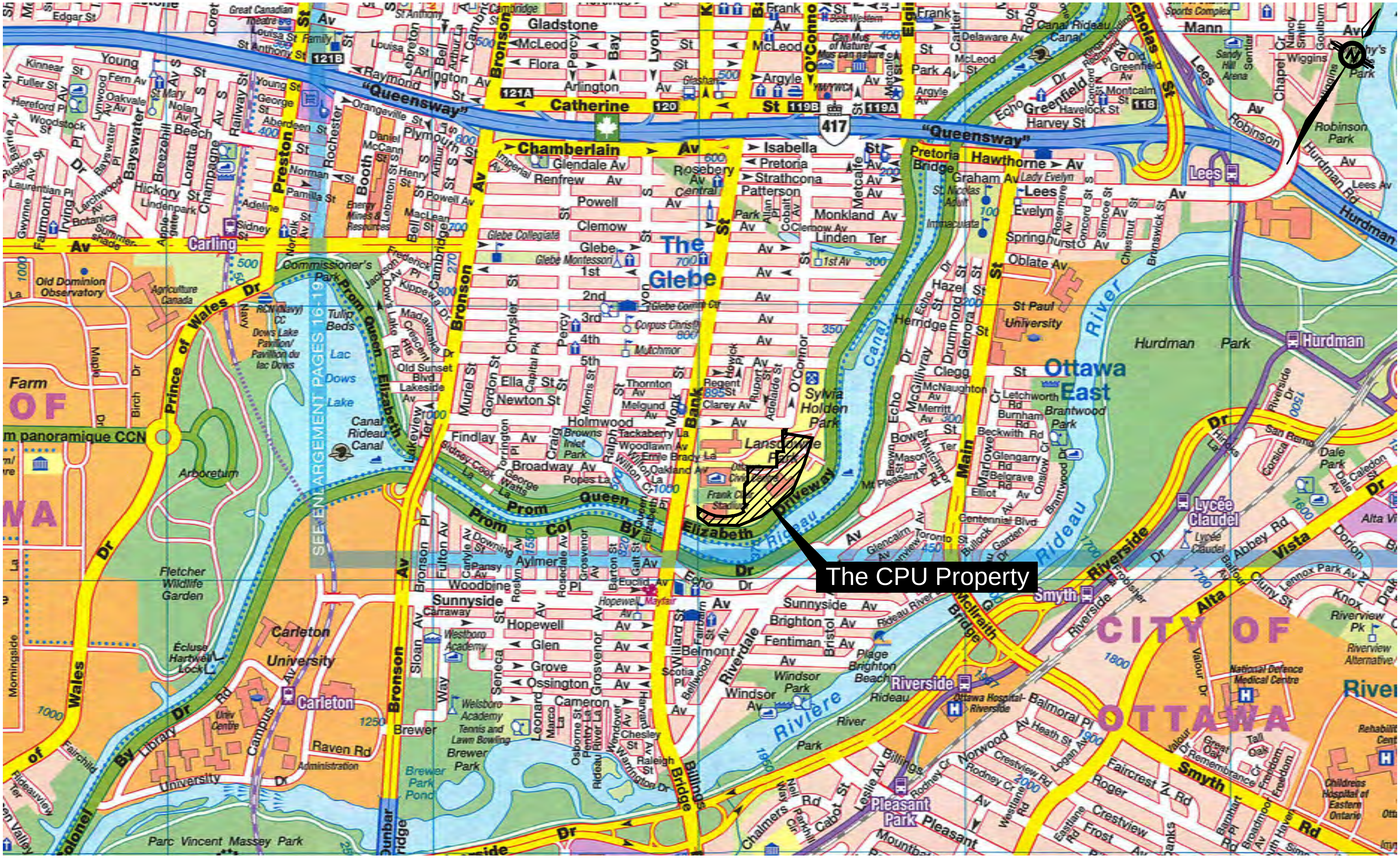


TITLE:
KEY PLAN
2017 ANNUAL REPORT
LANSDOWNE PARK - ZONE C
CPU No. 0371-8TYQMY
450 QUEEN ELIZABETH DRIVEWAY
OTTAWA, ONTARIO

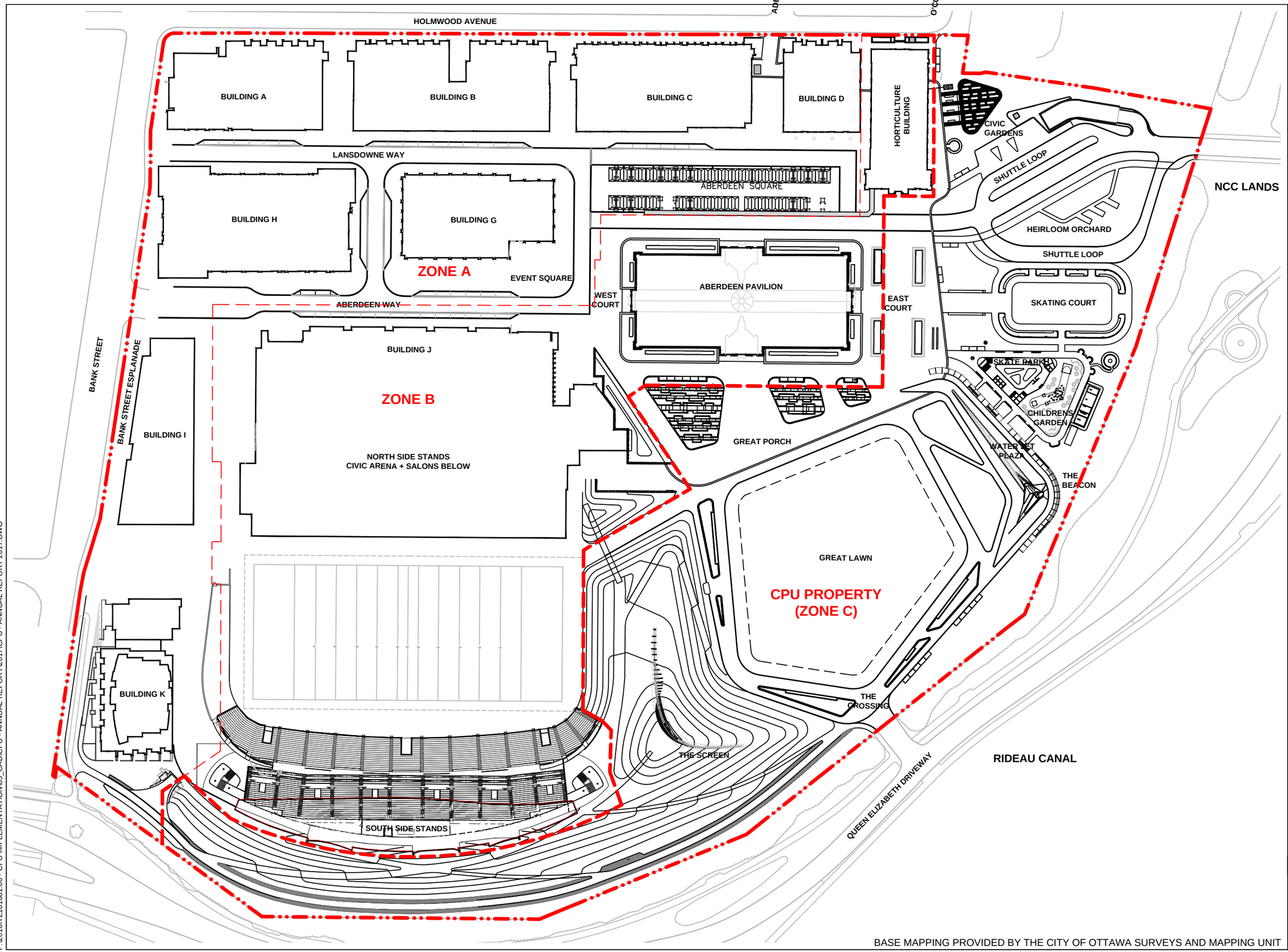
CLIENT: Ottawa

amec foster wheeler
ENVIRONMENT & INFRASTRUCTURE
300-210 COLONNADE ROAD
OTTAWA, ONTARIO CANADA

DATE: MARCH 2018		PROJECT NO: TZ10100106	FIGURE NO: 1
DRAWN BY: JFT	CHECKED BY: KDH	SCALE: 1 : 20,000	

200 0 200 400 600
METRES

SOURCE: STREET ATLAS OF OTTAWA AND ENVIRONS, MAPART, 2010



LEGEND

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

15 0 15 30 45
METRES

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TITLE:

GENERALIZED SITE PLAN

PROJECT:

2017 ANNUAL REPORT

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

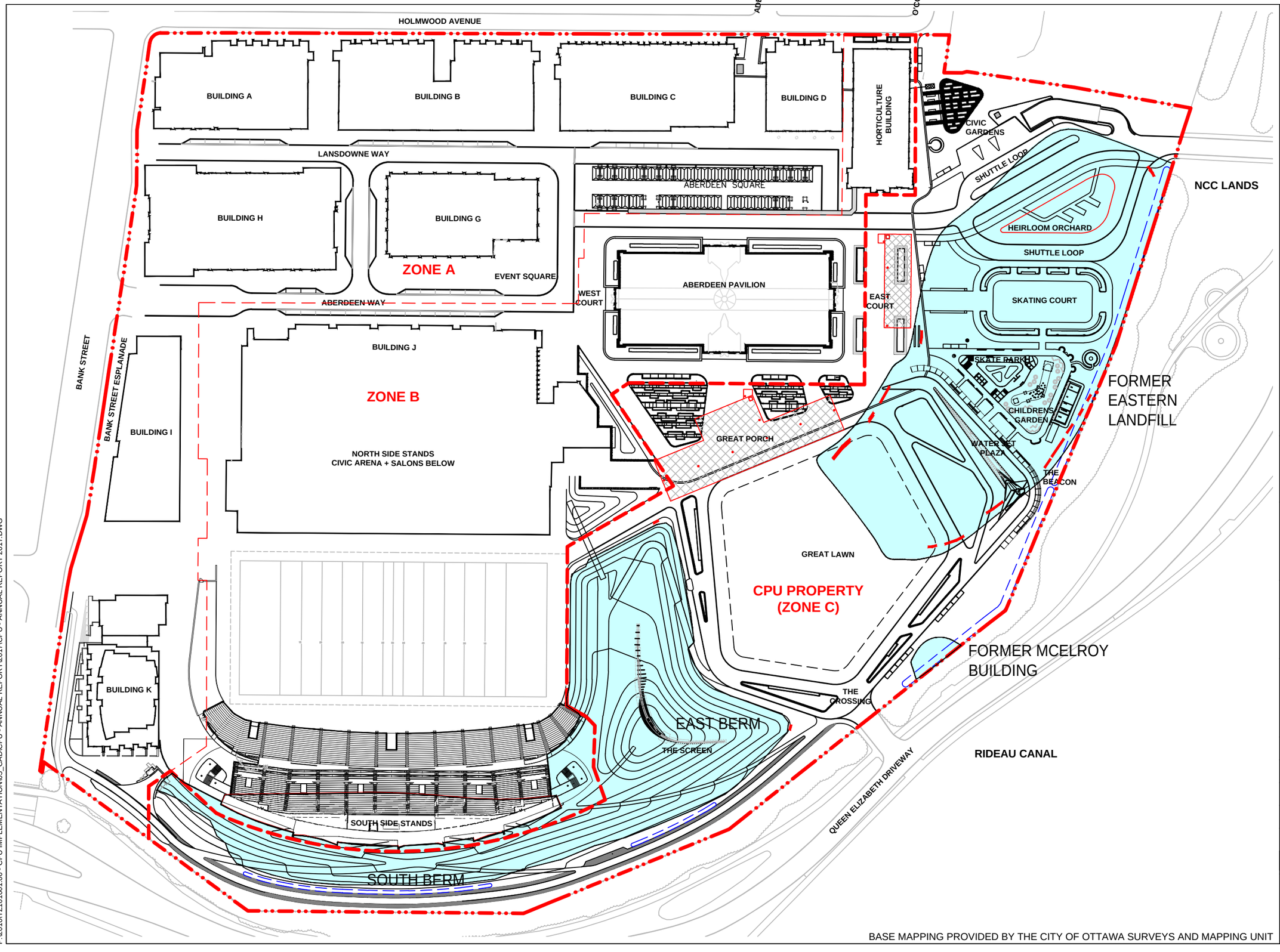
CLIENT:

Ottawa

DESIGNED BY:	KDH
DRAWN BY:	JFT
CHECKED BY:	KDH
DATE:	MARCH 2018
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\2017\CPU - ANNUAL REPORT 2017.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

15 0 15 30 45
METRES

amec foster wheeler

TITLE:

RISK MANAGEMENT MEASURES

PROJECT:

2017 ANNUAL REPORT

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

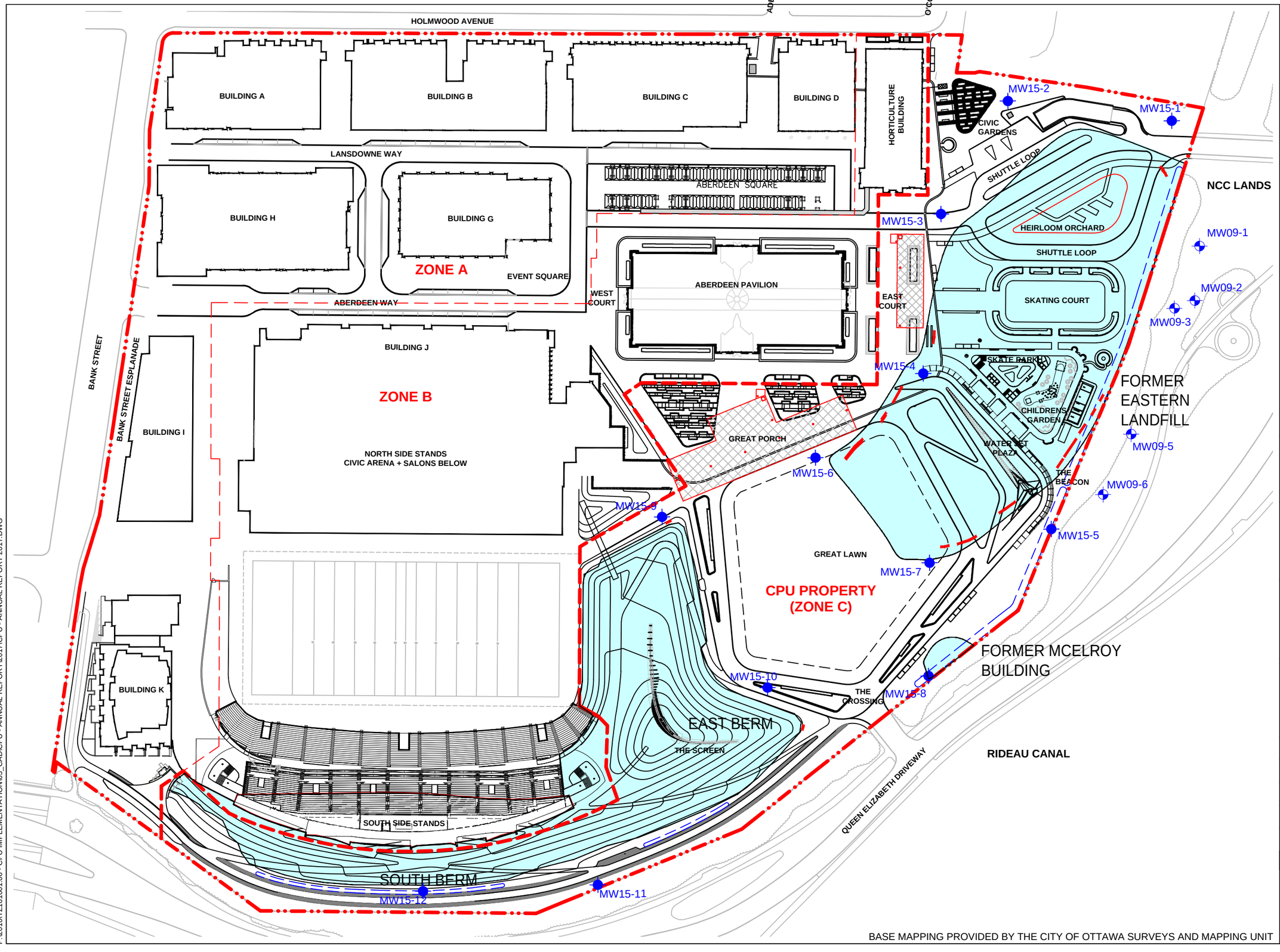
CLIENT:

Ottawa

DESIGNED BY:	KDH
DRAWN BY:	JFT
CHECKED BY:	KDH
DATE:	MARCH 2018
SCALE:	1 : 1,600
PROJECT NO:	TZ10100106
FIGURE NO:	3

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

P:\2010\TZ10100106 - CPU IMPLEMENTATION\05_CAD\CPU - ANNUAL REPORT\2017\CPU - ANNUAL REPORT 2017.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
- 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 MONITORING WELL LOCATION PLAN

PROJECT:

2017 ANNUAL REPORT

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

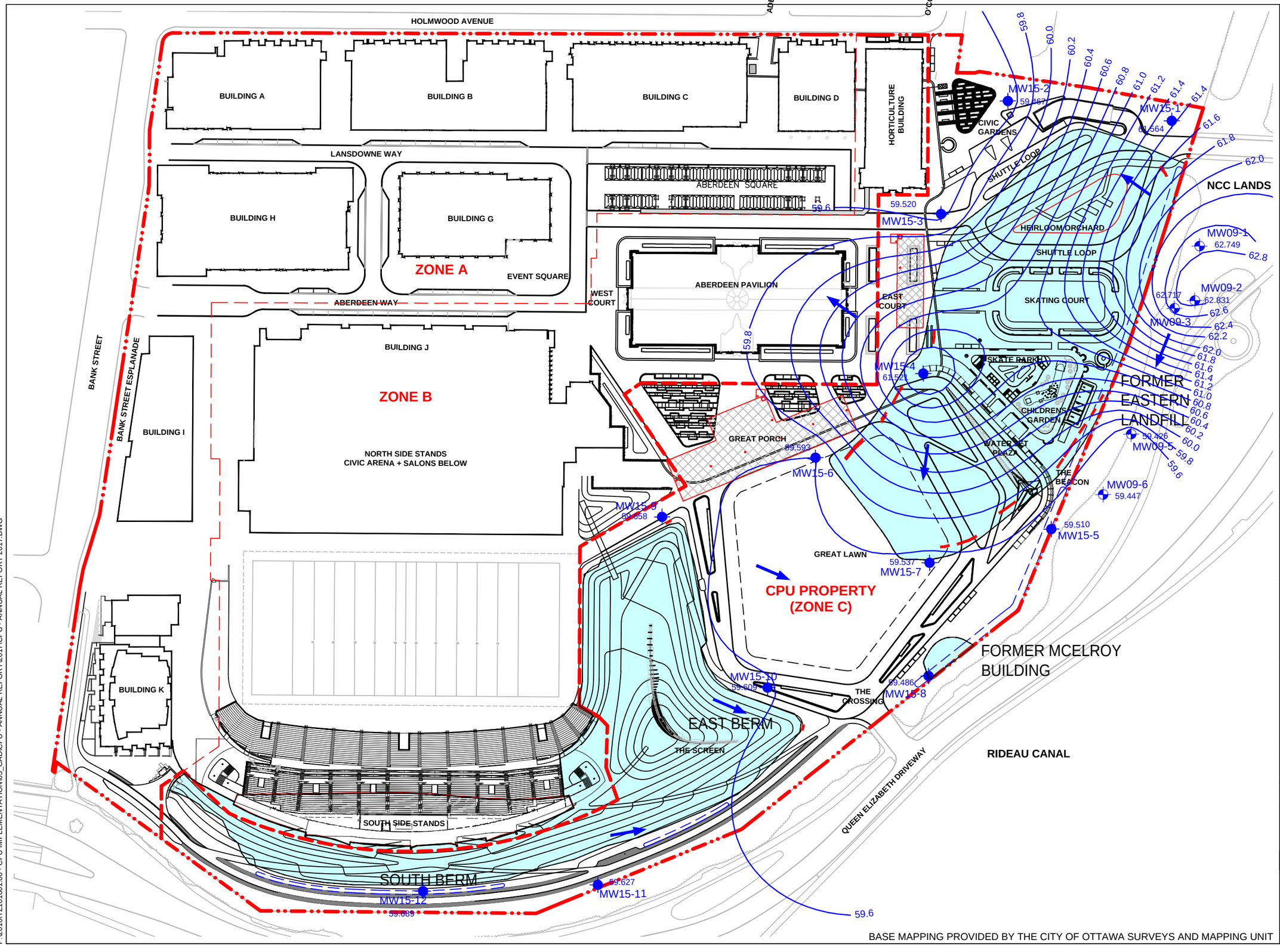
CLIENT:

Ottawa

DESIGNED BY:	KDH
DRAWN BY:	JFT
CHECKED BY:	KDH
DATE:	MARCH 2018
SCALE:	1 : 1,600
PROJECT NO:	TZ10100106
FIGURE NO:	4

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

P:\2010\TZ10100106 - CPU IMPLEMENTATION\05_CAD\CPU - ANNUAL REPORT\2017\CPU - ANNUAL REPORT 2017.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
- 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 - APRIL 28, 2017

PROJECT:

2017 ANNUAL REPORT

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

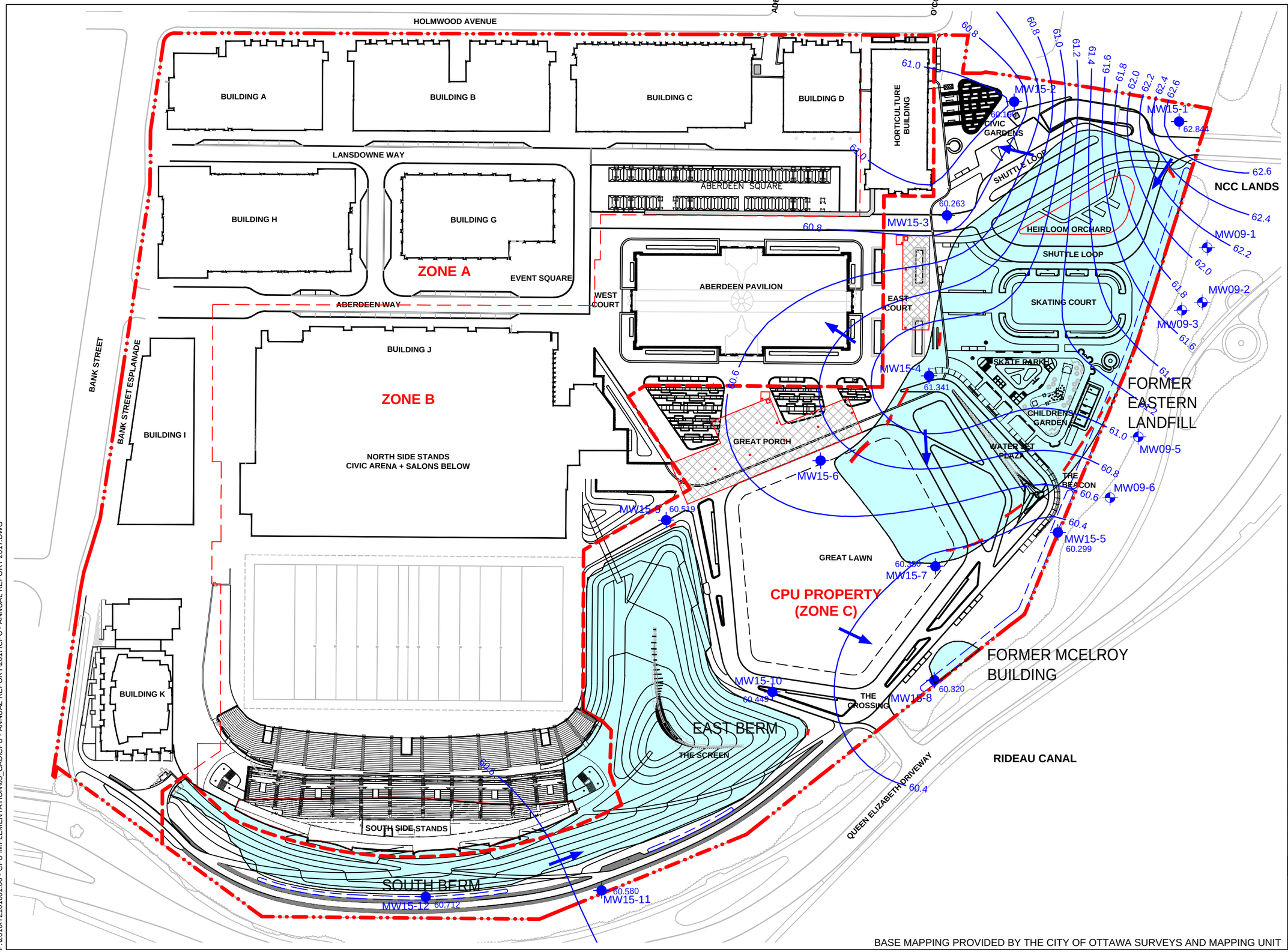
CLIENT:

Ottawa

DESIGNED BY:	KDH
DRAWN BY:	JFT
CHECKED BY:	KDH
DATE:	MARCH 2018
SCALE:	1 : 1,600
PROJECT NO:	TZ10100106
FIGURE NO:	5a

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

P:\2010\TZ10100106 - CPU IMPLEMENTATION\05_CAD\CPU - ANNUAL REPORT\2017\CPU - ANNUAL REPORT 2017.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
- 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 - JUNE 16, 2017

PROJECT:

2017 ANNUAL REPORT

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

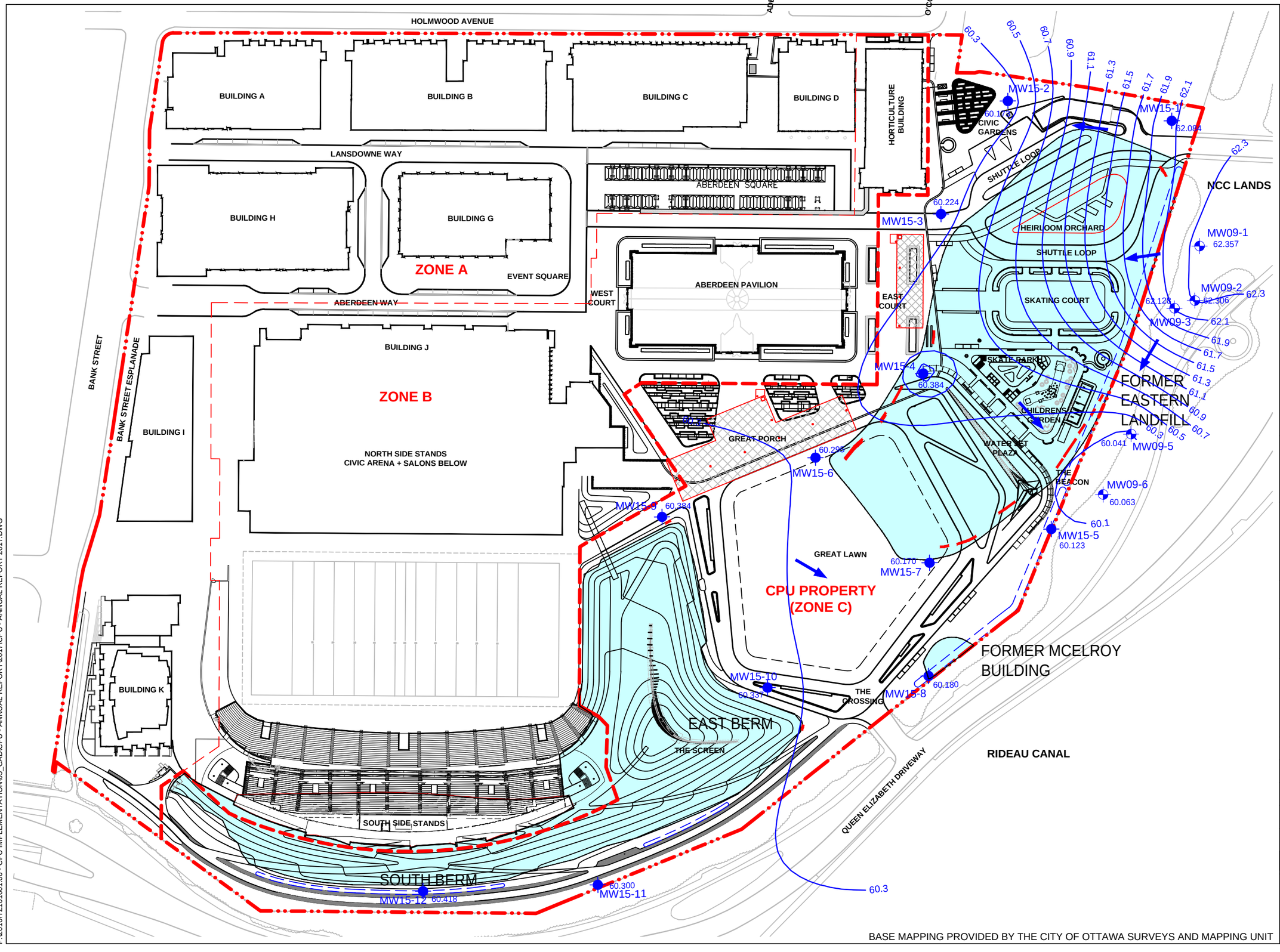
CLIENT:

Ottawa

DESIGNED BY:	KDH
DRAWN BY:	JFT
CHECKED BY:	KDH
DATE:	MARCH 2018
SCALE:	1 : 1,600
PROJECT NO:	TZ10100106
FIGURE NO:	**5b**

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

P:\2010\TZ10100106 - CPU IMPLEMENTATION\05_CAD\CPU - ANNUAL REPORT\2017\CPU - ANNUAL REPORT 2017.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
- 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 - OCTOBER 23, 2017

PROJECT:

2017 ANNUAL REPORT

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

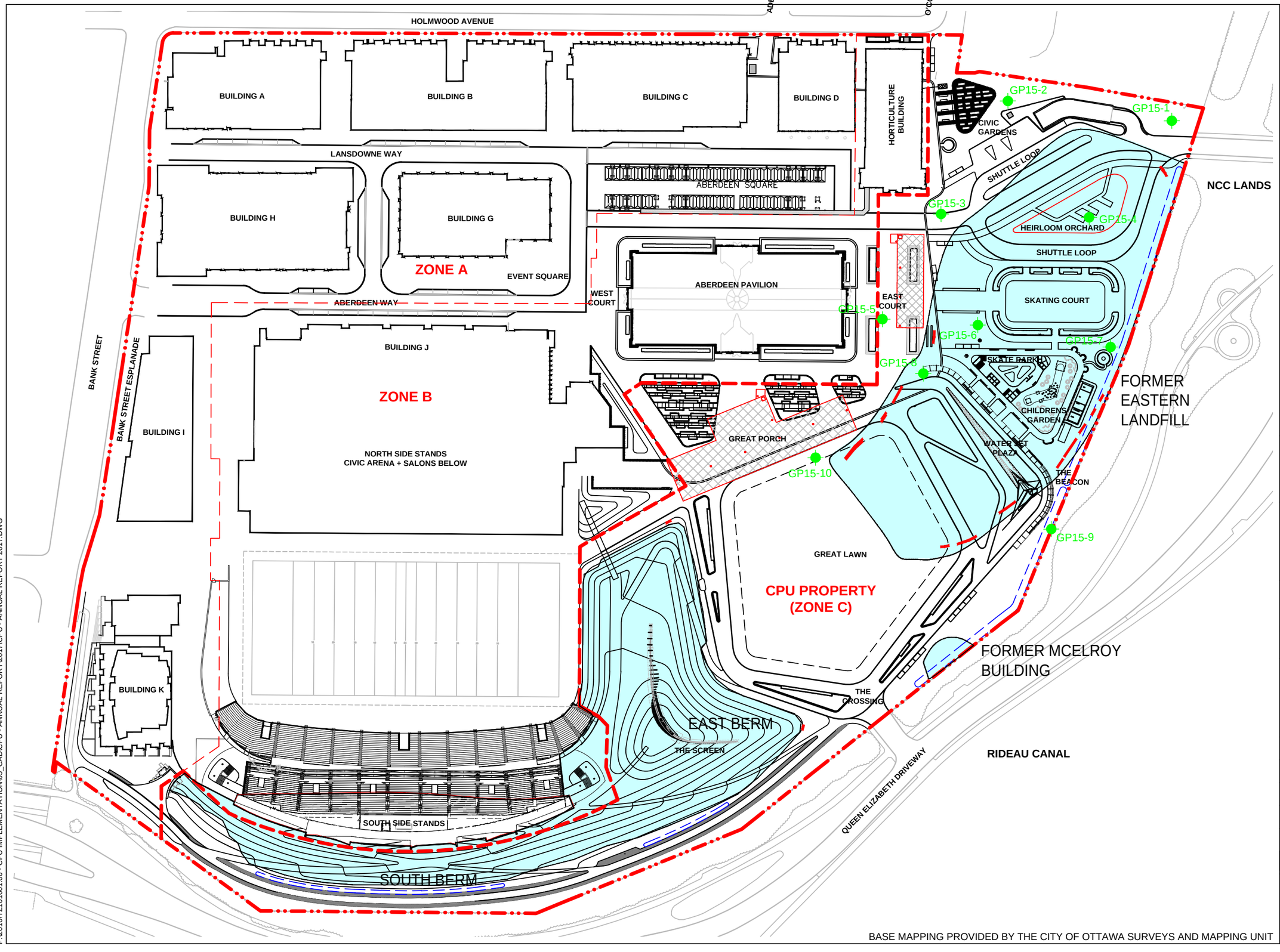
CLIENT:

Ottawa

DESIGNED BY:	KDH
DRAWN BY:	JFT
CHECKED BY:	KDH
DATE:	MARCH 2018
SCALE:	1 : 1,600
PROJECT NO:	TZ10100106
FIGURE NO:	5c

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

P:\2010\TZ101001.06 - CPU IMPLEMENTATION\05_CAD\CPU - ANNUAL REPORT\2017\CPU - ANNUAL REPORT 2017.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:

2017 ANNUAL REPORT

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

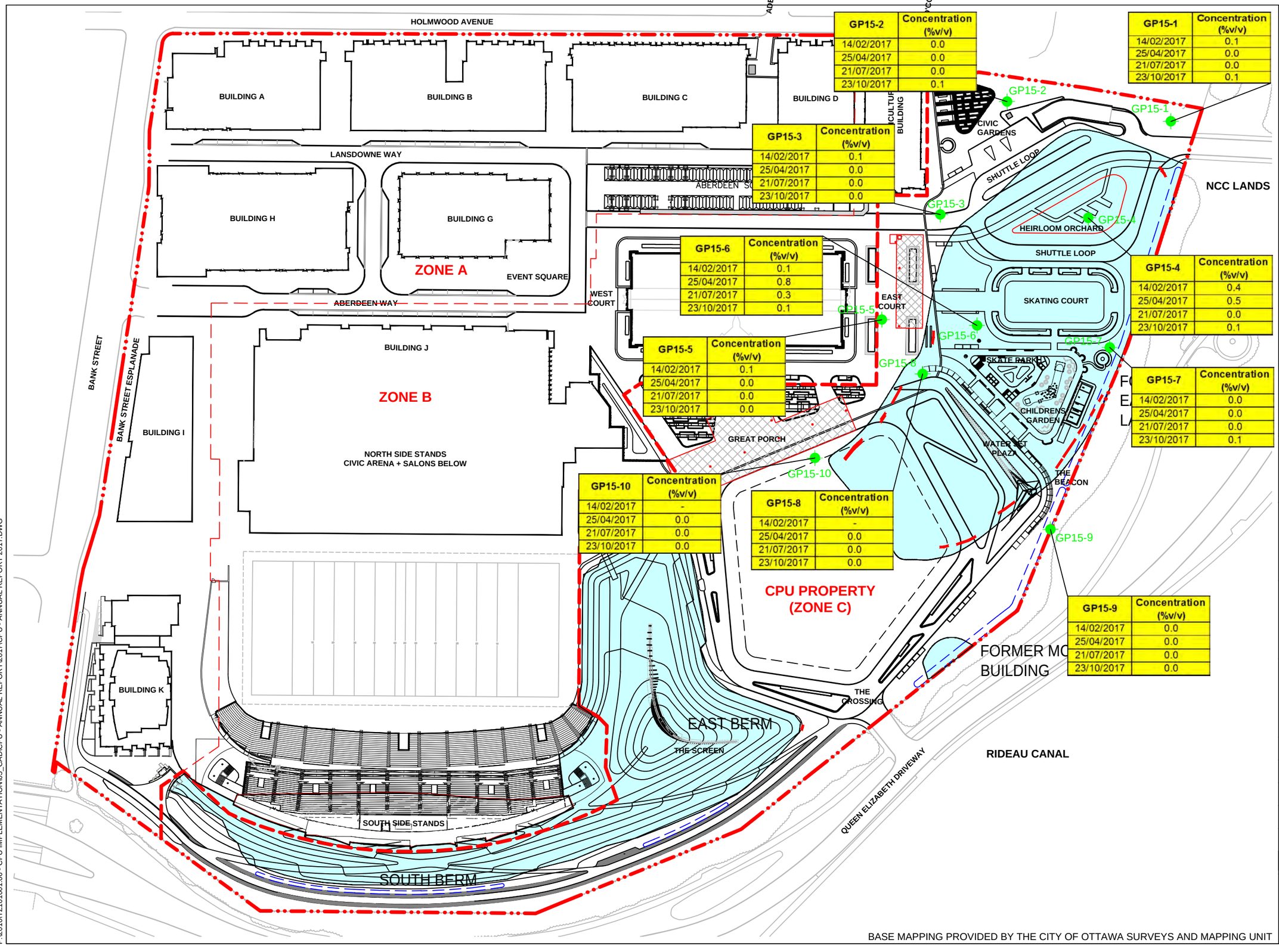
CLIENT:

Ottawa

DESIGNED BY:	KDH
DRAWN BY:	JFT
CHECKED BY:	KDH
DATE:	MARCH 2018
SCALE:	1 : 1,600
PROJECT NO:	TZ10100106
FIGURE NO:	6

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

P:\2010\TZ101001.06 - CPU IMPLEMENTATION\05_CAD\CPU - ANNUAL REPORT\2017\CPU - ANNUAL REPORT 2017.DWG



GP15-2	Concentration (%v/v)
14/02/2017	0.0
25/04/2017	0.0
21/07/2017	0.0
23/10/2017	0.1

GP15-1	Concentration (%v/v)
14/02/2017	0.1
25/04/2017	0.0
21/07/2017	0.0
23/10/2017	0.1

GP15-3	Concentration (%v/v)
14/02/2017	0.1
25/04/2017	0.0
21/07/2017	0.0
23/10/2017	0.0

GP15-6	Concentration (%v/v)
14/02/2017	0.1
25/04/2017	0.8
21/07/2017	0.3
23/10/2017	0.1

GP15-4	Concentration (%v/v)
14/02/2017	0.4
25/04/2017	0.5
21/07/2017	0.0
23/10/2017	0.1

GP15-5	Concentration (%v/v)
14/02/2017	0.1
25/04/2017	0.0
21/07/2017	0.0
23/10/2017	0.0

GP15-7	Concentration (%v/v)
14/02/2017	0.0
25/04/2017	0.0
21/07/2017	0.0
23/10/2017	0.1

GP15-10	Concentration (%v/v)
14/02/2017	-
25/04/2017	0.0
21/07/2017	0.0
23/10/2017	0.0

GP15-8	Concentration (%v/v)
14/02/2017	-
25/04/2017	0.0
21/07/2017	0.0
23/10/2017	0.0

GP15-9	Concentration (%v/v)
14/02/2017	0.0
25/04/2017	0.0
21/07/2017	0.0
23/10/2017	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:

2017 ANNUAL REPORT

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

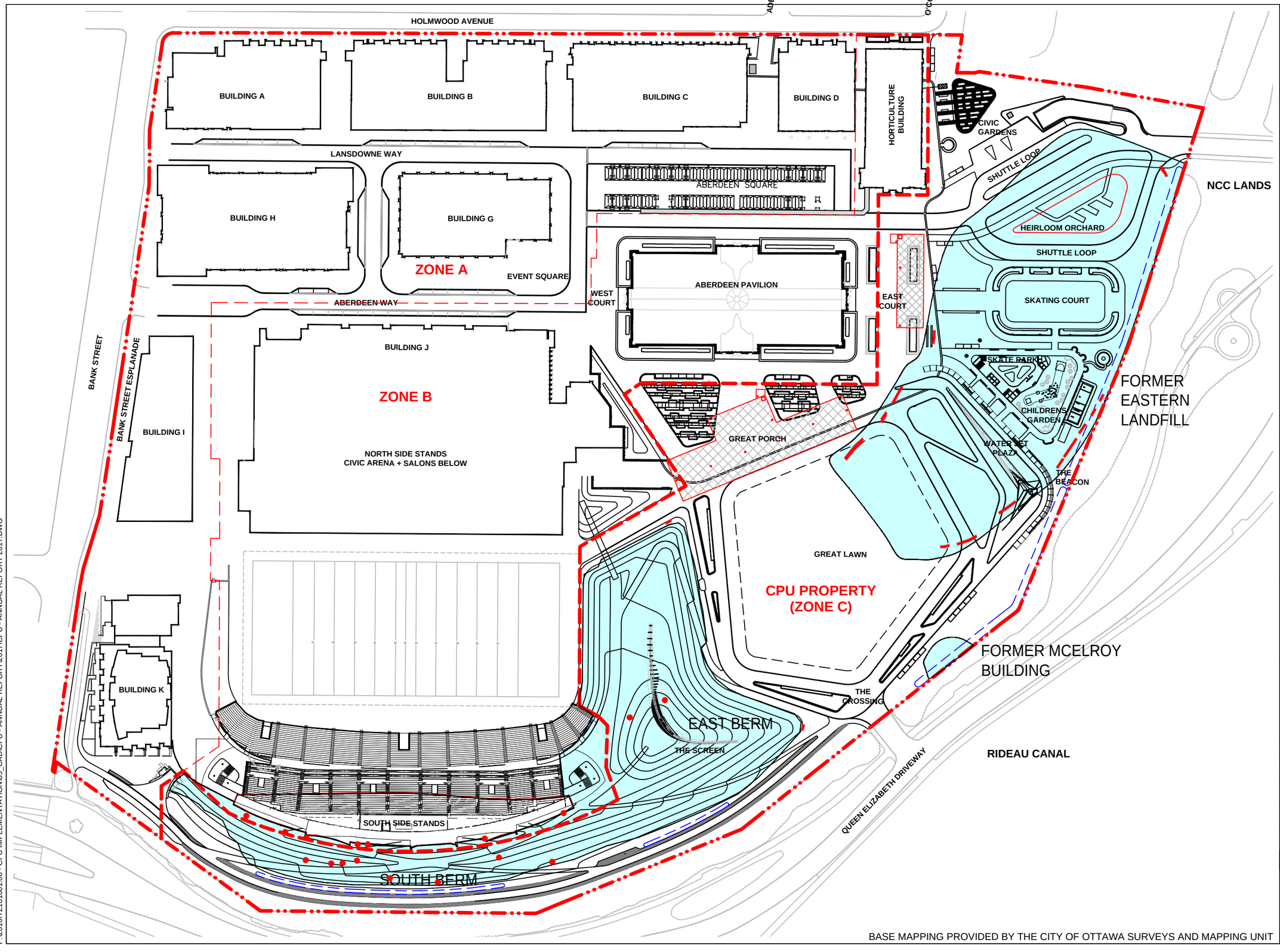
CLIENT:

Ottawa

DESIGNED BY:	KDH
DRAWN BY:	JFT
CHECKED BY:	KDH
DATE:	MARCH 2018
SCALE:	1 : 1,600
PROJECT NO:	TZ10100106
FIGURE NO:	7

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

P:\2010\TZ\10001.06 - CPU IMPLEMENTATION\05_CAD\CPU - ANNUAL REPORT\2017\CPU - ANNUAL REPORT 2017.DWG



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:

2017 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 2018
SCALE:	1 : 1,000
PROJECT NO:	TZ10100106
FIGURE NO:	8

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

P:\2010\TZ101001.06 - CPU IMPLEMENTATION\05_CAD\CPU - ANNUAL REPORT\2017\CPU - ANNUAL REPORT 2017.DWG

APPENDIX A

Certificate of Property Use

(Available Upon Request)

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.