2018 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
Project No. TZ10100106

Prepared for:

Ontario Ministry of the Environment, Conservation and Parks Ottawa District Office

2430 Don Reid Drive, Ottawa, Ontario K1H 1E1

March 2019

Wood Environment & Infrastructure Solutions,
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31 March 2019

Reference No. TZ10100106

VIA EMAIL

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

Attention: Tracy Hart
Ottawa District Manager

Dear Ms. Hart;

RE: 2018 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 2018 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,

Wood Environment & Infrastructure Solutions,
A Division of Wood Canada 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), now the Ministry of Environment, Conservation and Parks (MECP), 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 MECP by March 31 of the following year. This report has been prepared by Wood Environment & Infrastructure Solutions ("Wood"), on behalf of the City of Ottawa (the "City") to meet the annual reporting requirements for 2018 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 2018 to meet the annual reporting requirements are as follows:

Inspections of the RMM implemented at the CPU Property were conducted in 2018 in accordance with the Inspection and Maintenance Plan (IMP). In 2017, a temporary grandstand was erected on the East Berm necessitating the excavation of several hundred shallow hand dug holes to permit placement of level footing plates to support the footings of the grandstand. The reinstatement of the East Berm was conducted in the spring of 2018 once the temporary grandstand was removed. Reinstatement of the clean soil cap consisted of backfilling the holes with material previously excavated at each location, placing topsoil over any disturbed areas and finally applying hydroseed. Inspections conducted during the reinstatement activities confirmed that the areas previously disturbed had been reinstated to conditions consistent with CPU specifications.

To fulfill the requirements of the Risk Management Plan (RMP) and confirm reinstatement of the East Berm a second survey of both the East and South Berms was conducted in December 2018 to assess any differential settlement or consolidation of materials comprising the clean soil cap. The survey reported that all survey points on both the East and South Berms were within the 0.1 m allowable settlement threshold when compared to those of the 2014 as-built survey.

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. Although the survey of the South Berm did not identify any deficient areas in 2018, deteriorated soil cap conditions continue to be present on the South Berm and should be addressed in 2019 to prevent further deterioration of the RMM.

The 2018 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 groundwater flow patterns beneath the CPU Property similar to those observed since inception of

the groundwater monitoring program in 2015. Shallow groundwater, 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 groundwater samples collected from the monitoring well network located at the CPU property in 2018 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 2018 as per the 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 SMP or the HASP.

Based on the results of the GWMP, Methane Monitoring Plan (MMP) and IMP completed in 2018, no contingency measures were deemed necessary at the CPU Property and therefore no such measures or activities were implemented in 2018. 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 2018.

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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	Groundwater Monitoring Program
HASP	Health and Safety Plan
IMP	Inspection and Maintenance Plan
LFG	Landfill Gas
LSLP	Lansdowne Stadium Limited Partnership Ltd.
MMP	Methane Monitoring Plan
MOE	Ministry of the Environment
MECP	Ministry of the Environment, Conservation and Parks
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 the Environment and Climate Change (MOECC), now the Ministry of the Environment, Conservation and Parks (MECP), 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 MECP by March 31 of the following year. This report has been prepared by Wood Environment & Infrastructure Solutions ("Wood"), 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 2018.

1.1 Background

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, Wood (2012) submitted a Risk Assessment (RA) to the Environmental Assessment and Approvals Branch of the MECP 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 MECP 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 groundwater beneath the CPU Property.

2.1 Risk Management Measures

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

1. **Geotechnical Engineering:** Quality assurance and quality control for such earthworks as the placement and compaction of geotechnical materials and soils impacted by any COC shall be carried out by the representative of the geotechnical engineering firm responsible for the supervision of construction based on professional judgment.
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, Groundwater 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. **Groundwater Monitoring Program:** Development and implementation of a Groundwater Monitoring Program (GWMP), for a minimum of five years, to identify any changes in the hydrological components and groundwater quality resulting from implementation of the risk management measures and establishing trigger levels and contingency activities in the event that the monitoring results show any concentration(s) greater than the 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 MECP 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 available on request.

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 3H:1V, the geotextile and impacted soil is set-back of approximately 2.56 metres from the toe of the berms.
- The geotextile overlying the impacted soil was covered with no less than 1 metre of clean fill (i.e., soil meeting *Table 3 Site Condition Standards in a Non-Potable Groundwater Condition - Residential/Parkland/Institutional Property Use*), which includes an upper layer of topsoil sufficient to support landscaping needs.
- In areas where trees were planted, sufficient soil depth was maintained around the rooting zones such that the roots of the mature trees would not have the potential for penetrating the underlying geotextile. At a minimum, trees were planted on compacted soil to prevent downward growth of

rootmass. No plant species with tap root systems were placed above or within 5 metres of any areas subject to soil capping.

- 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 and the second was conducted in December of 2018.
- 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 2018, Wood 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 Groundwater Condition - Residential/Parkland/Institutional Property Use*), a hard surface cap (i.e., asphalt, concrete or interlocking pavers and granular subbase), or a combination thereof. The thickness of the soft soil cap overlying the geotextile was determined based on landscaping needs but was not less than 500 millimetres inclusive of topsoil and grass sod. Examples of the different hard cap surface treatments include;
  - Concrete Unit Paving on Grade;
  - Granite Paving;
  - Reinforced and coloured asphalt paving;
  - Resilient Play Surface; and,
  - Refrigerated Concrete Slab for skating rink.
- Where features were constructed that penetrated the geotextile such as foundations for light standards or playground equipment, at the point of penetration, the geotextile was placed to extend 0.3 m up and around the penetration point.
- In areas where trees were planted, sufficient soil depth was maintained around the rooting zones such that the roots of the mature trees would not have the potential for penetrating the underlying geotextile. At a minimum, trees were planted on compacted soil to prevent downward growth of rootmass. No plant species with tap root systems were placed above or within 5 metres of any areas subject to soil capping.
- To ensure that migration of contaminants does not occur, utility trenches installed through the area of impacted soil contained within the berms were sealed with clay plugs at the transition from impacted to non-impacted 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 2018, Wood 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 Groundwater Condition - Residential/Parkland/Institutional Property Use*), a hard surface cap (i.e., asphalt, concrete or interlocking pavers and granular subbase), or a combination thereof. The thickness of the soft soil cap overlying the geotextile was determined based on landscaping needs but was not less than 500 millimetres inclusive of topsoil and grass sod.

- Where features were constructed that penetrated the geotextile such as foundations for light standards, at the point of penetration, the geotextile was placed to extend 0.3 m up and around the penetration point.
- In areas where trees were planted, sufficient soil depth was maintained around the rooting zones such that the roots of the mature trees would not have the potential for penetrating the underlying geotextile. At a minimum, trees were planted on compacted soil to prevent downward growth of rootmass. No plant species with tap root systems were placed above or within 5 metres of any areas subject to soil capping.
- To ensure that migration of contaminants does not occur, utility trenches installed through the area of impacted soil contained within the berms were sealed with clay plugs at the transition from impacted to non-impacted 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 2018, Wood 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 groundwater encountered during any earthworks are managed in compliance with all applicable environmental laws including a CPU specific to the RA RSC Property portion of the site. In this context, "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, Groundwater and Sediment Standards for Use under Part XV.1 of the Environmental Protection Act*", Table 3 Full Depth Generic SCS in a Non-Potable Groundwater Condition for Residential/Parkland/Institutional (R/P/I) Land Use, coarse soil type (2011 Table 3 SCS);
- Provide a process to manage impacted soil and/or groundwater, including any excess soil;
- Provide a contingency plan to identify and manage any unknown contamination identified during the construction process or produced due to a spill or release during construction;
- Support the execution of the site health and safety plan as it relates to the safety of the construction workforce and the neighbouring community where contamination is encountered;
- Outline the methodology and procedures to minimize dust created during the excavation, loading and importation, placement and compaction of soil;
- Outline the procedures for notification and reporting; and,
- Integrate into other management plans and procedures that could include quality, environmental management, emergency response, and sustainability.

The revised SMP to meet the requirements of Condition 4.2.5 of the CPU was submitted to the MECP on June 2, 2014. The SMP was included in contract documents and provided to contractors during the redevelopment project and Wood was retained by the City to ensure implementation of the SMP during construction works. No changes or amendments to the SMP were made in 2018.

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 2018.

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 MECP 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 2018 Wood 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 2018:

1. April 24, 2018 – Routine spring and weather-related inspection, following a significant rainfall event with a total of 34.6 mm of rain recorded between April 15th and 16th, that included all RMM;
2. May 25, 2018 – Event specific and weather-related inspection, following the Tulip Festival (May 11th to 21st, 2018) as well as a rainfall event of 25.6 mm between May 19th and 20th, that included all RMM;
3. June 8, 2018 – Weather related inspection, triggered after rainfall events of 50 mm between June 3rd and 4th, 2018; that included all RMM;
4. July 5, 2018 – Event specific inspection; following the Bud Light Escapade Music Festival held between June 23rd and 24th and Canada Day weekend events held between June 30th and July 2nd, 2018; that included all RMM;
5. August 3, 2018 – Weather-related inspection, triggered after rainfall events of 130.8 mm between July 22nd and 25th, including a one-day rainfall event of 61.4 mm on July 25th, and 38.6 mm between July 27th and 29th, that included all RMM;
6. September 27, 2018 – Event specific and weather-related inspection, following the Ottawa CityFolk Festival held between September 12th and 16th, as well as a rainfall event of 31.6 mm on September 11th, which included all RMM; and,
7. November 9, 2018 – Routine fall inspection that included all RMM.

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

In a letter to the City of Ottawa, dated September 15, 2017, the MECP acknowledged the City of Ottawa's letter of intent to install a temporary grandstand on the East Berm. The letter acknowledged 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 MECP also requested confirmation that the geotextile and clean soil cap have been returned to a condition consistent with the CPU specifications and that the construction works and reinstatement activities be included in the 2017 and 2018 annual CPU reports.

Reinstatement of the clean soil cap, in the area of the temporary grandstands, was completed by Thunderbolt Contracting Ltd. ("Thunderbolt") in the spring of 2018. Wood was retained by Lansdowne Stadium Limited Partnership Ltd. ("LSLP") to perform periodic inspections throughout the clean soil cap reinstatement to document the activities, and ensure reinstatement was conducted in accordance to CPU specifications. Reinstatement activities were primarily completed between April 30th and May 16th while the area immediately adjacent the Art Screen was reinstated in late summer due to on-going work on the Art Screen. Access to the work area was restricted by temporary fencing erected around the area. Additional details with regards to the reinstatement activities are provided in Section 10.0 and in the inspection logs and memorandum provided in Appendix C.

The area of the former McElroy Building and a portion of the Eastern Swale was used by Tower Scaffolding Services Inc. ("Tower") as a staging area during the temporary stand construction and removal and by Thunderbolt during the reinstatement activities. The majority of the staging area, including all of the former McElroy Building area, was temporarily surfaced with granular material to facilitate the use of heavy equipment in this area. As a result of these activities groundwater monitoring well MW15-8 was damaged thereby allowing surface gravel to enter into the well preventing sampling during the spring monitoring event. The gravel was subsequent removed from the well using a vacuum truck and the well restored to service (see Section 10.0)

There was no significant deterioration of the RMM that would result in an increase in potential risk to human health on the CPU property observed during any of the inspections conducted in 2018 and therefore no immediate actions were recommended throughout the year. No changes or amendments to the IMP were made in 2018.

7.0 Groundwater Monitoring Program

A proposed GWMP outlining the proposed monitoring program to satisfy the requirements of Condition 4.2.7 of the CPU was submitted to the MECP for its approval on September 2, 2014 (AMEC, 2014c). Communication from the MECP 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, groundwater flow details, infiltration rates and interflow details;
2. Identifying any changes in groundwater quality resulting from establishing the RMM;
3. Establishing the location and installation details of all groundwater monitoring wells to be included in the program;
4. Establishing the frequency of all groundwater sampling and monitoring events;
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 Groundwater 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 groundwater beneath the CPU Property. As the GWMP was designed to detect changes to both physical flow characteristics and groundwater quality, the monitoring well locations were selected in consideration of the groundwater flow patterns previously identified at the Site and the proposed locations of the RMM implemented at the Site. Monitoring locations were therefore established both upgradient and downgradient of the RMM as well as within the immediate areas of the RMM. The groundwater monitoring well locations are shown on Figure 4.

The groundwater 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 groundwater monitoring wells installed at the Site were instrumented with dedicated Waterra inertial lift pumps and sufficient lengths of 12 mm inside diameter low density polyethylene (LDPE) tubing to facilitate well development and purging requirements. Following a minimum 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 groundwater that may have been disturbed or otherwise altered during the drilling and well installation process. Once developed, the wells were instrumented with 6 mm inside diameter LDPE tubing to facilitate low-flow sampling using a peristaltic pump.

7.2 Groundwater Monitoring and Sampling

Groundwater monitoring was conducted on May 29th, 2018 and November 8th, 2018 and included all monitoring wells installed at the CPU Property, with the exception of MW15-8 which could not be monitored during the May 2018 event as it had been damaged during the construction of temporary stands for the Grey Cup. 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 May 29th and November 8th 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 groundwater and the static groundwater elevations recorded at the monitoring wells are summarized in Table 2. In the spring, groundwater was present at depths ranging from 2.807 metres below ground surface (mbgs) at MW15-1 to 5.523 mbgs at MW15-2. Water table elevations recorded at the monitoring wells varied between 59.705 metres above sea level (masl) at MW15-2 and 62.723 masl at MW09-1. A groundwater elevation contour plan for the May 29, 2018 monitoring event depicting the inferred groundwater flow pattern beneath the CPU Property is provided on Figure 5a.

In the fall, groundwater was present at depths ranging from 3.352 mbgs at MW09-3 to 5.723 mbgs at MW15-12. Water table elevations recorded at the monitoring wells varied between 59.640 masl at MW09-5 and 62.187 masl at MW09-2. A groundwater elevation contour plan for the November 8, 2018 monitoring event depicting the inferred groundwater flow pattern beneath the CPU Property is provided on Figure 5b.

The inferred groundwater flow patterns beneath the CPU Property observed during the spring and fall monitoring events are similar to those observed during previous monitoring events conducted since inception in 2015. Shallow groundwater 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 reclaimed former inlet of the Rideau Canal.

Groundwater samples were collected on May 30 and 31, 2018 during the spring sampling event and on November 12 and 13, 2018 during the fall sampling event. Groundwater samples were collected from each of the monitoring wells installed at the CPU Property with the exception of monitoring wells MW15-8 during the May sampling event as it was damaged during the construction of temporary stands for the Grey Cup. Details of the damage and repair work are provided in the preceding section 6.0.

Groundwater samples were collected using low-flow sampling techniques in order to minimize potential sample biasing due to sediment entrainment. Groundwater field parameters measured during sampling including pH, temperature, dissolved oxygen (DO), conductivity and oxidation-reduction potential (ORP) and general observations made during sampling are provided in Table 3. Each of the groundwater 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 groundwater quality resulting from the implementation of the RMM.

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 MW15-12 and MW15-3 respectively for the spring sampling event and samples DUP-1 and DUP-2 are blind duplicate samples of MW15-7 and MW15-8 for the fall sampling event. Two (2) trip blanks were used during both the spring and fall sampling event, for analysis of chloroform to assess potential cross contamination during sample storage and transport.

7.3 Groundwater Sample Analysis

Groundwater sample analyses were performed by Paracel Laboratories Ltd. of Ottawa, Ontario. Analytical results for groundwater samples collected from the monitoring wells located on the CPU Property were evaluated through comparison with the 2011 Table 3 SCS for residential / parkland / institutional property use and coarse textured soil, where established, and for ammonia, chloroform and iron, to the PSS derived from the Risk Assessment as provided in CPU 0371-8TYQMY.

The MECP 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 an RSC is being sought under *Ontario Regulation 153/04 – Records of Site Condition, as amended* ("O.Reg. 153/04") at a property and when addressing chloroform in soil and/or groundwater 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 groundwater concentrations are numerically equal to or lower than the values listed in Table A of this guidance.

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

The results of the spring and fall groundwater 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 Monitoring Event

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

7.3.1.1 Petroleum Hydrocarbons

PHC were not detected in any of the groundwater 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) groundwater sample collected from MW15-2, located on the CPU Property, at a concentration of 1.6 µg/L and therefore well below the applicable Table A Chloroform Guidance value of 240 µg/L. All other groundwater 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

Two (1) PAHs, fluoranthene and pyrene, were detected in the groundwater sample collected from monitoring well MW15-5, located on the CPU property. The concentrations reported for fluoranthene and pyrene were well 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 fifteen (15) metals, including seven or more of arsenic, barium, boron, calcium, cadmium, cobalt, copper, iron, lead, magnesium, molybdenum, nickel, selenium, sodium, uranium and zinc were detected in each of the groundwater samples. All groundwater samples collected reported metals parameter concentrations below their respective 2011 Table 3 SCS where established or the PSS for iron.

7.3.1.5 General Chemistry Parameters

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

7.3.2 Fall Monitoring Event

Fifteen (15) groundwater samples, including two blind QA/QC duplicate sample, were collected from on-Site monitoring wells in the fall on November 12th and 13th, 2018. The results of the analysis are summarized in Table 4b.

7.3.2.1 Petroleum Hydrocarbons

PHC were not detected in any of the groundwater 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 groundwater 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 2.4 µg/L, 1.2 µg/L, 0.9 µg/L and 0.6 µg/L, respectively. These concentrations are below the applicable Table A Chloroform Guidance value of 240 µg/L. All other groundwater 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

PAH were not detected in any of the groundwater samples. All 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 sixteen (16) metals including seven or more of barium, boron, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, molybdenum, nickel, sodium, uranium, vanadium and zinc were detected in each of the groundwater samples. All groundwater samples collected reported metals parameter concentrations below their respective 2011 Table 3 SCS where established or the PSS for iron.

7.3.2.5 General Chemistry 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, duplicates 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.

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 sample 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 (Paracel) is accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) in accordance with *ISO/IEC 17025:1999 – "General Requirements for the Competence of Testing and Calibration Laboratories"* for the tested

parameters set out in the "S*oil, Ground Water and Sediment Standards for Use under Part XV.1 of the Environmental Protection Act*" dated 15 April 2011.

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

Sample analysis dates provided on the reports of analysis issued by Paracel indicate that all sample analyses were performed within the required sample/extract hold times. The RLs were met for all tested parameters.

Laboratory Blank Samples

Laboratory blank samples include method blanks and blank spikes. Method blanks consist of an uncontaminated media sample which is free of the target analytes or any other parameters that may interfere with the analysis and are subject to the entire analytical procedure including extraction, digestion, or any other preparation procedure. Method blanks are used to monitor laboratory background level of the target analytes and laboratory artefacts or anomalies. Method blanks are also used to monitor cross contamination of carry-over between samples, notable when high concentrations of the target analytes are present.

Blank spikes consist of an uncontaminated media sample free of the target analytes or interferences which is fortified with a known concentration of target analytes. The blank spike is processed through the entire analytical method including any extraction, digestion or any other preparation procedure. Spike blanks are used to monitor analyte recovery and potential loss during the preparation procedures as well as to validate the calibration of the instrumentation or technique.

Based on the laboratory Reports of Analysis, laboratory sample blank analyses met MECP requirements.

Matrix Spike Samples

Matrix spike samples consist of an aliquot from a randomly chosen sample that is fortified with a known concentration of target analytes. Matrix spike samples are processed through the entire analytical method including any extraction, digestion or any other preparation procedure. The matrix spike sample

is used to evaluate laboratory precision and to evaluate any "matrix effects" that may exist in a sample due to its composition that may affect the recovery of the target analytes. An example is the presence of peat in soils which tends to adsorb organic analytes resulting in a poor matrix spike recovery.

Based on the laboratory Reports of Analysis, recoveries reported for spiked samples/blanks were acceptable, with the exception of RPD values for calcium on report of analysis 1846110 and 1846213, for beryllium on report of analysis 1822387 and sodium on report of analysis 1822570. The results for the spiked samples were accepted based on other acceptable QC.

Laboratory Replicates

Laboratory replicates (or duplicates) consist of an aliquot from a randomly chosen sample within an analytical batch that is processed through the entire analytical method to evaluate analytical precision and sample homogeneity. The differences between the two sample results are expressed as RPDs.

Based on the laboratory Reports of Analysis, RPDs for laboratory replicate sample analyses met MECP requirements, with the exception of boron on report of analyses 1822387 and DOC on report of analysis 182250 which reported elevated RPD value. The results were accepted due to the results being less than 10 times the MDL.

Surrogate Recoveries

Surrogates are deuterated analogues or compounds not normally found in nature but behave chemically and physically similar to the target analytes in the analysis. Known surrogate concentrations are added to samples prior to analysis and recoveries calculated and expressed as a percentage. Surrogates are employed to monitor the efficiency of organic extractions, instrument performance and provide within run quality control. The results are reported as percentage recoveries based on the known concentrations added to the sample.

Laboratory surrogate recoveries reported as part of the laboratory Reports of Analysis were found to be within acceptable ranges.

7.5.4 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 MECP for its approval on September 2, 2014 (AMEC, 2014d). Communication from the MECP 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:

- 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;
- location and installation details of all boreholes and landfill gas probes included in the program;
- frequency of all sampling and monitoring events;
- 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,
- 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 groundwater monitoring wells (GP15-1 through GP 15-3 and GP15-8 through GP15-10) to permit monitoring of LFG composition and subsurface pressure, to verify the current levels of methane in the subsoil environment and to identify areas of potential gas impingement. Each LFG probe was constructed as per the details provided in the MMP.

The locations of the 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 21st, May 29th, August 3rd and November 8th, 2018. 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 or 5000 Landfill Gas Monitor. The GEM 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 GP15-6 (0.2 vol. % in May, and 0.3 vol. % in November). Based on the methane concentrations noted above, the Site meets the on-site methane concentrations limits as outlined in O.Reg. 232/98 and the recommended methane alert levels provided in Procedure D-4-1.

8.4 Landfill Gas Data Analyses

The fairly consistent presence of low level initial and stable methane concentrations measured at GP15-6 indicate that methane impacts are predominantly confined within the footprint of the former Eastern Landfill. 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 GP15-5, GP15-6 and GP15-8 in February and November) suggests that the subsurface methane is not likely to migrate beyond the immediate areas in which it is encountered. The lack of detectable methane 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 2018, no contingency measures were deemed necessary and therefore no such measures were implemented at the CPU Property in 2018.

10.0 Site Restoration Activities

Temporary grandstands were erected 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 provide a level surface on the sloped sides of the berm on which to set the footings for the grandstand. The holes were thus wedged shaped and generally quite shallow, not exceeding a maximum depth of 90 cm. As such, the excavations did not damage or disturb the non-woven geotextile at the base of the clean soil cap. The temporary grandstand was disassembled during the winter and restoration activities effected in spring and summer of 2018.

Wood was retained by LSLP to sample soils brought to the Site, to perform periodic inspections throughout the clean soil cap reinstatement and to document the activities, and ensure reinstatement was conducted in accordance with the specifications stipulated in the CPU. Reinstatement of the clean soil cap overlying the East Berm was primarily completed between April 30th and May 16th while the area immediately adjacent the Art Screen was reinstated in late summer due to on-going work on the Art Screen. Reinstatement activities included manually backfilling the shallow holes excavated within the clean soil cap and placing topsoil and hydroseed over the disturbed areas. Access to the work area was restricted by temporary fencing erected around the area.

Soil previously excavated from and stockpiled beside the shallow holes was used to backfill the excavations. Clean topsoil placed over the excavation was sourced from Greely Sand & Gravel located at 1971 Old Prescott Road in Greely, Ontario. The topsoil was sampled prior to being imported to the Site in accordance with O. Reg. 153/4 for soils brought to an RSC property. Results of the laboratory analysis indicated all parameters to be below Table 3 SCS for residential / parkland / institutional (R/P/I) property use and coarse textured soil as well as the more stringent Table 1 Background SCS for industrial / commercial / community / residential / parkland / institutional (I/C/C/R/P/I) property use for all samples analyzed. Details of the inspections including photo logs as well as the toposoil sampling memorandum including laboratory results are provided in Appendix C.

A survey of the East and South Berms was conducted by Stantec in December of 2018. The differential settlement of materials on the East and South Berm measured during the 2018 survey were within the 0.1 metres allowable differential from the 2014 as-built survey of the berms. Visual inspections as well as the results of a survey of the East Berm confirmed that RMM had been restored to conditions consistent with the CPU specifications.

As a result of activities related to the construction of temporary stands on the East Berm groundwater monitoring well MW15-8 was damaged allowing surface gravel to enter into the well preventing sampling during the spring monitoring event. Restoration of the staging area, as well as reinstatement of MW15-8, was conducted in early October. LSLP retained Clean Water Works and Wood to effect repairs to the damaged monitoring well MW15-8. Under Wood's supervision, Clean Water Works removed gravel from the well using pressurized water which was then removed along with any debris in the well using a

vacuum truck. A much greater quantity of water was removed then introduced in an attempt to remove any material potentially introduced during rehabilitation activities. An inspection of the area post reinstatement showed that the area had been restored to conditions consistent with the CPU specifications. Pictures of the staging area post reinstatement are included in the November RMM inspection log in Appendix B.

With regards to other areas of the Site, visual inspections undertaken in 2018 were similar to those of 2017 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. The areas are not considered to result in any increase in the levels of risk to potential receptors at the CPU Property, however restoration using clean fill/topsoil in 2019 to prevent further deterioration of the RMM in this area.

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 2018.

11.0 Conclusions and Recommendations

The findings and results of the monitoring, sampling and inspection programs carried out at the CPU Property in 2018 to meet the annual reporting requirements are as follows:

- Inspections of the RMM implemented at the CPU Property were conducted in 2018 in accordance with the Inspection and Maintenance Plan (IMP). In 2017, a temporary grandstand was erected on the East Berm necessitating the excavation of several hundred shallow hand dug holes to permit placement of level footing plates to support the footings of the grandstand. The reinstatement of the East Berm was conducted in the spring of 2018 once the temporary grandstand was removed. Reinstatement of the clean soil cap consisted of backfilling the holes with material previously excavated at each location, placing topsoil over any disturbed areas and finally applying hydroseed. Inspections conducted during the reinstatement activities confirmed that the areas previously disturbed had been reinstated to conditions consistent with CPU specifications.
- To fulfill the requirements of the Risk Management Plan (RMP) and confirm reinstatement of the East Berm a second survey of both the East and South Berms was conducted in December 2018 to assess any differential settlement or consolidation of materials comprising the clean soil cap. The survey reported that all survey points on both the East and South Berms were within the 0.1 m allowable settlement threshold when compared to those of the 2014 as-built survey.
- 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. Although the survey of the South Berm did not identify any deficient areas in 2018, deteriorated soil cap conditions continue to be present on the South Berm and should be addressed in 2019 to prevent further deterioration of the RMM.
- The 2018 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 groundwater flow patterns beneath the CPU Property similar to those observed since inception of the groundwater monitoring program in 2015. Shallow groundwater, 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 groundwater samples collected from the monitoring well network located at the CPU property in 2018 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 2018 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, Methane Monitoring Plan (MMP) and IMP completed in 2018, no contingency measures were deemed necessary at the CPU Property and therefore no such measures or activities were implemented in 2018. 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 2018.

12.0 Closure

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

Respectfully Submitted,

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13.0 References

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

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

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

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

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, Groundwater and Sediment Standards for Use under Part XV.1 of the Environmental Protection Act, April 15, 2011, PIBS # 7382e01.

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

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

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

Tables

Table 1. Groundwater Monitoring Well Construction Details

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

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

Table 2. Groundwater Measurement and Elevation Data

Monitoring Well I.D.	Ground Surface Elevation (masl)	Top of Casing Elevation (masl)	Bottom of Well Screen Elevation (mbtoc)	May 29, 2018			November 8, 2018		
				Depth to Water (mbtoc)	Depth to Water (mbgs)	Static Elevation (masl)	Depth to Water (mbtoc)	Depth to Water (mbgs)	Static Elevation (masl)
MW15-1	65.492	65.409	59.392	2.724	2.807	62.685	3.837	3.920	61.572
MW15-2	65.228	65.085	58.518	5.380	5.523	59.705	5.315	5.458	59.770
MW15-3	65.067	64.899	58.357	5.117	5.285	59.782	5.085	5.253	59.814
MW15-4	65.319	65.256	59.219	4.035	4.098	61.221	4.967	5.030	60.289
MW15-5	64.924	64.895	58.824	5.055	5.084	59.840	5.197	5.226	59.698
MW15-6	64.680	64.615	59.500	4.651	4.716	59.964	4.757	4.822	59.858
MW15-7	64.513	64.431	59.033	4.521	4.603	59.910	4.714	4.796	59.717
MW15-8	64.898	64.815	58.798	Damaged			5.144	5.227	59.671
MW15-9	65.253	65.148	59.153	5.087	5.192	60.061	5.240	5.345	59.908
MW15-10	65.043	64.979	58.943	4.571	4.635	60.408	5.243	5.307	59.736
MW15-11	64.571	64.447	58.471	4.281	4.405	60.166	4.668	4.792	59.779
MW15-12	65.596	65.498	58.886	5.220	5.318	60.278	5.625	5.723	59.873
MW09-1	65.718	65.658	60.828	2.935	2.995	62.723	3.565	3.625	62.093
MW09-2	65.667	65.601	60.777	3.065	3.131	62.536	3.414	3.480	62.187
MW09-3	65.426	65.368	60.536	3.007	3.065	62.361	3.294	3.352	62.074
MW09-5	65.108	65.061	59.008	5.335	5.382	59.726	5.421	5.468	59.640
MW09-6	65.232	65.202	59.132	5.435	5.465	59.767	5.552	5.582	59.650

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

Table 3. Groundwater 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)	pH (pH units)	Specific Conductance (uS/cm)	Dissolved Oxygen (mg/L)	Temperature (°C)	Oxidation Reduction Potential (ORP) (mV)	PHC	PAH	Metals	GWC	Chloroform	
MW15-1	05/31/18	2.530	2.625	0.095	6.93	2930	0.22	11.30	-82.2	✓	✓	✓	✓	✓	Cloudy brown, no sheen or odour.
	11/12/18	3.878	3.975	0.097	6.79	3500	0.60	14.40	-59.2	✓	✓	✓	✓	✓	Clear, no sheen or odour.
MW15-2	05/31/18	5.339	5.360	0.021	7.35	2430	5.31	11.80	126.6	✓	✓	✓	✓	✓	Clear, no sheen or odour.
	11/12/18	5.364	5.365	0.001	7.25	2570	4.36	14.10	47.9	✓	✓	✓	✓	✓	Clear, no sheen or odour.
MW15-3	05/31/18	5.086	5.101	0.015	7.11	2460	5.24	13.70	143.3	✓	✓	✓	✓	✓	Cloudy, no sheen or odour.
	11/12/18	5.127	5.131	0.004	7.35	3510	4.54	14.70	-37.8	✓	✓	✓	✓	✓	Clear, no sheen or odour.
MW15-4	05/31/18	4.022	4.037	0.015	7.12	2302	0.05	11.80	-100.5	✓	✓	✓	✓	✓	Cloudy brown, no sheen or odour.
	11/12/18	-	-	-	-	-	-	-	-	✓	✓	✓	✓	✓	Iron build-up within the well prevented low-flow sampling. The well was purged dry and sampled with wattera inertial lift pump.
MW15-5	05/30/18	5.035	5.050	0.015	7.29	1710	0.34	11.80	126.4	✓	✓	✓	✓	✓	Clear, no sheen or odour.
	11/12/18	5.255	5.257	0.002	6.99	2714	1.55	11.84	61.6	✓	✓	✓	✓	✓	Clear, no sheen or odour.
MW15-6	05/31/18	4.622	4.626	0.004	7.09	4320	3.10	11.10	160.6	✓	✓	✓	✓	✓	Clear, no sheen or odour.
	11/13/18	4.830	4.831	0.001	7.38	2950	3.12	14.00	46.6	✓	✓	✓	✓	✓	Clear, no sheen or odour.
MW15-7	05/31/18	4.495	4.496	0.001	7.15	2220	3.65	10.20	147.3	✓	✓	✓	✓	✓	Clear, no sheen or odour.
	11/12/18	4.764	4.765	0.001	7.00	2637	2.25	11.50	86.3	✓	✓	✓	✓	✓	Clear, no sheen or odour.
MW15-8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Top of casing was broken from construction activities in the area allowing gravel to enter the well preventing sample collection.
	11/13/18	5.206	5.206	0.000	7.44	1400	5.40	12.88	150.3	✓	✓	✓	✓	✓	Clear, no sheen or odour.
MW15-9	05/31/18	5.056	5.064	0.008	6.86	2500	7.01	13.70	172.6	✓	✓	✓	✓	✓	Cloudy brown, no sheen or odour.
	11/13/18	5.305	5.310	0.005	7.48	2480	5.74	14.00	70.1	✓	✓	✓	✓	✓	Clear, no sheen or odour.
MW15-10	05/30/18	4.887	5.030	0.143	7.06	3050	1.94	12.90	161.5	✓	✓	✓	✓	✓	Brown, no sheen or odour.
	11/13/18	5.307	5.326	0.019	6.76	3804	5.60	11.90	156.8	✓	✓	✓	✓	✓	Clear, no sheen or odour.
MW15-11	05/30/18	4.280	4.282	0.002	7.56	1060	3.26	14.60	110.3	✓	✓	✓	✓	✓	Clear, no sheen or odour.
	11/13/18	4.744	4.744	0.000	7.41	1595	2.01	14.04	140.7	✓	✓	✓	✓	✓	Clear, no sheen or odour.
MW15-12	05/30/18	5.200	5.201	0.001	7.13	2240	4.08	11.30	130.9	✓	✓	✓	✓	✓	Cloudy brown, no sheen or odour.
	11/13/18	5.700	5.700	0.000	7.50	1232	2.61	11.21	119.2	✓	✓	✓	✓	✓	Clear, no sheen or odour.

Notes:

Water Level Data as Recorded During Low-Flow Sampling.

Field Parameters Measured using a YSI 556 Multi-Parameter Water Quality Monitoring Instrument.

mbtoc = Metres Below Top of Casing.

PHC = Petroleum Hydrocarbons.

PAH = Polynuclear Aromatic Hydrocarbons.

Metals = Sb, As, Ba, Be, B, Cd, Ca, Cr, Cr(vi), Co, Cu, Fe, Pb, Mg, Hg, Mo, Ni, Se, Ag, Na, Th, V, Zn.

GWC = General Water Chemistry (pH, alkalinity, ammonia, conductivity, chloride, nitrate, sulphate, biochemical oxygen demand [BOD], chemical oxygen demand [COD], dissolved organic carbon [DOC], total dissolved solids [TDS]).

Notes on Ground Water Analytical Summary Tables

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

RDL = Laboratory Analytical Method Reporting Detection Limit.

RL = MOE 2011 Analytical Protocol Reporting Limit.

DUP = Quality Assurance/Quality Control Duplicate Sample.

RPD = Relative Percent Difference (Between Primary and Duplicate Samples).

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

PHC = Petroleum Hydrocarbons.

< = Less Than Laboratory Analytical Method Detection Limit.

- = 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.

Table 4a. Summary of Groundwater Analyses - Spring 2018

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)	MW15-1 MW15-1 CPU Property 1822570-01 5/31/2018	MW15-2 MW15-2 CPU Property 1822570-02 5/31/2018	MW15-3 MW15-3 CPU Property 1822570-03 5/31/2018	MW15-3 DUP-2 CPU Property 1822570-08 5/31/2018	MW15-3 Average	MW15-3 RPD (%)	MW15-4 MW15-4 CPU Property 1822570-04 5/31/2018	MW15-5 MW15-5 CPU Property 1822387-01 5/30/2018	MW15-6 MW15-6 CPU Property 1822570-05 5/31/2018	MW15-7 MW15-7 CPU Property 1822570-06 5/31/2018	MW15-9 MW15-9 CPU Property 1822570-07 5/31/2018	MW15-10 MW15-10 CPU Property 1822387-02 5/30/2018	MW15-11 MW15-11 CPU Property 1822387-03 5/30/2018	MW15-12 MW15-12 CPU Property 1822387-04 5/30/2018
General Inorganic Parameters (mg/L)																		
pH (pH units)	0.1	-	-	-	7.2	7.5	7.6	7.8	7.7	2.60%	7.6	7.4	7.6	7.4	7.8	7.3	7.8	7.8
Alkalinity (CaCO3)	5	-	-	-	430	299	274	274	274	0.00%	524	438	298	400	270	406	307	306
Ammonia	0.01	-	-	4.524	1.32	0.06	0.04	0.14	0.09	-	3.63	0.4	0.05	0.07	0.06	0.06	0.0	0.1
Conductivity (µS/cm)	5	-	-	-	3360	2630	2940	2940	2940	0.00%	2670	1950	5150	2790	2880	3500	1280	2530
Chloride	1	1	2300	-	814	467	666	665	666	0.15%	300	178	1400	581	592	661	168	519
Nitrate (N)	0.1	0.1	-	-	< 0.1	4.6	4.3	4.3	4.3	0.00%	< 0.1	0.2	2.9	2.9	3.9	1.3	0.7	0.4
Sulphate	1	-	-	-	96	406	206	206	206	0.00%	564	395	252	153	323	443	113	165
Biological Oxygen Demand (BOD)	2	-	-	-	3	< 2	< 2	< 2	< 2	-	< 2	< 2	5.0	< 2	< 2	< 2	< 2	< 2
Chemical Oxygen Demand (COD)	10	-	-	-	12	< 10	36	< 10	< 23	-	27	11.0	22.0	13	18	77	< 10	10.0
Dissolved Organic Carbon	0.5	-	-	-	1.7	< 0.5	< 0.5	< 0.5	< 0.5	-	7.1	3.4	1.2	5.2	0.8	27.8	1.5	1.5
Hardness	-	-	-	-	614	830	547	602	574.5	9.57%	953	640	849	649	600	643	319	470
Total Dissolved Solids	10	-	-	-	1980	1860	1750	1750	1750	0.00%	1820	1210	3230	1650	1760	2090	660	1410
Volatile Organic Compounds (µg/L)																		
Chloroform	0.5	1	240 [c]	22	< 0.5	1.6	< 0.5	< 0.5	< 0.5	-	< 0.5	< 0.5	0.6	< 0.5	0.6	< 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	0.04	< 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	0.04	< 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	< 0.5
Arsenic	1	1	1900	-	< 1	< 1	< 1	< 1	< 1	-	2	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Barium	1	2	29000	-	756	186	100	98	99	2.02%	82	154	131	164	79	80	98	78
Beryllium	0.5	0.5	67	-	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	-	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Boron	10	10	45000	-	66	56	44	42	43	4.65%	94	91	54	66	57	57	44.0	48.0
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	-	-	-	193000	264000	172000	185000	178500	7.28%	298000	210000.0	275000	218000	184000	212000	96900	144000.0
Chromium	1	10	810	-	< 1	< 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	< 10
Cobalt	0.5	1	66	-	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	-	1.2	1.7	< 0.5	< 0.5	1.7	1.0	< 0.5	< 0.5
Copper	0.5	5	87	-	< 0.5	1.8	1.4	1.2	1.3	15.38%	0.8	1.7	2.1	2.9	1.7	7.1	< 0.5	< 0.5
Iron	100	-	-	24240	19500	< 100	< 100	< 100	< 100	-	21000	< 100	< 100	< 100	< 100	< 100	< 100	< 100
Lead	0.1	1	25	-	0.1	< 0.1	< 0.1	< 0.1	< 0.1	-	0.2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Magnesium	200	-	-	-	32000	41600	28300	33700	31000	17.42%	50800	27800.0	39200	25600	34100	27800	18800	26700.0
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	-	0.6	3.7	1.4	1.3	1.35	7.41%	1.8	0.6	1.1	3.4	6.4	< 0.5	0.7	0.9
Nickel	1	1	490	-	< 1	1	< 1	< 1	< 1	-	4	4	2	1	10.0	6	< 1	< 1
Selenium	1	5	63	-	< 1	< 1	< 1	< 1	< 1	-	< 1	< 1	2.0	< 1	< 1	< 1	< 1	< 1
Silver	0.1	0.3	1.5	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Sodium	200	5000	2300000	-	459000	203000	371000	446000	408500	18.36%	242000	205000	683000	326000	372000	546000	156000	355000.0
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	-	0.2	3	1.4	1.3	1.4	7.41%	0.8	0.8	3.4	0.9	2.1	1.5	0.7	1.0
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	-	6	< 5	< 5	< 5	< 5	-	303	< 5	6	< 5	< 5	< 5	< 5	< 5

Table 4a. Summary of Groundwater Analyses - Spring 2018

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)	MW15-12 DUP-1 CPU Property 1822387-10 5/30/2018	MW15-12 Average	MW15-12 RPD (%)	Trip Blank Trip Blank 1822387-11 5/25/2018	Trip Blank Trip Blank 1822570-09 5/31/2018										
General Inorganic Parameters (mg/L)																			
pH (pH units)	0.1	-	-	-	7.8	7.8	0.00%	-	-										
Alkalinity (CaCO3)	5	-	-	-	305	306	0.33%	-	-										
Ammonia	0.01	-	-	4.524	0.03	0.05	-	-	-										
Conductivity (µS/cm)	5	-	-	-	2510	2520	0.79%	-	-										
Chloride	1	1	2300	-	556	538	6.88%	-	-										
Nitrate (N)	0.1	0.1	-	-	0.3	0.4	-	-	-										
Sulphate	1	-	-	-	166	166	0.60%	-	-										
Biological Oxygen Demand (BOD)	2	-	-	-	< 2	< 2	-	-	-										
Chemical Oxygen Demand (COD)	10	-	-	-	10	10	0.00%	-	-										
Dissolved Organic Carbon	0.5	-	-	-	1.8	1.65	18.18%	-	-										
Hardness	-	-	-	-	479	474.5	1.90%	-	-										
Total Dissolved Solids	10	-	-	-	1410	1410	0.00%	-	-										
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	-	-	-										
PHC F2 (>C10 - C16) [a]	100	100	150	-	< 100	< 100	-	-	-										
PHC F3 (>C16 - C34) [a]	100	500	500	-	< 100	< 100	-	-	-										
PHC F4 (>C34) [a]	100	500	500	-	< 100	< 100	-	-	-										
Polynuclear Aromatic Hydrocarbons (µg/L)																			
Acenaphthene	0.05	1	600	-	< 0.05	< 0.05	-	-	-										
Acenaphthylene	0.05	1	1.8	-	< 0.05	< 0.05	-	-	-										
Anthracene	0.05	0.1	2.4	-	< 0.01	< 0.01	-	-	-										
Benzo(a)anthracene	0.01	0.2	4.7	-	< 0.01	< 0.01	-	-	-										
Benzo(a)pyrene	0.01	0.01	0.81	-	< 0.01	< 0.01	-	-	-										
Benzo(b)fluoranthene	0.01	0.1	0.75	-	< 0.05	< 0.05	-	-	-										
Benzo(g,h,i)perylene	0.05	0.2	0.2	-	< 0.05	< 0.05	-	-	-										
Benzo(k)fluoranthene	0.05	0.1	0.4	-	< 0.05	< 0.05	-	-	-										
Chrysene	0.05	0.1	1	-	< 0.05	< 0.05	-	-	-										
Dibenzo(a,h)anthracene	0.05	0.2	0.52	-	< 0.05	< 0.05	-	-	-										
Fluoranthene	0.01	0.4	130	-	< 0.01	< 0.01	-	-	-										
Fluorene	0.05	0.5	400	-	< 0.05	< 0.05	-	-	-										
Indeno(1,2,3,c,d)pyrene	0.05	0.2	0.2	-	< 0.05	< 0.05	-	-	-										
Methylnaphthalene, 1- [b]	0.05	2	1800	-	< 0.05	< 0.05	-	-	-										
Methylnaphthalene, 2- [b]	0.05	2		-	< 0.05	< 0.05	-	-	-										
Naphthalene	0.05	2	1400	-	< 0.05	< 0.05	-	-	-										
Phenanthrene	0.05	0.1	580	-	< 0.05	< 0.05	-	-	-										
Pyrene	0.01	0.2	68	-	< 0.01	< 0.01	-	-	-										
Metals (µg/L)																			
Antimony	0.5	0.5	20000	-	< 0.5	< 0.5	-	-	-										
Arsenic	1	1	1900	-	< 1	< 1	-	-	-										
Barium	1	2	29000	-	92	85	16.47%	-	-										
Beryllium	0.5	0.5	67	-	< 0.5	< 0.5	-	-	-										
Boron	10	10	45000	-	52	50	8.00%	-	-										
Cadmium	0.1	0.5	2.7	-	< 0.1	< 0.1	-	-	-										
Calcium	100	-	-	-	147000	145500	2.06%	-	-										
Chromium	1	10	810	-	< 1	< 1	-	-	-										
Chromium (VI)	10	10	140	-	< 10	< 10	-	-	-										
Cobalt	0.5	1	66	-	< 0.5	< 0.5	-	-	-										
Copper	0.5	5	87	-	< 0.5	< 0.5	-	-	-										
Iron	100	-	-	24240	< 100	< 100	-	-	-										
Lead	0.1	1	25	-	< 0.1	< 0.1	-	-	-										
Magnesium	200	-	-	-	26900	26800	0.75%	-	-										
Mercury	0.1	0.1	0.29	-	< 0.1	< 0.1	-	-	-										
Molybdenum	0.5	0.5	9200	-	0.9	0.9	0.00%	-	-										
Nickel	1	1	490	-	< 1	< 1	-	-	-										
Selenium	1	5	63	-	< 1	< 1	-	-	-										
Silver	0.1	0.3	1.5	-	< 0.1	< 0.1	-	-	-										
Sodium	200	5000	2300000	-	354000	354500	0.28%	-	-										
Thallium	0.1	0.5	510	-	< 0.1	< 0.1	-	-	-										
Uranium	0.1	2	420	-	1	1	0.00%	-	-										
Vanadium	0.5	0.5	250	-	< 0.5	< 0.5	-	-	-										
Zinc	5	5	1100	-	< 5	< 5	-	-	-										

Table 4b. Summary of Groundwater Analyses - Fall 2018

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 1846110-01 11/12/2018	MW15-2 MW15-2 CPU Property 1846110-02 11/12/2018	MW15-3 MW15-3 CPU Property 1846110-03 11/12/2018	MW15-4 MW15-4 CPU Property 1846213-01 11/13/2018	MW15-5 MW15-5 CPU Property 1846110-04 11/12/2018	MW15-6 MW15-6 CPU Property 1846213-02 11/13/2018	MW15-7 MW15-7 CPU Property 1846110-05 11/12/2018	MW15-7 DUP-1 CPU Property 1846110-11 11/12/2018	MW15-7 Average	MW15-7 RPD (%)	MW15-8 MW15-8 CPU Property 1846213-03 11/13/2018	MW15-8 DUP-2 CPU Property 1846213-08 11/13/2018	MW15-8 Average	MW15-8 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	-	-	-	7.1	7.6	7.6	7.4	7.3	7.8	7.4	7.4	7.4	0.00%	7.7	7.7	7.7	0.00%
Alkalinity (CaCO3)	5	-	-	-	497	329	306	672	454	357	422	423	423	0.24%	344	344	344	0.00%
Ammonia	0.01	-	-	4.524	1.17	0.03	0.04	2.8	0.32	0.13	0.04	0.32	0.18	-	0.02	0.25	0.1	-
Conductivity (µS/cm)	5	-	-	-	2890	2150	3010	1700	2280	2640	2110	2080	2095	1.43%	1160	1160	1160	0.00%
Chloride	1	1	2300	-	703	414	712	119	286	582	394	373	384	5.48%	156	156	156	0.00%
Nitrate (N)	0.1	0.1	-	-	< 0.1	3.9	2.9	< 0.1	0.6	1.5	1.0	1.0	1.0	0.00%	0.6	0.6	0.6	-
Sulphate	1	-	-	-	31	186	188	207	424	162	157	156	157	0.64%	80	80	80	0.00%
Biological Oxygen Demand (BOD)	2	-	-	-	< 2	< 2	< 2	3	< 2	< 2	< 2	< 2	< 2	-	< 2	< 2	< 2	-
Chemical Oxygen Demand (COD)	10	-	-	-	16	12	14	27	13	35	21	< 10	< 15.5	-	12	24	18	-
Dissolved Organic Carbon	0.5	-	-	-	2.2	0.9	< 0.5	5.6	2.0	1.2	0.9	1.8	1.4	-	0.6	< 0.5	< 0.55	-
Hardness	-	-	-	-	480	398	428	871	734	193	555	557	556	0.36%	317	323	320	1.88%
Total Dissolved Solids	10	-	-	-	1540	1210	1570	1130	1440	1370	1160	1160	1160	0.00%	632	626	629	0.95%
Volatile Organic Compounds (µg/L)																		
Chloroform	0.5	1	240 [c]	22	< 0.5	2.4	1.2	< 0.5	< 0.5	0.9	< 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	-	-
PHC F2 (>C10 - C16) [a]	100	100	150	-	< 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	-	-
PHC F4 (>C34) [a]	100	500	500	-	< 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	-	-
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	-	-
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	-	-
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	-	-
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	-	-
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	-	-
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	-	-
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	-	-
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	-	-
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	-	-
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	-	-
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	-	-
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	-	-
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	-	-
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	-	-
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	-	-
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	-	-
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	-	-
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	-	663	85	81	125	157	34	119	108	114	9.69%	56	57	56.5	1.77%
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	-	69	45	35	86	88	29	52	52	52	0.00%	38	37	38	2.67%
Cadmium	0.1	0.5	2.7	-	< 0.1	< 0.1	< 0.1	0.2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	-
Calcium	100	-	-	-	152000	129000	132000	283000	240000	65300	178000	180000	179000	1.12%	98200	99800	99000	1.62%
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	1.5	0.9	< 0.5	< 0.5	< 0.5	-	< 0.5	< 0.5	< 0.5	-
Copper	0.5	5	87	-	< 0.5	1.8	1.6	7.8	3.1	9.3	2.3	2.3	2.3	0.00%	1.8	2	1.9	10.53%
Iron	100	-	-	24240	12200	< 100	< 100	112	< 100	< 100	< 100	< 100	< 100	-	< 100	< 100	< 100	-
Lead	0.1	1	25	-	< 0.1	< 0.1	< 0.1	0.2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	-
Magnesium	200	-	-	-	24300	18700	23700	39800	32500	7130	26500	26100	26300	1.52%	17600	17900	17750	1.69%
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	-	3.2	11.9	1.6	1.7	0.5	2.5	< 0.5	< 0.5	< 0.5	-	0.7	0.7	0.7	0.00%
Nickel	1	1	490	-	< 1	1	< 1	2	4	4	2	2	2	0.00%	< 1	1	< 1	-
Selenium	1	5	63	-	< 1	1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	-	< 1	< 1	< 1	-
Silver	0.1	0.3	1.5	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	-
Sodium	200	5000	2300000	-	385000	289000	421000	108000	210000	451000	198000	200000	199000	1.01%	117000	118000	117500	0.85%
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	2.5	1.4	0.7	1	2.4	0.9	0.9	0.9	0.00%	0.4	0.5	0.5	22%
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	68	< 5	6	< 5	< 5	< 5	-	< 5	< 5	< 5	-

Table 4b. Summary of Groundwater Analyses - Fall 2018

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 MW15-9 CPU Property 1846213-04 11/13/2018	MW15-10 MW15-10 CPU Property 1846213-05 11/13/2018	MW15-11 MW15-11 CPU Property 1846213-06 11/13/2018	MW15-12 MW15-12 CPU Property 1846213-07 11/13/2018	Trip Blank Trip Blank 1846110-12 11/8/2018	Trip Blank Trip Blank 1846213-09 11/8/2018								
General Inorganic Parameters (mg/L)																		
pH (pH units)	0.1	-	-	-	7.8	7.3	7.7	7.8	-	-								
Alkalinity (CaCO3)	5	-	-	-	372	389	320	302	-	-								
Ammonia	0.01	-	-	4.524	0.03	0.09	0.09	0.03	-	-								
Conductivity (µS/cm)	5	-	-	-	2060	2950	1300	956	-	-								
Chloride	1	1	2300	-	300	553	193	133	-	-								
Nitrate (N)	0.1	0.1	-	-	2.2	1.0	1.0	0.2	-	-								
Sulphate	1	-	-	-	313	387	89	34	-	-								
Biological Oxygen Demand (BOD)	2	-	-	-	< 2	< 2	< 2	< 2	-	-								
Chemical Oxygen Demand (COD)	10	-	-	-	21	50	< 10	15	-	-								
Dissolved Organic Carbon	0.5	-	-	-	1.5	12.8	< 0.5	< 0.5	-	-								
Hardness	-	-	-	-	341	501	355	255	-	-								
Total Dissolved Solids	10	-	-	-	1190	1750	682	524	-	-								
Volatile Organic Compounds (µg/L)																		
Chloroform	0.5	1	240 [c]	22	0.6	< 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	-	-								
PHC F2 (>C10 - C16) [a]	100	100	150	-	< 100	< 100	< 100	< 100	-	-								
PHC F3 (>C16 - C34) [a]	100	500	500	-	< 100	< 100	< 100	< 100	-	-								
PHC F4 (>C34) [a]	100	500	500	-	< 100	< 100	< 100	< 100	-	-								
Polynuclear Aromatic Hydrocarbons (µg/L)																		
Acenaphthene	0.05	1	600	-	< 0.05	< 0.05	< 0.05	< 0.05	-	-								
Acenaphthylene	0.05	1	1.8	-	< 0.05	< 0.05	< 0.05	< 0.05	-	-								
Anthracene	0.05	0.1	2.4	-	< 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	-	-								
Benzo(a)pyrene	0.01	0.01	0.81	-	< 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	-	-								
Benzo(g,h,i)perylene	0.05	0.2	0.2	-	< 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	-	-								
Chrysene	0.05	0.1	1	-	< 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	-	-								
Fluoranthene	0.01	0.4	130	-	< 0.01	< 0.01	< 0.01	< 0.01	-	-								
Fluorene	0.05	0.5	400	-	< 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	-	-								
Methylnaphthalene, 1- [b]	0.05	2	1800	-	< 0.05	< 0.05	< 0.05	< 0.05	-	-								
Methylnaphthalene, 2- [b]	0.05	2		-	< 0.05	< 0.05	< 0.05	< 0.05	-	-								
Naphthalene	0.05	2	1400	-	< 0.05	< 0.05	< 0.05	< 0.05	-	-								
Phenanthrene	0.05	0.1	580	-	< 0.05	< 0.05	< 0.05	< 0.05	-	-								
Pyrene	0.01	0.2	68	-	< 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	-	-								
Arsenic	1	1	1900	-	< 1	< 1	< 1	< 1	-	-								
Barium	1	2	29000	-	45	43	87	45	-	-								
Beryllium	0.5	0.5	67	-	< 0.5	< 0.5	< 0.5	< 0.5	-	-								
Boron	10	10	45000	-	53	41	27	33	-	-								
Cadmium	0.1	0.5	2.7	-	< 0.1	< 0.1	< 0.1	< 0.1	-	-								
Calcium	100	-	-	-	105000	158000	106000	80200	-	-								
Chromium	1	10	810	-	2	< 1	< 1	< 1	-	-								
Chromium (VI)	10	10	140	-	< 10	< 10	< 10	< 10	-	-								
Cobalt	0.5	1	66	-	1.7	0.7	< 0.5	< 0.5	-	-								
Copper	0.5	5	87	-	3.4	7.1	1.5	2	-	-								
Iron	100	-	-	24240	< 100	< 100	< 100	< 100	-	-								
Lead	0.1	1	25	-	< 0.1	< 0.1	0.1	< 0.1	-	-								
Magnesium	200	-	-	-	19200	25900	21800	13300	-	-								
Mercury	0.1	0.1	0.29	-	< 0.1	< 0.1	< 0.1	< 0.1	-	-								
Molybdenum	0.5	0.5	9200	-	8.4	0.5	0.9	1	-	-								
Nickel	1	1	490	-	7	4	< 1	< 1	-	-								
Selenium	1	5	63	-	< 1	< 1	< 1	< 1	-	-								
Silver	0.1	0.3	1.5	-	< 0.1	< 0.1	< 0.1	< 0.1	-	-								
Sodium	200	5000	2300000	-	347000	452000	136000	103000	-	-								
Thallium	0.1	0.5	510	-	< 0.1	< 0.1	< 0.1	< 0.1	-	-								
Uranium	0.1	2	420	-	2.7	1.6	0.8	0.5	-	-								
Vanadium	0.5	0.5	250	-	< 0.5	< 0.5	< 0.5	0.6	-	-								
Zinc	5	5	1100	-	< 5	< 5	< 5	< 5	-	-								

Table 5. Landfill Gas Monitoring Data

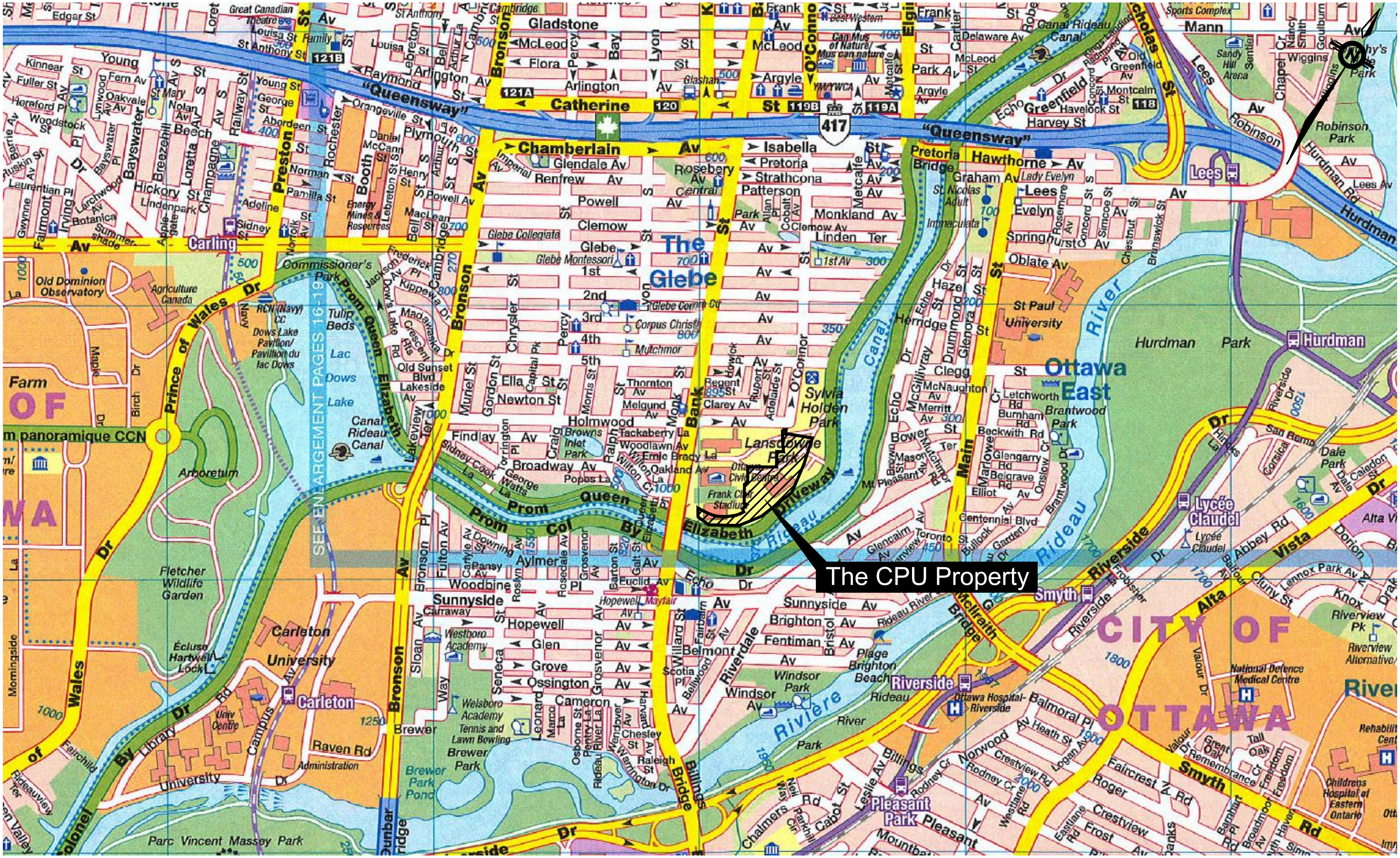
Monitor ID	MTM Coordinates		Ground Surface Elevation (masl)	Screen Interval (mbgs)	Geologic Media Intersected by Screen	Monitoring Date	In-Situ Measurements							Comments (Status of Landfill Gas Probes)
	Easting	Northing					Methane (CH_4)			Carbon Dioxide (%)	Oxygen (%)	Balance Gases (%)	Relative Pressure (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	21-Feb-18	0.0	0.0	0.0	6.0	6.0	87.9	0.0	Good Condition
						29-May-18	0.0	0.0	0.0	5.7	12.7	81.6	0.0	Good Condition
						3-Aug-18	0.0	0.0	0.0	4.7	12.2	82.1	0.0	Good Condition
						8-Nov-18	0.0	0.0	0.0	4.0	16.5	79.6	0.0	Good Condition
GP15-2	368835.264	5029365.156	65.228	1.52 - 3.05	Overburden	21-Feb-18	-	-	-	-	-	-	-	Local Flooding
						29-May-18	0.0	0.0	0.0	2.5	13.4	84.0	0.0	Good Condition
						3-Aug-18	0.0	0.0	0.0	3.3	8.6	88.0	0.0	Good Condition
						8-Nov-18	0.0	0.0	0.0	4.7	7.2	88.1	0.0	Good Condition
GP15-3	368835.685	5029306.220	65.067	1.52 - 3.05	Overburden	21-Feb-18	0.0	0.0	0.0	20.0	0.3	79.5	0.0	Good Condition
						29-May-18	0.0	0.0	0.0	1.4	17.1	81.5	0.0	Good Condition
						3-Aug-18	0.0	0.0	0.0	1.6	15.1	73.9	0.0	Good Condition
						8-Nov-18	0.0	0.0	0.0	0.6	21.2	78.2	0.0	Good Condition
GP15-4	368893.417	5029339.143	-	1.52 - 3.05	Overburden	21-Feb-18	-	-	-	-	-	-	-	Could Not Locate
						29-May-18	0.0	0.0	0.0	6.0	9.7	84.1	0.0	Good Condition
						3-Aug-18	0.0	0.0	0.0	7.9	3.3	81.5	0.0	Good Condition
						8-Nov-18	0.0	0.0	0.0	12.7	<<	86.9	0.0	Good Condition
GP15-5	368837.499	5029252.218	-	0.91 - 2.44	Overburden	21-Feb-18	0.1	0.0	0.0	18.4	1.8	79.7	-0.4	Good Condition
						29-May-18	0.0	0.0	0.0	2.8	16.0	81.1	0.0	Good Condition
						3-Aug-18	0.0	0.0	0.0	3.8	9.4	78.8	0.0	Good Condition
						8-Nov-18	0.0	0.0	0.0	4.1	14.4	81.5	0.0	Good Condition
GP15-6	368875.492	5029271.998	-	0.61 - 2.13	Overburden	21-Feb-18	-	-	-	-	-	-	-	Could Not Locate
						29-May-18	0.2	0.2	3.0	4.1	0.8	94.9	0.0	Good Condition
						3-Aug-18	0.0	0.0	0.0	3.9	1.8	89.8	0.0	Good Condition
						8-Nov-18	0.3	0.3	0.0	5.6	<<	94.3	-0.1	Good Condition
GP15-7	368931.653	5029294.223	-	0.91 - 2.44	Overburden	21-Feb-18	-	-	-	-	-	-	-	Local Flooding
						29-May-18	0.0	0.0	0.0	5.4	8.1	86.7	0.0	Good Condition
						3-Aug-18	0.0	0.0	0.0	4.8	12.4	72.6	0.0	Good Condition
						8-Nov-18	0.0	0.0	0.0	3.1	19.3	77.6	0.0	Good Condition
GP15-8	368865.766	5029240.857	65.319	1.52 - 3.05	Overburden	21-Feb-18	-	-	-	-	-	-	-	Local Flooding
						29-May-18	0.0	0.0	0.0	5.2	9.7	84.8	0.0	Good Condition
						3-Aug-18	0.0	0.0	0.0	8.3	7.5	84.6	0.0	Good Condition
						8-Nov-18	0.0	0.0	0.0	3.2	17.6	79.2	-0.2	Good Condition
GP15-9	368950.930	5029210.490	64.924	1.52 - 3.05	Overburden	21-Feb-18	-	-	-	-	-	-	-	Local Flooding
						29-May-18	0.0	0.0	0.0	3.8	14.1	82.0	0.0	Good Condition
						3-Aug-18	0.0	0.0	0.0	0.1	20.5	79.3	0.0	Good Condition
						8-Nov-18	0.0	0.0	0.0	4.0	18.7	77.3	0.0	Good Condition
GP15-10	368843.807	5029183.520	64.680	0.91 - 2.13	Overburden	21-Feb-18	-	-	-	-	-	-	-	Could Not Locate
						29-May-18	0.0	0.0	0.0	3.8	9.7	86.4	0.0	Good Condition
						3-Aug-18	0.0	0.0	0.0	7.9	4.4	87.7	0.0	Good Condition
						8-Nov-18	0.0	0.0	0.0	2.0	17.5	80.5	0.0	Hose barb was damaged and will need to be replaced. The height of the probe will need to be adjusted.

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.

Figures

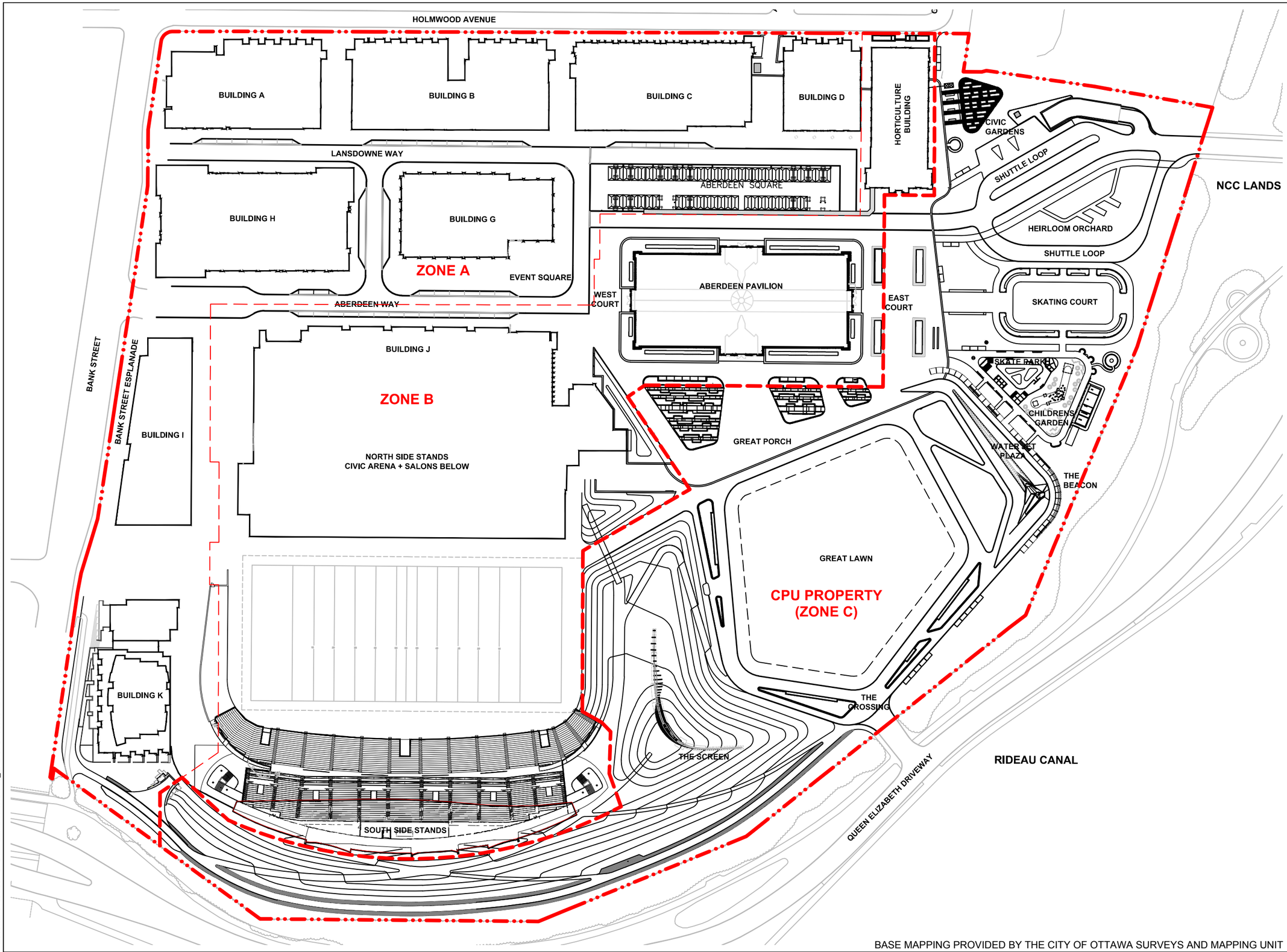
\\OTT-FS1\PROJECTS\2010\TZ101001.06 - CPU IMPLEMENTATION\05_CAD\CPU - ANNUAL REPORT\LANSDOWNE PARK - KEY PLAN.DWG



TITLE:	CLIENT:	
KEY PLAN 2018 ANNUAL REPORT LANSDOWNE PARK - ZONE C CPU No. 0371-8TYQMY 450 QUEEN ELIZABETH DRIVEWAY OTTAWA, ONTARIO	Ottawa	wood.
DATE: MARCH 2019	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

wood.

TITLE:

GENERALIZED SITE PLAN

PROJECT:

2018 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 2019
SCALE:	1 : 1,600
PROJECT NO:	TZ10100106

FIGURE NO:

2

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

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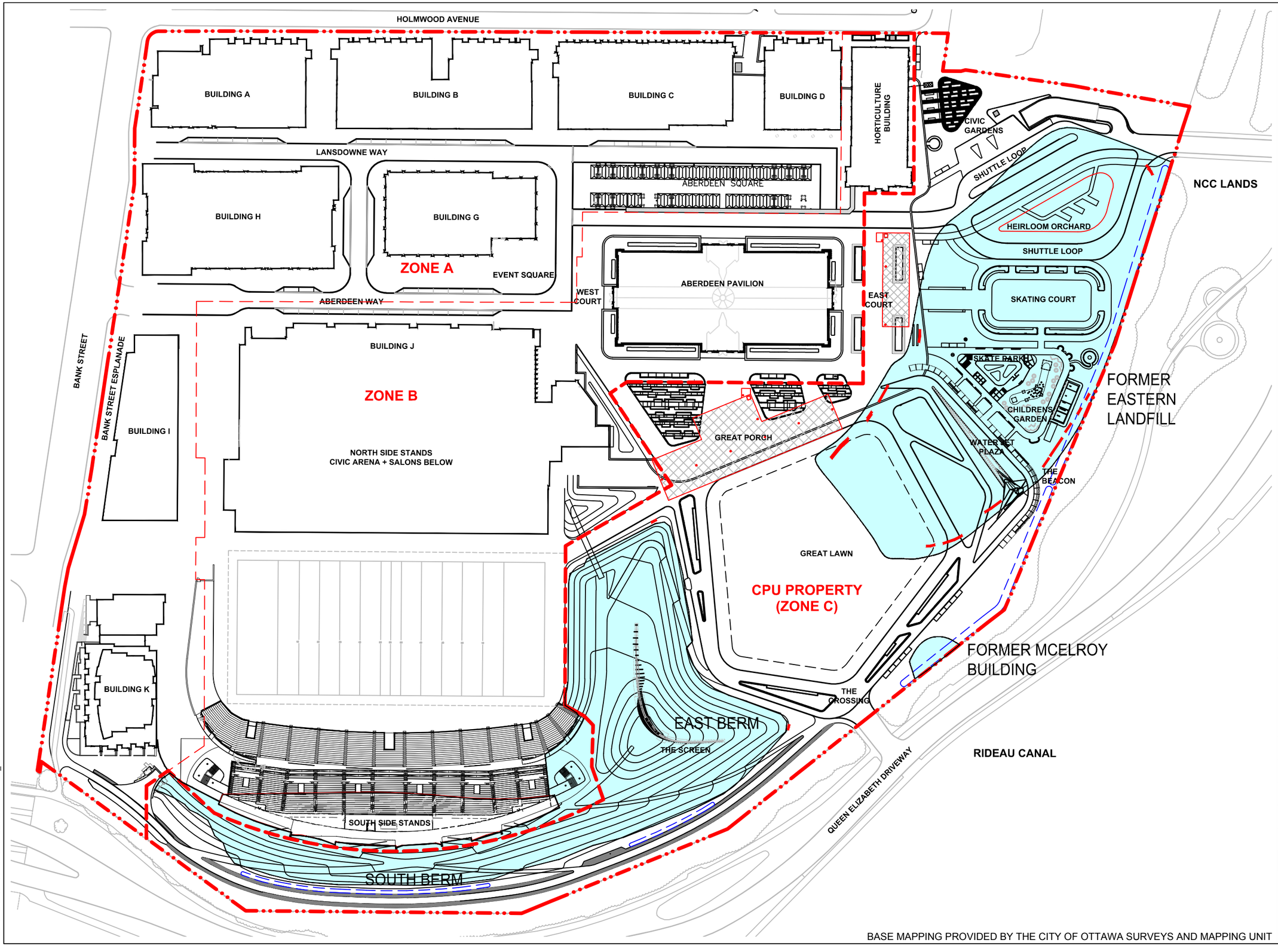

LEGEND

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

15 0 15 30 45
METRES

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

TITLE:
RISK MANAGEMENT MEASURES

PROJECT:
2018 ANNUAL REPORT
LANSDOWNE PARK - CPU PROPERTY
450 QUEEN ELIZABETH DRIVEWAY
OTTAWA, ONTARIO

CLIENT:

DESIGNED BY:	KDH
DRAWN BY:	JFT
CHECKED BY:	KDH
DATE:	MARCH 2019
SCALE:	1 : 1,600
PROJECT NO:	TZ10100106
FIGURE NO:	3

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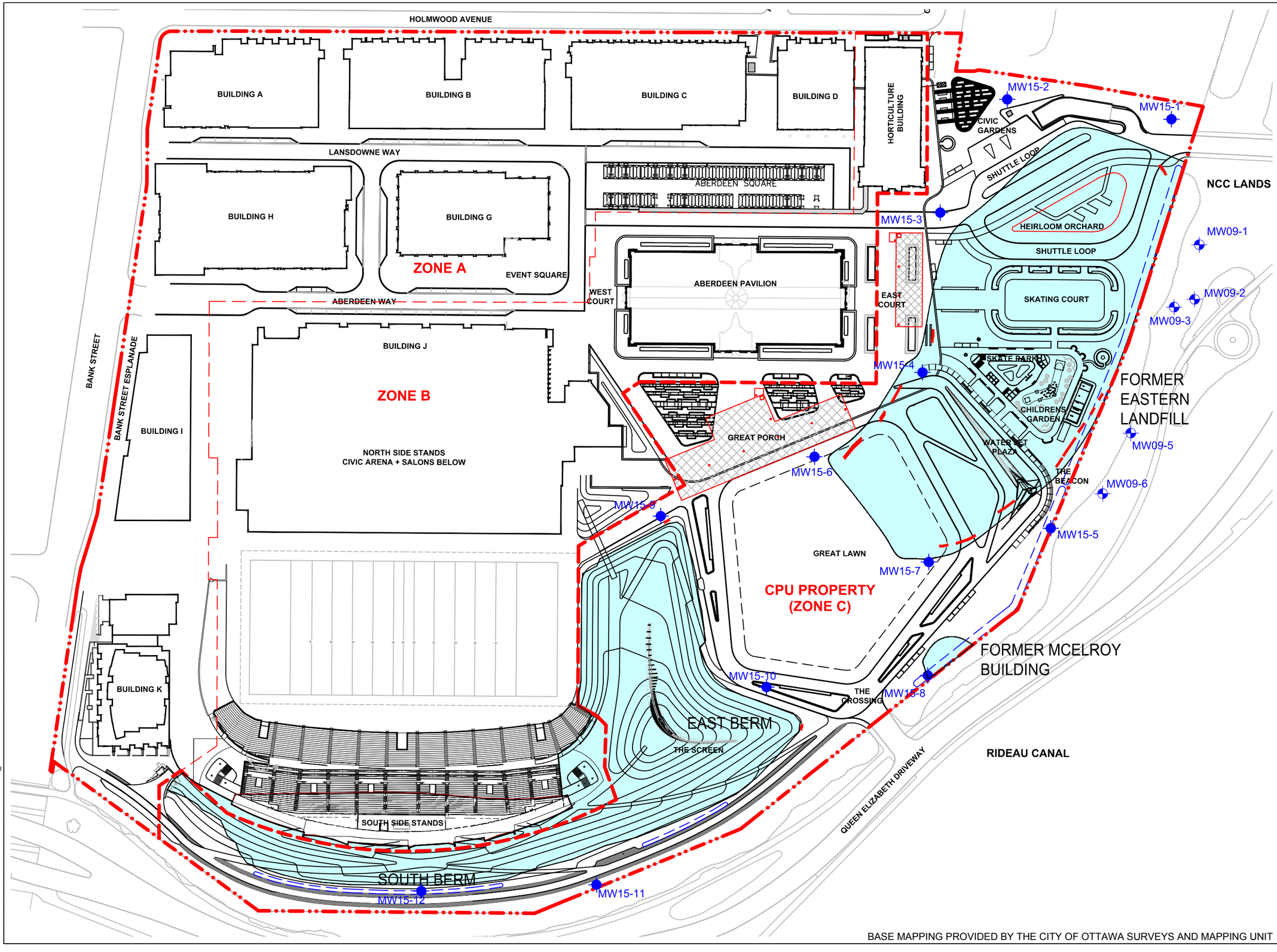

LEGEND

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

15 0 15 30 45
METRES

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

TITLE:
GROUNDWATER MONITORING WELL LOCATION PLAN

PROJECT:
2018 ANNUAL REPORT
LANSDOWNE PARK - CPU PROPERTY
450 QUEEN ELIZABETH DRIVEWAY
OTTAWA, ONTARIO

CLIENT:

DESIGNED BY:	KDH
DRAWN BY:	JFT
CHECKED BY:	KDH
DATE:	MARCH 2019
SCALE:	1 : 1,600
PROJECT NO:	TZ10100106
FIGURE NO:	4

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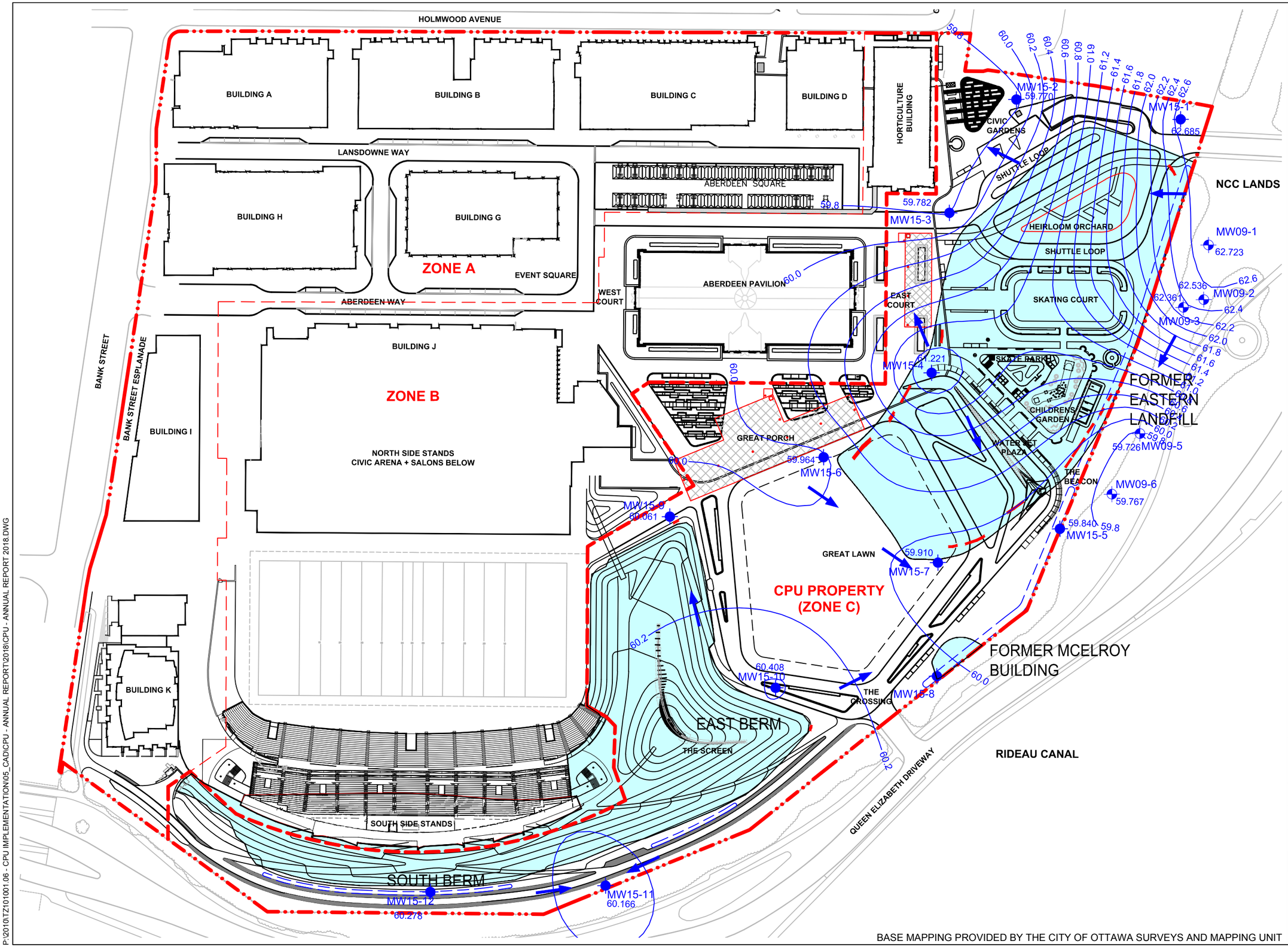

LEGEND

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

wood.

TITLE:

GROUNDWATER ELEVATION CONTOUR PLAN - MAY 29, 2018

PROJECT:

2018 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 2019
SCALE:	1 : 1,600
PROJECT NO:	TZ10100106
FIGURE NO:	5a

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

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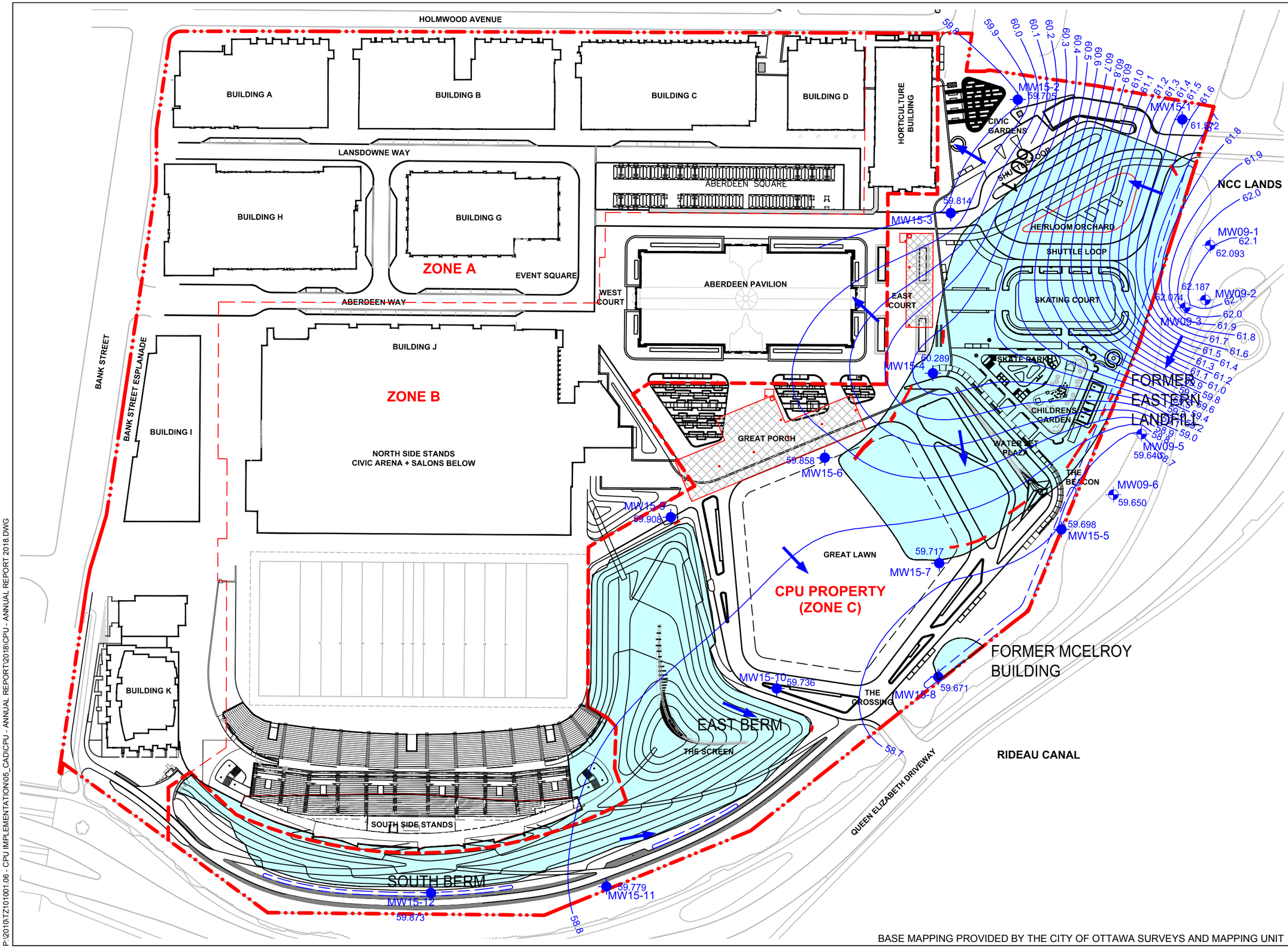

LEGEND

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

15 0 15 30 45
METRES

wood.

TITLE:

GROUNDWATER ELEVATION CONTOUR PLAN - NOVEMBER 8, 2018

PROJECT:

2018 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 2019
SCALE:	1 : 1,600
PROJECT NO:	TZ10100106
FIGURE NO:	5b

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

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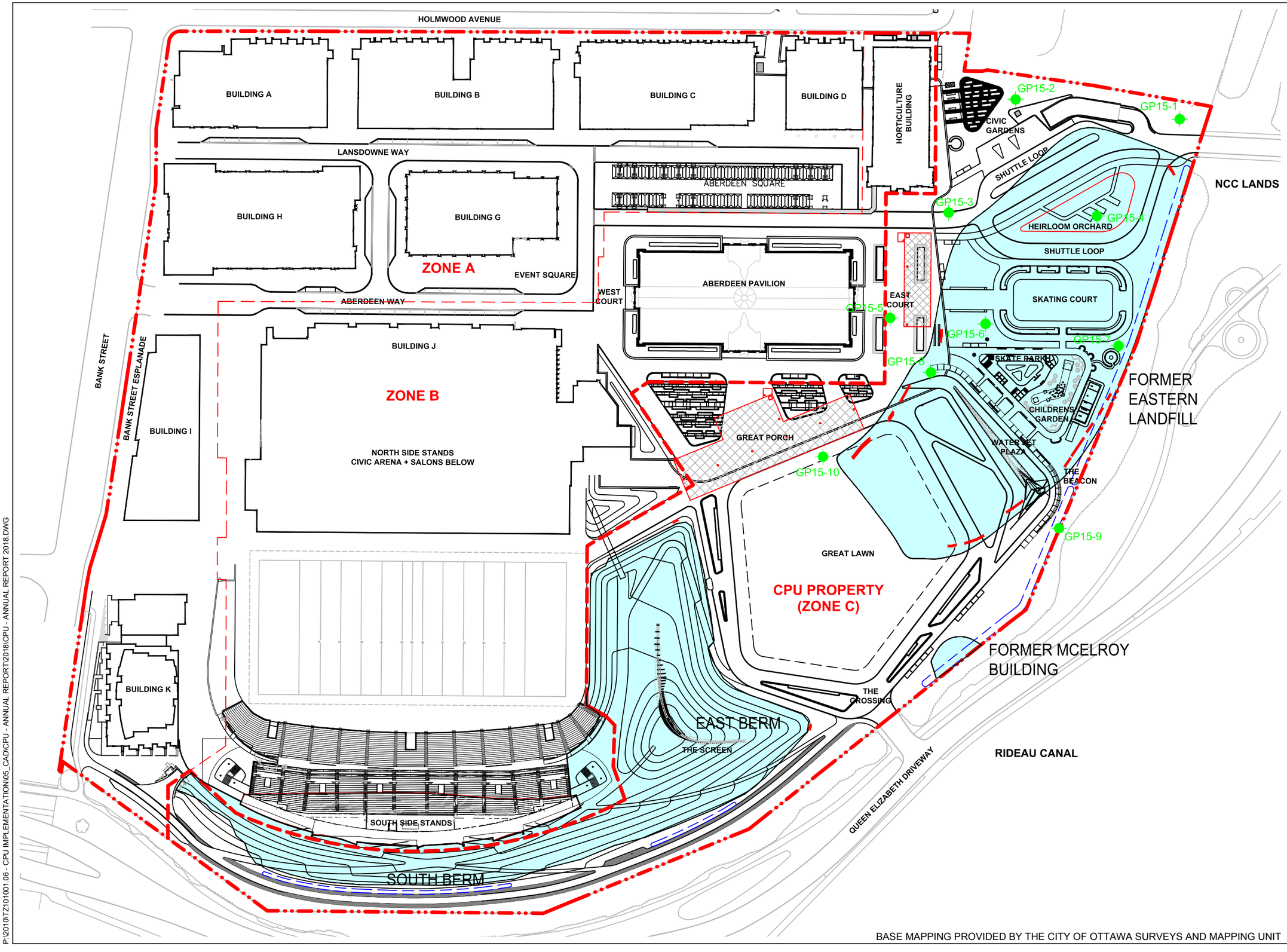

LEGEND

- 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

wood.

TITLE:

LANDFILL GAS PROBE LOCATION PLAN

PROJECT:

2018 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 2019
SCALE:	1 : 1,600
PROJECT NO:	TZ10100106
FIGURE NO:	6

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

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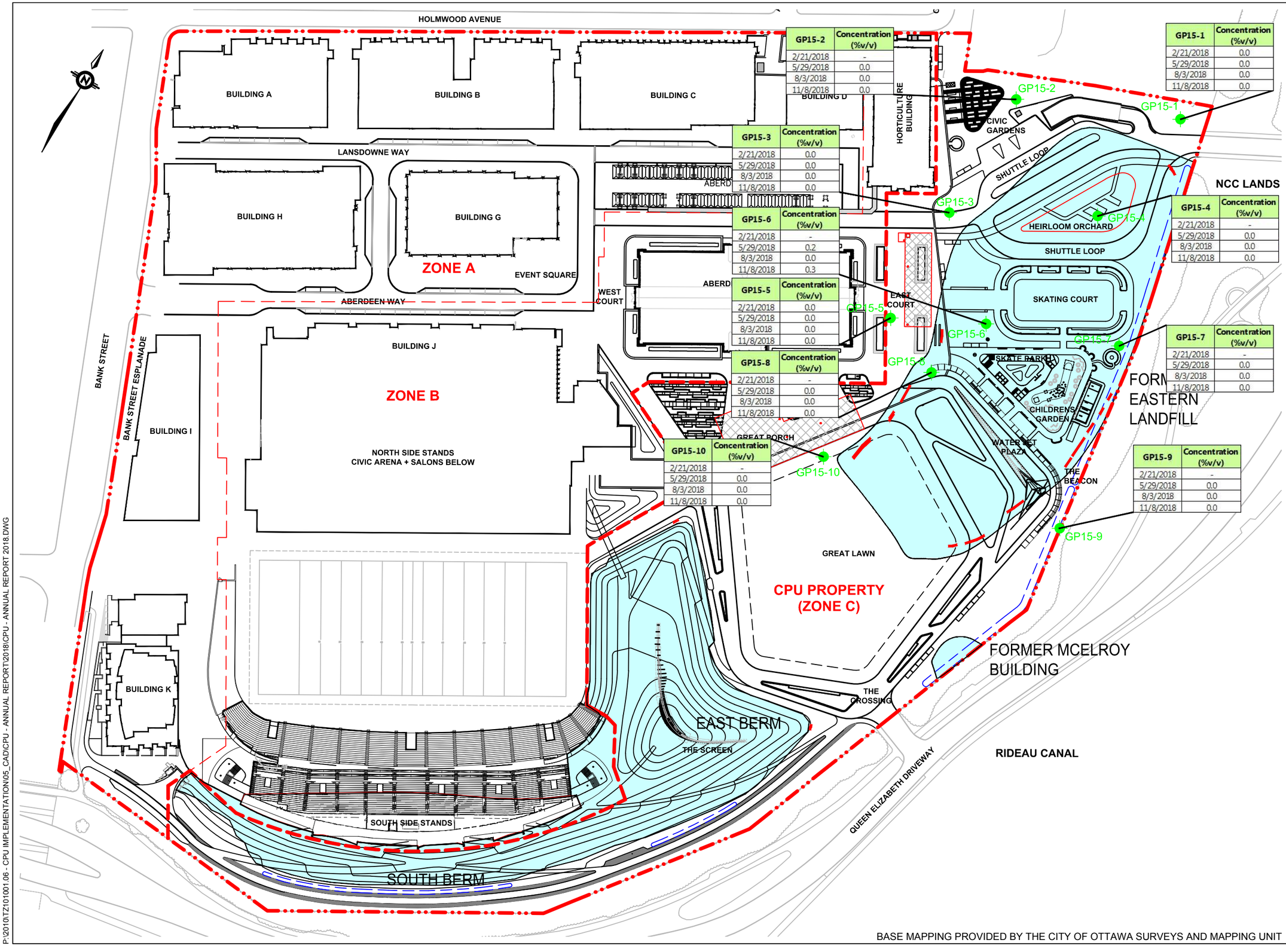

GP15-1	Concentration (%v/v)
2/21/2018	0.0
5/29/2018	0.0
8/3/2018	0.0
11/8/2018	0.0

GP15-2	Concentration (%v/v)
2/21/2018	-
5/29/2018	0.0
8/3/2018	0.0
11/8/2018	0.0

GP15-3	Concentration (%v/v)
2/21/2018	0.0
5/29/2018	0.0
8/3/2018	0.0
11/8/2018	0.0

GP15-4	Concentration (%v/v)
2/21/2018	-
5/29/2018	0.0
8/3/2018	0.0
11/8/2018	0.0

GP15-5	Concentration (%v/v)
2/21/2018	0.0
5/29/2018	0.0
8/3/2018	0.0
11/8/2018	0.0

GP15-6	Concentration (%v/v)
2/21/2018	-
5/29/2018	0.2
8/3/2018	0.0
11/8/2018	0.3

GP15-7	Concentration (%v/v)
2/21/2018	-
5/29/2018	0.0
8/3/2018	0.0
11/8/2018	0.0

GP15-8	Concentration (%v/v)
2/21/2018	-
5/29/2018	0.0
8/3/2018	0.0
11/8/2018	0.0

GP15-9	Concentration (%v/v)
2/21/2018	-
5/29/2018	0.0
8/3/2018	0.0
11/8/2018	0.0

GP15-10	Concentration (%v/v)
2/21/2018	-
5/29/2018	0.0
8/3/2018	0.0
11/8/2018	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

NOTES ON METHANE CONCENTRATIONS:

BOLD: METHANE CONCENTRATION EXCEEDS ONTARIO REGULATION 232/98 FOR OFF-SITE BUILDING OR FOUNDATION.

BOLD/YELLOW SHADING: METHANE CONCENTRATION EXCEEDS ONTARIO REGULATION 232/98 FOR ON-SITE BUILDING OR FOUNDATION.

BOLD/YELLOW SHADING/UNDERLINED: METHANE CONCENTRATION EXCEEDS MOECC REGULATION 232/98 FOR LANDFILL PROPERTY BOUNDARY SUBSURFACE.

15 0 15 30 45
METRES

wood.

TITLE:

SUBSURFACE METHANE CONCENTRATIONS AT LANDFILL GAS PROBES

PROJECT:

2018 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 2019
SCALE:	1 : 1,600
PROJECT NO:	TZ10100106
FIGURE NO:	7

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

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Appendix A

Certificate of Property Use
(Available Upon Request)

Appendix B

Risk Management Measures Inspection Logs

Appendix C

Reinstatement Inspection Logs

Appendix D

Stratigraphic and Instrumentation Logs

Appendix E

Laboratory Certificates of Analysis

Appendix F

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 Professional Services 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 Wood'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 of 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, Wood must be notified in order that it may determine if modifications to the conclusions in the report are necessary.
8. The utilization of Wood's services during the implementation of any remedial measures will allow Wood to observe compliance with the conclusions and recommendations contained in the report. Wood'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 of conclusions in the report, is the sole responsibility of such third party. Wood 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 Wood.
11. Provided that the report is still reliable, and less than 12 months old, Wood will issue a third-party reliance letter to parties client identifies in writing, upon payment of the then current fee for such letters. All third parties relying on Wood's report, by such reliance agree to be bound by our proposal and Wood's standard reliance letter. Wood's standard reliance letter indicates that in no event shall Wood be liable for any damages, howsoever arising, relating to third-party reliance on Wood's report. No reliance by any party is permitted without such agreement.

wood.

Wood Environment & Infrastructure Solutions
A Division of Wood Canada Limited