

EXECUTIVE SUMMARY

**PHASE I AND PHASE II
ENVIRONMENTAL SITE ASSESSMENT
PROPOSED LVEC
DEVELOPMENT**

Prepared for:

**The Corporation of the
City of Kingston
216 Ontario Street
Kingston, ON K7L 2Z3**

Prepared by:



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May, 2005

Our File KB3586

EXECUTIVE SUMMARY

Water and Earth Science Associates Ltd (WESA.) was retained by the Corporation of the City of Kingston to conduct a Phase I and II Environmental Site Assessment on the property located along the waterfront between Bay Street and the north end of D.S. Fluhrer Park in Kingston, Ontario.

PHASE I ESA:

The objective of the Phase I ESA was to provide an indication of actual or potential environmental liability associated with the property as a result of current and historical property uses and to highlight areas of focus for the Phase II ESA investigation. The Phase I ESA was performed in accordance with the substance and intent of the guideline document produced by the Canadian Standards Association (CSA Z768-01). As such, it is based on visual observations made during a site visit, interviews with persons familiar with the property, a review of historical records concerning the current and past uses of the property and requests for information filed with regulatory agencies. The Phase I ESA did not include any sample gathering, analysis or measurements and is not intended to be a definitive investigation of contamination or other environmental concerns at the property.

The Site is located on the east side of Wellington Street (including the extension corridor that was formerly the CNR right of way), beginning at the eastern foot of Bay Street and continuing north until the north end of D.S. Fluhrer Park. It is bordered to the east by the shoreline of Cataraqui River. The Site is bounded to the west by residential developments and to the south by an office building (MacDonald Cartier Building). A vacant lot and the Woolen Mill commercial property borders the Site to the north.

A limiting factor for this assessment was that the Metalcraft Marine Ship Builders and the Kingston Marina were inaccessible. All other property components of the Site owned by the City of Kingston were accessed.

The findings of the Phase I ESA indicated that there was no known evidence of actual contamination on the accessible parts of the subject property, with the exception of minor discoloration of the asphalt in areas of the municipal parking lot, suggesting minor spills of vehicle fluids to the asphalt surface. There are no current activities in the city park to warrant any environmental concern. Restricted viewing of the inaccessible portions of the Site made it difficult to determine actual evidence of existing surface contamination in these areas. However, observations of areas of disposed scrap metal and other materials (i.e. treated wood,

plastic, fibreglass, as well as chemical and hydrocarbon storage drums/tanks) as well as an existing active fueling station represent a high potential for surface contamination to enter the soil and groundwater on the Site.

A review of historical air photos confirms the area has in the past hosted a number of industrial and commercial operations that had a high potential to contaminate the soil and groundwater. The key parameters of concern at the subject Site have been identified as general chemistry, metals, total petroleum hydrocarbons (TPH), polyaromatic hydrocarbons (PAHs) and volatile organic compounds (VOCs).

There is a high potential that the subject property soils and groundwater have been recipients of contaminants from present and historical operations both on-site and off-site. Details of these contaminant sources and chemical characteristics are outlined within this report. An intrusive investigation (Phase II environmental assessment) was required in order to delineate the level of contamination present in the soil and groundwater located on the subject property. The findings of the Phase I investigation were used to refine the Phase II investigation plan.

A geophysical investigation was completed to identify subsurface anomalies. Linear and point anomalies were identified and correlated with previous structures or current features known to be present in the area. The primary features identified in the three areas were an apparent large building foundation in the Anglin Bay Parking area, lineaments through the City Marina corresponding to historical fuel pipelines, and lineaments through Fluhrer Park corresponding to historical fuel pipelines and City stormwater pipes.

PHASE II ESA:

Ten borehole locations were investigated during the Phase II ESA work (see figures at end of executive summary). The hydrostratigraphy of the Site consists of a three layer system with an overburden/bedrock interface confined aquifer overlain by a clayey silt/silty clay aquitard, which is overlain by a relatively thin (<5 m) unconfined saturated fill unit. Hydraulic head measurements for these three wells indicate that groundwater flow at the overburden (clay)/bedrock interface is to the northeast at a hydraulic gradient of approximately 0.025. This flow direction seems at odds with the bedrock surface contours, which are nearly orthogonal to the direction of groundwater flow at this interface. The unconfined fill layer is water saturated below a depth of 1 to 2 metres and serves as the primary shallow groundwater zone. The construction dewatering activities in this area at the time of sampling may have been influencing the direction of shallow groundwater flow to the southwest and west rather than east, which would be intuitively expected. The maximum elevation of the water table in the southern portion

of the Site (Anglin Parking Lot) was 75.003 (MW9) as measured on January 28, 2005. The maximum elevation of the water table on this date in the northern and central portions of the Site was 75.025 (MW1-2). The mean elevation of Lake Ontario is 74.5 masl. A very low vertically downward hydraulic gradient of 0.001 and 0.003 upward was determined.

Two samples targeting the fill layer and the clay layer were selected from each location using field observations of olfactory evidence and field vapour readings to assist in the decisions. Wells were installed at 9 of the 10 locations. Wells were screened at the fill/clay interface and two deep wells along the east side of the Site were screened at the Clay/bedrock interface at 29 m and 32 mbgs. One groundwater sample was collected from each well. Standard decontamination and health and safety procedures were followed during the field work waste water and soil were characterized by TLCP or groundwater chemistry results as non-hazardous and removed from Site for disposal at appropriate disposal facilities.

The analytical results were compared to Tables 1 and 3 of the Ontario Regulation 153/04 Site Condition Standards for background concentrations (Table 1) and full depth non-potable groundwater conditions (Table 3). For discussion purposes the chemistry is organized into five groups; metals, PAHs, VOCs, TPHs and PCBs.

Soil chemistry results indicate that the fill layer is contaminated at all locations investigated at levels that exceed the Table 1 Standards. At five locations the Table 3 Standards are exceeded for either or both metals and hydrocarbons (PAHs, VOCs, TPH). These consist of two samples from Anglin Parking Lot (northeast and centrally located), one sample from the City marina peninsula and two samples from Fluhrer Parking Lot (west and east ends).

Soil samples collected from the silty clay layer underlying the fill material did not contain organic contaminants in excess of the Table 1 Standards except at one location MW4-SS7 where VOCs exceeded the Table 1 Standards. Metal results for the same samples indicated that metal concentrations exceed the Table 1 Standards at seven locations and exceeded the Table 3 Standards at one of these locations (MW9-SS6) taken from the Anglin Parking Lot northeast corner.

All of the groundwater samples analyzed from the fill layer contained either metal or hydrocarbon contaminants in excess of the Table 1 Standards except at MW8 located at the northwest corner of Anglin Parking Lot where no exceedances were detected. One sample collected from MW9 located at the northeast corner of Anglin Parking Lot exceeded Table 3 Standards for PAHs.

The impacts appear to be restricted to the overburden fill layer. Migration of contamination in the surface overburden from the west towards the Site is likely intercepted by the utilities trench. Contaminated soil in the area of the proposed LVEC facility exceeds Table 1 and Table 3 Standards in two locations and exceeds Table 1 Standards for shallow groundwater in samples collected from the three wells located in close proximity to the proposed site.

The Site is located in close proximity to Anglin Bay and therefore remediation to Table 3 Standards may not be sufficient if a Record of Site Condition is required because the proximity to surface water makes the Site environmentally sensitive as defined in the Regulation. Remediation of the Site to Table 1 Standards may not be practical given the widespread nature of impacts on the Site. The development of Site Specific Remedial Standards may be required through the development of a Risk Assessment. Remedial or mitigative measures that are suitably protective of the environment and ensure the Standards derived through the RA will be required.

Potential impacts to the development are described and have been divided into impacts during construction and potential impacts once the facility has been put into use. Impact mitigation during construction relates to managing contaminated soil and related health considerations. Impacts during operation are related to contaminant migration into the facility as vapours or groundwater and the implementation or installation of mitigative measures during construction to address these concerns.

Impact mitigation may consist of source removal through excavation of the contaminated soil to the appropriate standard or containment of the contaminants through the installation of impermeable barriers. Source removal may result in groundwater migration to the building foundation occurring more readily through imported granular fill materials. Removal of impacted soil to allow for the construction of the LVEC may require the removal of 32,175 m³ of impacted soil from the LVEC Site building footprint at a cost of approximately \$1.1M.

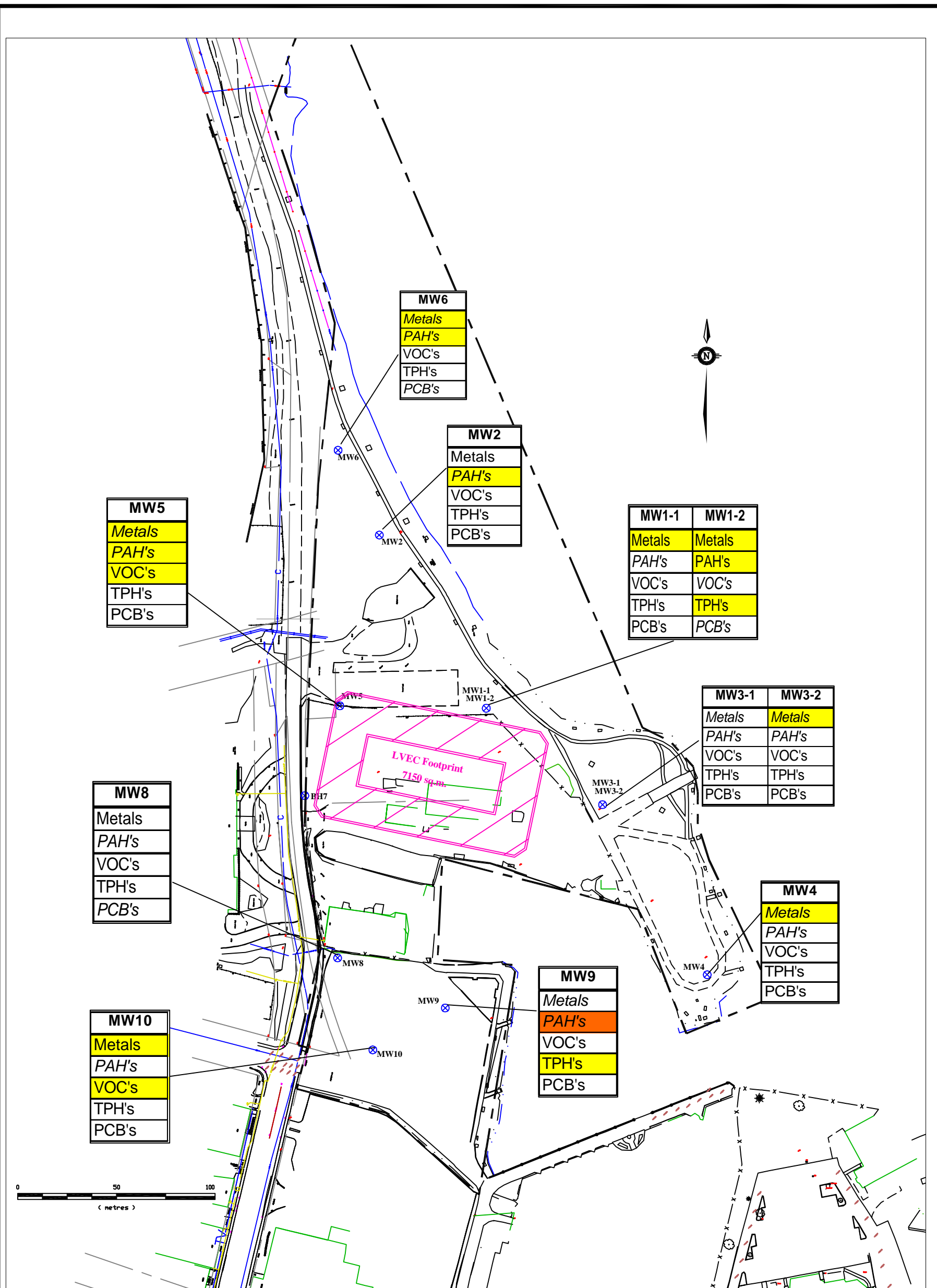
Pathway prevention/reduction can be accomplished in a number of ways, but the two broad approaches involve either the installation of a barrier in the pathway or the presence of a “break” or gap in the pathway. The best approach will depend in large measure on the foundation design of the facility. This may include the installation of an impermeable barrier during construction or, a vapour and/or groundwater collection system to prevent migration of contaminants into the building.

An alternative contaminant migration mitigative measure is to install a pathway break. A pathway break is simply an element of the construction of the facility that ensures that a pathway

does not exist between the source (ground water and contaminated soil) and the receptor and it is accomplished in a way that does not involve a physical “barrier”. An example would be constructing the building on an elevated slab so there is no pathway between the vapour source and the building envelope or constructing the building without any subsurface components to minimize the potential pathways. These types of controls are not as effective as the barriers because vapour intrusion can still potentially occur through clean fill placed beneath the slab.

The recommendations for this Site are as follows:

- Complete a Risk Assessment,
- Assess contaminant levels in soil and groundwater within the proposed building foundation enveloped through a detailed Phase II ESA of the Marina property,
- Confirm groundwater flow directions under seasonal and stable conditions in the absence of construction works,
- Remediation of contaminated source materials to Risk Assessment derived standards,
- Minimize subsurface construction and restrict construction to above the Cataraqui River water level,
- Complete investigation and characterization of the development site footprint,
- Complete vapour intrusion modeling with data collected over one annual cycle, and
- Include vapour intrusion controls in the facility design.



LEGEND:

⊗ MONITORING WELL LOCATIONS

GROUNDWATER CHEMISTRY EXCEEDANCE(S) SUMMARY:

- EXCEEDANCE(S) COMPARED TO TABLE 1:
FULL DEPTH SITE CONDITION STANDARDS (ONT. REG. 153/04)
- EXCEEDANCE(S) COMPARED TO TABLE 3:
FULL DEPTH GENERIC SITE CONDITION STANDARDS
IN A NON-POTABLE GROUNDWATER CONDITION

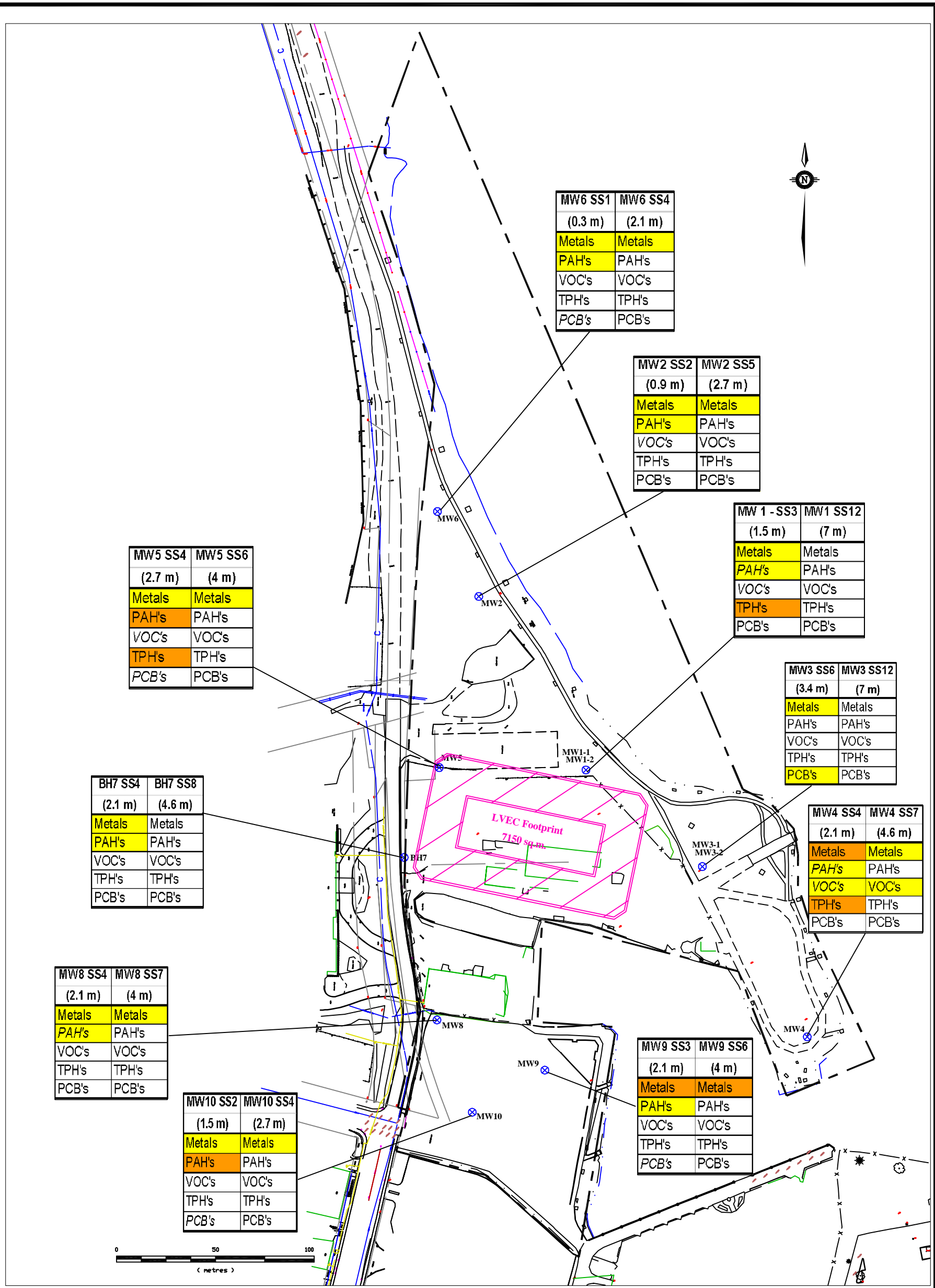
PAH's ELEVATED DETECTION LIMIT ABOVE
TABLE 1 STANDARDS

PROJECT NUMBER: KB3586	DRAWN BY: C.M.R.	DESIGNED BY: W.I.
DATE: 03 DECEMBER 2004	CHECKED BY: B.O'C.	
SCALE: AS SHOWN	CAD FILE NO.: B3586-CHEMISTRY	

FIGURE: E-2.1

**GROUNDWATER CHEMISTRY
EXCEEDANCE(S)**

PROPOSED LVEC PROPERTY
CITY OF KINGSTON



LEGEND:

⊗ MONITORING WELL LOCATIONS

SOIL CHEMISTRY EXCEEDANCE(S) SUMMARY:

- EXCEEDANCE(S) COMPARED TO TABLE 1:
FULL DEPTH SITE CONDITION STANDARDS (ONT. REG. 153/04)
- EXCEEDANCE(S) COMPARED TO TABLE 3:
FULL DEPTH GENERIC SITE CONDITION STANDARDS
IN A NON-POTABLE GROUNDWATER CONDITION

PAH's ELEVATED DETECTION LIMIT ABOVE
TABLE 1 STANDARDS

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FIGURE: E-2.2

SOIL CHEMISTRY EXCEEDANCE(S)

PROPOSED LVEC PROPERTY
CITY OF KINGSTON