



# Remediation Action Plan

185 – 195 Fifteenth Avenue, West Hoxton, NSW



Prepared for Western Sydney Parkland Trust  
July 2016

Project No.16058



# Quality Management

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Signature		
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This report was prepared in accordance with the scope of services set out in the contract between Zoic Environmental Pty Ltd, ABN 23 154 745 525 and the client.



## Executive Summary

Western Sydney Parkland Trust (WSPT) commissioned Zoic Environmental Pty Ltd (Zoic) to prepare this Remediation Action Plan (RAP) for 185 – 195 Fifteenth Avenue, West Hoxton (“the site”). The objective of the RAP is to provide detail on remedial and validation works that are required to render the site suitable for the proposed Fifteenth Avenue Business Hub (FABH) development.

The site covers an area of approximately 8.9 hectares which consists of six parcels of land, and is the subject of State Significant Development Application (SSD 14 6407). Under the SSD the following development works are proposed across the site:

- Three southern Lots (Lot 345; Lot 346 and Lot 2) fronting Fifteenth Avenue are proposed for retail outlets, large format retail, fast food outlet, service station, central carpark and childcare facility in addition to internal roads and landscaped areas; and
- Three northern Lots (Lot 304; Lot 305 and Lot 306) are proposed to be subdivided.

The majority of the site, particularly the northern three Lots, has predominantly been used for market gardening and rural activities. For the three southern there have been the following uses:

- South-eastern lot (Lot 345) was used as a bus depot from approximately 1957 until 2015. Features of the former bus depot included workshops; inspection pit; administration facilities; and, a wash bay. Several underground storage tanks (UST) had been removed from the front (southern) portion of the site prior to intrusive sampling; two large diesel above ground storage tanks (AST) were located near the central workshop and wash bay area.
- Central southern lot (Lot 346) contains a residential house and three farming sheds. Activities at this lot include manure packaging and distribution whereby horse manure is delivered onsite and stockpiled prior to being bagged and sold.
- South-western lot (Lot 2) predominantly rural use including a large dam covering approximately 2500m<sup>2</sup>; an unpaved triangular public carpark covering 2000m<sup>2</sup> fronting onto Fifteenth Avenue; and, an earthen drainage ditch constructed between the dam and the public carpark.

Intrusive investigations have been completed for the site as follows:

- Zoic (May 2016) Phase 2 Environmental Site Assessment 195 Fifteenth Avenue, West Hoxton. Prepared for WSPT (Ref: 16035).
- Douglas Partners (July 2015) Detailed Site (Contamination) Investigation, 185 Fifteenth Avenue, West Hoxton. Prepared for WSPT (Ref: 84801).
- Golder Associates (May 2015) Preliminary Environmental Site Assessment for Commercial Precinct, 195 Fifteenth Avenue, West Hoxton. Prepared for WSPT (Ref: 147622023\_001).
- Golder Associates (March 2015) Preliminary Environmental Site Assessment 185 Fifteenth Avenue, West Hoxton. Prepared for WSPT (Ref: 147622023\_004).

The combined scope of field works presented in the Zoic and DP investigations has been summarised as follows:



- In total, 75 locations have been sampled across the site with a combination of test pitting, boreholes and hand augers.
- Six groundwater wells were installed and sampled on the bus depot property (Lot 345) during the DP DSI works; four of these groundwater well were able to be found and re-sampled during the Zoic (May 2016) DSI fieldworks.
- Zoic (May 2016) compared analytical results to the most sensitive NEPM 2013 criteria for residential with garden/accessible soils HIL-A/ HSL-A (which includes childcare centres); DP (July 2015) compared results to NEPM 2013 commercial/industrial criteria (HSL-D / HIL-D).

Based on the findings of the intrusive investigations there have been no areas of gross soil or groundwater contamination identified at the site, however localised remedial works were considered to be required to ensure that the site is suitable for the proposed development. The RAP includes remedial works associated with:

- **Area 1:** associated with near-surface asbestos ACM fragments identified by Golder and ACM/FA/AF identified by Zoic (TP2/0.1-0.2) in the south-eastern portion of Lot 346 estimated total volume 180m<sup>3</sup>
- **Potential Remediation at Area 2:** associated with BHI9 (DP, July 2015) which had BaP above adopted commercial EIL criteria. Remedial works only considered to be required if landscaping is proposed in this area as this fill may not be suitable for growing media.

The preferred remedial options, as evaluated in the RAP, is for excavation and offsite disposal to licenced landfill facility for Area 1; and if remediation of Area 2 is required, then these soils are suitable to be relocated beneath proposed buildings or roadways.

The RAP also provides a scope for additional sampling to close out the following identified data gaps:

- **Data Gap 1:** Confirmatory sampling beneath buildings and structures (once removed).
- **Data Gap 2:** Validation of the former UST area.
- **Data Gap 3:** Confirmatory asbestos sampling in accordance with NEPM 2013 requirements of near-surface soils across the former bus depot portion of the site
- **Data Gap 4:** Confirmatory sampling potential surface spill area in the central-western portion of the bus depot.

This RAP has been prepared in accordance with NSW OEH (2011) Consultants Reporting on Contaminated Sites; NEPM 2013 Site Contamination Assessment, SEPP 55 (1998) Remediation on Land and other relevant guidelines made or endorsed by the NSW EPA to provide details on how the site can be made suitable for the proposed development.



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# 1. Introduction

## 1.1 Background

This Remediation Action Plan (RAP) was commissioned by Western Sydney Parklands Trust (WSPT) for 185 – 195 Fifteenth Avenue, West Hoxton (“the site”) to address identified localised contamination and data gaps from the previous investigations.

The site comprises six separate lots covering an area of 8.9 hectares which is the subject of State Significant Development (SSD 14\_6407) application for the commercial development known as Fifteenth Avenue Business Hub (FABH). The development is proposed to include:

- Three southern Lots (Lot 345; Lot 346 and Lot 2) are proposed for retail outlets, large format retail, fast food outlet, service station, central carpark and childcare facility in addition to internal roads and landscaped areas.
- Three northern Lots (Lot 304; Lot 305 and Lot 306) are proposed to be subdivided.

The previous Phase 2 Environmental Site Investigations completed by Zoic (May 2016) and DP (July 2015) should be read in conjunction with this RAP. While no areas of gross contamination were identified during these intrusive works, localised areas of impact were identified as follows:

- Impacted soil and groundwater associated with the former UST area of the bus depot on Lot 345.
- Asbestos (bonded asbestos containing materials (ACM) / friable asbestos (FA) / asbestos fines (AF)) impacted near-surface soils around the sheds of Lot 346.

This RAP documents the requirements to ensure that the site is appropriately remediated and validated so as to be suitable for the proposed FABH development.

## 1.2 Objectives of the RAP

The key objectives of the RAP are to:

- Summarise the current contamination status of the site;
- Discuss remediation options and reasons for the selection of the preferred strategy;
- Provide a detailed description of the preferred remediation strategy;
- Develop sampling strategy to close out identified data gaps;
- Determine clean up criteria for the site;
- Document regulatory requirements for the remediation works; and
- Document validation procedures to confirm that the site has been rendered suitable for the proposed use (commercial with a childcare centre on 195 Fifteenth Avenue).

This RAP has been prepared in accordance with the NSW OEH (2011) Consultants Reporting on Contaminated Sites; NEPM 2013 Site Contamination Assessment, SEPP 55 (1998) Remediation on Land and other relevant guidelines made or endorsed by the NSW EPA.



### 1.3 Regulatory Requirements

The RAP has been prepared, where practicable, to comply with relevant regulatory requirements and guidelines, including:

- Environmental Planning and Assessment Act 1979;
- Protection of the Environment Operations Act 1997;
- Contaminated Land Management Act 1997;
- State Environmental Planning Policy No. 55 (1998) – Remediation of Land (SEPP 55);
- Waste Avoidance Resource Recovery Act 2000;
- Protection of the Environment Operations (Waste) Regulation 2005;
- Work Health and Safety Act and Regulations 2011.
- DECCW (2009) Waste Classification Guidelines;
- DECCW (2010) UPSS Technical Note: Decommissioning, abandonment and removal of underground petroleum storage systems;
- NSW DEC (2006) Guidelines for the NSW Site Auditor Scheme;
- NSW OEH (2011) Guidelines for Consultants Reporting on Contaminated Sites;
- NSW OEH (2008) Guidelines for Implementing the POEO (Underground Petroleum Storage Systems) Regulation

### 1.4 Roles and Responsibilities

It is envisaged that the following personnel will be involved in the implementation of the RAP:

- Client/Project Manager –WSPT;
- CLM Auditor – Andrew Lau;
- Principal Contractor - to be appointed;
- Subcontractors – to be appointed; and
- Environmental Consultant – Zoic Environmental Pty Limited (Zoic).

Table 1.4 outlines roles and responsibilities during the implementation of the RAP. The primary contact for all environmental communications, including incident reporting, will be the Project Manager.



**Table 1.4: Roles and Responsibilities**

<b>Party</b>	<b>Responsibility of Party</b>
Client	<ol style="list-style-type: none"><li>1. Will provide suitable direction to the Principal Contractor on request.</li><li>2. Will review the effectiveness of the RAP, following any incident or other event that suggest the RAP is ineffective and update the RAP, as required.</li><li>3. Will record any review of the RAP conducted and ensure that any improvements are implemented and communicated to relevant parties.</li></ol>
CLM Auditor	<ol style="list-style-type: none"><li>1. Will review and endorse the strategy presented in the RAP.</li><li>2. Will provide Section B Site Audit Statement (SAS) and associated Site Audit Report (SAR) confirming that the site can be made suitable for the proposed development if the RAP is implemented.</li><li>3. At the completion of remediation, the Auditor will review the Validation Report prepared by the Environmental Consultant and then prepare a Section A SAS and associated SAR confirming the site is suitable for the proposed FABH.</li></ol>
Principal Contractor	<ol style="list-style-type: none"><li>1. Will maintain ultimate responsibility for implementation of the RAP.</li><li>2. Must ensure that suitable induction has occurred.</li><li>3. Must ensure that any potential risks associated with their tasks as part of this RAP have been assessed and suitable control measures implemented.</li><li>4. Will notify Environmental Consultant where evidence of potential contamination is encountered (e.g. odours, staining, asbestos, etc.).</li><li>5. Will conduct inductions to this RAP and maintain a record of Subcontractor and Environmental Consultant inductions.</li><li>6. Must ensure that any issues that suggest that the Work Plan is ineffective are reported to the Client.</li><li>7. Must report any incidents, corrective actions or complaints to the Client</li><li>8. Will act as contact point for any incident reporting.</li><li>9. Must maintain and collate all records associated with classification, transport and acceptance of waste to landfill and will, as soon as practicable, provide the records to the Client.</li></ol>
Subcontractors	<ol style="list-style-type: none"><li>1. Must ensure that any potential risks associated with their tasks as part of this RAP have been assessed and suitable control measures implemented.</li><li>2. Must ensure that all operatives are inducted and briefed on the existence and contents of this RAP.</li><li>3. Will be required to report any incidents, corrective actions or complaints to the Client / Principal Contractor as soon as practicable as they occur.</li><li>4. Will promptly notify any concerns regarding the implementation of this RAP to the Project Manager / Principal Contractor as soon as practicable as they occur.</li></ol>
Environmental Consultant	<ol style="list-style-type: none"><li>1. Will provide support for implementation of the RAP, as requested by the Client / Principal Contractor.</li><li>2. Must ensure that any potential risks associated with their tasks as part of this RAP have been assessed and suitable control measures implemented.</li><li>3. Must ensure appropriate inductions are completed.</li><li>4. Will conduct environmental sampling and monitoring, as requested by the Client / Principal Contractor and as outlined in the RAP.</li><li>5. Must report any incidents, corrective actions or complaints to Project Manager / Principal Contractor.</li></ol>



Party	Responsibility of Party
	<ol style="list-style-type: none"><li>6. If required, will provide recommendations for changes to the RAP or additional works that may be requested by the Client / Principal Contractor to facilitate the implementation of the RAP.</li><li>7. At the completion of remedial and validation works, the Environmental Consultant will prepare a validation report that makes clear conclusion on whether the site is suitable for the proposed development.</li></ol>

Where the specific procedures are technical or complex in nature, the Client may appoint qualified agents (e.g. Project manager; environmental contractors and/or consultants) to fulfil the requirements or advise the appropriate implementation.

## 1.5 Emergency Contacts and Response

Prior to implementation of this RAP, the Principal Contractor must provide the following information:

- The names and contact details for the Principal Contractors emergency response personnel;
- Responsibilities of those personnel;
- Contact details for emergency services (ambulance, fire brigade, spill clean-up services);
- Steps to follow to minimise damage and control an emergency;
- Instructions and contact details for notifying relevant government agencies, local councils and, if necessary, neighbouring land owners;
- The location of on-site information detailing the above and any hazardous materials, including Material Safety Data Sheets and spill containment materials (where appropriate); and
- A copy of the above information must be kept in the Master Copy of the RAP maintained by the Client.

Where required, immediate verbal notification to the NSW EPA (and others, as required by the Protection of the Environment Legislation Amendment Act, 2011) must take place using the following contact numbers:

- NSW EPA Pollution Reporting – 13 15 55
- WorkCover – 13 10 50
- Fire and Rescue NSW - 000



## 2. Site Identification and Description

### 2.1 Identification

For the purposes of this RAP, the site is defined as 185-195 Fifteenth Avenue, West Hoxton, NSW. Site details are summarised in Table 2.1 with relevant figures detailing site location, current and proposed layouts provided in Appendix A.

**Table 2.1: Site Details**

Item	Site Details
Street Address:	185 – 195 Fifteenth Avenue, West Hoxton, NSW 2171
Current Description:	<p>185 Fifteenth Avenue:</p> <ul style="list-style-type: none"><li>• Lot 345 DP 2475</li></ul> <p>195 Fifteenth Avenue:</p> <ul style="list-style-type: none"><li>• Lot 2 DP 307334</li><li>• Lot 304 DP2475</li><li>• Lot 305 DP2475</li><li>• Lot 306 DP 2475</li><li>• Lot 346 DP2475</li></ul>
Proposed Description:	<p>The concept layout for the southern three Lots within the site to create seven leasehold lots and internal roads/landscaping as follows:</p> <p>Lot 1: Fast Food.</p> <p>Lot 2: Large Format Retail.</p> <p>Lot 3: Service Station.</p> <p>Lot 4: Retail/Business. Supermarket.</p> <p>Lot 5: Child care centre.</p> <p>Lot 6: Future development site.</p> <p>Lot 7: Stormwater detention.</p> <p>Under the SSD, the northern three Lots are subject to subdivision only.</p> <p>Zoic note that the proposed childcare centre is located on 195 Fifteenth Avenue (not the former bus depot portion of the site at 185 Fifteenth Avenue).</p>
Current Site Ownership:	WSPT
Geographical Coordinates (to approximate center):	Latitude: - -33.920156 Longitude: 150.831389



Item	Site Details
Size:	<p>The site covers approximately 8.9 hectares with each of the six lots comprising the following:</p> <ul style="list-style-type: none"><li>• Lot 345 DP 2475: 1.220 ha</li><li>• Lot 2 DP 307334: 1.865 ha</li><li>• Lot 304 DP2475: 2.217 ha</li><li>• Lot 305 DP2475: 1.224 ha</li><li>• Lot 306 DP 2475: 1.216 ha</li><li>• Lot 346 DP2475: 1.214 ha</li></ul>
Local Government Area:	Liverpool City Council
Zoning:	<p>According to Council 149 Certificates obtained by Golders as part of the Phase 1 ESA (May 2015), there is no information on zoning for the site. Review of Liverpool Council LEP (2008) zoning maps indicate that the site is zoned "WSP SEPP Western Sydney Parklands".</p>
Surrounding land use	<p>North: Flynn Avenue and then rural use including poultry sheds. East: Residential and rural residential properties. South: Fifteenth Avenue and commercial use (including butcher; delicatessen; liquor store; service station; and, post office). West: Twenty-seventh Avenue beyond which is the Sydney Water Supply Channel and associated landscaped corridor. There is also a small war memorial to the southwest of the site (Kirkpatrick and Boyland Park).</p>

## 2.2 Current Site Condition

Information on site conditions has been taken from the following reports:

- 195 Fifteenth Avenue: Site conditions taken from Section 3.1 of Zoic (May 2016) Phase 2 ESA for 195 Fifteenth Avenue.
- 185 Fifteenth Avenue: Section 3.2 of DP (July 2015) Details Site Investigation for 185 Fifteenth Avenue.



### *195 Fifteenth Avenue:*

Based on Zoic's inspection during DSI fieldwork (3 May 2016) on the 195 Fifteenth Avenue Site, the following observations on site condition were made:

- The site was predominantly undeveloped, cleared grazing land covered by grass, shrubs and small stands of trees. A large blackberry outcrop was located in the southwestern portion of the site.
- A residential house and three associated sheds were located on Lot 346. The tenants operated horse manure packaging whereby stockpiles of manure are delivered and then bagged in the sheds prior sale.
- The sheds appeared to be constructed of corrugated iron with concrete hardstand floors; the roof of the residential house (and potentially the wall cladding) was suspected to be made of ACM. Several palm trees were observed in the vicinity of the residential house.
- A large dam was located on Lot 2 (southwestern portion of the site) which covers an area of approximately 2500m<sup>2</sup>. Water in the large dam was clear with no sign of algal growth or hydrocarbon staining. A small dam was located along the mid-western boundary of the site (boundary of Lot 2 and Lot 304); no algal growth, staining or other indicators of contamination were observed in the waters of the small dam.
- An unpaved carpark covering approximately 2000m<sup>2</sup> was located to the on Lot 2 south of the large dam adjoining Fifteenth Avenue.
- An earthen drainage ditch has been constructed on Lot 2 between the large dam and the public carpark in the southwestern portion of the site.
- A herd of steers occupied the western lots (Lot 2; Lot 304 and Lot 305) with access to the large dam for drinking water.
- Much of 195 Fifteenth Avenue had reworked uneven surface soils indicative of past market gardening activities.
- There were no signs of chemical storage. Along the northern boundary (Flynn Avenue) there was significant amounts of surficial dumped rubbish – including metal; mattresses; wood; white goods; and, household bags of rubbish.
- The topography across 195 Fifteenth Avenue generally falls from east to west and towards the southwest. The elevations ranged from approximately 100m AHD to 85m AHD.

### *185 Fifteenth Avenue:*

Based on their walkover inspection of the bus depot (10 April 2015), DP made the following observations (Lot 345):

- The majority of surface was paved or covered with asphalt, concrete or gravel. The areas associated with workshop and wash bay appeared to have been filled or levelled. Several areas within and around the workshops had visible staining of assumed hydrocarbons.
- Former USTs were located along the southern boundary of the bus depot. At the time of the inspection, the area appeared to have been filled-in with the surface consisting of loosely compacted aggregate. There were no signs of staining or odours.



- The main workshop and wash bay were constructed of clip-lock metal with concrete flooring. The area was clean and tidy with minimal staining. Several metal drums along with pieces of metal and mechanical parts stored at the north exterior of the workshop. A treatment plant for the used washing water was located on the south western corner of the wash bay and appeared to discharge into an in ground put further west.
- An office building located next to the main workshop on the east was constructed of ACM with a timber floor. A small toilet block was located north of the office building along with a septic tank.
- There was a small workshop and storage shed at the south eastern corner of Lot 345. The buildings were constructed of galvanized iron and metal and timber frame along with a concrete floor. A meal room located on the northern end of the buildings had a timber floor. Significant oil staining was observed on the workshop/storage building floor. Mechanical plant including a forklift and air compressor were located within the building.
- There was a small building in the south west corner of Lot 345. The building had vinyl wall cladding and may have been the main office for the bus depot although it was not open at the time of the inspection. A demountable building was attached to the rear of the building and was used as a lunch room, with a demountable toilet block directly behind the building.
- There were two 45 kL diesel ASTs (One located behind the main workshop while the other was located on a concrete pad on the western portion of Lot 345 directly west of the wash bay). Minor hydrocarbon staining was observed around the AST located north of the workshop, with water pooled on the concrete pad making observations of staining impossible. Of note, the AST on the concrete pad was removed offsite before the start of fieldwork.
- A mechanic inspection pit was located to the south of the main workshop, with a non-functioning bus located directly to the west of the pit.
- There were several large shipping containers located north of the main workshop along with a fire truck and other miscellaneous items such as rims and plastic drums. A portable fuel tank with bowser was located on the north east corner of Lot 345, with visible hydrocarbon staining observed within the vicinity of the fuel tank.
- There were buses on the site with several located on the north boundary, with several non-functioning buses located across the site. There was visible hydrocarbon staining around the buses parked on the northern boundary.

Zoic note that at the time of the fieldworks for 195 Fifteenth Avenue (3 May 2016), the bus depot at 185 Fifteenth Avenue was no longer operational and was boarded up and locked. Zoic noted that the ASTs observed by DP had been removed and there were no buses/shipping containers present on Lot 345.



### 3. Environmental Setting

Title	Details
Geology and Soil Map Conditions:	<p><i>Geology:</i> The Geological Map of Penrith (1:100,000) indicates that the site is underlain by the Bringelly shale of the Wainamatta Group.</p> <p><i>Soil:</i> The 1:100,000 Soil Landscape Series Sheet 9030 for Penrith indicates that the soil at the site consists of Luddenham soils, typically associated with the undulating rises of Wainamatta shale.</p>
Acid Sulfate Soils:	The NSW Natural Resources Atlas indicated that the site is not located in an area known for the occurrence of acid sulfate soils (ASS).
Location of Fill Materials:	<p>185 Fifteenth Avenue (DP, July 2015):</p> <ul style="list-style-type: none"><li>• Fill materials was encountered in most boreholes across Lot 345 ranging in depth from 0.3m to 2.8m (BH2; targeting former USTs). The average depth of fill was approximately 0.9m.</li><li>• Fill was described as clayey sand with inclusions of gravel, asphalt, concrete, timber, sandstone.</li></ul> <p>195 Fifteenth Avenue: (Zoic, May 2016)</p> <ul style="list-style-type: none"><li>• Minimal fill identified during the intrusive work.</li><li>• The majority of fill material was identified in test pits around the residential house and associated structures (Lot 346) and contained inclusions of blue metal, and isolated occurrences of tiles, brick, ash, glass and/or plastic to maximum thickness of 0.9m (TP02).</li><li>• The majority of 195 Fifteenth Avenue had reworked natural topsoil associated with historic market gardening activities.</li><li>• Localised dumped surficial rubbish was identified on the northern site boundary with Flynn Avenue and to a lesser extent along the north-western boundary with Twenty-Seventh Avenue.</li></ul>
Depth to groundwater	<p>Zoic (14 June 2016) carried out a search of Department of Primary Industries Office of Water for registered well in the vicinity of the site. The search indicated that there were no registered wells within a 500m radius of the site.</p> <p>As part of their intrusive works at 185 Fifteenth Avenue, Douglas Partners installed six groundwater monitoring wells (Lot 345).</p> <p>Based on a review of the borehole logs:</p> <ul style="list-style-type: none"><li>• Wells were installed to depths of between 10m and 15m bgl.</li><li>• Groundwater ingress was observed in two groundwater wells (MW2 and MW23) at depths of 12m and 13m bgl respectively.</li><li>• Standing water levels recorded during groundwater sampling ranged from 6.3m to 10m bgl.</li></ul>
Direction and Rate of Groundwater Flow:	Douglas Partners (July 2015) inferred that groundwater flow was west/south-west across 185 Fifteenth Avenue. This was confirmed by Zoic as part of re-sampling the groundwater wells at 185 Fifteenth Avenue (May 2016).
Nearest Water Body:	The Sydney Water Supply Channel is located on the western side of Twenty-Seventh Avenue (approximately 20m west the site).



Title	Details
Direction of Surface Run Off:	<p>Surface water is expected to follow the topography and internal drainage lines of the site.</p> <ul style="list-style-type: none"><li>• For 195 Fifteenth Avenue, the majority of runoff would enter the large dam located in the southwestern portion of the site.</li><li>• For 185 Fifteenth Avenue, it is anticipated that surface water would flow across the hardstands and enter the Fifteenth Avenue road drainage system.</li></ul>
Topography:	<p>DP (July 2015) reviewed the Liverpool 1:25,000 Topographic Sheet 9030-II-S (Central Mapping Authority of NSW) which indicated that the site has an elevation of approximately 95m AHD.</p> <ul style="list-style-type: none"><li>• Lot 345 (185 Fifteenth Avenue): located on a ridge line running approximately north-east to south-west with a steep fall to the north-east and a gentler fall to the south--west. The predominant fall is towards the west.</li><li>• Zoic noted that the topography of 195 Fifteenth Avenue was uneven with an overall slope to the south and west. The measured RL ranged from 100m AHD to 85m AHD (southwestern area).</li></ul>
Boundary Condition:	<p>Both properties within the site are fenced and locked to prevent public access.</p> <p>There are numerous internal fences within 195 Fifteenth Avenue.</p> <p>Significant amounts of household and general rubbish were noted along the northern fence line adjoining Flynn Avenue (195 Fifteenth Avenue).</p>
Flood Potential:	<p>Liverpool Council Section 149 certificate for Lot 346 indicates that the land is not subject to flood related development controls.</p>
Relevant Local Sensitive Environments:	<p>The relevant sensitive human receptors associated with the site are:</p> <ul style="list-style-type: none"><li>• Future occupants (predominantly commercial use- with the exception of childcare centre on 195 Fifteenth Avenue).</li><li>• Construction and maintenance workers.</li><li>• Adjacent site users (commercial and residential).</li></ul> <p>The closest ecological receptors are:</p> <ul style="list-style-type: none"><li>• Vegetation across the site (mainly 195 Fifteenth Avenue).</li><li>• Sydney Water Supply Channel located approximately 20m west of the site.</li><li>• Groundwater beneath the site.</li></ul>



## 4. Previous Environmental Investigations

Zoic was provided with the following previous reports that have been prepared for the site (or parts thereof):

- Golder Associates (May 2015) Preliminary Environmental Site Assessment for Commercial Precinct, 195 Fifteenth Avenue, West Hoxton. Prepared for WSPT (Ref: 147622023\_001).
- Douglas Partners (July 2015) Detailed Site (Contamination) Investigation, 185 Fifteenth Avenue, West Hoxton. Prepared for WSPT (Ref: 84801).
- Zoic (May 2016) Phase 2 Environmental Site Assessment 195 Fifteenth Avenue, West Hoxton. Prepared for WSPT (Ref: 16035).

Key findings of the above listed investigations are summarised in the following sections.

### 4.1 Preliminary Environmental Site Investigation (PSI) 195 Fifteenth Avenue (Golder, May 2015).

The Phase 1 ESA included:

- Numerous desktop searches (aerial photographs, selection of historic title searches; Council 149 Certificate; NSW WorkCover Dangerous Goods search; published geology and soil maps; contaminated land records and public registers held by NSW EPA).
- Site walkover noting environmental conditions, and features.
- Interview with long-term tenant (since 1970).
- Limited sediment sampling and water sampling from the two dams only (three sediment samples; two surface water samples from the dams).
- As part of associated geotechnical investigation, selected soil samples were analysed (results provided in Appendix B).
- Analysis for TRH, BTEX, PAH, metals, OPP, OCP and asbestos.
- Soil and sediment results compared to NEPM 2013 HSL D and EIL/ESL; Dam water sample compared to ANZECC (2000).
- All soil, sediment and surface water results below relevant adopted site criteria, however, Golder reported two fragments of confirmed ACM across the surface of the builder's yard (Lot 346).

Based on the findings of the Phase 1 ESA, Golder made the following recommendations:

- Soil/groundwater assessment of the land packages would be required to confirm the suitability of the site for the proposed development.
- Asbestos cement debris to be managed prior to commencement of earthworks in accordance with guidance proposed in WorkCover.



## 4.2 Detailed Environmental Site Investigation (DSI) 185 Fifteenth Avenue (DP, July 2015)

DP completed the DSI (July 2015) on the former bus depot which included:

- Review of a previous Golder Associates (March 2015) PSI for 185 Fifteenth Avenue (not provided to Zoic). The PSI reportedly included a review of historic land titles; historic aerial photographs; NSW EPA Public registers; Council 149 Zoning Certificate and soil containing results from a geotechnical investigation undertaken by Golder in February 2014 (not provided to Zoic) which included environmental sampling and analysis from six locations (analysis for total recoverable hydrocarbons (TRH); monocyclic aromatic hydrocarbons (BTEX); organochlorine pesticides (OCP); polychlorinated biphenyls (PCB); metals and asbestos – results reportedly below adopted NEPM HIL D site criteria).
- DP summarise the previous Golder PSI findings as follows: The area appeared to have been primarily used for agricultural land, including grazing, market gardening and poultry farming, The southern portion of Lot 345 was cleared prior to the 1950s, and based on the evidence of aerial photographs and on land title records, has been used as a bus depot since 1957 (owned by Liverpool Transport Co Pty Ltd). Infrastructure, including a newer bus wash bay and workshop, was constructed in the mid-section of Lot 345 at some point after 1994. The northern portion of the depot was cleared prior to 2002 to provide additional bus parking areas.
- Golder (March 2015) reportedly completed a WorkCover search related to storage of dangerous goods. This indicated that Liverpool Transport Co P/L held licence 35/002071 for a UST of 5000L capacity. During the site inspection by Golder, a site worker reportedly indicated that three USTs had been removed from the southern area in November 2014. One of the USTs was reported to contain liquid at the time, which was pumped out prior to the UTs being removed. The site worker did not know if associated validation works had occurred.
- The main potential sources of contamination were considered to be: former USTs; AST; maintenance activities; former market gardening activities and filling.
- Fieldworks completed as part of the DP DSI included drilling of 25 boreholes using track-mounted rig (BH1 to BH25). Six sampling locations were converted to groundwater monitoring wells (MW2; MW9; MW10; MW23; MW24; and MW25) to depths of between 10.5m and 15m bgl).
- Analytical testing was carried out by Envirolab (and ALS for secondary analysis). Soil analysis included analysis for metals; TRH; BTEX; PAH; PCB; OCP; organochlorine pesticides (OPP); volatile organic compounds (VOC); and asbestos screening (ID in 40g samples). Groundwater samples were analysed for metals; TRH; BTEX; PAH; VOC; OCP; OPP; and phenols.
- Soil analytical results were compared to NEPM 2013 commercial/industrial HIL/HSL; Management Limits; and, CRC Care (2011) HSL for direct contact (maintenance worker).
- Groundwater analytical results were compared to fresh water GIL and Drinking Water criteria presented in NEPM 2013.
- Based on a review of the soil analytical results against the various adopted criteria, the following exceedances were identified:
  - Soils from BH2 (targeting former UST area) had hydrocarbon odours at 5m bgl. Analytical results from BH2 at 0.1m and 5.5m did not exceed the adopted site criteria.



- Medium- to heavy-end TRH was detected in 11 samples (near-surface), all of which were below the adopted site criteria.
- All PAH results were below the adopted health-based criteria (BaP TEQ); one sample from BH19 exceeded the adopted ecological ESL for BaP (1.4mg/kg).
- DP also report that a previous near-surface sample from Golder sampling (BH14 near former USTs) exceeded the ESL for TRH (C10-C34).
- In regards to groundwater observations and analytical results, which were generally below the adopted site criteria:
  - No PSH or other indicators of significant contamination were observed in the field; a slight hydrocarbon odour was noted in MW2 (former UST area).
  - There was a detection of TRH C16-C34 in MW2 with result of 230 µg/L. Given that the well is located in the former UST pit and soil results had minor TRH concentrations this is not an unexpected result. There were also minor exceedances of benzene and xylene in MW2. The concentration of benzene was 1700 µg/L with the GIL for fresh water being 950 µg/L. The concentration for xylene was 790 µg/L with the GIL for fresh water being 350 µg/L. Given that there are no exceedances of the HSLs considering the vapour intrusion pathway, and there are no groundwater extraction processes known in close proximity to the site, no remediation of the groundwater at this location is warranted.
  - There were also minor exceedances for several heavy metals including cadmium, copper and zinc and copper in the wells. Following hardness modified values being applied to the results, all metals were within the adopted GILs.
- Based on the findings of the DSI, DP provided the following main recommended:
  - A hazardous building materials survey of existing buildings should be completed prior to demolition, with any hazardous materials removed by a licensed contractor in accordance with WorkCover guidelines;
  - Upon completion of demolition, a qualified occupational hygienist should inspect the property, and prepare a clearance report demonstrating that no hazardous materials (particularly asbestos) exist on the site surface after demolition;
  - Hydrocarbon odours and staining are likely to be encountered on site during future civil works, particularly at the surface and in the area of the former USTs, workshops and inspection pit. Where encountered they should be excavated and waste classified for off-site disposal (if surplus) or land farmed for re-use on site.

### 4.3 Phase 2 ESA for 195 Fifteenth Avenue (Zoic, May 2016)

The scope of work for the Phase 2 ESA completed by Zoic (May 2016) included:

- Review of an existing Phase 1 Environmental Site Assessment (Phase 1 ESA) prepared by Golder (May 2015);
- Fieldworks included a walkover site inspection and intrusive sampling at 50 locations which were chosen based on a combination of targeted sampling in identified potential areas of environmental concern and to provide general site coverage across the site.



- Collection of groundwater from four groundwater wells, MW2, MW9, MW24 and MW25, previously installed on 185 Fifteenth Avenue by DP (July 2015).
- Soil and groundwater samples were analysed by a NATA accredited laboratory for the identified contaminants of concern that may be associated with past agricultural use including selected heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, and zinc); organochlorine pesticides (OCPs) and asbestos. Selected samples were targeted for analysis of hydrocarbons (TRH; BTEX, phenols and PAH), nitrogen, phosphorous and coliforms.
- Laboratory results were compared against the most sensitive NEPM 2013 criteria for residential with garden/accessible soils (which includes childcare centres). Groundwater results were compared to NEPM 2013 freshwater criteria and drinking water criteria.

Based on the field observations and evaluation of analytical soil results, no areas of gross contamination were identified across 195 Fifteenth Avenue and it was considered that the area is generally suitable for the proposed development (including child care centre) with the exception of the following:

- Asbestos (ACM, FA/AF) were identified in TP2 near one of the sheds in the south-eastern portion of the site.
- Localised dumped household waste and rubbish identified along the northern boundary with Flynn Avenue and to a lesser extent along the north-western boundary with Twenty-Seventh Avenue are aesthetically unsuitable.
- Groundwater results from MW2 (185 Fifteenth Avenue) had concentrations of lead/TRH/BTEX above adopted site criteria. It is noted that these results had increased since the DP (July 2015) sampling round;

Notwithstanding the general site suitability for the proposed development, the following key recommendations were made:

- The portion of the site around the residential house and sheds requires near surface asbestos remediation and validation.
- Following demolition of site structures, confirmatory samples should be collected from within former building footprints to ensure that the underlying soils are suitable for the proposed land uses.
- Localised dumped debris and household waste were identified along the northern and north-western fenced boundaries should be removed and disposed appropriately to a licensed landfill.



## 5. Extent of Impact and Data Gaps

This section provides details on the extent of known impact across the site and the data gaps that are required to be closed out to ensure that the site can be made suitable for the proposed development.

The evaluation of extent of impacts requiring remedial works is based on the following:

- 185 Fifteenth Avenue (Lot 345) former bus depot – this area is proposed for commercial development and will NOT include the proposed childcare centre. Once the FABH layout has been finalised, there may a requirement to consider ecological EIL/ESL in landscaped areas in this portion of the site.
- 195 Fifteenth Avenue – proposed for commercial development INCLUDING childcare centre (i.e. remediated to more sensitive low-density residential guidelines and ecological EIL/ESL presented in NEPM 2013).
- It is noted that the recommended Hazardous Materials Survey for the site (both 185 and 195 Fifteenth Avenue) are not included in the current RAP, as they are assumed to form a separate scope of works.

### 5.1 Areas Requiring Remediation

Based on the review of the previous investigations by Zoic (May 2016); DP (July 2015) and Golder (May 2015), the following areas exceeded the adopted human health HIL/HSL criteria and require remediation (refer to Figure 7 Appendix A):

- **Area 1:** associated with near-surface asbestos ACM fragments identified by Golder and ACM/FA/AF identified by Zoic (TP2/0.1-0.2) in the south-eastern portion of Lot 346 which Golder describe as the 'builder's yard' around the sheds (Remediation Area 1 covers approximately 900m<sup>2</sup> (40m x 30m minus shed footprint of 200m<sup>2</sup>). Given the FA/AF identified at TP2/0.1-0.2m (Zoic, May 2016), the vertical extent of impact is likely to be 0.2m (total volume 180m<sup>3</sup> equating to approximately 310 tonnes based on a bulk density if 1.7t/m<sup>3</sup>).

Possible Remediation Area (ecological);

- **Area 2:** associated with BH19 (DP, July 2015) which had BaP above adopted commercial EIL criteria at a 0.1-0.2 (2.2mg/kg vs EIL of 1.4mg/kg) and therefore may not be suitable for growing media. It is anticipated that the impacted volume would be 0.4m deep (thickness of fill at BH19) x 3m x 3m (total volume of 3.6m<sup>3</sup> equating to 6.1 tonnes based on bulk density of 1.7 tonnes/m<sup>3</sup>).

### 5.2 Additional Investigation (Data Gaps)

This section outlines the identified data gaps that are required to be addressed to confirm that the site is suitable for its intended FABH development. These data gaps are predominantly due to access constraints during the respective investigations by DP (July 2015) and Zoic (May 2016) or due to uncertainties in sampling/analytical techniques (as for ACM in boreholes across 195 Fifteenth Avenue) or lack of validation procedures and documentation associated with the UST removal at 195 Fifteenth Avenue (refer to Figure 8, Appendix A).

- **Data Gap 1: Existing Structures:** Sampling beneath existing buildings and structures (preferably once structure are removed); this should include:



**Lot 346:** Two sampling locations within each of the four building/shed footprints (8 testpits);

**Lot 345 (Bus Depot):** 8 sampling locations within building footprints (testpits), former 45kL diesel ASTs on western side of central workshop (three test pits), and beneath in-ground hoist (inspection pit) south of main workshop (one testpit).

- **Data Gap 2:** former UST area at the bus depot (Lot 345). There is anecdotal evidence that three USTs were removed from this area around November 2014 (from Golder March 2015 PSI on 185 Fifteenth Ave – not provided to Zoic). This area has not been validated in accordance with DECCW (2010) UPSS Technical Note – Site Validation Reporting. As part of preparing the RAP, Zoic completed additional review of satellite images (from nearmap.com), which seem to confirm that the USTs along the southern boundary of Lot 345 were removed sometime between 21 November 2014 and 8 January 2015 (refer to Appendix A, Figure 5). Soil sampling should provide indicative validation of 'wall' and 'base' samples (five testpits- one for each wall and one in the centre). MW2 should be re-sampled (or if destroyed, should be re-installed). It may be beneficial to install an additional groundwater well hydraulically down gradient of the former UST (south-west) to establish whether associated groundwater impacts have the potential to be migrating offsite towards Fifteenth Avenue.
- **Data Gap 3: Asbestos Analysis (Lot 345):** Sampling for asbestos completed across Lot 345 included 37 analysis of 40g samples. Although no asbestos was identified, given that the sampling and analysis was not in accordance with NEPM 2013 or WA (2009) DoH guidance, some confirmatory asbestos should be carried out. Zoic recommends 12 grid-based testpits across the former bus depot with appropriate 500g samples analysed in accordance with NEPM 2013 from surface and/or near surface fill.
- **Data Gap 4: Potential surface spill (Lot 345):** As part of preparing the RAP, Zoic completed a review of satellite images for the bus depot (nearmap.com). The images (presented in Figure 6, Appendix A) indicate that there may have been localised surface spill in the central-western portion of the bus depot near the former 45kL diesel ASTs (between at least 6 May 2015 and 10 August 2015). Zoic note that the spill is likely to have started after the DP fieldwork, which were carried out mid-April 2015. Based on an assumed area of potential impact of 500m<sup>2</sup> it is considered that 5 targeted test pits should be sampled in this area (10m grid). Samples should be collected from near-surface and underlying soils to establish whether there is any residual impact from the potential spill that may require remedial works.



## 6. Conceptual Site Model

Based on the information obtained during the desktop review and field observations, Zoic has prepared the following conceptual site model (CSM).

**Table 6.1: Conceptual Site Model**

Contaminant or Area of Concern	Potential Receptors	Exposure Pathways	Remediation or Intrusive works recommended?
Identified Asbestos in near-surface soils around sheds of Lot 346	<p><b>Human:</b></p> <ul style="list-style-type: none"> <li>• Current residents</li> <li>• Future onsite construction / maintenance works (intrusive works)</li> <li>• Future site users</li> <li>• Adjoining occupants</li> </ul> <p><b>Ecological:</b> none</p>	<ul style="list-style-type: none"> <li>• Inhalation of fibres</li> <li>• Aesthetics</li> </ul>	Zoic recommend that remediation of surface and near-surface soils around the shed of Lot 346 is required to make the area suitable for the proposed development
Identified BaP above EIL criteria in shallow fill material at BH19 of Lot 345	<p><b>Human:</b> none.</p> <p><b>Ecological:</b> Future landscaping</p>	Ecological: Uptake by flora species	Zoic consider that remediation of fill material may be required if this portion of the site is proposed for landscaping.
Potential impact beneath existing structures – fill material	<p><b>Human:</b></p> <ul style="list-style-type: none"> <li>• Onsite construction workers/ maintenance workers.</li> <li>• Onsite future users</li> </ul> <p><b>Ecological:</b></p> <ul style="list-style-type: none"> <li>• Underlying groundwater</li> <li>• Future flora landscaping</li> </ul>	<p>Human: Dermal and/or oral contact to potentially impacted soil.</p> <p>Ecological: There is potential for fill to be leaching to groundwater</p> <p>Ecological: Uptake by flora species</p>	Identified data gap – Zoic recommend sampling and analysis of baseline concentrations of contaminants of potential concern (COPC)
Potential remaining impact associated with former UST area on Lot 345	<p><b>Human:</b></p> <ul style="list-style-type: none"> <li>• Onsite construction workers/ maintenance workers.</li> <li>• Future occupants.</li> </ul> <p><b>Ecological:</b></p> <ul style="list-style-type: none"> <li>• Underlying groundwater</li> </ul>	<p>Human: dermal or oral contact to potentially impacted soil.</p> <p>Vapour intrusion from potential volatiles.</p> <p>Ecological: potential impact to groundwater.</p>	<p>Identified data gap – sampling in former UST area recommended as this area has not been validated in accordance with current guidance.</p> <p>Sampling and analysis for contaminants of concern (lead; TRH; BTEX, PAH).</p>
Potential asbestos in near-surface soils of Lot 345	<p><b>Human:</b></p> <ul style="list-style-type: none"> <li>• Current residents</li> <li>• Future onsite construction / maintenance works (intrusive works)</li> <li>• Future site users</li> <li>• Adjoining occupants</li> </ul> <p><b>Ecological:</b> none</p>	<ul style="list-style-type: none"> <li>• Inhalation of fibres</li> <li>• Aesthetics</li> </ul>	Identified data gap - it is recommended that confirmatory asbestos sampling be completed in accordance with current NEPM 2013 and WA DOH (2009) guidelines.
Potential surface spill in	<b>Human:</b> Onsite construction workers/ maintenance workers.	Human: dermal or oral contact to potentially impacted soil.	Identified data gap – sampling recommended across potential spill area.



Contaminant or Area of Concern	Potential Receptors	Exposure Pathways	Remediation or Intrusive works recommended?
Midwestern portion of Lot 345	<ul style="list-style-type: none"><li>• Future occupants.</li></ul> <b>Ecological:</b> <ul style="list-style-type: none"><li>• Underlying groundwater</li></ul>	Vapour intrusion from potential volatiles.  Ecological: potential impact to groundwater.	Sampling and analysis for contaminants of concern (lead; TRH; BTEX, PAH).



## 7. Remedial Options

Possible remediation options for Area 1 and Area 2 (refer to Section 5.1) were considered against the current NSW EPA waste management hierarchy as set out in the Waste Minimisation and Management Act 1995 and the DEC (2006) Guidelines for the NSW Auditor Scheme (2<sup>nd</sup> Edition). An evaluation of remediation options to address the localised Remediation Areas and to render the site suitable for the proposed development are presented in Table 6.1 below.

- **Area 1:** 180m<sup>3</sup> of ACM/FA/AF impacted near-surface soils.
- **Area 2:** 3.6m<sup>3</sup> of PAH-impacted soils above commercial EIL (only in an area of proposed landscaping)

**Table 7.1: Consideration of Remedial Options**

Technical Characteristic	Option 1 Excavation – off-site disposal	Option 2 Do Nothing	Option 3 Cap and Contain
<b>Cost</b>	Low-medium	None	Low
<b>Technical Feasibility</b>	<p><b>Area 1:</b> Satisfactory for identified contamination (asbestos)</p> <p><b>Area 2:</b> Satisfactory for identified contamination (PAH); it is considered these soils could either be disposed offsite or reused onsite beneath proposed structures or hardstands.</p>	<p><b>Area 1:</b> Not appropriate for Asbestos.</p> <p><b>Area 2:</b> Possible if this area is not proposed as growing media.</p>	<p>Possible for a wide range of contaminants including asbestos identified at <b>Area 1</b>.</p> <p><b>Area 2:</b> Although technically feasible- it would not be considered necessary to cap and contain the EIL exceedance associated with Area 2.</p>
<b>Human Health Risk</b>	<p><b>Area 1 and Area 2:</b> Low – excavation and off-site disposal will eliminate future human health exposure. Onsite OHS controls required during works.</p>	<p><b>Area 1:</b> medium–human health risks associated with FA/AF.</p> <p><b>Area 2:</b> No human health risk associated with EIL exceedance of BaP.</p>	<p><b>Area 1:</b> Relatively low – only minimal soil disturbance involved to cap Area 1, however, there will remain ongoing management associated with a cap and contain strategy.</p> <p><b>Area 2:</b> No human health risk.</p>
<b>Reliability</b>	Excellent - removes contamination completely from the site.	None- does not remove identified contamination or human health risk for <b>Area 1</b> .	<p><b>Area 1:</b> high – minimal potential for asbestos breakthrough if containment is breached.</p> <p><b>Area 2:</b> N/A</p>
<b>Regulatory Approval</b>	Satisfactory – Compliance with Regulatory Authorities. Licensed landfills available.	<b>Area 1:</b> Not satisfactory – NEPM does not allow for asbestos in surface soils.	Generally satisfactory – approval is required from Council to allow soils to be encapsulated as the remedial strategy. Will require a long term EMP and notation on title that contamination remains onsite.



Technical Characteristic	Option 1 Excavation – off-site disposal	Option 2 Do Nothing	Option 3 Cap and Contain
Ongoing Liability	Nil as all contamination is removed	<b>Area 1:</b> High – human health risks remain.  <b>Area 2:</b> Not applicable.	Moderate– capping system needs to be maintained and ongoing monitoring necessary to ensure the integrity of the cap.
Implementation Time Frame	Short	Not applicable	Initial implementation (1 month) but requirement for ongoing management.
Limitations	Requires waste classification of excavated fill material prior to disposal and validation works post remediation. May result in a larger than anticipated amount of material for disposal.	If nothing is done for Area 1, the site will not be suitable for development as FABH	Limitations to potential land use for the site. Ongoing liability and EMP required, which must be accepted and enforced by Council.



## 8. Rationale for Selection of Preferred Remedial Options

Option 1 is considered the most feasible approach based on the NSW EPA preferred remedial strategies when considering the contaminant type and the proposed development

The rationale for the selection of Option 1 is based on the relatively small volume of identified localised soil impact (Area 1), and that the cost of off-site disposal to landfill is considerably less than the cap and contain strategy costs for soils; the 'Do Nothing' option is not feasible as portions of the site require further investigation or remediation.

Relative benefits of the Option 1 strategy are as follows:

- The costs associated with the 'excavate and dispose' remediation method are low to medium;
- The 'excavate and dispose' remediation method is a proven technology for the removal of the type of contaminants associated with impacted fill and the approach is approved by regulatory bodies;
- The 'excavate and dispose' remediation method is dependent upon the cost and availability of suitable landfill disposal sites. These are readily available in the greater Sydney region;
- After completion of the remediation works and validation sampling, the site would be suitable for residential land use;
- The timeframe for implementation of the 'excavate and dispose' remediation method is relatively short compared to other remediation methods evaluated; and
- It is considered that any additional remediation required following the investigation works associated with the 'Data Gaps' identified in Section 5.2 can also be closed out with the Option 1 remediation strategy (excavation and offsite disposal).



## 9. Scope of Remediation

### 9.1 Preliminaries

A summary of the anticipated preliminaries is provided below:

- Obtain regulatory approvals and licenses required to complete the remedial activities proposed for the site (see Section 13);
- Obtain a Hazardous Material Survey for onsite buildings; both for Lots 345 and 346;
- Ensure removal of any hazardous materials from within the existing structures at the site (as identified in the required Hazardous Material Survey) are completed by appropriately licensed contractors in accordance with current regulations and guidelines and disposal at a suitably licensed facility;
- Ensure a clearance certificate is issued by appropriately licensed contractors prior to commencement of demolition works;
- Removal of site structures (including demolition works) to allow access for site testing and collection of validation data;
- Prepare and implement a Site Management Plan for the proposed site works (see Section 14);
- Prepare and implement a Work Health & Safety Plan (see Section 15);

### 9.2 Data Gap Works

Additional sampling (as described in Section 5.2) should be carried out following removal of buildings/ structures and associated hardstand, the following targeted sampling should be completed:

- **Data Gap 1: Existing Structures:** Sampling beneath buildings and structures:
  - **Lot 346:** Two sampling locations within each of the four building/shed footprints (8 testpits); and
  - **Lot 345 (Bus Depot):** 8 sampling locations within building footprints (testpits); beneath former ASTs on western side of central workshop (3 testpits) and beneath in-ground inspection pit south of main workshop (one testpit).
- **Data Gap 2: former UST area at the bus depot (Lot 345).** The former UST area soil sampling requires validation of 'wall' and 'base samples (five testpits- one for each wall and one in the centre).
  - Recommended re-sampled of MW2. It may be beneficial to install an additional groundwater well hydraulically immediately down gradient of the former UST (south-west) to establish whether associated groundwater impacts have the potential to be migrating offsite towards Fifteenth Avenue.
  - Based on the clay and shale subsurface conditions, it is anticipated that groundwater impact associated with MW2 is localised and confined to the former pit area.



- **Data Gap 3: Asbestos Analysis (Lot 345):** 12 grid-based testpits across the former bus depot with appropriate 500g samples analysed in accordance with NEPM 2013 from surface and/or near surface fill.
- **Data Gap 4: Potential surface spill (Lot 345):** sampling of potential surface spill area in the central-western portion of the bus depot near the former 45kL diesel ASTs (5 targeted testpits should be sampled in this area).

### 9.3 Remediation and Validation Works

#### General:

- Excavated contaminated fill should be temporarily stockpiled on either a sealed surface or a plastic sheet and covered with an impermeable plastic sheet to prevent rain infiltration, dust and runoff generation.
- If placement on an impervious surface is not possible, confirmation is required that cross-contamination of the soil underneath has not occurred.
- Where contaminant concentrations in validation samples exceed the site remediation criteria, further 'chase-out' excavation must be carried out, until new validation samples return concentrations below the site validation criteria.
- Soil samples will be analysed as per the sampling design outlined in Table 9.1.
- Validation samples for Area 1 will be collected immediately after the final excavation face has been created (500g samples in ziplock bags). If Area 2 requires remediation, samples will be collected in laboratory supplied glass jars with Teflon lined lid.
- For Data Gap Area 1 to Area 4, samples will be collected as follows (as required):
  - Soil samples collected in laboratory supplied glass jars with Teflon lined lids or 500g samples for asbestos analysis in ziplock bags;
  - Soil will be placed in a ziplocked bag which will be screened in the field using a calibrated PID to detect the presence of volatile hydrocarbons.
  - Groundwater will be sampled in laboratory supplied glass and plastic bottles.
- Samples will be kept in ice or in a cool room of approximately 4°C and sample handling will be carried out under chain of custody protocols and in accordance with industry accepted standard practice.
- During data gap and validation field sampling, adequate quality control samples comprising field inter and intra laboratory duplicates (at a minimum rate of 5% for intra and inter laboratory duplicate samples) and equipment wash blanks will be collected, where appropriate. Trip spikes and blanks will be used for each batch of samples collected and analysed.

#### Area 1 (Asbestos ACM/FA/AF impacts in around shed of Lot 346):

- Scraping of surface soils across the area to 0.2m.
- Collection of validation samples as per Validation Sampling Plan presented in Section 9.
- Inspection of surface soils walking 1m transects (in two perpendicular directions).



- Validation of Area 1 excavation to demonstrate that contamination has been removed (refer to Section 9 for validation sampling plan).
- Waste classification of excavated soils to allow for appropriate waste disposal to licensed landfill facility.

#### **Area 2 (if required):**

Area 2 (located at DP July 2015 BH19) may or may not require remedial works, depending on whether the proposed development includes proposed landscaping in this part of the site where soils impacted by BaP were encountered.

If remediation/validation of Area 2 is required, the following process should be followed:

- Excavation of fill soils as outlined in Section 5.1
- Inspection of excavation followed by collection of validation sample (refer to Section 9 for validation sampling plan).
- Excavated soils can either be reused onsite beneath hardstands or buildings; or alternately waste classification of excavated soils to allow for appropriate off site disposal to licensed landfill facility.

#### **Validation Sampling Procedure:**

- Given the anticipated shallow extent of excavation associated with Area 1 (and Area 2, if required) a hand trowel will be used for collecting soil validation samples; the equipment shall be rinsed with de-ionised water and phosphate free detergent (Decon 90) between sampling locations. To maintain sample integrity, new nitrile gloves will be used to collect each sample.
- If deeper excavations are required (if deeper chase-out excavation is required or if any of the data gaps require remediation) validation samples will be collected from the excavator bucket or directly from the excavation wall by using a decontaminated stainless steel trowel or by hand with nitrile gloves. Where samples are collected from the excavator bucket, the sample will be obtained from the centre of the bucket to minimise the potential for cross-contamination and to ensure a representative sample is obtained.
- All laboratory supplied sample containers will be clearly labelled with a sample number, sample location, sample depth, sample date and samplers initials. The sample containers will then be transferred into an Esky for shipment to the testing laboratory for analysis. A chain-of-custody (COC) form will be completed, and forwarded with the samples to the testing laboratory. Sample analysis is to be conducted NATA accredited laboratory in accordance with NATA approved methods.
- A PID will be used for all data gap works associated with the hydrocarbon contamination including base and wall sample collection from the UST area; beneath former diesel ASTs; potential spill area; beneath in-ground inspection pit; and, beneath workshop buildings. Sample collection methods will be recorded and reported, with rationale for sample selection.
- Based on the validation sampling results, one of the following actions will be taken:
  - If some of the validation samples fail to meet the remediation criteria, the soils identified as failing the remediation criteria will be further excavated. Further validation of these areas will be required.



- If some of the validation samples fail the remediation criteria and further excavation is not considered practicable, alternate remedial strategies and / or risk assessment to assess the significance of the remaining contamination may be considered.
- If all validation samples meet the remediation criteria, no further remedial works will be required.

## 9.4 Waste Classification Works

Waste classification of soils is required to be carried out in accordance with NSW EPA (2014) Waste Classification guidelines to allow for disposal to a suitably licensed landfill facility.

Analysis for the purposes of waste classification should include metals; TRH; BTEX; PAH and asbestos (with possible toxicity characteristic leaching procedure (TCLP) testing for metals and/or PAH, as required).

All records associated with waste classification, transport and receipt by the recycling facility and / or landfill must be collated and provided to the Environmental Consultant for inclusion on the Validation Report.

## 9.5 Reporting

Following the completion of remedial works, a Validation Report shall be prepared that makes a clear conclusion on whether the site has been remediated to a standard suitable for the proposed development. The report is to comply with the requirements of the NSW OEH (2011) Guidelines for Consultants Reporting on Contaminated Site and the NSW EPA (2006) Guidelines for the NSW Site Auditor Scheme (2nd Edition).

This Validation Report will include:

- Scope of remedial works completed including justification of any deviations from the RAP during the works;
- Any unexpected finds during the remedial works program, including details of management, materials tracking and validation;
- Results of all data gap sampling completed in accordance with the RAP;
- Results of all validation sampling undertaken during the course of the remedial works;
- QA/QC and data acceptance;
- Waste documentation including the volume of soil excavated and stockpiled (including segregation details), the volume of material disposed of offsite, truck / load movements and waste disposal dockets;
- Waste classification and landfill licenses;
- Details of any environmental incidents that occurred during the course of the remedial works and the actions undertaken in response to these incidents;
- Details of any areas of the site where contamination was identified extending beyond the site boundary (if appropriate), and requirements to manage this; and
- Other information as appropriate.



## 10. Validation and Data Gap Plan

The objective of the validation program is to ensure that at the completion of the remedial works, the property is suitable for the proposed land use. The validation program is to be implemented as follows, after the removal of all buildings, hardstand surfaces at the site and the data gap investigation works.

**Table 10.1 Validation Sampling Frequency and Analysis**

Area of Concern	Number of Samples / Sampling Pattern	Analytical Testing
<b>Area 1 (Asbestos Lot 346)</b>	A minimum of nine (9) surface validation samples are to be collected (10m grid) across the 900m <sup>2</sup> area.  If the depth of excavation is required to be extended beyond a depth of 0.5m, then wall validating samples will be required (1 per 10 lineal meters).	500g samples to be analysed for asbestos in accordance with NEPM 2013
<b>Area 2 – if required (Lot 345)</b>	A minimum of five (5) validation samples (4 wall samples and one base sample).	PAH
<b>Waste Classification for off-site disposal</b>	Allow for 1 sample per 100 m <sup>3</sup> of stockpiled materials. <ul style="list-style-type: none"> <li>Nine (9) waste classification samples from Area 1.</li> <li>If soils from Area 2 require offsite disposal (3.6m<sup>3</sup> equating to 6.1 tonnes). It is considered that one waste classification sample would be sufficient (noting that this is an EIL exceedance).</li> </ul>	TPH, BTEX, PAH, heavy metals, asbestos and possible TCLP testing to aid classification.
<b>Stockpile footprint (if not placed on hardstand/plastic)</b>	1 sample per 10m <sup>2</sup>	Metals, TPH, BTEX, PAH, asbestos.
<b>Data Gap 1</b>	<ul style="list-style-type: none"> <li>Eight testpits within building footprints (Lot 346).</li> <li>Eight testpits within building footprints (Lot 345).</li> <li>Three testpits in AST footprints (Lot 345)</li> <li>One testpit beneath in-ground pit (Lot 345)</li> </ul> <p>Samples collected near-surface; then at 0.5m or change in lithology. A minimum of two samples from each location.</p>	Metals, TRH, BTEX, PAH, and phenol; asbestos (selected VOC for Lot 345)
<b>Data Gap 2</b>	Five (5) validation testpits are to be collected from the walls and floor of the former UST area. No fill points/bowser/pipe work was identified during the DSI, however if these are uncovered during the excavation works, targeted validation works will be required as follows:	Soil: Total Petroleum Hydrocarbons (TPH); Benzene, Toluene, Ethylbenzene, Xylene (BTEX), PAH, heavy metals.



- 1 sample per bowser;
- 1 sample per fill point;
- 1 sample per 5m of line work.

Groundwater sampling from MW2

GW: TRH; BTEX; VOC, metals

<b>Data Gap 3 (Asbestos Lot 345)</b>	12 grid-based test pits across Lot 345. Near-surface samples to be collected for asbestos in accordance with NEPM 2013 (500g samples). Underlying samples to be collected (only to be analysed for delineation purposes if required).	Asbestos
<b>Hot Spot Removal (contingency)</b>	Should areas of impact (other than Area 1 /Area 2) be identified during the demolition works, then excavation and removal of this material is required. Five (5) validation samples are to be collected from the excavation walls and base	Contingent on hotspot findings but at a minimum TPH, BTEX, PAH, heavy metals, asbestos.
<b>QA/QC</b>	Inter-laboratory 1:20 Intra-laboratory 1:20 Rinsate 1: sample event : per media Trip Blanks and Spikes per sampling event	TPH, BTEX, PAH, Metals and/or asbestos Spikes for BTEX only.

## 10.1 Duration of Remediation and Validation Works

Based on the proposed scope of the data gap works, remediation and validation works it is expected that it will take approximately 6-8 weeks to complete after the demolition of existing above ground site structures.

A contingency of a further 4 weeks should be included to allow for chasing out plus implementation of further works, as required.

The overall duration of the program is anticipated to take approximately 12 weeks (excluding weather delays).



## 11. Validation Criteria

The following presents a summary of the remediation/validation criteria for the site.

### 11.1 Soil Health Investigation Levels (HIL)

NEPM 2013 presents Tier 1 Health Investigation Levels (HIL) for a broad range of chemicals such as metals, inorganics, polycyclic aromatic hydrocarbons, phenols, pesticides, and other organics (Table 1A(1)).

The HILs are applicable to generic land uses such as residential, commercial / industrial or public open space, for all soil types, generally within the first 3 metres of soil below ground level. The HILs have been applied to assess human health risks via all relevant pathways of exposure.

Based on the proposed development for FABH, soil remediation/validation results will be assessed against the following:

- 185 Fifteenth Avenue (Lot 345): HIL D – Commercial; this is based on the assumption that the proposed childcare centre **will not** be on this lot.
- 195 Fifteenth Avenue: HIL A – residential with garden/accessible soils (includes childcare centres) – although the FABH layout has not been finalised, it is understood that this portion of the site **will** contain the proposed childcare centre.

### 11.2 Health Screening Levels (HSL)

NEPM 2013 presents Tier 1 Health Screening Levels (HSL) for the following petroleum compounds and fractions (Table 1A(3)):

- Benzene, Toluene, Ethylbenzene and Xylenes (BTEX);
- Naphthalene; and
- F1 (TPH C<sub>6</sub>-C<sub>10</sub> - naphthalene) and F2 (TPH >C<sub>10</sub>-C<sub>16</sub> – naphthalene).

The HSL are applicable to generic land uses such as residential, commercial / industrial or recreational/public open space, and differ for soil types between the ground surface and soils >4 metres below ground level. The HIL are applied to assess human health risks via the inhalation and direct contact pathways of exposure.

Based on the proposed development for FABH, soil remediation/validation results will be assessed against the following:

- 185 Fifteenth Avenue (Lot 345): HSL D – Commercial; based on the assumption that the proposed childcare centre **will not** be on this lot.
- 195 Fifteenth Avenue: HSL A & HSL B – residential; this portion of the site will contain the proposed childcare centre and therefore the more conservative HSL are considered applicable.



### 11.3 Ecological Investigation Levels (EIL)

NEPM 2013 presents Ecological Investigation Levels (Interim EILs) for As, Cu, Cr<sup>3+</sup>, Ni, Pb, Zn, DDT and naphthalene. These EIL are applicable for areas proposed for landscaping and any growing media that may be imported to site for landscaping purposes.

- 185 Fifteenth Avenue (Lot 345): EIL for commercial; based on the assumption that the proposed childcare centre will not be on this lot.
- 195 Fifteenth Avenue: EIL for urban residential; this portion of the site will contain the proposed childcare centre and therefore the more conservative EIL are considered applicable.

### 11.4 Ecological Screening Levels (ESL)

Table 1B (6) of NEPM 2013 presents Ecological Screening Levels (ESL) for TPH C<sub>6</sub>-C<sub>40</sub> fractions, BTEX and benzo(a)pyrene. The ESL are applicable to generic land uses such as areas of ecological significance, urban residential areas and public open space, and commercial/ industrial land uses.

The ESL have been applied to assess risks to terrestrial ecosystems, generally, within the top 2 metres of coarse or fine soil at the final surface/ground level.

- 185 Fifteenth Avenue (Lot 345): ESL for commercial; based on the assumption that the proposed childcare centre will not be on this lot.
- 195 Fifteenth Avenue: ESL for urban residential; this portion of the site will contain the proposed childcare centre and therefore the more conservative ESL are considered applicable.

### 11.5 Groundwater Investigation levels (GIL)

Table 1C of NEPM 2013 presents Groundwater Investigation Levels (GIL). The Freshwater GIL are applicable for the site (see ANZECC & ARMCANZ 2000); In the absence of Freshwater GIL, the Drinking Water guidelines presented in Table 1C are referred to (taken from NHMRC 2011).

Table 1A(4) of NEPM 2013 presents groundwater Health Screening Levels (HSL) for vapour intrusion Table 1A(4). These groundwater HSL apply for different landuse and textures for the following petroleum compounds and fractions:

- Benzene, Toluene, Ethylbenzene and Xylenes (BTEX);
- Naphthalene; and
- F1 (TPH C<sub>6</sub>-C<sub>10</sub> - naphthalene) and F2 (TPH >C<sub>10</sub>-C<sub>16</sub> - naphthalene).

In relation the existing groundwater well installed at 185 Fifteenth Avenue, the commercial (clay) HSL are considered applicable.

### 11.6 Decision Making Process for Soils

For the soils to be considered suitable for use at the site the following criteria will be adopted with respect to the decision making process:

- If the soil results are less than the adopted site criteria then the materials can be deemed suitable for use;



- If the soil results are greater than the adopted guideline and the statistical analysis demonstrates that the upper 95% confidence limit on the average concentration falls below the adopted site criteria; with no single analyte concentration exceeding 250% of the adopted site criteria; and, the standard deviation of the results being less than 50% of the site criteria then the materials can be deemed suitable for use; and
- If the statistical analysis does not satisfy the requirements of the above point then further assessment and/or remediation and/or management will be required to facilitate reuse of these materials.
- If there are no significant aesthetics issues (including odour; deleterious materials) then the materials can be deemed suitable for use.

## 11.7 Waste Classification

To assess the waste classification of materials to be disposed of off-site, the NSW EPA refers to the NSW DECC (2014) "Waste Classification Guidelines, Part 1: Classifying Waste".

Waste classification will include total concentrations for contaminants of concern identified, as well as leachable concentrations by conducting the Toxicity Characteristics Leaching Procedure (TCLP), where necessary.

## 11.8 Imported Material

Where required, excavations shall be backfilled (after successful soil validation) using validated excavated natural material (ENM) or virgin excavated natural material (VENM) imported to the site.

If the imported fill requires testing to validate it as ENM/VENM, samples will require analysis for heavy metals, TPH, BTEX, PAH, OCP, PCB and asbestos. Testing will be conducted prior to importation of material to site. ENM/VENM shall be considered suitable for use on site where:

- Heavy metals (M8) concentrations are less than representative background concentrations expected for the material.
- TPH, BTEX, PAH, OCP, OPP, PCB total phenol concentrations are less than the laboratory limit of reporting.
- Asbestos is not detected at the laboratory limit of reporting.
- A minimum of three samples of imported fill will be analysed (per source site) with one additional sample obtained per 500m<sup>3</sup>.

Any other beneficial use imported material (such as ENM, road base) will be required to be assessed in accordance with the frequency and analytical suites prescribed in the relevant Exemptions issued under Part 6, Clause 51 and 51a of Protection of the Environment Operations (Waste) Regulation 2005; Although the development layout has not been finalised, it is considered that these may include:

- The Excavated Natural Material Exemption
- The Recovered Aggregate Exemption
- The 'Batch Process' Recovered Fines Exemption



- The continuous process; Recovered Fines Exemption

## 11.9 Quality Assurance / Quality Control

Samples should be collected by experienced personnel in accordance with NEPM, Australian Standard AS4482.1 (2005) and AS4482.2 (1999) and NSW EPA requirements.

Samples will be collected using a new pair of disposal latex gloves where applicable. Sampling equipment which has direct contact with samples will be decontaminated between samples by scrubbing with a Decon 90 solution and then with potable water.

## 11.10 Laboratory Testing

The chemical testing laboratories engaged to perform the laboratory testing will be NATA registered for the analysis undertaken. The laboratory will be instructed to perform and report results of internal quality control tests, which will consist of performing reagent blanks and surrogate spike analysis for organics and standard reference matrix for inorganic analysis.

The laboratory quality control data will be checked as follows:

- Checking that the reporting limits and procedures are satisfactory;
- Checking that the samples are analysed within holding times;
- Checking that laboratory blanks / reagent blanks are less than the laboratory reporting limits;
- Checking the reproducibility of samples by calculating the Relative Percentage Differences (RPDs) between primary and duplicate laboratory samples using a control limit of 50%; and
- Checking that laboratory spikes, surrogate spikes, matrix spikes and duplicate matrix spike recoveries are within acceptable control limits.



## 12. Contingency Plan

The conditions that may be encountered when excavating are uncertain (particularly in relation to the former bus depot on Lot 345). As unknown and variable subsurface conditions impose a degree of uncertainty for the project a set of anticipated conditions has been assumed in developing the contingency plan. A risk-based approach should be used when determining contingency actions.

Table 11.1 lists some potential events that may arise during the remediation of the site, and actions that could be undertaken if unexpected conditions occur.

**Table 12.1 Examples of Possible Contingency Actions**

Anticipated Problem	Corrective Action
Asbestos cement sheeting, lagging, piping, etc	<ul style="list-style-type: none"> <li>• Stop excavations if there is the potential for people to inhale airborne asbestos fibres.</li> <li>• Contact environmental consultant immediately to assess whether the material is asbestos.</li> <li>• Cover the area with plastic and suppress dust by wetting down if needed.</li> <li>• Please a warning sign at the entrance to the site where asbestos removal or site remediation is taking place.</li> </ul>
Friable asbestos	<ul style="list-style-type: none"> <li>• Stop excavations, cover the area with plastic and suppress dust by wetting down if needed.</li> <li>• Isolate area with appropriate signage and fencing to prevent access.</li> <li>• Contact environmental consultant immediately to assess whether the material is asbestos.</li> <li>• If required, appointment of Class A Asbestos Contractor to prepare friable Asbestos Removal (and Air) plan.</li> <li>• Please a warning sign at the entrance to the site where asbestos removal or site remediation is taking place.</li> </ul>
Discovery of other USTs	Stop excavation and contact environmental consultant. Works to be conducted as outlined in preceding sections of RAP.
Groundwater contamination	Should groundwater contamination be identified at the site (such as around former UST area), works should cease and advice from the environmental consultant sought. Remedial options to manage encountered groundwater contamination range in scale based on the size of the impact. An appropriate remedial strategy should be developed to ensure that risk to human health and the environment is adequately managed. <b><i>It is anticipated that groundwater impact associated with MW2 is likely to be localised and contained within the former UST pit area.</i></b>
Chemical spill/exposure	Stop work, refer to Occupational Health, Safety and Plan, and immediately contact environmental consultant.
Excessive rain	<ul style="list-style-type: none"> <li>• Maintain access roads, cover high-traffic areas with gravel, or cover working areas/stockpiles with plastic, or shutdown operations until runoff is more manageable.</li> </ul>



Anticipated Problem	Corrective Action
	<ul style="list-style-type: none"><li>Inspect and maintain sediment control pond and filter fences.</li></ul>
Unmanageable mud in excavation zone	<ul style="list-style-type: none"><li>Improve drainage collection system</li><li>Add geotextile/gravel in problem areas,</li><li>Strip off mud/slurry material or excavate from the top of the till.</li></ul>
Excessive drainage	<ul style="list-style-type: none"><li>Minimize active/contaminated work area,</li><li>Improve diversion clean run-on or maintain sufficient onsite wastewater storage capacity</li><li>Mobilise additional storage and/or treatment systems as needed.</li></ul>
Excessive dust	<ul style="list-style-type: none"><li>Use water sprays or biodegradable dust sprays or cease dust generating activity until better dust control can be achieved, or apply interim capping systems.</li></ul>
Excessively wet materials	Stockpile and dewater onsite, or add absorbents.
Odours during remedial works	<p>A potential for nuisance odours may be associated with the former bus depot. Controls to be applied include:</p> <ul style="list-style-type: none"><li>Biosolve surfactant sprays or sprinklers to reduce odour</li><li>Immediate off-site disposal of odorous materials as it is excavated or covering odorous material as practical.</li><li>Smoothing the surface of any stockpiled material to minimize excavated of fugitive odours.</li><li>Establishment of a documented complaints/action procedure.</li><li>Boundary monitoring for VOCs.</li></ul>
Environmental and/or WHS Control Fail or environmental or WHS monitoring indicates potential hazards	<p>Environmental and WHS contingencies would be presented in the Site Management Plan to be prepared by the Contractor. For example, presence of elevated concentrations of volatile hydrocarbons if noted during excavation. Actions could include:</p> <ul style="list-style-type: none"><li>Minimise extent of soils exposed to atmosphere</li><li>Increase level of PPE to include half-face respirator</li><li>Ensure machine drivers work in air conditioned cabs, and</li><li>Conduct monitoring at excavation face and at site boundaries.</li></ul>
Identification of contaminated material at the site boundary	Should validation (soil and groundwater) results indicate that contaminated materials extend beyond the site boundary, notification will be required to relevant parties (site owner, NSW EPA) in accordance with the guidelines. Further delineation investigations will be need to be conducted.



## 13. Quality Assurance/Quality Control

The data quality objectives (DQO) process is a systematic planning tool based on the scientific method for establishing criteria for data quality and for developing data collection designs. The data quality objectives define the experimental process required to test a hypothesis. The DQO process was developed to ensure that efforts relating to data collection are cost effective, by eliminating unnecessary, duplicative or overly precise data whilst at the same time, ensuring the data collected is of sufficient quality and quantity to support defensible decision making.

It is recognised that the most efficient way to accomplish these goals is to establish criteria for defensible decision making before the data collection begins, and then develop a data collection design based on these criteria. By using the DQO process to plan the validation works, the relevant parties can improve the effectiveness, efficiency and defensibility of a decision in a resource and cost effective manner.

The DQO process consists of seven steps, which are designed to clarify the study objectives, define the appropriate type of data and specify tolerable levels of potential decision errors. The seven-step DQO process that will be adopted for the remediation and validation works will be as follows:

- Step 1 – Defining the Problem. The first step in the DQO process is to 'define the problem' that has initiated remedial works;
- Step 2 – Identify the Decision. The second step in the process is to define the decision statement that the works will attempt to resolve;
- Step 3 – Identify Inputs to the Decision. In this step, the different types of information needed to resolve the decision statement are identified.
- Step 4 – Define the Study Boundaries;
- Step 5 – Develop a Decision Rule;
- Step 6 – Specify Limits on Decision Errors; and
- Step 7 – Optimise the Design for Obtaining the Data.

### 13.1 Step 1: Define the Problem

The site is required to be confirmed as suitable for commercial development as FABH (including a childcare centre proposed on 195 Fifteenth Avenue). Remediation and validation to confirm no ongoing environmental or human health risks to be conducted in the following areas (refer to Figure 7, Appendix A):

- **Area 1:** 180m<sup>3</sup> of ACM/FA/AF impacted near-surface soils.
- **Area 2:** 3.6m<sup>3</sup> of PAH-impacted soils above commercial EIL (only if in an area of proposed landscaping).

The following data gaps are required to be closed out as part of confirming site suitability (refer to Figure 8, Appendix A):

- **Data Gap 1: Existing Structures:** Sampling beneath buildings and structures (Lot 345 and 346).
- **Data Gap 2: former UST area.** The former UST area soil sampling requires validation of 'wall' and 'base' samples and confirmatory groundwater sampling.



- **Data Gap 3: Asbestos Analysis (Lot 345):** grid-based testpits across the former bus depot with appropriate 500g samples analysed in accordance with NEPM 2013 from surface and/or near surface fill.
- **Data Gap 4: Potential surface spill (Lot 345):** sampling of potential surface spill area in the central-western portion of the bus depot near the former 45kL diesel ASTs.

## 13.2 Step 2: Identify the Decision

The principle decision is “What is the most appropriate way to minimise ongoing liability and risk associated Area 1 (and potentially Area 2) and render the site suitable for future use as a commercial precinct known as FABH (including childcare centre on 195 Fifteenth Avenue)?”

Requirements of the adopted remediation and validation works must include:

- No unacceptable on or off-site impact after remedial works;
- Provisions to verify that the remedial actions are adequate and will not result in on or off-site impact (i.e. validation); and
- Provisions to verify that the site is suitable for the proposed development.

## 13.3 Step 3: Identify the Inputs to the Decision

The inputs to the decision are as follows:

- Data currently available for the site (Zoic, May 2016; Douglas Partners July 2015; Golder May 2015).
- Assessment of identified Data Gap 1 to Data Gap 4 (as described in Section 8.2 and Table 9.1) with additional soil data and groundwater to be assessed against adopted validation criteria.
- Validation data obtained during the remediation works program for Area 1 (and potentially Area 2), including validated results; field observations and photographs.
- Materials waste classification, stockpiling, tracking and disposal documentation.
- Validation of imported backfill/materials, if required.
- Comparison of analytical data to adopted NEPM 2013 criteria presented in Section 10.

## 13.4 Step 4: Define the Boundaries of the Study

The site location is shown on Figure 1, and current layout and identified soil exceedances shown on Figure 2 Appendix A; remediation areas are provided in Figure 7; and, data gaps are provided in Figure 8.

The lateral extent of the RAP is limited to the boundaries of the site, shown in Figures 2, Appendix A.

The vertical extent of the required remedial /management works on the site will be guided by the presence of impacted materials requiring removal. Final depths of excavation will be based on observations made during the remedial works.



### 13.5 Step 5: Develop a Decision Rule

Based on the available site information and in accordance with DEC (2006), elements of the decision rule can be established as follows:

- Have the impacted areas/sources been removed from the site?
- Have soil materials which will remain at the site been adequately validated?
- If potential contamination remains at the site, will ongoing issues be managed via an EMP or a change in remedial strategy?
- Have remedial works adequately reduced the overall risk of the site?
- Is the site rendered suitable for the proposed use?
- Have aesthetic issues been addressed where appropriate?
- Has validation been reported in accordance with NSW OEH (2011)?

Validation sampling is required to demonstrate that impacted areas and sources have been remediated and validated as suitable for the proposed land use.

The criteria published by NEPM 2013 are conservative thresholds for assessing potential impact of contamination on human health and as such, are considered appropriate for use as validation criteria.

Surface soils (less than 300mm depth) in areas of landscaping or accessible soils should also be free from rubble (including bricks, glass and tiles), stained soils and odour such that they are deemed aesthetically suitable for the proposed uses.

In the event that soil needs to be imported to facilitate the development (e.g. backfill excavations or for landscaping), it will be obtained from reputable suppliers and must comprise Virgin Excavated Natural Material (VENM).

It is intended that soils be validated to the adopted Validation Criteria presented in Section 10. This will ensure that:

- The remedial works adequately reduce the overall risk of the site; and
- The site be rendered suitable for the proposed commercial use (which is likely to include a childcare centre on 195 Fifteenth Avenue).

### 13.6 Step 6: Specify Tolerable Limits on Decision Errors

Quality Assurance and Quality Control (QA/QC) protocols in accordance with DEC (2006) guidelines will be applied to the remediation and validation works.

The pre-determined Data Quality Indicators (DQIs) established for this project in relation to precision, accuracy, representativeness, comparability and completeness are presented in the table below.



**Table 12.6 Data Quality Objectives and Indicators**

Data Quality Objective	Frequency conducted	Data Quality Indicator <sup>2</sup>
<b>Precision</b>		
Intra-laboratory field duplicates	1/20 samples	<5xLOR : <100% RPD <sup>1</sup>
Inter-laboratory field duplicates	1/20 samples	5-10xLOR : <75% RPD or >5xLOR: M8 <30% RPD >5xLOR: Other <50% RPD
Laboratory duplicates	1/20 samples	<5xLOR : no limit <sup>1</sup> 5-10xLOR : <70% RPD or >5xLOR: M8 <30% RPD >5xLOR: Other <50% RPD
Laboratory method blanks	1/20 samples	< LOR <sup>1</sup>
<b>Accuracy</b>		
Matrix spikes	1/20 samples	60 to 140%
Laboratory control samples	1/20 samples	70 to 130% (inorganic) As specified by lab (organic)
<b>Representativeness</b>		
Sampling handling storage and transport appropriate for media and analytes	-	Yes
Rinsate blanks	1 per day per equipment	<LOR
Laboratory blanks	1 per sampling event	<LOR
Trip Spike	1 per media	70 to 130% (inorganic) As specified by lab (organic)
Samples extracted and analyzed within holding times.	-	Hold Times: 14 days - organics 6 months – inorganics
<b>Comparability</b>		
Standard operating procedures used for sample collection and handling (including decontamination)	All Samples	Yes
Standard analytical methods used for all analyses	All Samples	Yes
Consistent field conditions, sampling staff and laboratory analysis	All Samples	Yes
Limits of reporting appropriate and consistent	All Samples	Yes
<b>Completeness</b>		



Data Quality Objective	Frequency conducted	Data Quality Indicator <sup>2</sup>
Soil description and COCs completed and appropriate	All Samples	Yes
Appropriate documentation for testing	All Samples	Yes
Data set to be 95% complete after validation	All Samples	Yes

1 - If the RPD between duplicates is greater than the pre-determined data quality indicator, a judgment will be made as to whether the excess is critical in relation to the validation of the data set or unacceptable sampling error is occurring in the field.

2- Guidelines for NSW Site Auditor Scheme (2<sup>nd</sup> edition)

### 13.7 Step 7: Optimise the Design of Obtaining Data

The purpose of this step is to identify a resource-effective data collection design for generating data to meet the project objectives. This will be achieved by the proposed Sampling and Analysis program for the validation of the excavations at the site, including the number of sample locations, media to be sampled, number of samples retained for analysis, analytical suite and method of sample collection.

Validation sampling and data gap works associated with remedial and site validation works are to be in accordance with the guidelines discussed in this report. Refer to Section 8 and Section 9 for the proposed sampling design for site validation works.



## 14. Regulatory Approvals/Licensing

This section discusses some of the regulatory compliance requirements associated with the remediation. It is important to note that this section is not exhaustive and the Contractor must ensure that they comply with all applicable legislation and guidelines as necessary.

### 14.1 Hazardous Building Materials

Any hazardous materials identified in the Hazardous Material Survey to be carried out on Lot 345 and Lot 346 (such as asbestos) are to be removed offsite in accordance with the requirements of the Work Health and Safety (WHS) Act 2011, WHS Regulation 2011, and WorkCover NSW requirements.

A Class A license is required to remove, repair or disturb friable asbestos. A Class B license is required to remove, repair or disturb more than 10m<sup>2</sup> of ACM. Any such works must include:

- Notification to WorkCover NSW at least seven days prior to the work commencing;
- Works must be supervised by a person with appropriate qualifications and experience; and
- All personnel involved with asbestos removal must have undertaken WorkCover NSW work specific training.

### 14.2 State Environment Planning Policy Number 55 (SEPP55) Remediation on Land

The remedial work will be carried out in accordance with State Environmental Planning Policy No. 55 – Remediation of Land (SEPP 55) and appropriate NSW EPA guidelines.

In accordance with SEPP 55, remediation is described as either Category 1 (work needing consent) or Category 2 (not needing consent).

The appointed planner (Willowtree Planning) has indicated that the proposed remedial works fall under Category 2.

In addition, the Auditor required that the following items under SEPP 55 Clause 9(e) be evaluated from the Section 149 Certificates obtained from Liverpool Council (Lot 345 and Lot 346 from Golder PSI March and May 2015) and other relevant information obtained from the SSD website (SSD 14 6407).

**Table 14.2 Evaluation of SEPP 55 Remediation Category under Clause 9e**

Item under Clause 9(e)	Consideration
Coastal protection:	149 Certificates state: <i>There has been no notification from the Department of Public Works that the land is subject to the operation of Section 38 or 39 of the Coastal Protection Act, 1979.</i>
Conservation or heritage item:	The Aboriginal and Historical Archeological Assessment for the site indicate that no heritage sites or items occur on the site that are listed on any State or local heritage register or schedule.
Habitat area, habitat protection area, habitat or wildlife corridor:	The 149 Certificates state: The land is not biodiversity certified land within the meaning of Part 7AA of the Threatened Species Conservation Act 1995.



Item under Clause 9(e)	Consideration
	The 149 Certificates also indicate that all of Liverpool Local Government Area is excluded from the operation of the Native Vegetation Act 2003.
Environment protection:	<p>The 149 Certificates states: "The land is not land to which a bio banking agreement under Part 7A of the Threatened Species Conservation Act 1995 relates.</p> <p>The Flora &amp; Fauna Assessment by Lesryk Environmental (March 2015) indicates that the site has no ecological communities or plant species listed under the Environment Protection &amp; Biodiversity Act 1999.</p>
Escarpment, escarpment protection or escarpment preservation:	No applicable
Floodway:	<p>149 Certificates state:</p> <p><i>Development on all of the land for the purposes of dwelling houses, dual occupancies, multi dwelling housing or residential flat buildings is not subject to flood related development controls.</i></p> <p><i>Development on all of the land for any other purpose is not subject to flood related development controls.</i></p>
Littoral rainforest:	Not applicable
Nature reserve:	<p>Under the WSP SEPP (Nature Reserves and Environmental Conservation Areas Map) the site is shown to contain a portion of Environmental Conservation Area along the northeastern boundary (on bus depot portion of the site).</p> <p>Subsequent communication from Department of Planning &amp; Environment (DoPE) acknowledges that the land is a bus depot and confirms that the map is incorrect and requires updating and that they are 'satisfied that the ENV (existing native vegetation) is not present on site'.</p>
Wetland:	Not applicable

Based on the evaluation of the appointed planner; consideration of criteria presented under SEPP 55 Clause 9(e); and the small nature of the proposed remediation, Zoic is in agreement with Willottree Planning that the proposed works constitute Category 2 remediation.

### 14.3 Protection of the Environment Operations (Waste) Regulations 2005

Part 6 of the Regulations specify that if waste is transported from the premises, the waste generator must ensure that the waste is transported:

- To a waste facility that is licensed under the Act, or
- To a person conducting mobile waste processing that is licensed under the Act, or
- To a place that can otherwise lawfully be used as a waste facility for that waste.

Waste disposal and landfill licensing documentation will be provided by the Contractor for inclusion in the Validated Report and to demonstrate compliance with the above.



#### 14.4 Waste Classification Guidelines, Part 1: Classifying Waste (NSW EPA 2014)

The NSW EPA (2014) Waste Guidelines provides guidance to waste generators to classify the wastes they produce and ensure the environmental and human health risks associated with it are managed appropriately and in accordance with the POEO Act 1997.

Soils to be removed from site could include asbestos, TRH and PAH impacted material.

Further waste classification is proposed within this RAP to classify soils that require offsite disposal as part of the remedial strategy.

A waste classification letter for soil which is proposed to be removed from the site will be prepared as part of remediation activities.



## 15. Site Management Plan

### 15.1 Site Responsibilities

The Principal Contractor shall be responsible for the preparation and implementation of a detailed remedial works Site Management Plan (Construction Environmental Management Plan), which may be required to comply with Council requirements and the relevant legislative requirements outlined in this RAP.

Please note that the Site Management Plan may require amendments to comply with any consent conditions issued by Liverpool City Council, as part of the Development Approval for the works, which have yet to be received.

### 15.2 Hours of Operation

Remediation works shall only be permitted during the times stated in the Development Consent. Emergency works is permitted to be completed outside these hours.

### 15.3 Underground Services

The Principal Contractor will be responsible for the location and protection of any underground services which have the potential to be impacted by the remedial works, and are not proposed to be removed as part of the scope of the remedial works.

### 15.4 Soil, Water and Waste Management

Soil excavation works will be conducted in a manner that minimises the potential migration of impacted soil and water off site and complies with the requirements of the Development Consent.

Sediment controls shall be erected down gradient of excavations to assist with sediment control. Stormwater may be managed through diversion (around excavation and stockpile areas) or detention (prior to controlled release). Detailed soil and water management plans shall be provided in the Site Management Plan for the remedial works.

Work shall be suspended during periods of severe inclement weather.

### 15.5 Noise

The remediation works shall comply with the requirements of the Development Consent as well as AS2436-1981 Guide to Noise Control on Construction, Maintenance Demolition Sites and the NSW EPA's Environmental Noise Control Manual for the control of noise from construction sites.

Where machinery and mechanical equipment is used on site, it will be in good working order and will be fitted with appropriate silencers when necessary.

### 15.6 Dust and Odour

Dust emissions shall be minimised by implementing the following controls:



- Erection of dust screens at site perimeter;
- Securely covering all loads entering or exiting the site;
- Wetting down excavated materials / excavations;
- Covering stockpiles; and
- Sealing of site ingress / egress points.

Due to the nature of the contaminants around the UST, odour may pose a potential environmental hazard. The Principal Contractor will be required to establish a procedure to proactively manage this problem if it arises.

### 15.7 Asbestos Encountered during Excavation

Where asbestos containing material is suspected or identified (Area 1), all excavation works must cease and a competent person (For example, an AS1 (asbestos fibres) or AS2 (ACM) licensed contractor) must be commissioned to coordinate the works and specify appropriate environmental control measures (e.g. airborne asbestos fibre monitoring) in accordance with existing legislation and guidance.

### 15.8 Material Transporting

The Principal Contractor shall ensure that there is no material tracked onto the street and that loads are securely covered. Soil, earth, mud or similar materials must be removed from the roadway by sweeping, shoveling, or a means other than washing, on a daily basis or as required. Soil washings from wheels shall be collected and disposed of in a manner that does not pollute waters.

All road rules shall be observed and the use of local roads shall be minimised.

A record of truck movements shall be kept in order to enable the waste to be tracked to the receiving landfill. The receiving landfill shall issue weighbridge and tipping documents and these shall be reconciled against the truck movement records to ensure accountability for all materials removed from site as part of remedial works.

### 15.9 Community Consultation

All owners and/or occupants of adjoining and opposite (across roadways) premises shall be notified of the remedial works program prior to works being commenced.

### 15.10 Complaint Reporting and Resolution

Complaints received from adjoining sites or the general public will be directed to the Principal Contractor. A Complaints Register (Date, Complainant Details, Nature of Complaint, Action Required, Responsibility, Due Date) must be maintained onsite to ensure that any concerns are recorded and addressed.

Within one working day of receiving the complaint, the Principal Contractor will prepare a written report detailing the nature of the complaint and all the actions taken to provide a solution.



## 16. Health and Safety Plan Outline

### 16.1 Responsibilities

The Principal Contractor is responsible for ensuring that the work is carried out in accordance with a detailed health and safety plan to be prepared prior to commencement of works. This will include:

- Ensuring a copy of the health and safety plan and RAP is available at the site during the remediation activities.
- Confirming individuals are competent in performing assigned tasks.
- Liaison with the contractor representatives, as appropriate, regarding safety matters.
- Investigation and reporting of incidents and accidents.

The Principal Contractor has not yet been commissioned.

Every individual worker is responsible for conducting their allocated tasks in a safe manner and in accordance with their training and experience. They must give due consideration to the safety of all others in their proximity and cooperate in matters of health and safety. All workers must leave their work areas in such a condition that the location will not be hazardous to others at any time.

### 16.2 Work Health and Safety Management Plan

Prior to the commencement of any activity related to this work, the Principal Contractor, Subcontractor or Environmental Consultant must manage risks associated with the works in accordance with Part 3.1 of NSW WHS Regulations 2011.

Prior to the commencement of any remedial activity, the Principal Contractor, Subcontractor or Environmental Consultant must prepare site specific work method statements (SWMS) in accordance with the NSW WHS Regulations 2011.

As required by the NSW WHS Regulation 2011, copies of approved SWMS must be retained and made readily accessible to any worker associated with the works.

A SWMS must:

- Take into account all relevant matters including circumstances at the site that may affect the way tasks are conducted;
- Be set out and expressed in a way that is readily accessible and understandable to those who use it;
- Identify the tasks to be conducted;
- Specify hazards relating to the tasks and risks to health and safety associated with those hazards;
- Describe the measures to be implemented to control the risks; and
- Describe how the control measures are to be implemented, monitored and reviewed.



As required by NSW WHS Regulations 2011, all persons conducting tasks under this RAP must take reasonable care for his or her own health and safety and take reasonable care that his or her acts or omissions do not adversely affect the health and safety of other persons or the environment.

In the event of an emergency arising on the site, appropriate action must be taken in accordance with established site procedures.

In the event of an accident, this is likely to include:

- Evaluate the seriousness of the injury, and contact emergency services, if necessary;
- Provide first aid, as appropriate, and if safe to do so evacuate the injured person;
- Make the area as secure as possible without jeopardising safety.
- If a serious accident occurs, do not disturb the scene, except to make safe and prevent further injury or damage, and keep all unauthorized people out; and
- Report all accidents to the Project Manager.

### 16.3 Personal Protective Equipment

All workers who may come into direct contact with contaminated soil or work within the vicinity of the remediation area will be required to wear (and be trained in the use and care) of following personal protective equipment:

- Overalls or long sleeved collared shirt.
- Heavy duty outer gloves (e.g. leather) where there is a risk of cuts or abrasions, otherwise nitrile gloves if in direct contact with soil (or contaminated water).
- Steel capped boots.
- Safety glasses.
- High visibility vest or jacket.
- Hard hat.
- Safety goggles.
- Earmuffs or earplugs, when noise levels make normal conversation difficult (approx. 85dBA).

In addition to the above, an approved half-faced respirator with organic cartridge shall be worn when the PID readings are above 30ppm are recorded in the breathing zone. The half face respirator cartridges shall be replaced as stipulated by the manufacturer.

Furthermore, due to the uncontrolled nature of the filling on the site there is potential for accumulation of toxic, flammable and / or explosive gases in excavations. A safe system of work (which is likely to include monitoring of air quality in excavations and in their immediate vicinity) must be established to manage these potential risks before any excavation work commences.



If any personal protective equipment is damaged or is suspected to not be functioning properly, it should be repaired or replaced immediately.

Personnel in PPE can be more susceptible to heat exhaustion and heat stroke. If the ambient temperature is greater than 25 degrees centigrade, employee temperature or overheating will be monitored during breaks, as well as recommending and encouraging above average levels of water consumption.

## 16.4 Air Monitoring (Asbestos and Hydrocarbon)

Asbestos materials are associated with Area 1; asbestos air monitors will be required at the perimeter of the Area 1 (and possibly around down-wind site boundary) during surface scraping works associated with Area 1 to establish whether airborne asbestos is generated. Air monitoring must be conducted in accordance with relevant guidance and legislation including NOHSC:3003 (2005) Guidance Note of the Membrane Filter Method for Estimating Airborne Asbestos Fibres (2<sup>nd</sup> Edition).

If odours are encountered, vapour monitoring shall be conducted to determine if they pose an unacceptable risk to human health as a result of remedial activities. Boundary monitoring with a PID should be conducted if any identified odorous contaminated soil is excavated, stockpiled or loaded for transport. Site activities will cease if PID concentrations at the boundaries of the Site exceed 10ppm.

## 16.5 Decontamination Procedures

The decontamination procedures specified below will be followed whenever personnel, plant or equipment leave the site.

- Personnel:
  - Wash boots in clean water.
  - Remove outer gloves and store for reuse.
  - Remove overalls and store for reuse (during the day) or place in a cleaning sack (end of each day).
  - Thoroughly wash hands and face.
  - If any part of a worker's body comes into direct contact with any potentially contaminated material, the affected part(s) should be immediately washed with clean water.
- Vehicle, plant and equipment: All equipment will be washed or otherwise cleaned to ensure that contaminated soil, water or dust is removed before it leaves the Site. All plant and equipment will have their outer bodies thoroughly cleaned of soil and sediment before moving off the Site. Plant and equipment decontamination must be undertaken on hardstand areas to prevent re-contamination of the site.



## 16.6 Emergency Response

In the event of an emergency arising on the site, appropriate action should be taken. Site evacuation procedures should be followed, as necessary.

In the event of an accident: evaluate the seriousness of the injury, and contact emergency services, if necessary; provide first aid, as appropriate, and if safe to do so evacuate the injured person; make the area as safe as possible without jeopardising safety. If a serious accident occurs, do not disturb the scene, except to make safe and prevent further injury or damage, and keep all unauthorized people out; and report all accidents to the Principal Contractor.

### **EMERGENCY CONTACT NUMBERS:**

**Police, Fire Brigade or Ambulance: 000**

**Royal Prince Alfred Hospital: (02) 9926 7111**

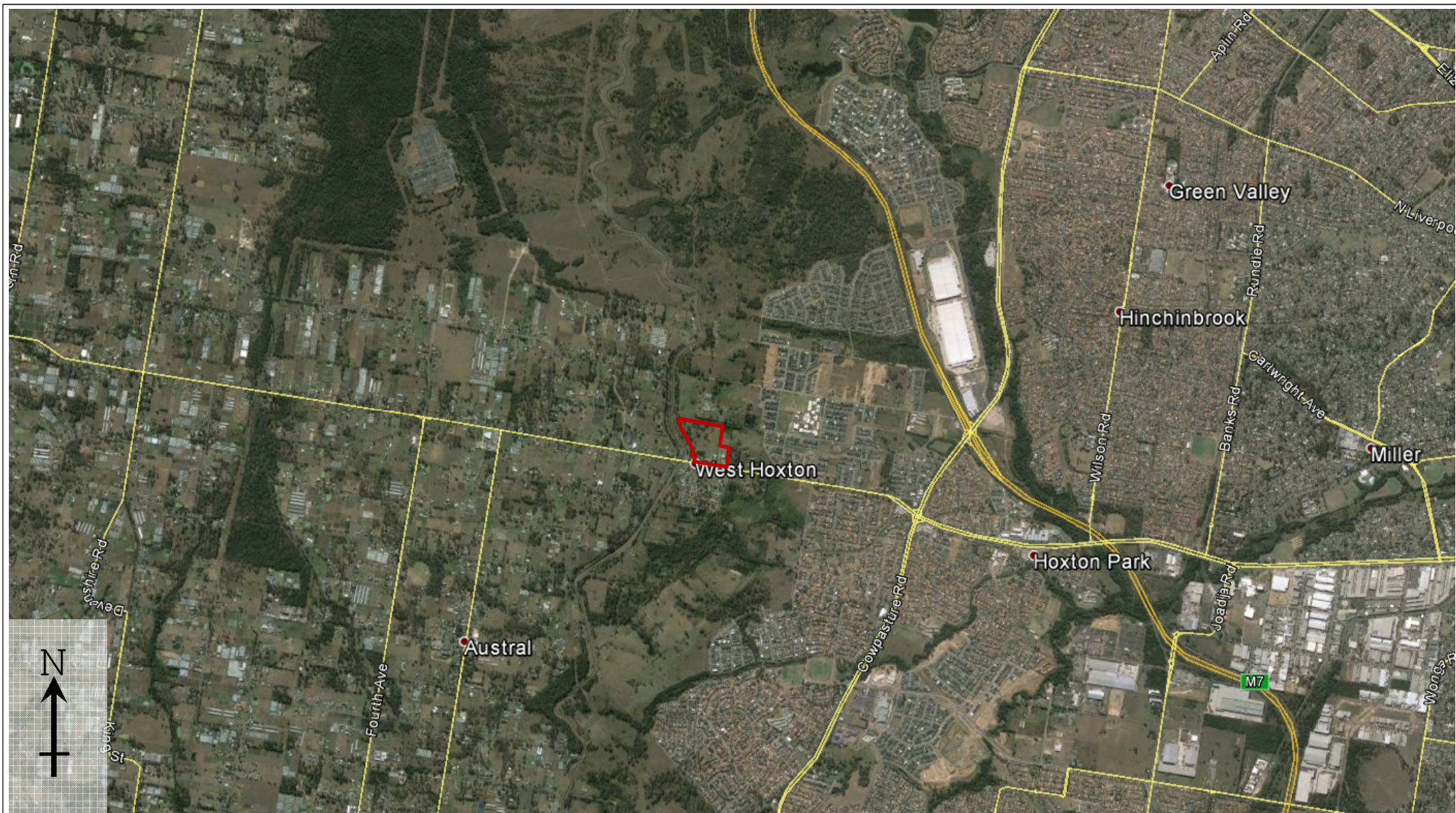


## 17. Conclusion

It is considered that the site can be made suitable for the proposed land use, subject to the implementation of the proposed remediation and validation works as outlined in this RAP.



## Appendix A – Figures



**LEGEND:**

— Site Boundary

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ZOIC Environmental Pty Ltd – [www.zoic.com.au](http://www.zoic.com.au)

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 June 2016  
 16058

**FIGURE 1**

**Site Location Plan**

Remediation Action Plan

185-195 Fifteenth Avenue, West Hoxton NSW





**LEGEND:**

- Site Boundary
- Zoic 2016 Area (195 Fifteenth Ave)
- DP 2015 Area (185 Fifteenth Ave)

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**FIGURE 2**  
 Site Layout Plan  
 Remediation Action Plan  
 185-195 Fifteenth Avenue, West Hoxton NSW

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**LEGEND:**

- DP 2015 Investigation Area
- ⊗ Borehole
- ⊗ Groundwater Monitoring Well

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**FIGURE 3**

DP 2015 Investigation Locations  
 Remediation Action Plan  
 185-195 Fifteenth Avenue, West Hoxton NSW

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**LEGEND:**

- ✕ Test pits
- Hand auger

**FIGURE 4**

Zoic 2016 Investigation Locations

Remediation Action Plan

185-195 Fifteenth Avenue, West Hoxton NSW

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21 November 2014



08 January 2015



**LEGEND:**

— Tank Removal Area

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**FIGURE 5**  
Indicative Tank Removal Satellite Imagery  
Remediation Action Plan  
185-195 Fifteenth Avenue, West Hoxton NSW

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**LEGEND:**

— Potential Spill Area

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**FIGURE 6**

**Potential Spill Satellite Imagery**

Remediation Action Plan  
 185-195 Fifteenth Avenue, West Hoxton NSW

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**LEGEND:**

- ▣ Area 1 (ACM/FA/AF)
- ▣ Area 2 – only if in landscaping area (EIL BaP)

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**FIGURE 7**  
**Remediation Areas**  
 Remediation Action Plan  
 185-195 Fifteenth Avenue, West Hoxton NSW





**LEGEND:**

- Data Gap 1 (buildings/ structures)
- Data Gap 2 (former UST validation)
- ◆ Data Gap 3 (Asbestos sampling)
- ◆ Data Gap 4 (potential spill area)

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**FIGURE 8**

Data Gaps – Indicative Sampling Plan  
 Remediation Action Plan  
 185-195 Fifteenth Avenue, West Hoxton NSW



## Appendix B – Analytical Result Summary Tables

Table 1: Summary Analytical Results - Soil Samples

			NEPM Soil Investigation Levels <sup>1</sup>					Sample Location				
Analyte	Units	LOR	HILs - Commercial / industrial land use	HSL - D Vapour Intrusion Sand 0-1m	EILs / ESL - Commercial and Industrial Coarse Grain	Management limits Commercial / Industrial Coarse Grain	BH11	BH11	BH12	BH13	BH14	
							0.5-0.95	0.5-0.95	0.5-0.95	0.1-0.2	0.0-0.1	
							9/02/2015	9/02/2015	9/02/2015	9/02/2015	9/02/2015	
							PS	LD	PS	PS	PS	
							123357	123357	123357	123357	123357	
TRH												
C6 - C10 Fraction	mg/kg	25				700	<25	<25	<25	<25	<25	
C6 - C10 Fraction minus BTEX (F1)	mg/kg	25		260	215 <sup>†</sup>		<25	<25	<25	<25	<25	
>C10 - C16 Fraction	mg/kg	50				1000	<50	<50	<50	<50	<50	
>C10 - C16 Fraction minus Naphthalene (F2)	mg/kg	50		NL/20,000 <sup>†</sup>	170 <sup>†</sup>		<50	<50	<50	<50	<50	
>C16 - C34 Fraction (F3)	mg/kg	100		27,000 <sup>†</sup>	1700	3500	230	340	120	620	320	
>C34 - C40 Fraction (F4)	mg/kg	100		38,000 <sup>†</sup>	3300	10000	140	160	<100	1000	210	
<b>BTEX</b>												
Benzene	mg/kg	0.2		3	75		<0.2	<0.2	<0.2	<0.2	<0.2	
Toluene	mg/kg	0.5		NL/99,000 <sup>†</sup>	135		<0.5	<0.5	<0.5	<0.5	<0.5	
Ethylbenzene	mg/kg	1		NL/27,000 <sup>†</sup>	165		<1	<1	<1	<1	<1	
meta- & para-Xylene	mg/kg	2					<2	<2	<2	<2	<2	
ortho-Xylene	mg/kg	1		230/81,000 <sup>*</sup>	95		<1	<1	<1	<1	<1	
<b>Inorganics</b>												
Arsenic	mg/kg	4	3000		160		8	9	13	<4	<4	
Cadmium	mg/kg	0.4	900				0.5	0.5	<0.4	<0.4	<0.4	
Chromium *	mg/kg	1	3600				76	74	13	4	23	
Copper	mg/kg	1	240000				20	17	21	150	53	
Lead	mg/kg	1	1500		1800		23	24	41	12	3	
Nickel	mg/kg	1	6000				19	15	8	5	76	
Zinc	mg/kg	1	400000				33	24	49	74	41	
Mercury	mg/kg	0.1	180				<0.1	<0.1	0.1	<0.1	<0.1	
<b>Polycyclic Aromatic Hydrocarbons</b>												
Naphthalene	mg/kg	0.1		NL/11,000 <sup>†</sup>	370		<0.1	<0.1	<0.1	<0.1	<0.1	
Acenaphthylene	mg/kg	0.1					<0.1	<0.1	<0.1	<0.1	<0.1	
Acenaphthene	mg/kg	0.1					<0.1	<0.1	<0.1	<0.1	<0.1	
Fluorene	mg/kg	0.1					<0.1	<0.1	<0.1	<0.1	<0.1	
Phenanthrene	mg/kg	0.1					0.1	0.1	0.2	0.1	0.1	
Anthracene	mg/kg	0.1					<0.1	<0.1	<0.1	<0.1	<0.1	
Fluoranthene	mg/kg	0.1					0.1	0.1	0.4	1.1	<0.1	
Pyrene	mg/kg	0.1					0.2	0.2	0.4	1.3	0.1	
Benz(a)anthracene	mg/kg	0.1					<0.1	<0.1	0.2	0.3	<0.1	
Chrysene	mg/kg	0.1					<0.1	<0.1	0.2	0.3	<0.1	
Benzo(b+k)fluoranthene	mg/kg	0.2					<0.2	<0.2	0.4	0.6	<0.2	
Benzo(a)pyrene	mg/kg	0.05			1.4		0.1	0.1	0.2	0.3	<0.05	
Indeno(1.2.3.cd)pyrene	mg/kg	0.1					0.1	0.2	0.1	0.2	<0.1	
Dibenz(a,h)anthracene	mg/kg	0.1					<0.1	<0.1	<0.1	<0.1	<0.1	
Benzo(g,h,i)perylene	mg/kg	0.1					0.2	0.3	0.2	0.2	<0.1	
Benzo(a)pyrene TEQ	mg/kg	0.5	40				<0.5	<0.5	<0.5	<0.5	<0.5	
Total +ve	mg/kg	0.5	4000				0.97	1.1	2.3	4.5	0.21	
<b>Organochlorine Pesticides</b>												
HCB	mg/kg	0.1	80				<0.1	<0.1	<0.1	<0.1	<0.1	
alpha-BHC	mg/kg	0.1					<0.1	<0.1	<0.1	<0.1	<0.1	
gamma-BHC (Lindane)	mg/kg	0.1					<0.1	<0.1	<0.1	<0.1	<0.1	
beta-BHC	mg/kg	0.1					<0.1	<0.1	<0.1	<0.1	<0.1	
Heptachlor	mg/kg	0.1	50				<0.1	<0.1	<0.1	<0.1	<0.1	
delta-BHC	mg/kg	0.1					<0.1	<0.1	<0.1	<0.1	<0.1	
Heptachlor Epoxide	mg/kg	0.1					<0.1	<0.1	<0.1	<0.1	<0.1	
gamma-Chlordane	mg/kg	0.1					<0.1	<0.1	<0.1	<0.1	<0.1	
alpha-chlordane	mg/kg	0.1	530				<0.1	<0.1	<0.1	<0.1	<0.1	
Endosulfan I	mg/kg	0.1					<0.1	<0.1	<0.1	<0.1	<0.1	
Endosulfan II	mg/kg	0.1	2000				<0.1	<0.1	<0.1	<0.1	<0.1	
Aldrin	mg/kg	0.1	45				<0.1	<0.1	<0.1	<0.1	<0.1	
Dieldrin	mg/kg	0.1					<0.1	<0.1	<0.1	<0.1	<0.1	
Endrin	mg/kg	0.1	100				<0.1	<0.1	<0.1	<0.1	<0.1	
pp-DDE	mg/kg	0.1					<0.1	<0.1	<0.1	<0.1	<0.1	
pp-DDD	mg/kg	0.1	3600				<0.1	<0.1	<0.1	<0.1	<0.1	
pp-DDT	mg/kg	0.1			640		<0.1	<0.1	<0.1	<0.1	<0.1	
Endrin Aldehyde	mg/kg	0.1					<0.1	<0.1	<0.1	<0.1	<0.1	
Endosulfan Sulphate	mg/kg	0.1					<0.1	<0.1	<0.1	<0.1	<0.1	
Methoxychlor	mg/kg	0.1	2500				<0.1	<0.1	<0.1	<0.1	<0.1	
<b>Polychlorinated Biphenyls</b>												
Arochlor 1016	mg/kg	0.1					<0.1	<0.1	<0.1	<0.1	<0.1	
Arochlor 1221	mg/kg	0.1					<0.1	<0.1	<0.1	<0.1	<0.1	
Arochlor 1232	mg/kg	0.1					<0.1	<0.1	<0.1	<0.1	<0.1	
Arochlor 1242	mg/kg	0.1	7				<0.1	<0.1	<0.1	<0.1	<0.1	
Arochlor 1248	mg/kg	0.1					<0.1	<0.1	<0.1	<0.1	<0.1	
Arochlor 1254	mg/kg	0.1					<0.1	<0.1	<0.1	<0.1	<0.1	
Arochlor 1260	mg/kg	0.1					<0.1	<0.1	<0.1	<0.1	<0.1	
<b>Asbestos</b>												
Asbestos ID in soil	g/kg	0.1					-	ND	ND	-	-	
Trace analysis	-	-					-	NAD	NAD	-	-	

**Notes**

- : Not analysed, not applicable
- mg/kg: Milligram per kilogram
- PS: primary sample
- LD: laboratory duplicate
- FD: field duplicate, analysed by ALS
- Sample identified as Dup on ELS certificate of analysis 123357 reported as BH14/0.0-0.1
- Sample identified as Trip 1 on ALS certificate of analysis ES 1503478 reported as BH14/0.0-0.1
- ND: no asbestos detected at reporting limit of 0.1g/kg (0.01 % w/w)
- NAD: no asbestos detected
- TRH: Total recoverable hydrocarbons
- BTEXN: Benzene, toluene, ethylbenzene, xylene
- LOR: Limits of Reporting
- \* Criteria for chromium (VI) adopted for total chromium.
- † HSLs for direct contact where HSL for vapour intrusion is non limiting (NL)
- Criteria for coarse grained soils have been adopted as a conservative measure.
- 1: NEPC (2013), National Environmental Protection (Assessment of Site Contamination) Measure 1999. Guideline on the Investigation Levels for Soil and Groundwater, Health Based Investigation Levels (HILs)-D (for commercial/industrial sites).

Exceeds HILs - Commercial / industrial land use

Exceeds HSL - D Vapour Intrusion Sand 0-1m

Exceeds EIL / ESL - Commercial and Industrial Coarse Grain

Exceeds Management limits Commercial / Industrial Coarse Grain

Exceeds multiple criteria

Table 1: Summary Analytical Results - Soil Samples

Sample Location	BH14	BH14	BH15	BH16
Sample Depth	0.0-0.1	0.5-0.95	0.5-0.95	0.5-0.95
Sample Date	9/02/2015	9/02/2015	9/02/2015	9/02/2015
Sample Description				
Sample Type	FD	PS	PS	PS
Batch	ES1503478	123357	123357	123357

Analyte	Units	LOR	NEPM Soil Investigation Levels <sup>1</sup>							
			HILs - Commercial / Industrial land use	HSL - D Vapour Intrusion Sand 0-1m	EILs / ESL - Commercial and Industrial Coarse Grain	Management limits Commercial / Industrial Coarse Grain				
<b>TRH</b>										
C6 - C10 Fraction	mg/kg	25				700	<10	<25	<25	<25
C6 - C10 Fraction minus BTEX (F1)	mg/kg	25		260	215 <sup>^</sup>		<10	<25	<25	<25
>C10 - C16 Fraction	mg/kg	50				1000	1810	<50	<50	<50
>C10 - C16 Fraction minus Naphthalene (F2)	mg/kg	50		NL/20,000 <sup>*</sup>	170 <sup>^</sup>		1810	<50	<50	<50
>C16 - C34 Fraction (F3)	mg/kg	100		27,000 <sup>*</sup>	1700	3500	5410	<100	<100	<100
>C34 - C40 Fraction (F4)	mg/kg	100		38,000 <sup>*</sup>	3300	10000	<100	<100	<100	<100
<b>BTEX</b>										
Benzene	mg/kg	0.2		3	75		<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	0.5		NL/99,000 <sup>*</sup>	135		<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	1		NL/27,000 <sup>*</sup>	165		<0.5	<1	<1	<1
meta- & para-Xylene	mg/kg	2					<0.5	<2	<2	<2
ortho-Xylene	mg/kg	1		230/81,000 <sup>*</sup>	95		<0.5	<1	<1	<1
<b>Inorganics</b>										
Arsenic	mg/kg	4	3000		160		<5	7	<4	<4
Cadmium	mg/kg	0.4	900				<1	<0.4	<0.4	<0.4
Chromium *	mg/kg	1	3600				41	13	18	14
Copper	mg/kg	1	240000				45	22	24	20
Lead	mg/kg	1	1500		1800		<5	11	31	54
Nickel	mg/kg	1	6000				152	4	14	6
Zinc	mg/kg	1	400000				87	21	45	67
Mercury	mg/kg	0.1	180				0.2	<0.1	<0.1	0.1
<b>Polycyclic Aromatic Hydrocarbons</b>										
Naphthalene	mg/kg	0.1		NL/11,000 <sup>+</sup>	370		<0.5	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	0.1					<0.5	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	0.1					<0.5	<0.1	<0.1	<0.1
Fluorene	mg/kg	0.1					<0.5	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.1					<0.5	<0.1	<0.1	<0.1
Anthracene	mg/kg	0.1					<0.5	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.1					<0.5	<0.1	<0.1	<0.1
Pyrene	mg/kg	0.1					<0.5	<0.1	<0.1	<0.1
Benz(a)anthracene	mg/kg	0.1					<0.5	<0.1	<0.1	<0.1
Chrysene	mg/kg	0.1					<0.5	<0.1	<0.1	<0.1
Benzo(b+k)fluoranthene	mg/kg	0.2					<0.5	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	0.05			1.4		<0.5	<0.05	<0.05	<0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.1					<0.5	<0.1	<0.1	<0.1
Dibenz(a,h)anthracene	mg/kg	0.1					<0.5	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	0.1					<0.5	<0.1	<0.1	<0.1
Benzo(a)pyrene TEQ	mg/kg	0.5	40				0.6	<0.5	<0.5	<0.5
Total +ve	mg/kg	0.5	4000				<0.5	NIL (+)VE	NIL (+)VE	NIL (+)VE
<b>Organochlorine Pesticides</b>										
HCB	mg/kg	0.1	80				<0.25	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	0.1					<0.25	<0.1	<0.1	<0.1
gamma-BHC (Lindane)	mg/kg	0.1					<0.25	<0.1	<0.1	<0.1
beta-BHC	mg/kg	0.1					<0.25	<0.1	<0.1	<0.1
Heptachlor	mg/kg	0.1	50				<0.25	<0.1	<0.1	<0.1
delta-BHC	mg/kg	0.1					<0.25	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	0.1					<0.25	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	0.1					<0.25	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	0.1	530				<0.25	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	0.1					<0.25	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	0.1	2000				<0.25	<0.1	<0.1	<0.1
Aldrin	mg/kg	0.1	45				<0.25	<0.1	<0.1	<0.1
Dieldrin	mg/kg	0.1					<0.25	<0.1	<0.1	<0.1
Endrin	mg/kg	0.1	100				<0.25	<0.1	<0.1	<0.1
pp-DDE	mg/kg	0.1					<0.25	<0.1	<0.1	<0.1
pp-DDD	mg/kg	0.1	3600				<0.25	<0.1	<0.1	<0.1
pp-DDT	mg/kg	0.1			640		<0.2	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	0.1					<0.25	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	0.1					<0.25	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	0.1	2500				<0.2	<0.1	<0.1	<0.1
<b>Polychlorinated Biphenyls</b>										
Arochlor 1016	mg/kg	0.1					-	<0.1	<0.1	<0.1
Arochlor 1221	mg/kg	0.1					-	<0.1	<0.1	<0.1
Arochlor 1232	mg/kg	0.1					-	<0.1	<0.1	<0.1
Arochlor 1242	mg/kg	0.1	7				-	<0.1	<0.1	<0.1
Arochlor 1248	mg/kg	0.1					-	<0.1	<0.1	<0.1
Arochlor 1254	mg/kg	0.1					-	<0.1	<0.1	<0.1
Arochlor 1260	mg/kg	0.1					-	<0.1	<0.1	<0.1
<b>Asbestos</b>										
Asbestos ID in soil	g/kg	0.1					-	-	-	-
Trace analysis	-	-					-	-	-	-

**Notes**

- : Not analysed, not applicable
- mg/kg: Milligram per kilogram
- PS: primary sample
- LD: laboratory duplicate
- FD: field duplicate, analysed by ALS
- Sample identified as Dup on ELS certificate of analysis 123357 reported as BH14/0.0-0.1
- Sample identified as Trip 1 on ALS certificate of analysis ES 1503478 reported as BH14/0.0-0.1
- ND: no asbestos detected at reporting limit of 0.1g/kg (0.01 % w/w)
- NAD: no asbestos detected
- TRH: Total recoverable hydrocarbons
- BTEXN: Benzene, toluene, ethylbenzene, xylene
- LOR: Limits of Reporting
- \* Criteria for chromium (VI) adopted for total chromium.
- † HSLs for direct contact where HSL for vapour intrusion is non limiting (NL)
- Criteria for coarse grained soils have been adopted as a conservative measure.
- 1: NEPC (2013), National Environmental Protection (Assessment of Site Contamination) Measure 1999. Guideline on the Investigation Levels for Soil and Groundwater, Health Based Investigation Levels (HILs)-D (for commercial/industrial sites).

Exceeds HILs - Commercial / industrial land use
Exceeds HSL - D Vapour Intrusion Sand 0-1m
Exceeds EIL / ESL - Commercial and Industrial Coarse Grain
Exceeds Management limits Commercial / Industrial Coarse Grain
Exceeds multiple criteria

Table 1: Summary Analytical Results - Soil Samples

Analyte	Units	LOR	NEPM Soil Investigation Levels <sup>†</sup>				Maximum reported value (mg/kg)	No exceeding guidelines
			HILs - Commercial / industrial land use	HSL - D Vapour Intrusion Sand 0-1m	EILs / ESL - Commercial and Industrial Coarse Grain	Management limits Commercial / Industrial Coarse Grain		
<b>TRH</b>								
C6 - C10 Fraction	mg/kg	25				700	<25	0
C6 - C10 Fraction minus BTEX (F1)	mg/kg	25		260	215 <sup>†</sup>		<25	0
>C10 - C16 Fraction	mg/kg	50				1000	1810	1
>C10 - C16 Fraction minus Naphthalene (F2)	mg/kg	50		NL/20,000 <sup>†</sup>	170 <sup>†</sup>		1810	1
>C16 - C34 Fraction (F3)	mg/kg	100		27,000 <sup>†</sup>	1700	3500	5410	1
>C34 - C40 Fraction (F4)	mg/kg	100		38,000 <sup>†</sup>	3300	10000	1000	0
<b>BTEX</b>								
Benzene	mg/kg	0.2		3	75		<0.2	0
Toluene	mg/kg	0.5		NL/99,000 <sup>†</sup>	135		<0.5	0
Ethylbenzene	mg/kg	1		NL/27,000 <sup>†</sup>	165		<1	0
meta- & para-Xylene	mg/kg	2		230/81,000 <sup>†</sup>	95		<2	0
ortho-Xylene	mg/kg	1						
<b>Inorganics</b>								
Arsenic	mg/kg	4	3000		160		13	0
Cadmium	mg/kg	0.4	900				<1	0
Chromium *	mg/kg	1	3600				76	0
Copper	mg/kg	1	240000				150	0
Lead	mg/kg	1	1500		1800		54	0
Nickel	mg/kg	1	6000				152	0
Zinc	mg/kg	1	400000				87	0
Mercury	mg/kg	0.1	180				0.2	0
<b>Polycyclic Aromatic Hydrocarbons</b>								
Naphthalene	mg/kg	0.1		NL/11,000 <sup>†</sup>	370		<0.5	0
Acenaphthylene	mg/kg	0.1					<0.5	-
Acenaphthene	mg/kg	0.1					<0.5	-
Fluorene	mg/kg	0.1					<0.5	-
Phenanthrene	mg/kg	0.1					<0.5	-
Anthracene	mg/kg	0.1					<0.5	-
Fluoranthene	mg/kg	0.1					1.1	-
Pyrene	mg/kg	0.1					1.3	-
Benz(a)anthracene	mg/kg	0.1					<0.5	-
Chrysene	mg/kg	0.1					<0.5	-
Benzo(b+k)fluoranthene	mg/kg	0.2					0.6	-
Benzo(a)pyrene	mg/kg	0.05			1.4		<0.5	0
Indeno(1.2.3.cd)pyrene	mg/kg	0.1					<0.5	-
Dibenz(a,h)anthracene	mg/kg	0.1					<0.5	-
Benzo(g,h,i)perylene	mg/kg	0.1					<0.5	-
Benzo(a)pyrene TEQ	mg/kg	0.5	40				0.6	0
Total +ve	mg/kg	0.5	4000				4.5	0
<b>Organochlorine Pesticides</b>								
HCB	mg/kg	0.1	80				<0.25	0
alpha-BHC	mg/kg	0.1					<0.25	-
gamma-BHC (Lindane)	mg/kg	0.1					<0.25	-
beta-BHC	mg/kg	0.1					<0.25	-
Heptachlor	mg/kg	0.1	50				<0.25	0
delta-BHC	mg/kg	0.1					<0.25	-
Heptachlor Epoxide	mg/kg	0.1					<0.25	-
gamma-Chlordane	mg/kg	0.1					<0.25	0
alpha-chlordane	mg/kg	0.1	530				<0.25	0
Endosulfan I	mg/kg	0.1					<0.25	0
Endosulfan II	mg/kg	0.1	2000				<0.25	0
Aldrin	mg/kg	0.1	45				<0.25	0
Dieldrin	mg/kg	0.1					<0.25	0
Endrin	mg/kg	0.1	100				<0.25	0
pp-DDE	mg/kg	0.1					<0.25	0
pp-DDD	mg/kg	0.1	3600				<0.25	0
pp-DDT	mg/kg	0.1			640		<0.2	0
Endrin Aldehyde	mg/kg	0.1					<0.25	-
Endosulfan Sulphate	mg/kg	0.1					<0.25	-
Methoxychlor	mg/kg	0.1	2500				<0.2	0
<b>Polychlorinated Biphenyls</b>								
Arochlor 1016	mg/kg	0.1					<0.1	0
Arochlor 1221	mg/kg	0.1					<0.1	0
Arochlor 1232	mg/kg	0.1					<0.1	0
Arochlor 1242	mg/kg	0.1	7				<0.1	0
Arochlor 1248	mg/kg	0.1					<0.1	0
Arochlor 1254	mg/kg	0.1					<0.1	0
Arochlor 1260	mg/kg	0.1					<0.1	0
<b>Asbestos</b>								
Asbestos ID in soil	g/kg	0.1					ND	-
Trace analysis	-	-					NAD	-

**Notes**

- : Not analysed, not applicable
- mg/kg: Milligram per kilogram
- PS: primary sample
- LD: laboratory duplicate
- FD: field duplicate, analysed by ALS
- Sample identified as Dup on ELS certificate of analysis 123357 reported as BH14/0.0-0.1
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- ND: no asbestos detected at reporting limit of 0.1g/kg (0.01% w/w)
- NAD: no asbestos detected
- TRH: Total recoverable hydrocarbons
- BTEXN: Benzene, toluene, ethylbenzene, xylene
- LOR: Limits of Reporting
- \* Criteria for chromium (VI) adopted for total chromium.
- † HSLs for direct contact where HSL for vapour intrusion is non limiting (NL)
- Criteria for coarse grained soils have been adopted as a conservative measure.
- 1: NEPC (2013), National Environmental Protection (Assessment of Site Contamination) Measure 1999. Guideline on the Investigation Levels for Soil and Groundwater, Health Based Investigation Levels (HILs)-D (for commercial/industrial sites).

Exceeds HILs - Commercial / industrial land use
Exceeds HSL - D Vapour Intrusion Sand 0-1m
Exceeds EIL / ESL - Commercial and Industrial Coarse Grain
Exceeds Management limits Commercial / Industrial Coarse Grain
Exceeds multiple criteria







			Organophosphorous Pesticides													Pesticides
	Heptachlor epoxide	Methoxychlor	Azinophos methyl	Bromophos-ethyl	Chlorpyrifos	Chlorpyrifos-methyl	Diazinon	Dichlorvos	Dimethoate	Ethion	Fenitrothion	Malathion	Ronnel	Parathion		
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg		
LOR	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		
NEPC (2013) HIL D		2,500			2,000											
NEPC (2013) HSL D, vapour intrusion, sand, 0-1m																
CRC Care (2011) HSL Intrusive Maintenance Worker, vapour intrusion, sand, 0-2m																
CRC Care (2011) HSL D, direct contact																
CRC Care (2011) HSL, Intrusive Maintenance Worker, direct contact																
NEPC (2013) EIL, Commercial and Industrial																
NEPC (2013) ESL, Commercial and Industrial, coarse																
NEPC (2013) Management Limits, Commercial and Industrial, coarse soil																
Field_ID	Sample_Depth_Range	Sampled_Date-Time	<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	
BH1	0.1-0.2	14/04/2015	<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	
BH2	0.1-0.2	14/04/2015	<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	
BH2	5.5-5.7	14/04/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH3	0.1-0.2	14/04/2015	<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	
BH3	0.9-1	14/04/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH4	0.1-0.2	14/04/2015	<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	
BH5	0.1-0.2	14/04/2015	<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	
BH5	0.4-0.5	14/04/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH6	0.1-0.2	14/04/2015	<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	
BH6	0.9-1	14/04/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH7	0.1-0.2	14/04/2015	<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	
BH8	0.1-0.2	14/04/2015	<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	
BH8	0.9-1	14/04/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH9	0.1-0.2	14/04/2015	<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	
BH9	1.4-1.5	14/04/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH10	0.1-0.2	14/04/2015	<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	
BH10	1.9-2	15/04/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH11	0.2-0.3	15/04/2015	<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	
BH11	0.9-1	15/04/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH12	0.1-0.2	15/04/2015	<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	
BH13	0.1-0.2	15/04/2015	<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	
BH13	0.9-1	15/04/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH14	0.1-0.2	15/04/2015	<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	
BH14	0.9-1	15/04/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH15	0.1-0.2	15/04/2015	<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	
BH16	0.1-0.2	15/04/2015	<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	
BH16	0.4-0.5	15/04/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH17	0.1-0.2	15/04/2015	<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	
BH17	0.4-0.5	15/04/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH18	0.1-0.2	15/04/2015	<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	
BH19	0.1-0.2	15/04/2015	<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	
BH20	0.1-0.2	15/04/2015	<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	
BH20	0.4-0.5	14/04/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH21	0.1-0.2	14/04/2015	<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	
BH22	0.1-0.2	14/04/2015	<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	
BH22	0.4-0.5	14/04/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH23	0.1-0.2	15/04/2015	<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	

NOTES:  
 ND - Not Detected at the laboratory reporting limit  
 NL - Not limiting  
 LOR - Limit of Reporting

	Metals											TPH										BTEX					MAH						
	B(s)p Total Potency Equivalent	Arsenic (Filtered)	Cadmium (Filtered)	Calcium (Filtered)	Chromium (III+VI) (Filtered)	Copper (Filtered)	Lead (Filtered)	Magnesium (Filtered)	Mercury (Filtered)	Nickel (Filtered)	Zinc (Filtered)	C10-C16	C16-C34	C34-C40	<C10-C16 less NAPHTHALENE (F2)	C6 - C9	C10 - C14	C15 - C28	C29-C36	C6-C10 less BTEX (F1)	C6-C10	Benzene	Ethylbenzene	Toluene	Xylene (m & p)	Xylene (o)	1,2,4-trimethylbenzene	1,3,5-trimethylbenzene	Isopropylbenzene	n-butylbenzene	n-propylbenzene		
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	
EQL	0.0005	0.001	0.0001	0.5	0.001	0.001	0.001	0.5	0.00005	0.001	0.001	0.05	0.1	0.1	0.05	0.01	0.05	0.1	0.1	0.01	0.01	0.001	0.001	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
NEPC (2013) HSL D, vapour intrusion, sand, 4-<8m	-	-	-	-	-	-	-	-	-	-	-	-	-	NL	-	-	-	-	6	-	NL	NL	NL	NL	NL	-	-	-	-	-	-	-	
NEPC (2013) GILs, Fresh Waters	-	0.024	0.0002	-	0.001	0.0014	0.0034	-	0.00006	0.011	0.008	-	-	-	-	-	-	-	-	-	0.95	-	-	0.2	0.35	-	-	-	-	-	-	-	
NEPC (2013) GILs, Drinking Water	-	0.01	0.002	-	0.05	2	0.01	-	0.001	0.02	-	-	-	-	-	-	-	-	-	-	0.001	0.3	0.8	0.6	-	-	-	-	-	-	-	-	
<b>LocCode</b>	<b>WellCode</b>	<b>Sampled_Date-Time</b>																															
MW10		5/05/2015	<0.0005	<0.001	0.0005	160	<0.001	0.002	<0.001	1100	<0.00005	0.006	0.007	<0.05	<0.1	<0.1	<0.05	<0.1	<0.05	<0.1	<0.1	<0.01	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
MW2		5/05/2015	<0.0005	<0.001	0.0003	230	<0.001	0.003	<0.001	750	<0.00005	0.002	0.006	0.23	<0.1	<0.1	0.21	14	0.73	<0.1	<0.1	5.2	15	1.7	0.48	4.7	2.1	0.79	0.24	0.067	0.014	0.002	0.032
MW23		5/05/2015	<0.0005	0.001	0.0001	150	<0.001	0.002	<0.001	430	<0.00005	0.01	0.014	<0.05	<0.1	<0.1	<0.05	<0.01	<0.05	<0.1	<0.1	<0.01	<0.01	<0.001	<0.001	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	
MW9		5/05/2015	<0.0005	<0.001	0.0001	140	<0.001	0.002	<0.001	710	<0.00005	0.006	0.021	<0.05	<0.1	<0.1	<0.05	<0.01	<0.05	<0.1	<0.1	<0.01	<0.01	<0.001	<0.001	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	
MW24		9/06/2015	<0.0005	<0.001	0.0001	-	<0.001	0.001	<0.001	-	<0.00005	0.004	0.016	<0.05	<0.1	<0.1	<0.05	<0.01	<0.05	<0.1	<0.1	<0.01	<0.01	<0.001	<0.001	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	
MW25		9/06/2015	<0.0005	0.002	0.0003	-	<0.001	<0.001	<0.001	-	<0.00005	0.006	0.03	<0.05	<0.1	<0.1	<0.05	<0.01	<0.05	<0.1	<0.1	<0.01	<0.01	<0.001	<0.001	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	

				Chlorinated Hydrocarbons																												
	p-isopropyltoluene	sec-butylbenzene	Styrene	tert-butylbenzene	1,1,1,2-tetrachloroethane	1,1,1-trichloroethane	1,1,2-tetrachloroethane	1,1,2-trichloroethane	1,1-dichloroethane	1,1-dichloroethene	1,1-dichloropropene	1,2,3-trichloropropane	1,2-dibromo-3-chloropropane	1,2-dichloroethane	1,2-dichloropropane	1,3-dichloropropane	2,2-dichloropropane	Bromochloromethane	Bromodichloromethane	Bromoform	Carbon tetrachloride	Chlorodibromomethane	Chloroethane	Chloroform	Chloromethane	cis-1,2-dichloroethene	cis-1,3-dichloropropene	Dibromomethane	Hexachlorobutadiene	Trichloroethene		
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	
EQL	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.01	0.001	0.01	0.001	0.001	0.001	0.001	0.001	0.001	
NEPC (2013) HSL D, vapour intrusion, sand, 4-<8m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
NEPC (2013) GILs, Fresh Waters	-	-	-	-	-	-	-	-	6.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
NEPC (2013) GILs, Drinking Water	-	-	0.03	-	-	-	-	-	-	-	-	-	-	0.003	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0007	-	
<b>LocCode</b>	<b>WellCode</b>	<b>Sampled_Date-Time</b>																														
MW10		5/05/2015		<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	<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	<0.01	<0.01	
MW2		5/05/2015		<0.001	0.002	0.003	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
MW23		5/05/2015		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
MW9		5/05/2015		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
MW24		9/06/2015		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
MW25		9/06/2015		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

	Halogenated Hydrocarbons				Halogenated Benzenes													Solvents	PAH/Phenols										
	Tetrachloroethene	trans-1,2-dichloroethene	trans-1,3-dichloropropene	Vinyl chloride	1,2-dibromoethane	Bromomethane	Dichlorodifluoromethane	Trichlorofluoromethane	1,2,3-trichlorobenzene	1,2,4-trichlorobenzene	1,2-dichlorobenzene	1,3-dichlorobenzene	1,4-dichlorobenzene	2-chlorotoluene	4-chlorotoluene	Bromobenzene	Chlorobenzene	Hexachlorobenzene	Cyclohexane	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(e)pyrene	Benzo(b,k)fluoranthene	Benzo(g,h,i)perylene	Chrysene	Dibenz(a,h)anthracene	
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
EQL	0.001	0.001	0.001	0.01	0.001	0.01	0.01	0.01	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.000001	0.001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
NEPC (2013) HSL D, vapour intrusion, sand, 4-<8m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NEPC (2013) GILs, Fresh Waters	-	-	-	-	-	-	-	-	0.003	0.085	-	0.26	0.06	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
NEPC (2013) GILs, Drinking Water	0.05	-	-	0.0003	-	-	-	-	0.03	0.03	-	-	0.04	-	-	-	0.3	-	-	-	-	-	-	0.00001	-	-	-	-	
<b>LocCode</b>	<b>WellCode</b>	<b>Sampled_Date-Time</b>																											
MW10		5/05/2015		<0.01	<0.01	<0.01	<0.1	<0.01	<0.1	<0.1	<0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.000001	<0.01	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
MW2		5/05/2015		<0.001	<0.001	<0.001	<0.01	0.004	<0.01	<0.01	<0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.000001	0.071	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
MW23		5/05/2015		<0.001	<0.001	<0.001	<0.01	<0.001	<0.01	<0.01	<0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.000001	<0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
MW9		5/05/2015		<0.001	<0.001	<0.001	<0.01	<0.001	<0.01	<0.01	<0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.000001	<0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
MW24		9/06/2015		<0.001	<0.001	<0.001	<0.01	<0.001	<0.01	<0.01	<0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.000001	<0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
MW25		9/06/2015		<0.001	<0.001	<0.001	<0.01	<0.001	<0.01	<0.01	<0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.000001	<0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

			Polychlorinated Biphenyls																							
	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	PAHs (Sum of total)	Phenanthrene	Phenolics Total	Pyrene	Arochlor 1016	Arochlor 1221	Arochlor 1232	Arochlor 1242	Arochlor 1248	Arochlor 1254	Arochlor 1260	PCBs (Sum of total)	4,4-DDE	β-BHC	Aldrin	Dieldrin	γ-BHC	Chlordane (cis)	Chlordane (trans)	δ-BHC	DDD	
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	
EQL	0.0001	0.0001	0.0001	0.0002		0.0001	0.05	0.0001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	
NEPC (2013) HSL D, vapour intrusion, sand, 4-<8m	-	-	-	NL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
NEPC (2013) GILs, Fresh Waters	-	-	-	0.016	-	-	-	-	-	-	-	0.0003	-	0.00001	-	-	-	-	-	-	-	0.00003	-	-	-	
NEPC (2013) GILs, Drinking Water	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0003	-	-	0.002	-	-	-	
LocCode	WellCode	Sampled_Date-Time																								
MW10		5/05/2015	<0.0001	<0.0001	<0.0001	<0.0002	0	<0.0001	<0.05	<0.0001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	
MW2		5/05/2015	<0.0001	<0.0001	<0.0001	0.013 - 0.016	0.013	<0.0001	<0.05	<0.0001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	
MW23		5/05/2015	<0.0001	<0.0001	<0.0001	<0.0002	0	<0.0001	<0.05	<0.0001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	
MW9		5/05/2015	<0.0001	<0.0001	<0.0001	<0.0002	0	<0.0001	<0.05	<0.0001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	
MW24		9/06/2015	<0.0001	<0.0001	<0.0001	<0.0002	0	<0.0001	<0.05	<0.0001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	
MW25		9/06/2015	<0.0001	<0.0001	<0.0001	<0.0002	0	<0.0001	<0.05	<0.0001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	

Organochlorine Pesticides												Organophosphorous Pesticides								
DDT	Endosulfan I	Endosulfan II	Endosulfan sulphate	Endrin	Endrin aldehyde	Endrin ketone	γ-BHC (Lindane)	Heptachlor	Heptachlor epoxide	Methoxychlor	Oxychlorane	Azinophos methyl	Azinophos Ethyl	Chlorfenvinphos E	Chlorfenvinphos Z	Chlorpyrifos	Chlorpyrifos-methyl	Diazinon	Dichlorvos	Dimethoate
mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
EQL	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001
NEPC (2013) HSL D, vapour intrusion, sand, 4-<8m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NEPC (2013) GILs, Fresh Waters	0.000006	-	0.000003	-	0.000001	-	-	0.000002	0.000001	-	-	-	-	-	-	0.000001	-	0.000001	-	0.000015
NEPC (2013) GILs, Drinking Water	0.009	-	0.02	-	-	-	0.01	-	0.0003	-	-	0.03	-	0.002	-	0.01	-	0.004	0.005	0.007
LocCode	WellCode	Sampled_Date-Time	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001
MW10		5/05/2015	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001
MW2		5/05/2015	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001
MW23		5/05/2015	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001
MW9		5/05/2015	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001
MW24		9/06/2015	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001
MW25		9/06/2015	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001

			Pesticides									
	Ethion	Fenitrothion	Fenthion	Malathion	Methyl parathion	Demeton-S-methyl	Parathion	Priniphos-methyl	Priniphos-ethyl			
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L			
EQL	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001			
NEPC (2013) HSL D, vapour intrusion, sand, 4-<8m	-	-	-	-	-	-	-	-	-			
NEPC (2013) GILs, Fresh Waters	-	0.0002	-	0.00005	-	-	0.000004	-	-			
NEPC (2013) GILs, Drinking Water	0.004	0.007	0.007	0.07	-	-	0.02	0.09	-			
LocCode	WellCode	Sampled_Date-Time										
MW10		5/05/2015		<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
MW2		5/05/2015		<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
MW23		5/05/2015		<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
MW9		5/05/2015		<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
MW24		9/06/2015		<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
MW25		9/06/2015		<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001

**Table T1: Summary of Metals and BTEX in soils**

	Total Nitrogen	Phosphorus	Metals								BTEX			
			Lead	Mercury	Nickel	Arsenic	Cadmium	Chromium	Copper	Zinc	Benzene	Toluene	Ethylbenzene	Xylene
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
	10	10	1	0.1	1	4	0.4	1	1	1	0.2	0.5	1	1
<b>HIL A / HSL A</b>	-	-	<b>300</b>	<b>40</b>	<b>400</b>	<b>100</b>	<b>20</b>	<b>100</b>	<b>6000</b>	<b>7400</b>	<b>0.7</b>	<b>480</b>	<b>NL</b>	<b>110</b>
<b>Ecological</b>	-	-	1100	-	270	100	-	320	190	270	65	105	125	45
TP01 0.0-0.2	-	-	23	<0.1	33	5	<0.4	30	41	63	-	-	-	-
TP 0.2 0.5	-	-	55	<0.1	15	9	0.6	24	29	170	<0.2	<0.5	<1	<1
TP03 0.2	-	-	23	<0.1	14	<4	<0.4	6	22	52	<0.2	<0.5	<1	<1
TP04 0.2	-	-	30	<0.1	39	<4	<0.4	39	48	95	-	-	-	-
TP05 0.2-0.3	-	-	35	<0.1	12	5	<0.4	11	42	110	-	-	-	-
TP06 0.2-0.3	630	200	68	<0.1	11	<4	<0.4	8	15	31	-	-	-	-
TP06 0.6-0.7	-	-	11	<0.1	5	5	<0.4	17	20	20	-	-	-	-
TP07 0.5-0.6	-	-	17	<0.1	15	7	<0.4	26	32	38	-	-	-	-
TP07 0.8-0.9	-	-	13	<0.1	6	7	<0.4	18	19	26	-	-	-	-
TP08 0.5-0.6	-	-	21	<0.1	12	8	<0.4	19	31	44	-	-	-	-
TP08 0.8-0.9	-	-	13	<0.1	6	6	<0.4	16	24	26	-	-	-	-
TP09 0.3-0.4	-	-	22	<0.1	61	4	<0.4	81	29	78	-	-	-	-
TP10 0.1-0.2	-	-	18	<0.1	6	11	<0.4	14	18	37	-	-	-	-
TP11 0.2-0.3	-	-	20	<0.1	10	8	<0.4	21	41	53	-	-	-	-
TP12 0.1-0.2	-	-	19	<0.1	11	8	<0.4	21	35	46	-	-	-	-
TP13 0.1-0.2	-	-	17	<0.1	11	7	<0.4	18	28	43	-	-	-	-
TP14 0.3-0.4	-	-	16	<0.1	10	7	<0.4	18	29	46	-	-	-	-
TP14 0.9-1.0	-	-	19	<0.1	10	5	<0.4	12	50	47	-	-	-	-
TP15 0.1-0.2	-	-	16	<0.1	9	7	<0.4	19	28	40	-	-	-	-
TP16 0.2-0.3	-	-	19	<0.1	9	7	<0.4	21	29	33	-	-	-	-
TP16 0.7-0.8	-	-	11	<0.1	5	6	<0.4	15	24	19	-	-	-	-
TP17 0.1-0.2	830	510	18	<0.1	10	8	<0.4	25	32	43	-	-	-	-
TP17 0.5-0.6	-	-	14	<0.1	11	7	<0.4	22	25	46	-	-	-	-
TP18 0.1-0.2	710	260	10	<0.1	7	7	<0.4	15	25	33	-	-	-	-
TP19 0.1-0.2	2100	870	14	<0.1	13	7	<0.4	17	34	63	-	-	-	-
TP19 0.3-0.4	450	280	12	<0.1	12	6	<0.4	17	29	47	-	-	-	-
TP19 0.9-1.0	-	-	16	<0.1	12	7	<0.4	18	40	71	-	-	-	-
TP20 0.1-0.2	-	-	18	<0.1	12	6	<0.4	23	32	50	-	-	-	-
TP21 0.2-0.3	-	-	13	<0.1	10	5	<0.4	17	27	44	-	-	-	-
TP22 0.2-0.3	-	-	19	<0.1	12	6	<0.4	14	17	42	-	-	-	-
TP23 0.2-0.3	-	-	12	<0.1	9	5	<0.4	18	25	31	-	-	-	-
TP23 0.5-0.6	-	-	13	<0.1	12	6	<0.4	21	31	48	-	-	-	-
TP24 0.2-0.3	-	-	15	<0.1	21	14	<0.4	23	26	40	-	-	-	-
TP24 0.7-0.8	-	-	15	<0.1	16	<4	<0.4	13	38	60	-	-	-	-
TP25 0.2-0.3	-	-	19	<0.1	15	5	<0.4	16	20	46	-	-	-	-
TP26 0.1-0.2	-	-	14	<0.1	9	5	<0.4	19	21	36	-	-	-	-
TP27 0.1-0.2	-	-	100	<0.1	8	8	<0.4	22	14	29	-	-	-	-
TP28 0.2-0.3	-	-	22	<0.1	11	6	<0.4	21	22	42	-	-	-	-
TP29 0.1-0.2	-	-	16	<0.1	10	5	<0.4	18	20	36	-	-	-	-
TP30 0.1-0.2	-	-	14	<0.1	7	10	<0.4	22	20	24	-	-	-	-
TP31 0.3-0.4	-	-	15	<0.1	9	6	<0.4	20	23	36	-	-	-	-
TP32 0.1-0.2	-	-	14	<0.1	8	8	<0.4	19	21	24	-	-	-	-
TP33 0.2-0.3	-	-	17	<0.1	6	8	<0.4	26	10	14	-	-	-	-
TP34 0.1-0.2	-	-	17	<0.1	9	6	<0.4	21	14	23	-	-	-	-
TP35 0.2-0.3	-	-	14	<0.1	8	7	<0.4	24	15	19	-	-	-	-
TP36 0.1-0.2	900	200	14	<0.1	8	7	<0.4	20	10	17	-	-	-	-
TP37 0.2-0.3	-	-	16	<0.1	10	5	<0.4	21	15	30	-	-	-	-
TP38 0.1-0.2	-	-	13	<0.1	7	6	<0.4	19	27	27	-	-	-	-
TP39 0.3-0.4	-	-	14	<0.1	7	7	<0.4	22	19	25	-	-	-	-
TP40 0.2-0.3	-	-	11	<0.1	8	7	<0.4	22	19	23	-	-	-	-
TP41 0.1-0.2	-	-	19	<0.1	13	<4	<0.4	13	38	55	<0.2	<0.5	<1	<1
TP42 0.1-0.2	-	-	21	<0.1	14	<4	<0.4	19	21	45	<0.2	<0.5	<1	<1
TP43 0.4-0.5	-	-	16	<0.1	7	<4	<0.4	18	26	31	<0.2	<0.5	<1	<1
HA01 0.1-0.2	-	-	57	<0.1	22	7	<0.4	24	52	110	-	-	-	-
HA02 0.0-0.1	-	-	26	<0.1	8	6	<0.4	17	26	80	<0.2	<0.5	<1	<1
HA03 0.1-0.2	2900	350	19	<0.1	9	5	<0.4	15	29	46	-	-	-	-
HA04 0.0-0.4	3300	430	-	-	-	-	-	-	-	-	-	-	-	-
HA05 0.1-0.2	2900	1100	16	<0.1	10	7	<0.4	16	29	60	-	-	-	-
HA06 0.0-0.1	4800	630	-	-	-	-	-	-	-	-	-	-	-	-
HA07 0.2-0.3	-	520	40	<0.1	16	8	<0.4	24	38	120	-	-	-	-

Table T2: Soil Results for TRH/TPH and PAHs

TRH NEPM 2013		PAH																			
	F1 (C6-C10 less BTEX)	F2 (>C10-C16 less Naphthalene)	>C16-C34	>C34-C40	Pyrene	Benzo(g,h,i)perylene	Indeno(1,2,3-c,d)pyrene	Fluoranthene	Acenaphthylene	Benzo(b,j,k)fluoranthene	Chrysene	Benzo(a)pyrene	Dibenz(a,h)anthracene	Benzo(a)anthracene	Acenaphthene	Phenanthrene	Fluorene	Benzo(a)pyrene TEQ calc (zero)	Naphthalene	Total PAHs	
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	
EQL	25	50	100	100	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.05	0.1	0.1	0.1	0.1	0.1	0.5	1	0	
HIL/HSL A, Clay 0-1m.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	5	300	
NEPM 2013 EIL/ ESLs - Urban Residential	-	120	1300	5600	-	-	-	-	-	-	-	0.7	-	-	-	-	-	-	-	170	-
Field ID	Location																				
TP01 0.0-0.2	TP01 0.0-0.2	<25	<50	180	150	0.3	0.1	<0.1	0.2	<0.1	<0.2	0.1	0.1	<0.1	0.1	<0.1	0.2	<0.1	<0.5	<0.1	1.2
TP 0.2 0.5	TP 0.2 0.5	<25	<50	<100	<100	0.3	0.2	0.2	0.3	<0.1	0.4	0.2	0.2	<0.1	0.2	<0.1	0.1	<0.1	<0.5	<1	2.2
TP03 0.2	TP03 0.2	<25	<50	<100	<100	0.2	<0.1	<0.1	0.2	<0.1	<0.2	0.2	<0.05	<0.1	<0.1	<0.1	1.3	<0.1	<0.5	<1	3.4
TP04 0.2	TP04 0.2	-	<50	180	<100	0.3	<0.1	<0.1	0.2	<0.1	0.2	0.2	0.2	<0.1	0.1	<0.1	0.6	<0.1	<0.5	0.4	2.4
TP05 0.2-0.3	TP05 0.2-0.3	-	<50	120	<100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP07 0.5-0.6	TP07 0.5-0.6	-	<50	<100	<100	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	ND
TP08 0.5-0.6	TP08 0.5-0.6	-	<50	<100	<100	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	ND
TP09 0.3-0.4	TP09 0.3-0.4	-	<50	<100	<100	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	ND
TP13 0.1-0.2	TP13 0.1-0.2	-	<50	<100	<100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP19 0.3-0.4	TP19 0.3-0.4	<25	<50	<100	<100	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	ND
TP21 0.2-0.3	TP21 0.2-0.3	-	<50	<100	<100	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	ND
TP23 0.2-0.3	TP23 0.2-0.3	-	<50	<100	<100	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	ND
TP24 0.2-0.3	TP24 0.2-0.3	-	<50	<100	<100	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	ND
TP25 0.2-0.3	TP25 0.2-0.3	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	ND
TP26 0.1-0.2	TP26 0.1-0.2	-	<50	<100	<100	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	ND
TP32 0.1-0.2	TP32 0.1-0.2	-	<50	<100	<100	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	ND
TP34 0.1-0.2	TP34 0.1-0.2	-	<50	<100	<100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP38 0.1-0.2	TP38 0.1-0.2	-	<50	<100	<100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP41 0.1-0.2	TP41 0.1-0.2	<25	<50	<100	<100	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<1	ND
TP42 0.1-0.2	TP42 0.1-0.2	<25	<50	<100	<100	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<1	ND
TP43 0.4-0.5	TP43 0.4-0.5	<25	<50	<100	<100	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<1	ND
HA02 0.0-0.1	HA02 0.0-0.1	<25	<50	<100	<100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<1	-



**Table T4: Summary of Asbestos Results**

			Asbestos ID	ACM >7mm	FA / AF	Trace
				% w/w	% w/w	
NEPM 2013 HIL/HSL A Soil			-	0.01%	0.001%	
Sample ID	Field ID	Matrix*				
-	-	-				
146058-81	TP01	SOIL	Not detected	na	na	-
146058-82	TP02	SOIL	<b>Chrysotile, amosite, crocidolite</b>	<b>1.2347</b>	<b>0.1522</b>	-
146058-83	TP05	SOIL	Not detected	na	na	-
146058-84	PT06	SOIL	Not detected	na	na	-
146058-85	TP07	SOIL	Not detected	na	na	-
146058-86	TP08	SOIL	Not detected	na	na	-
146058-87	TP11	SOIL	Not detected	na	na	-
146058-88	TP17	SOIL	Not detected	na	na	-
146058-89	TP19	SOIL	Not detected	na	na	-
146058-90	TP24	SOIL	Not detected	na	na	-
146058-91	TP40	SOIL	Not detected	na	na	-
146058-92	TP41	SOIL	Not detected	na	na	-
146058-93	TP42	SOIL	Not detected	na	na	-
146058-94	TP43	SOIL	Not detected	na	na	-

T5: Summary of QA/QC Results for Soil Investigation

Sample ID	Field ID	Location	Sample Date	Moisture	Lead	Mercury (guidelines mercury - inorganic)	Nickel	Arsenic	Cadmium	Chromium (III+VI) (guidelines chromium VI and III)	Copper	Zinc	Benzene	Toluene	Ethylbenzene	Xylene (m & p) (guideline xylene total)	Xylene (o) (guideline xylene total)	C6-C10	C6 - C9
				%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
146058-12	TP06 0.6-0.7	TP06 0.6-0.7	3/05/2016	24	11	<0.1	5	5	<0.4	17	20	20	-	-	-	-	-	-	-
146058-95	DUP1	TP06 0.6-0.7	3/05/2016	20	12	<0.1	6	6	<0.4	19	17	22	-	-	-	-	-	-	-
<b>RPD %</b>				<b>18</b>	<b>9</b>	-	<b>18</b>	<b>18</b>	-	<b>11</b>	<b>16</b>	<b>10</b>	-	-	-	-	-	-	-
146058-52	TP24 0.7-0.8	TP24 0.7-0.8	3/05/2016	18	15	<0.1	16	<4	<0.4	13	38	60	-	-	-	-	-	-	-
146058-96	DUP2 (A)	TP24 0.7-0.8	3/05/2016	15	15	<0.1	18	6	<0.4	15	35	66	-	-	-	-	-	-	-
<b>RPD %</b>				<b>18</b>	<b>0</b>	-	<b>12</b>	<b>40</b>	-	<b>14</b>	<b>8</b>	<b>10</b>	-	-	-	-	-	-	-
ES1609818001	DUP2(B)	TP24 0.7-0.8	3/05/2016	17.2	17	<0.1	16	6	<1	15	30	55	-	-	-	-	-	-	-
<b>RPD %</b>				<b>5</b>	<b>13</b>	-	<b>0</b>	<b>40</b>	-	<b>14</b>	<b>24</b>	<b>9</b>	-	-	-	-	-	-	-
146058-79	HA07 0.2-0.3	HA07 0.2-0.3	3/05/2016	19	40	<0.1	16	8	<0.4	24	38	120	-	-	-	-	-	-	-
ES1609818002	DUP3	HA07 0.2-0.3	3/05/2016	23.3	42	<0.1	15	12	<1	27	32	179	-	-	-	-	-	-	-
<b>RPD %</b>				<b>20</b>	<b>5</b>	-	<b>6</b>	<b>40</b>	-	<b>12</b>	<b>17</b>	<b>39</b>	-	-	-	-	-	-	-
146058-97	TS	Trip Spike	2/05/2016	-	-	-	-	-	-	-	-	-	105	105	104	102	102	-	-
146058-98	TB	Trip Blank	2/05/2016	0.2	-	-	-	-	-	-	-	-	<0.2	<0.5	<1	<2	<1	<25	<25

Table T6: Summary of Groundwater Results for Inorganics, Heavy Metals, BTEX and Naphthalene

						Inorganics						Metals						BTEXN							
						Nitrogen (Total)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (total) as CaCO3	Alkalinity (Carbonate as CaCO3)	Alkalinity (Hydroxide) as CaCO3	Phosphorus - Total	Arsenic (guidelines arsenic III and V)	Cadmium	Chromium (III+VI) (guidelines chromium VI and III)	Copper	Lead	Mercury (guidelines mercury - inorganic)	Nickel	Zinc	Benzene	Toluene	Ethylbenzene	Xylene (m & p) (guideline xylene total)	Xylene (o) (guideline xylene total)	Naphthalene
						mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL						0.1	5	5	5	5	0.05	1	0.1	1	1	1	0.05	1	1	1	1	1	2	1	1
NEPM 2013 GIL Fresh Waters						TBD	-	-	-	-	-	13	0.2	-	1.4	3.4	0.06	11	8	950	-	-	-	350	16
NEPM 2013 GIL Drinking Water						-	-	-	-	-	-	10	2	-	2000	10	1	20	-	1	800	300	-	-	-
NEPM 2013 HSL A&B Groundwater - Residential. Clay 4m to <8m						-	-	-	-	-	-	-	-	-	-	-	-	-	-	5000	NL	NL	-	-	NL
Sample ID	Field ID	Well code	Date	GW Depth	Depth Cat.																				
146064-1	MW2	MW2	3/05/2016	7.2	4-<8m	-	-	-	-	-	<1	<0.1	<1	<1	6	<0.05	5	1	800	4300	1400	4900	2100	420	
146064-2	MW9	MW9	3/05/2016	7.8	4-<8m	-	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	<1	<2	<1	<1	
146064-3	MW24	MW24	3/05/2016	6.7	4-<8m	-	-	-	-	-	<1	<0.1	<1	<1	<1	<0.05	2	6	<1	<1	<1	<2	<1	<1	
146064-4	MW25	MW25	3/05/2016	5.7	4-<8m	-	460	460	<5	<5	<1	0.5	<1	4	<1	<0.05	10	14	<1	<1	<1	<2	<1	<1	
146064-5	DAM1	DAM1	3/05/2016	0	-	44	-	-	-	-	3.7	1	<0.1	<1	2	<1	<0.05	<1	<1	-	-	-	-	-	
146064-6	DAM2	DAM2	3/05/2016	0	-	1.8	-	-	-	-	0.08	1	<0.1	<1	<1	<0.05	<1	<1	-	-	-	-	-	-	

**Table T7: Summary of Groundwater Results for TRH/TPH and MAHS**

**Notes:**

a. all VOC results below detection limit, with the exception of cyclohexane

					TRH NEPM 2013						TPH				Monocyclic aromatic hydrocarbons								Total Organochlorine Pesticides	Total Chlorinated Hydrocarbons	Total Halogenated Hydrocarbons	Total Halogenated Benzenes	Total VOCs		
					C6-C10	>C10-C16	>C16-C34	>C34-C40	F1 (C6-C10 less BTEX)	F2 (>C10-C16 less Naphthalene)	C6 - C9	C10 - C14	C15 - C28	C29-C36	Styrene (Vinyl benzene)	n-propylbenzene	n-butylbenzene	1,3,5-trimethylbenzene	sec-butylbenzene	1,2,4-trimethylbenzene	tert-butylbenzene	isopropylbenzene	p-isopropyltoluene						
					µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	
EQL					10	50	100	100	10	50	10	50	100	100	1	1	1	1	1	1	1	1	1	1	0.2	1	1	1	1
NEPM 2013 GIL Fresh Waters					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NEPM 2013 GIL Drinking Water					-	-	-	-	-	-	-	-	-	-	30	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NEPM 2013 HSL A&B Groundwater - Residential. Clay 4m to <8m					-	-	-	-	NL	NL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Well code	Date	GW Depth	Depth Cat.	Matrix	37000	420000	67000	<10000	23000	420000	28000	520000	130000	<10000	<10	460	65	580	32	3300	<10	100	13	-	ND	ND	ND	ND / 380 <sup>d</sup>	
MW2	3/05/2016	7.2	4-<8m	clay	<10	<50	<100	<100	<10	<50	<10	<50	<100	<100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
MW9	3/05/2016	7.8	4-<8m	clay	<10	<50	<100	<100	<10	<50	<10	<50	<100	<100	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	ND	ND	ND	ND	
MW24	3/05/2016	6.7	4-<8m	clay	<10	<50	<100	<100	<10	<50	<10	<50	<100	<100	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	ND	ND	ND	ND	
MW25	3/05/2016	5.7	4-<8m	clay	<10	<50	<100	<100	<10	<50	<10	<50	<100	<100	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	ND	ND	ND	ND	
DAM1	3/05/2016	-	-	SW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND	-	-	ND	-	
DAM2	3/05/2016	-	-	SW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND	-	-	ND	-	





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Sydney 2000  
Phone: + 61 2 9231 1045  
[www.zoic.com.au](http://www.zoic.com.au)