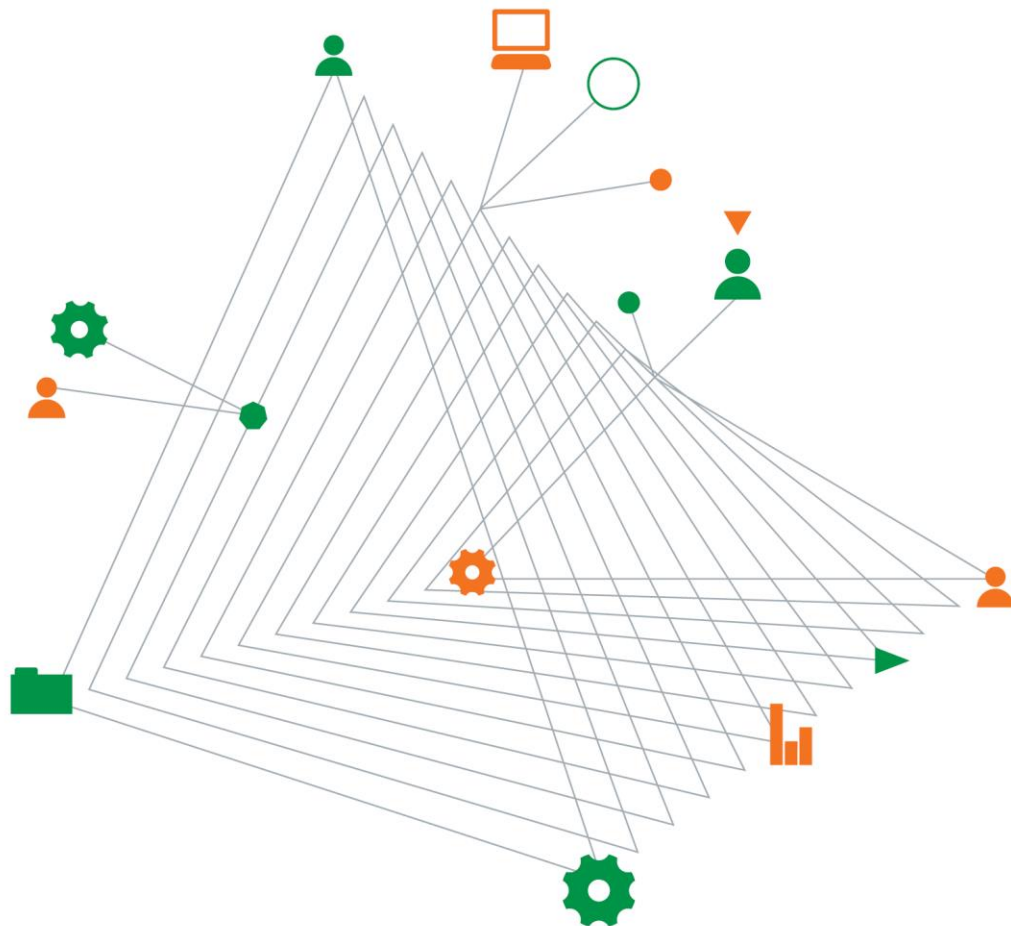


## University of Newcastle

### Honeysuckle City Campus Development (HCCD) Project

Remedial Action Plan, University of  
Newcastle HCCD, Site 1

5 March 2019



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# Remedial Action Plan, Site 1, University of Newcastle HCCD, Site 1

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## Appendices

Appendix A - Figures

# 1. Introduction

The University of Newcastle (The University) is preparing a development application to the Newcastle City Council (NCC) for a proposed building at Lot 1 DP 1163346. The building forms part of the greater Honeysuckle City Campus Development (HCCD) across Lots 1, 2 and 3 DP 1163346; with the proposed development area referred to as "Site 1" (the Site). The Site will be developed over time to include three multi-storey campus buildings that comprise office and classroom spaces with an included open space area. No residential areas are proposed for the Site.

Coffey has recently completed a Detailed Site Investigation (DSI) at Site 1 to support the future mixed-use commercial/industrial and open space/recreational land uses.

While the concentrations of chemicals of concern were below the Commercial/Industrial land use criteria contained in the NEPM 1999 (2013), some remediation was required where Open Space/Recreational land use was proposed. Objectives

The objective of the Remediation Action Plan (RAP) will be to provide guidance on the remediation and validation activities to be undertaken in order to render the site suitable for the proposed future mixed Commercial/Industrial and Open Space/Recreational land uses for the development.

## 1.1. Regulatory Guidelines

This RAP has been prepared in general accordance with the requirements of the following guidelines:

- National Environment Protection Council (NEPC) (1999) National Environment Protection (Assessment of Site Contamination) Measure (ASC NEPM), which was amended in 2013 (ASC NEPM 2013);
- NSW OEH (2011) 'Guidelines for Consultants Reporting on Contaminated Sites';
- NSW EPA (2017) 'Contaminated Sites: Guidelines for the NSW Site Auditor Scheme';
- NSW EPA (1995) 'Sampling Design Guidelines'; and
- NSW EPA (2014) 'Waste Classification Guidelines Part 1: Classifying Waste'.

## 1.2. RAP Requirements

The NSW OEH (2011) *Guidelines for Contaminants Reporting on Contaminated Sites* provides requirements that are to be considered in the preparation of RAPs. As such, the RAP addresses the following requirements:

- Remediation goals;
- Discussion of the extent of remediation required;
- Discussion of possible remediation options;
- Rationale for selecting the preferred remedial option;
- Proposed validation testing;
- Contingency plans for unexpected findings; and
- Health, Safety, Security and Environmental (HSSE) requirements.

## 2. Site Information

### 2.1. Site Location and Identification

General site location is shown in Appendix A, Figure 1 with the relevant site information provided in Table 2-1.

Table 2-1: Summary of site details

<b>Site Address</b>	16, 16A and 16B Honeysuckle Drive, Newcastle NSW 2300
<b>Approximate Site Area</b>	Approximately 8,546m <sup>2</sup>
<b>Title Identification Details</b>	Lot 1, 2 & 3 DP1163346
<b>Current Land Zoning</b>	B4 Mixed Zone Uses
<b>Current Land use</b>	The site comprises a vacant block with access via Wright Lane.
<b>Proposed Land use</b>	Commercial/Industrial (Offices and academic facilities) and Open Space/Recreational for a proposed communal space within the development
<b>Adjoining Site Uses</b>	<ul style="list-style-type: none"> <li>• North – Honeysuckle Drive, Lee Wharf Commercial Buildings;</li> <li>• South – Wright Lane, Wright Lane Car Park, Former Rail Corridor;</li> <li>• East – Settlement Way, Chifley Apartments, Commercial Offices;</li> <li>• West – Worth Place, Commercial Offices.</li> </ul>
<b>Site Coordinates</b>	The centre of the site is located approximately at 32.926210646, 151.768890977

### 2.2. Site topography and drainage

#### Geology and Soils

Reference to the 1:100,000 scale Newcastle Coalfields Regional Geology Map indicates that the site is underlain by fill, alluvial / estuarine soils that are, in turn, underlain by rock belonging to the Lambton Subgroup of the Newcastle Coal Measures. This subgroup comprises siltstone, sandstone and coal seams. The top of rock occurs at approximately -20m AHD and the anticipated presence of suitable founding conditions in the Unit 3 sand between approximately -5m and -10m AHD.

#### Acid Sulfate Soils

Reference to the Newcastle 1:25,000 Acid Sulfate Soil Risk Map indicates that the site is in an area of “High Probability” of Acid Sulfate Soils (ASS) between 1 and 3 metres below the ground surface. The Site was also classified as Class 3<sup>1</sup> in the Newcastle City Council, Local Environment Plan, Map 4, 2012.

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<sup>1</sup> Works more than 1 metre below the natural ground surface and works by which the water table is likely to be lowered more than 1 metre below natural ground surface may require a Management Plan or Preliminary Assessment prior to development consent being issued

## Hydrogeology

Groundwater was observed during site investigations at depths between 2.0m and 3.8m below ground surface (bgs).

A search of the NSW Office of Water for registered groundwater bores located within a 500m radius of the site was undertaken. The search revealed that there were three groundwater bores registered within this radius. A summary of the groundwater search is included in Table 2-2.

Table 2-2 - Groundwater Bore Search Results Summary

Monitoring Well ID	Purpose of bore	Distance and direction from site	Water Bearing Zones
GW201489	Monitoring Bore	421m South East	2.00 – 5.00m bgs
GW201490	Monitoring Bore	479m South East	2.00 – 4.50m bgs
GW201491	Monitoring Bore	434m South East	2.00 – 4.50m bgs



## 3. Summary of Previous Reports

### 3.1. Summary of previous assessments

Historical contamination assessments were summarised in a report produced by Coffey in 2013 for the University of Newcastle (Coffey Ref: Summary of Previous Contamination Assessments Honeysuckle Central, 754-NTLGE198271-AB, Coffey (2013)).

The Coffey (2013) Report was based on the review of the following contamination assessment reports:

- Waste Classification Assessment of Lot 3 – Proposed Temporary Carpark, ref: N8459/02-AS dated 15 June 2004, Coffey (2004a);
- Waste Classification of Proposed Roadway (Part Lot 3 and Part Lot 24), ref: N8459/02-AT dated 16 June 2004 (Coffey 2004b);
- Water Quality Assessment Lot 4, Lot 24 and Lot 3, ref: N8459/02-BE dated 21 July 2004 (Coffey 2004c);
- Lee Wharf Development – Contamination Assessment, ref: N8459/05-AD 6 July 2004 (Coffey 2004d);
- Lee Wharf Development – Responses to Mallesons Queries Regarding Contamination Matter, ref: N8459/05-AF 2 June 2004, Coffey (2004e);
- Honeysuckle Central Contamination Assessment, ref: GEOTWARA20903AA-AE, dated 17 December 2008 (Coffey, 2008); and
- Data from fieldwork completed but not reported in 2011

The summary found that based on the location of Site 1, there was a high probability of Acid Sulfate Soils (ASS) being present at the site (ASRIS 2015) as it was located within an area categorised as Class 3 for the probability of occurrence of ASS/Potential ASS. As such, development consent was required for works more than 1 m below ground surface or works by which the water table is likely to be lowered more than 1 m below natural ground surface.

Historically, the site contained an electrician shop, boiler shop, blacksmiths, locomotive/machine shop, carpenters' shop, electrical substation, and the Bullock Island causeway. In 1993, there was an electrical substation, railway lines, carriage repair sheds, railway goods loading area, and a plumber's shop located at the site.

The main contaminants of potential concern (COPC) include petroleum hydrocarbons, PAHs, heavy metals, asbestos. It is noted that an electrical substation was present at the site in 1993. Although Coffey reported PCB concentrations below the LOR, there was the potential that these samples were not collected from the area near the former substation. As such, PCB remained a COPC in the former electrical substation areas.

Findings and recommendations provided in the previous assessments undertaken on Site 1 included:

- Based on the location of Site 1, there was a high probability of Acid Sulfate Soils (ASS) being present at the site as it was located within an area categorised as Class 3 for the probability of occurrence of Actual ASS (AASS) / Potential ASS (PASS). Investigation and classification of AASS/ PASS on site should be carried out and if encountered, an Acid Sulfate Soil Management Plan may be required depending on depth of disturbance;

- The main contaminants of potential concern (COPC) included petroleum hydrocarbons, PAHs, heavy metals, PCBs and asbestos. Waste classification and onsite reuse of fill and natural material should be undertaken;
- Asbestos was detected in two samples along the eastern boundary at 0.1m depth, it was unknown if asbestos impact was present in fill in other parts of the site. An asbestos management plan may be required, and areas identified as asbestos impacted may require delineation and removal and disposal; and
- Groundwater at the site had previously contained heavy metal impacts, including copper, zinc, manganese and lead. Therefore, additional assessment of groundwater would be required in order to update the status of contamination in line with current guidelines and regulations.

## 3.2. Coffey (2019) Detailed Site Investigation

This Detailed Site Investigation (DSI) was requested by The University based on a request from NCC to complete the recommendations made in the previous reports on the Site. The reports included:

- Summary of Previous Contamination Assessments Honeysuckle Central, Coffey (2013); and
- Site Wide Remedial Concept Plan (extract p128-144), JBS&G (2016).

Coffey has previously completed a waste classification assessment across the Site (Coffey Ref: Waste Classification Assessment of Lot 3 – Proposed Temporary Carpark, ref: N8459/02-AS dated 15 June 2004). The assessment included 7 locations across the Site. In order to complete a DSI in general accordance with the NSW EPA Sampling Design Guidelines 1995, an additional 13 locations were required.

The scope of work completed for this DSI included:

- Placement of twelve (12) boreholes, with logging of soil returns and collection of soil samples and the collection of two surface soil samples;
- Installation of three (3) groundwater monitoring wells at selected locations;
- Laboratory analysis of selected soil and water samples plus appropriate quality control samples for the contaminants of concern; and
- Preparation of a detailed site investigation contamination report (including a preliminary in-situ waste classification assessment).

Soil analytical results from BHP08 – BHP20 (minus BHP17 due to Aboriginal Heritage issues) and two surface soil samples (SS1 and SS2) were compared to the site assessment and waste classification criteria. The soil results have been combined with the results of seven (7) locations previously sampled during the Coffey (2004) Waste Classification Assessment of Lot 3 (BHE1, BHE2, BHE3, BHE4, BHE5, BHE6 and BHE7). Sampling locations have been provided in Appendix A, Figure 2.

As identified in the initial results obtained from soil locations BHE1 to BHE7 during the previous investigations on site the main contaminants of potential concern from a site suitability perspective were BaP and Lead. For the purposes of the proposed development the adopted SAC is HIL/HSL C open space/recreational to support the inclusion of an open space communal area within the development.

The highest concentrations of BaP and lead are associated with the presence of slag materials in the fill. Slag was identified in the upper 1m bgs soils at BHP08, BHP10, BHP15 and BHP19. Both BaP and lead were elevated in BHP08 and BHP10, with elevated lead also identified in BHP15 and

BHP19. From previous experience with slag-based fill, the leachability of these contaminants under both acidic and neutral conditions are typically low.

A comparison of the analytical results against health-based investigation and screening levels reported eight (8) exceedances of the adopted Site Assessment Criteria (SAC) for Lead (600mg/kg HIL C). These included 1,800mg/kg (BHE7 0.5 – 0.6m), 740mg/kg (BHP8 0.2-0.3), 640mg/kg (BHP8 0.9-1.0), 2,200mg/kg (BHP15 0.2-0.3m), 1,800mg/kg (BHP15 0.9-1.0m), 1,100mg/kg (BHP16 0.0-0.2), 1,100mg/kg (BHP18 0.2-0.3) and 1,000mg/kg (BHP19 0.1-0.3). Five (5) exceedances of the SAC for Bap TEQ (3mg/kg) were recorded for BHP8 0.2 – 0.3 (45mg/kg), BHP8 0.9-1.0 (31mg/kg), BHP10 0.2-0.3 (61mg/kg), BHP15 0.9-1.0 (6.9mg/kg) and BHP18 0.2-0.3 (7.4mg/kg).

Three (3) samples are a Lead hotspot based on the SAC used. These include BHE7 0.5-0.6, BHP15 0.2-0.3 and BHP15 0.9-1.0. Three (3) samples are BaP hotspots based on the SAC used. These include BHP8 0.2 – 0.3, BHP8 0.9-1.0, BHP10 0.2-0.3. Given the identified hotspots a 95% UCLaverage calculation is not valid for the assessment of overall lead and BaP average concentrations.

No asbestos containing materials were identified during these works, however, considering the finds made in 2011 one cannot preclude the site is completely asbestos free. This potential for identifying ACM on site (most likely in bonded form) should be managed using an Asbestos Management Plan.

A preliminary in situ waste classification was completed in accordance with the NSW EPA Waste Classification Guidelines (2014) with the following findings:

- 95%UCL lead concentrations (606 mg/kg) for the nineteen (19) locations across the site exceeded the CT2 restricted solid waste criteria without TCLP (400 mg/kg); and
- 95%UCL B(a)P (not TEQ) concentrations (5.2 mg/kg) for the nineteen (19) locations across the site exceeded the CT2 criteria without TCLP (3.2 mg/kg).

Based on a comparison of the results to the waste classification guidelines and considering the results of the statistical appraisal for lead and B(a)P, fill soils have a preliminary waste classification of **General Solid Waste (TCLP1/SCC1)**, with the exception of soils around BHP08, BHP10 and surface soils to approximately 0.3m bgs at location BHP18.

It is recommended that additional TCLP analysis of lead and BaP in samples exceeding the CT1/CT2 (no leach) criteria be undertaken on specific stockpiles identified for offsite disposal. Should TCLP results exceed the General Solid Waste TCLP/SCC1 criteria, delineation of the soils in the vicinity of those exceedances should be undertaken to limit the extent of soils classified as Restricted Solid Waste SCC2. Remediation and validation sampling of these areas should then be undertaken.

The results of the laboratory analysis of groundwater samples collected from monitoring wells (MW01, MW02 and MW03), reported the following exceedances of the GILs:

- Copper (Filtered) (*DGV – 0.00133µg/L*) was detected at a concentration of 0.004mg/L (MW01); and
- Zinc (Filtered) (*DGV – 0.0015µg/L*) was detected at a concentration of 0.087mg/L (MW01) and 0.17mg/L (MW03) respectively.

The results of the laboratory analysis of the Acid Sulfate Soil samples collected during the most recent site investigation indicate the following;

- Field screening of 25 primary soil samples collected in the natural material observed on site was undertaken;
- Samples in a 1:5 mixture with distilled water were recorded at a pH between 8.6 to 9.6 (pH units). A pH less than or equal to 4 being potentially indicative of Actual Acid Sulfate Soils;

- pH<sub>FOX</sub> ranging from 2.8 to 7.8 (pH units), with reactions recorded between no reaction/ slight reaction to extreme reactions with constant froth, after oxidation in hydrogen peroxide, being observed for the samples. pH<sub>FOX</sub> of less than 3.5 can be indicative of Potential Acid Sulfate Soils (PASS);
- Chromium suite analyses was undertaken on 14 selected samples (BHP9 3.4-3.5, BHP9 3.8-3.9, BHP11 3.3-3.5, BHP13 2.5-2.6, BHP14 3.3-3.5, BHP18 3.5-3.8, BHP19 3.1-3.3, BHP20 2.9-3.0, MW01 3.8-4.0, MW02 3.8-4.0, MW02 4.8-5.0 and MW03 3.8-4.0). The samples were selected following visual and olfactory screening for Potential ASS characteristics (dark grey marine sediment, sulphurous odour);
- The total pH drop was in the range of 0.6 to 6.2 pH units. A drop of more than 1 unit, plus increase in temperature, effervescence, colour and odour factors can be indicative of PASS;
- Results indicated that 12 of the 14 samples tested (excluding BHP15 2.5-2.8 and BHP16 2.8-3.0) exceeded the adopted SAC for the site of 0.03 % S. Results ranged between 0.032 and 0.44.
- Coffey calculated a liming rate of between 1.5 and 20.59 kg/tonne for the samples that exceeded the above criteria.

Based on a review of available data from previous and recent investigations, and observations made during fieldwork, Coffey concludes that the Site in its current form is not suitable for the proposed development, with remediation required for the BaP and lead hotspots identified, to satisfy a HIL/HSL C SAC. Coffey notes that the site is however compliant with HIL/HSL D Commercial/Industrial land use criteria.

The following recommendations have been included for the remediation of the site, management of excess spoil, groundwater and potential acid sulfate soils:

- Given the identification of lead and BaP TEQ hotspots (in excess of HIL/HSL C SAC) the site requires remediation and validation of these impacted areas in order to make it suitable for the proposed development. It is recommended that delineation, remediation and validation of the identified hotspots be completed and a final 95%UCLaverage be undertaken following completion to assess the remediated site status. Coffey recommends the preparation of a remediation action plan (RAP) to address the delineation, remediation and validation of the Site to a final land use of HIL/HSL C Open Space/Recreational. The soil excavated during the remediation and trenching works can be reused as fill on site provided it is placed below 2m bgs and at least 0.5m above the standing water level. If this material is to be taken off site it is recommended that the stockpiles be assessed against the NSW EPA Waste Classification Guidelines including a TCLP for both PAH and metals (lead being the metal found to be in exceedance in the preliminary assessments). Retention of the material on site should be prioritised over export of material to landfill, regardless of the waste classification criteria obtained;
- Ongoing groundwater assessment during the development stages of this project is recommended. This will be used to assess whether the background levels of heavy metal contamination, or any other COPC, are affected by actions during development. The wells installed on the property during this DSI should be retained if possible and utilised for ongoing groundwater monitoring;
- As recommended in the 2004 with further confirmation during this DSI, the groundwater should be of sufficient quality to be considered suitable for stormwater discharge. Dewatering will need to be managed by undertaking a dewatering assessment and preparation of a site-specific Dewatering Management Plan (DMP). Preliminary discussions with Council regarding the requirements for discharge to stormwater during dewatering should also be undertaken prior to the commencement of early earthworks activities such as trenching for services.
- Future groundwater investigations (dewatering assessment) for the assessment of discharge of groundwater resulting from dewatering activities to the stormwater drains should use an expanded

suite of chemicals of potential concern including cations and anions including calcium, magnesium, potassium and sodium, chloride), alkalinity, Kjeldahl nitrogen, nitrate, nitrite, total nitrogen, total phosphorus and sulfate;

- Potential Acid Sulfate Soils (PASS) were identified in sub-surface soil samples collected from approximately 2.5 – 4.0mbgs. Preparation of an Acid Sulfate Soils Management Plan (ASSMP) is recommended for use on site during site development works (including early trenching works for the installation of services and future bulk excavation) that are anticipated to exceed 2.5mbgs;
- Nine (9) soil samples (surface) were assessed for the presence of asbestos in the fill materials with no presence detected in the samples. Observation of the surface soils adjacent to the eastern boundary (where surface asbestos was identified in previous investigations) was undertaken. Three suspected pieces of material were sampled and tested for the presence of asbestos. No asbestos was found to present in the materials sampled. No asbestos containing materials were identified during these works, however, considering the finds made in 2011 one cannot preclude the site is completely asbestos free. This potential for identifying ACM on site (most likely in bonded form) should be managed using an Asbestos Management Plan.;
- A preliminary classification of General Solid Waste (TCLP1/SCC1) has been assessed for the in-situ soils, primarily impacted by elevations of PAH and lead in the 0 – 1.0m bgs fill. With the exception of soils in the vicinity of BHP08, BHP10 and shallow soils (0.3m bgs) at location BHP18 which are classified as Restricted Solid Waste SCC2.
- It is recommended that additional TCLP analysis of lead and BaP in samples exceeding the CT1/CT2 (no leach) criteria be undertaken on all stockpiles identified for offsite disposal; and
- Coffey also recommends that prior to the commencement of site redevelopment works, an appropriate Construction Environmental Management Plan (CEMP) is prepared by the appointed construction contractor to manage environmental risk posed to construction workers, and to the surrounding public and environment, by construction works and to manage waste in accordance with appropriate New South Wales statutes. Coffey recommends inclusion of a Contaminated Land Management Plan (CLMP) and Unexpected Finds Protocol (UFP) within the CEMP, to provide a procedure for emergency response should contaminated material (including asbestos) or items of heritage significance be uncovered during site redevelopment.

## **4. Remediation Programme**

Coffey has compared the sample analysis results against the HIL/HSL C and D site assessment criteria (SAC). When compared to the HIL/HSL C SAC, Coffey identified benzo(a)pyrene TEQ (BaP TEQ) hotspots in three locations BHP8, BHP10 and BHP18. Lead hotspots were also identified in two locations BHE7 and BHP15. It is recommended that these hotspots be remediated and validated to achieve a 95% UCL across the site that is below the HIL/HSL C site assessment criteria for lead and BaP.

### **4.1. Remedial goals**

The broad remediation goals, with respect to contamination, are to identify management measures that would ensure the site is suitable for future mixed Commercial/Industrial and Open Space/Recreational land uses. The most sensitive land use application (Open Space/Recreational) will form the basis of the site assessment goals.

#### **4.1.1. Remediation hierarchy**

The ASC NEPM 1999 (2013) provides a preferred hierarchy of options for site clean-up and/or management which is outlined as follows:

- If practicable, on-site treatment for the contamination so that it is destroyed, and the concentrations are reduced to below the adopted site clean-up criteria; or
- Offsite treatment of excavated soil, so that the contamination is destroyed, or the associated risk is reduced to an acceptable level.

If the above is not practicable:

- Consolidation and isolation of the soil on site by containment within a properly designed barrier; or
- Removal of contaminated material to an approved facility followed, where necessary, by replacement with appropriate material; or
- Where the assessment indicates remediation would have no net environmental benefit or would have a net adverse environmental effect, implementation of an appropriate management strategy.

#### **4.1.2. Preferred remedial strategy**

Based on the proposed development and the potentially limited volume of contaminated material at the identified impacted boreholes, the preferred remedial strategy was to delineate the extent of lead and BaP contamination both vertically and horizontally, followed by removal and validation sampling of the remediated areas.

It is not being recommended that the excavation voids be backfilled following remediation, as the area will most likely be reconfigured during the site development works, which are at this stage planned to immediately follow the remedial works. Should there be a delay in the works programme then imported material may be required to backfill the excavations.

The steps to be followed are discussed in detail in Section 4.1.3 (below).

#### **4.1.3. Proposed remediation strategy**

The steps involved with the remediation of the site are discussed below:

- Delineation of the BaP impacted soils around BHP8, BHP10 and BHP18 and lead impacted soils around BHE7 and BHP15 to more accurately estimate the volume of material impacted in each location;
- Removal of the impacted material;
- Waste classification of the impacted material followed by offsite disposal to landfill; and
- Following removal of soils, a suitably qualified and trained environmental scientist will collect soil samples from the excavations for validation purposes. This will be carried out as per the procedures outlined below in Section 4.1.4. with the delineation samples identified as per Table 4-1.

Table 4-1: Delineation Sample Identification Scheme

	<b>BHE7</b>	<b>BHP15</b>	<b>BHP8</b>	<b>BHP10</b>	<b>BHP18</b>
<b>SN2</b>	1	1	1	1	1
<b>SN5</b>	1	1	1	1	1
<b>SS2</b>	1	1	1	1	1
<b>SS5</b>	1	1	1	1	1
<b>SE2</b>	1	1	1	1	1
<b>SE5</b>	1	1	1	1	1
<b>SW2</b>	1	1	1	1	1
<b>SW5</b>	1	1	1	1	1
<b>VN50</b>	1	1	1	1	1
<b>VN100</b>	1	1	1	1	1
<b>VS50</b>	1	1	1	1	1
<b>VS100</b>	1	1	1	1	1
<b>VE50</b>	1	1	1	1	1
<b>VE100</b>	1	1	1	1	1
<b>VW50</b>	1	1	1	1	1
<b>VW100</b>	1	1	1	1	1

Sample designations include sample location and direction from the primary impacted sample e.g. SN1 = Surface North 1. Surface samples designated 2 and 5 are 2m and 5m from the original impacted location respectively. Surface samples will be collected from 0 – 0.2m bgs layer and are horizontal delineation points. For vertical delineation samples (prefix V) a similar sample designation scheme will be adopted e.g. VN50 = Vertical North 50. The numbers 50 and 100 represent the sampling depths 50cm and 100cm depths bgs respectively.

#### **4.1.4. Delineation, excavation and removal of BaP and lead impacted soils**

The delineation works are outlined below:

- The contaminant impacts previously identified at boreholes BHP8, BHP10 and BHP18 for BaP TEQ and BHE7 and BHP15 for lead are to be delineated;
- The delineation sampling is to be carried out by a suitably qualified environmental consultant;
- Delineation samples are to be taken at approximately 2m and approximately 5m to the north, south, east and west of each borehole (eight delineation locations per borehole);
- Delineation samples are to be taken from both the surface soils (0 – 0.2m) and at 0.5m and 1.0m bgs;
- Each sample will be placed into laboratory-supplied sterilised containers and kept in ice-chilled eskies following collection;
- Delineation samples will be collected using a mobile tracked drill (SPT and sample tubes);
- A clean pair of disposable nitrile gloves is to be worn when collecting each sample;
- Sample locations are to be recorded (e.g. with a hand-held GPS).
- The delineation samples are to be dispatched to a NATA-accredited laboratory for PAH and lead analyses. A field duplicate sample and field triplicate sample will also be collected and analysed to assess field quality control procedures. An equipment rinsate sample will also be collected and analysed to assess field decontamination procedures.

Once the extent of BaP TEQ and lead impacts are identified through the delineation assessment, the following works are to be carried out:

- The BaP TEQ and lead-impacted soils are to be excavated and stockpiled on an impervious surface;
- A waste classification letter will be required for the soils to be disposed offsite. The letter will be prepared for the material using data collected from the delineation samples;
- The excavated soil is to be disposed offsite to the nearest licensed landfill by a suitably qualified contractor;
- Following removal of BaP TEQ-impacted soil, validation soil sampling will be carried out by the environmental consultant in accordance with Section 4.2 (below); and
- The results of the validation sampling are to be detailed and presented in a site validation report.

## **4.2. Validation programme**

Validation soil sampling will be undertaken to confirm that impacted material has been removed. The validation sampling process is discussed in the sections below.

### **4.2.1. BaP TEQ and Lead Health Investigation Levels**

The current zoning is B4 mixed use and the development as proposed includes both commercial/industrial and open space/recreational land uses. For the purposes of this report investigation levels for Commercial / industrial use and recreational use have been provided.



## 4.2.2. Health Investigation Levels HIL

The HIL values from the NEPM ASC (2013) for each of the applicable landuses for the site are listed in Table 9.1.

**Table 9.1: HILs for Applicable Landuse**

Contaminant	HIL C <sup>(1)</sup> (mg/kg)	HIL D <sup>(1)</sup> (mg/kg)
Applicable landuse	Recreational	Commercial/ industrial
Lead	600	1,500
Carcinogenic PAHs (as BaP TEQ)	3	40

1. The Amended NEPM ASC HIL values

## 4.2.3. Site validation methodology

In order to assess the effectiveness of the remediation works and assess the suitability of the site for future Open Space/Recreational C land use, validation of the site will be undertaken. This section summarises the scope of works for the validation programme.

### Soil validation strategy

Validation soil sampling will be completed in accordance with the following guidelines:

- Australian Standard AS 4482.1 (1997) Guide to the Sampling and Investigation of Potentially Contaminated Sites;
- Coffey Environments Standard Operating Procedure for Soil Sample Collection; and
- ASC NEPM 1999 (2013).

Following completion of the excavation works, a suitably qualified environmental scientist will collect a minimum of one sample per 25 square meters at the base of the remediated excavation.

Samples will be analysed for the COPCs identified namely lead or BaP TEQ as applicable. Where significant number of validation samples or excavations continually fail the Investigation Levels, other validation technique (e.g. by use of statistics, etc.) may be undertaken. Alternatively, other remediation and/or management strategy can be adopted.

Where there may be uncertainty about waste classification or unexpected conditions encountered during excavation, the material should be stockpiled on plastic sheet or paved surface to minimise impact. Sampling to confirm waste classification should be undertaken as per the guidance included in Table 2, EPA Victoria Industrial Waste Resources Guidelines 2009 (IWRG702 – June 2009) for stockpile samples as reproduced in Table 4-2.

:

Table 4-2: Minimum Number of Samples for Stockpiles 200m<sup>3</sup> or less

Soil Volume m <sup>3</sup>	No of Samples
25 or < 25	3
50	3
75	3
100	4
125	5
150	6
175	7
200	8
>200	1:25

For sample volumes > 200m<sup>3</sup> a sampling rate reduction can be applied subject to a comparison of the 95%UCL<sub>average</sub> of the soil (IWRG702, 2009). The applicable sampling rate is dependent on the heterogeneity of the material being assessed. The sampling rates applicable to generally homogeneous material in excess of 200m<sup>3</sup> is included in Table 4-3.

Table 4-3: Minimum number of samples for soil volumes greater than 200m<sup>3</sup> (1:25 or 95%UCL)

Soil Volume m <sup>3</sup>	No of Samples at 1:25m <sup>3</sup>	Minimum Number of Samples 95%UCL <sub>average</sub>
300	12	10
400	16	10
500	20	10
600	24	10
700	28	10
800	32	10
900	36	10
1000	40	10
1500	60	10
2000	80	10
2500	100	10
3000	120	12 (1:250)
4000	160	16 (1:250)
4500	180	18 (1:250)
5000	200	20 (1:250)
>5000	1:25	1:250

The following steps will be undertaken in order to obtain representative validation samples for laboratory analysis:

- Samples will be collected from the remediated areas directly by hand or by using hand tools (stainless steel hand augers or shovels or trowels);
- Samples will be placed into laboratory-supplied glass jars;
- Hand tools used during sample collection will be decontaminated between samples by rinsing with phosphate-free detergent and potable water;
- A clean pair of disposable nitrile gloves will be worn when handling samples;
- Samples will be placed into secure containers after collection; and
- Samples will be submitted to a NATA-accredited laboratory under chain of custody conditions.

#### 4.2.4. Quality assurance / quality control

DQIs for the project will be based on the field and laboratory considerations in the table in Appendix V of NSW DECC (2006) and NEPM Schedule B2 Appendix B, (NEPC, 2013). These comprise:

- Completeness – a measure of the amount of useable data (expressed as %) from a data collection activity;
- Comparability – the confidence (expressed qualitatively) that data may be considered to be equivalent for each sampling and analytical event;
- Representativeness – the confidence (expressed qualitatively) that data are representative of each media present on the site;
- Precision – a quantitative measure of the variability (or reproducibility) of data; and
- Accuracy – a quantitative measure of the closeness of reported data to the true value.

Laboratory analyses will be undertaken in laboratories which are NATA accredited for the analyses undertaken. The following laboratory QA/QC analyses will be undertaken:

- Laboratory duplicates – at least one per batch
- Matrix spike – at least one per batch or approximately at 5% of analyses
- Laboratory blank – at least one per batch or approximately at 5% of analyses
- Laboratory control samples – at least one per batch or approximately at 5% of analyses
- Surrogates – for relevant analytes
- Surrogate spikes – for relevant analytes

Specific indicators for field and laboratory QC samples are shown in Table 9.8.

**Table 9.8: Data Quality Indicators for Analytical Results**

Type of Quality Control Sample	Control Limit
Duplicate Samples	Relative Percentage Difference (RPD) within 50% for soil
Triplicate Samples	RPD within 50% for soil
Spikes	Recoveries within the following ranges <ul style="list-style-type: none"> <li>• 70% - 130% for inorganics / metals</li> </ul>

	<ul style="list-style-type: none"> <li>• 60% - 140% for organics</li> <li>• or as specified in laboratory's quality plan</li> </ul>
Blanks	Analytes not detected

## 4.3. Imported Fill Requirements

Imported material should be assessed prior to importation and **must** meet one of the following material types:

- Virgin Excavated Natural Material (VENM);
- Suitable exempt material (such as ENM). This material will be assessed in accordance with NSW EPA (2014a) 'The Excavated Natural Material Order 2014' and NSW EPA (2014b) 'The Excavated Natural Material Exemption 2014';
- Other materials approved by NSW EPA resource recovery orders or resource recovery exemptions determined to be suitable for importation; or

Some commercial material or quarry product may be used (e.g. road aggregate, re-cycled building materials, topsoil, mulch, etc.) with prior approval from a suitably qualified environmental consultant.

Material being imported to the site shall also be tracked and the following information shall also be recorded:

- Truck and/or bin registration number
- Origin of material
- Material type
- Approximate volume
- Relevant classification document
- Proposed use onsite
- Proposed location for use
- Observations of material and confirmation it matches approved material.

### 4.3.1. Reporting

#### Site validation report

A site validation report will need to be prepared, following the soil remediation works, summarising the results of the soil remediation and validation of the site. The report will need to be written in accordance with relevant sections of the NSW OEH (2011) *Guidelines for Consultants Reporting on Contaminated Sites*. The validation report will also need to provide a statement as to the suitability of the site for the proposed land use.

The validation report should also include evidence of the disposal of material removed from the site (e.g. waste disposal dockets).

## **5. Site management during Remediation**

The management strategies for environmental issues that may arise during site works are discussed in the sections below. These strategies are considered a minimum requirement to be followed by the remediation contractor before and during remediation activities. It is envisaged that the remediation contractor will develop site specific environmental work plans for soil removal.

### **5.1. Air emissions**

As lead and semi-volatile BaP TEQ are the primary COCs and the likelihood of significant volatile contamination being present on the site is considered to be low, vapours are considered unlikely to be generated during remedial works.

### **5.2. Dust**

The remediation works will involve excavation of the subsurface, movement of soils, and general vehicular movements across the site. As such, dust generation is considered a potential environmental impact to the surrounding environment and the public.

The following management measures should be implemented to prevent dust impacts.

- A communications and complaints register should be kept on site to ensure that concerns of local residents and workers are recorded and addressed;
- Boundary fences should be maintained around the perimeter of the site to prevent dust from migrating laterally from these areas;
- Excavated soils should be watered as required to minimise the potential for dust generation;
- If dust migration from excavation areas is considered excessive due to high winds, the works should be delayed or limited during these periods;
- Trucks removing material from the site should have loads covered;
- Vehicular movements entering and exiting the site should be kept to a minimum; and
- Works should be limited during times of high winds.

#### **Stockpile Areas**

Based on the proposed remedial strategy, stockpiling of soils is considered likely. The following procedures are to be followed:

- Stockpiles should be regularly watered to minimise dust generation;
- Stockpiles should be covered with high-density polyethylene (HDPE) sheeting or equivalent, after being created in order to minimise the potential for dust generation and generation of runoff; and
- Stockpile heights should not exceed the heights of the boundary fences.

### **5.3. Noise controls**

Noise will be generated during site works and is considered a potential environmental issue. The noise that will be generated is anticipated to be mainly derived from earthworks activities. It is anticipated that the level of noise generated will not exceed that of a typical construction site.

Noise limitations imposed by Council are to be adhered to. This may include restrictions on working days and hours, and acceptable noise levels.

A noise monitoring programme may be required if noise cannot be easily managed. This may include noise surveys at the source and at surrounding properties.

## **5.4. Working hours**

Working hours would need to be consistent with Council requirements. These are considered to be in the order of 7am to 6pm Monday to Friday and 8am to 1pm on Saturdays.

## **5.5. Site access restrictions**

During the delineation, remediation and validation works it will be necessary to restrict site access solely to authorised staff and contractors who have appropriate levels of personal protective equipment and hazard awareness.

Temporary site fencing and appropriate signage is to be maintained, and unauthorised personnel are to be kept outside.

## **6. Occupational health and safety**

### **6.1. Health and safety plans**

Prior to the commencement of site works, Coffey will prepare a Health, Safety, Security and Environmental (HSSE) Plan. The HSSE Plan will include the following information:

- Likely hazards and control measures;
- Emergency assembly areas;
- Emergency contact numbers;
- Site security procedures;
- First aid wardens on the site; and
- Procedures for the safe handling of chemicals and contaminated soil and groundwater.

The HSSE Plan should be reviewed when new tasks are undertaken. The HSSE Plan should be updated as required to cover the tasks undertaken.

In addition, subcontractors engaged by Coffey should prepare Safe Work Method Statements (SWMS) for their activities. The SWMS should contain the following information:

- The steps of the activity to be performed;
- Hazards and perceived risks for each step of the activity;
- Control measures to be adopted to eliminate or minimise the hazards; and
- The persons responsible for implementing control measures.

## **7. Licenses and approvals**

### **7.1. Licenses and approvals**

At the present moment the remediation works would be classified as Category 2 with a requirement of 30 days' notice to Council prior to commencement of the works. It should be noted that the State Environmental Planning Proposal (SEPP) for Contaminated Land is currently in a draft format and will replace the former SEPP 55. There is currently no date given for the implementation of the new SEPP and it is currently in draft for comment.

The volume of material being removed from the site should be documented by the client and/or the remediation contractor, supported by material tracking sheets and waste disposal dockets if available.

## **8. Unexpected Finds Protocol**

### **8.1. Purpose**

This procedure outlines a methodology for consistent response and management of unexpected finds during proposed enabling, early and development works. This procedure considers heritage obligations under the Heritage Act 1977 (NSW), National Park and Wildlife Act 1974 (NSW), Aboriginal and Torres Strait Islander Heritage Protection Act 1984 (Cth) and the Coroners Act 2009 (NSW).

### **8.2. Scope**

This procedure applies to all contractors and sub-contractors conducting excavation works on Site 1 or in support of works being conducted on Site 1. These include the installation of service trenches, stormwater drains and bulk earthworks activities.

This procedure considers that an application for a Project specific Aboriginal Heritage Impact Permit (AHIP) has been applied for under Section 90 of the National Parks and Wildlife Act 1974 to manage harm or potential harm to Aboriginal objects and places. Detailed investigations undertaken as part of the AHIP process notwithstanding, unexpected heritage items may still be unearthed during excavation works being undertaken on site. This procedure is applicable in those cases and triggers a cessation of work and guides on the relevant processes of seeking technical advice and regulatory notification.

### **8.3. Applicable Legislation and Procedures**

- Heritage Act 1977 (NSW);
- National Parks and Wildlife Act 1974 (NSW);
- Aboriginal and Torres Strait Islander Heritage Protection Act 1984 (Cth);
- Coroner's Act 2009 (NSW); and
- Unexpected Archaeological Finds 2012 (RMS).

### **8.4. Types of Unexpected Finds**

For this procedure an 'Unexpected find' is defined as any unanticipated potential contaminant or archaeological discovery not identified during previous assessments. An unexpected find may include:

- Contaminated materials;
- Buried infrastructure (e.g. underground storage tanks, pipes, footings);
- LNAPL/DNAPL contamination;
- Asbestos;
- Potential acid sulphate soils;
- Aboriginal and Non-Aboriginal Heritage artefacts; and
- Human skeletal remains.



## 8.5. General Initial Response

If during enabling, early or development works, there is any unexpected find the following applies;

- Cease Work Immediately and notify the Site Supervisor;
- Identification and classification of the find (Aboriginal/European Heritage, buried infrastructure, possible ACM, Contaminants);
- Evacuate and Isolate the area;
- Provide PPE to workers as required (for contaminated material including Underground Storage Tanks (UST's, pipes, asbestos containing material (ACM);
- Photograph the find and mark the identified location using a GPS;
- Install temporary fencing and signage;
- Notify the University HSE Representative;
- Tool box to all site staff; and
- Notify the University and Engage specialist consultants as required.

## 8.6. Management of Asbestos

Asbestos places worker health at risk when elevated levels of asbestos fibres are breathed into the lungs. The Safework NSW guideline for Managing Asbestos in or On Soil, 2014 states the following regarding asbestos exposure:

*"The likelihood of exposure occurring depends upon the potential for the asbestos material to release fibres, whether the asbestos material is contained or covered, and any operational control measures or personal protective equipment which have been applied to limit the generation and/or inhalation of airborne fibres.*

*Non-friable asbestos, previously referred to as 'bonded asbestos', in sound condition represents a low human health risk. However, friable asbestos materials or damaged, crumbling bonded asbestos, have the potential to generate, or be associated with, free asbestos fibres and therefore must be carefully managed to minimise the release of asbestos fibres into the air."*

If in situ soil (surface/fill) or stockpiled material is suspected to contain asbestos, the Site Supervisor should be informed immediately. It should be assumed that the soil is asbestos impacted, and work immediately ceased. A suitably qualified environmental consultant or licensed asbestos assessor should be contacted to sample the material for confirmation of asbestos presence and type (friable or bonded).

If confirmed, the Site Supervisor must ensure the implementation of asbestos management procedures as outlined in Section 9 (Management of asbestos contaminated materials) of the Contaminated Land Management Plan (CLMP), (Coffey Ref: 754-NTLEN213472-R05 Rev 1). The control measures will include but not be limited to:

- Identifying contaminant boundaries as determined by an independent licensed asbestos assessor or suitably qualified environmental consultant;
- Minimize disturbance to in situ soils or stockpiles containing potential ACM until the asbestos management procedures have been implemented;
- Isolating, securing and clearly identifying the area of potential ACM impact site using signs and barriers;

- Application of dust reduction/control measures such as spraying of water and application of wetting agents;
- Providing workers with appropriate personal protection equipment (PPE) based on the suspected level of contamination and the control measures implemented;
- Sampling of the suspected contaminated materials and/or air monitoring; and
- Execute a site toolbox talk focused on the provision of information to workers on hazards and safe work practices to minimise airborne dust exposure.

A licensed asbestos assessor should be engaged, and a comprehensive assessment conducted as required. If asbestos is confirmed, any impacted material must be removed by a licensed asbestos removalist and a clearance certificate obtained from a licensed asbestos assessor.

## **8.7. Skeletal Remains**

During the progression of excavation works bones (human and animal) may be unexpectedly exhumed. If the bones are clearly human in origin, work will cease, access will be prevented to the immediate area by installing barriers and contact the local police immediately. The police may take control of the site for investigative purposes. The bones are not to be touched or disturbed. The coroner will assess the bones to determine if they are under 100 years old. If the bones are assessed to be over 100 years old they are managed, human or otherwise, as heritage items.

If the origin of the bones cannot be immediately identified as human, a suitably qualified Archaeologist or Anthropologist should be engaged to undertake an assessment of origin. Approval from the coroner, police, Aboriginal groups, Office of Heritage, Anthropologist or the client may be required before bones can be removed.

## **8.8. Contaminated Materials**

In the event suspected contaminated materials (UST's, footings, pipes, flowing free phase hydrocarbons, oily wastes odorous or suspicious looking soils etc.) are discovered, steps must be taken to assess the materials and minimize potential impact on the environment. Upon discovering the items work will cease and an assessment of immediate risks carried out by the Site Supervisor and Project Manager. Following the initial assessment, a suitably qualified environmental consultant will be engaged to assess the short and long-term risks to human health and the environment and provide options for mitigation, management and/or disposal. Contaminated materials must be disposed at a licensed facility under an appropriate waste classification in accordance with the NSW EPA Waste Classification Guidelines (2014).

All unexpected contaminated material finds on site to be managed in accordance with the CLMP.

## **8.9. Potential Acid Sulphate Soils (PASS)**

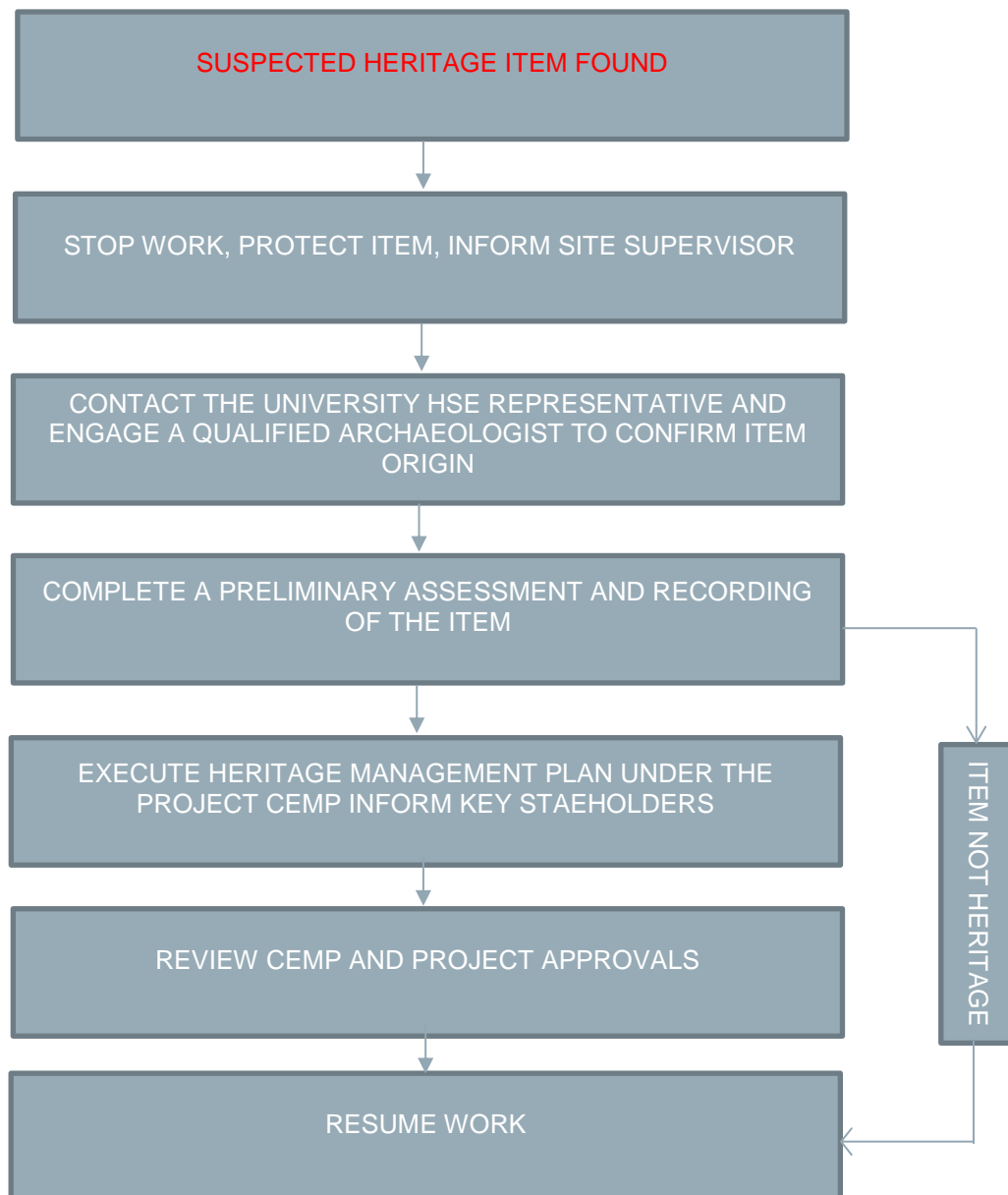
Based on the proposed depth of remedial works PASS materials are not expected to be encountered during excavation.

## **8.10. Aboriginal Heritage**

The identification of any relic, artefact or material suspected to be of Aboriginal original triggers an immediate cessation of works. The Site Supervisor and or Project Manager shall be notified immediately, who will in turn contact the University HSE representative. A qualified archaeologist must be engaged to confirm the find.

Following this, the Site Supervisor and or Project Manager must complete a preliminary assessment and recording of the item. If the item was identified to not be of Aboriginal origin works will immediately recommence following that clearance. Should Aboriginal Heritage items be confirmed the University HSE representative will then notify NSW Police, National Parks and Wildlife Service and Local Aboriginal stakeholders. If an approved Heritage Management Plan exists as part of an approved CEMP this must be executed.

The following flowchart illustrates the required actions following the suspected identification of Aboriginal heritage objects.



The Office of Environment and Heritage require notification and an AHIP permit is required prior to removal of artefacts. Site inductions should include an introduction and awareness to the possible presence of Aboriginal heritage and the expectation and procedures regarding their management. Aboriginal Artefacts could include but not limited to stone tools, shell middens, axe grinding grooves,

rock art, burials and scarred trees. Please refer to the included RMS guidance (Appendix) (Unexpected Heritage Items Procedure 2014) for further procedural and visual guidance.

## 9. References

Coffey (2016) Preliminary Contamination Assessment (Reference ENAUWARA04766AA-R01 dated 11 July 2016); and

Coffey (2015) Phase 2 Contamination Assessment (Reference ENAUWARA04792AA-R02 dated 13 January 2017).

**National Occupational Health and Safety Commission (2005)** Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres 2nd Edition, 3003 - 2005.

**NEPC (2013)** *National Environmental Protection (Assessment of Site Contamination)* Measure 1999, as amended in 2013, National Environment Protection Council.

**NSW EPA (1997)** Environment Guidelines: the Use and Disposal of Biosolids.

**NSW OEH (2011)** *Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites*, OEH 2011/0650, ISBN 0 7310 3892 4, Office of Environment and Heritage, Sydney.

**NSW Workcover (2013)** Managing Asbestos in or on Soil.

**Safe Work Australia (2011)** Code of Practice: How to Manage and Control Asbestos in the Workplace.

**Safe Work Australia (2011)** Code of Practice: How to Safely Remove Asbestos.

# Important information about your **Coffey** Environmental Report

## **Introduction**

This report has been prepared by Coffey for you, as Coffey's client, in accordance with our agreed purpose, scope, schedule and budget.

The report has been prepared using accepted procedures and practices of the consulting profession at the time it was prepared, and the opinions, recommendations and conclusions set out in the report are made in accordance with generally accepted principles and practices of that profession.

The report is based on information gained from environmental conditions (including assessment of some or all of soil, groundwater, vapour and surface water) and supplemented by reported data of the local area and professional experience. Assessment has been scoped with consideration to industry standards, regulations, guidelines and your specific requirements, including budget and timing. The characterisation of site conditions is an interpretation of information collected during assessment, in accordance with industry practice,

This interpretation is not a complete description of all material on or in the vicinity of the site, due to the inherent variation in spatial and temporal patterns of contaminant presence and impact in the natural environment. Coffey may have also relied on data and other information provided by you and other qualified individuals in preparing this report. Coffey has not verified the accuracy or completeness of such data or information except as otherwise stated in the report. For these reasons the report must be regarded as interpretative, in accordance with industry standards and practice, rather than being a definitive record.

## **Your report has been written for a specific purpose**

Your report has been developed for a specific purpose as agreed by us and applies only to the site or area investigated. Unless otherwise stated in the report, this report cannot be applied to an adjacent site or area, nor can it be used when the nature of the specific purpose changes from that which we agreed.

For each purpose, a tailored approach to the assessment of potential soil and groundwater contamination is required. In most cases, a key objective is to identify, and if possible quantify, risks that both recognised and potential contamination pose in the context of the agreed purpose. Such risks may be financial (for example, clean up costs or constraints on site use) and/or physical (for example, potential health risks to users of the site or the general public).

## **Limitations of the Report**

The work was conducted, and the report has been prepared, in response to an agreed purpose and scope, within time and budgetary constraints, and in reliance on certain data and information made available to Coffey.

The analyses, evaluations, opinions and conclusions presented in this report are based on that purpose and scope, requirements, data or information, and they could change if such requirements or data are inaccurate or incomplete.

This report is valid as of the date of preparation. The condition of the site (including subsurface conditions) and extent or nature of contamination or other environmental hazards can change over time, as a result of either natural processes or human influence. Coffey should be kept apprised of any such events and should be consulted for further investigations if any changes are noted, particularly during construction activities where excavations often reveal subsurface conditions.

In addition, advancements in professional practice regarding contaminated land and changes in applicable statutes and/or guidelines may affect the validity of this report. Consequently, the currency of conclusions and recommendations in this report should be verified if you propose to use this report more than 6 months after its date of issue.

The report does not include the evaluation or assessment of potential geotechnical engineering constraints of the site.

## **Interpretation of factual data**

Environmental site assessments identify actual conditions only at those points where samples are taken and on the date collected. Data derived from indirect field measurements, and sometimes other reports on the site, are interpreted by geologists, engineers or scientists to provide an opinion about overall site conditions, their likely impact with respect to the report purpose and recommended actions.

Variations in soil and groundwater conditions may occur between test or sample locations and actual conditions may differ from those inferred to exist. No environmental assessment program, no matter how comprehensive, can reveal all subsurface details and anomalies. Similarly, no professional, no matter how well qualified, can reveal what is hidden by earth, rock or changed through time.

The actual interface between different materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but

steps can be taken to reduce the impact of unexpected conditions.

For this reason, parties involved with land acquisition, management and/or redevelopment should retain the services of a suitably qualified and experienced environmental consultant through the development and use of the site to identify variances, conduct additional tests if required, and recommend solutions to unexpected conditions or other unrecognised features encountered on site. Coffey would be pleased to assist with any investigation or advice in such circumstances.

### **Recommendations in this report**

This report assumes, in accordance with industry practice, that the site conditions recognised through discrete sampling are representative of actual conditions throughout the investigation area. Recommendations are based on the resulting interpretation.

Should further data be obtained that differs from the data on which the report recommendations are based (such as through excavation or other additional assessment), then the recommendations would need to be reviewed and may need to be revised.

### **Report for benefit of client**

Unless otherwise agreed between us, the report has been prepared for your benefit and no other party. Other parties should not rely upon the report or the accuracy or completeness of any recommendation and should make their own enquiries and obtain independent advice in relation to such matters.

Coffey assumes no responsibility and will not be liable to any other person or organisation for, or in relation to, any matter dealt with or conclusions expressed in the report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with or conclusions expressed in the report.

To avoid misuse of the information presented in your report, we recommend that Coffey be consulted before the report is provided to another party who may not be familiar with the background and the purpose of the report. In particular, an environmental disclosure report for a property vendor may not be suitable for satisfying the needs of that property's purchaser. This report should not be applied for any purpose other than that stated in the report.

### **Interpretation by other professionals**

Costly problems can occur when other professionals develop their plans based on misinterpretations of a report. To help avoid misinterpretations, a suitably qualified and experienced environmental consultant should be retained to explain the implications of the report to other professionals referring to the report and then review plans and specifications produced to see how other professionals have incorporated the report findings.

Given Coffey prepared the report and has familiarity with the site, Coffey is well placed to provide such

assistance. If another party is engaged to interpret the recommendations of the report, there is a risk that the contents of the report may be misinterpreted and Coffey disowns any responsibility for such misinterpretation.

### **Data should not be separated from the report**

The report as a whole presents the findings of the site assessment and the report should not be copied in part or altered in any way. Logs, figures, laboratory data, drawings, etc. are customarily included in our reports and are developed by scientists or engineers based on their interpretation of field logs, field testing and laboratory evaluation of samples. This information should not under any circumstances be redrawn for inclusion in other documents or separated from the report in any way.

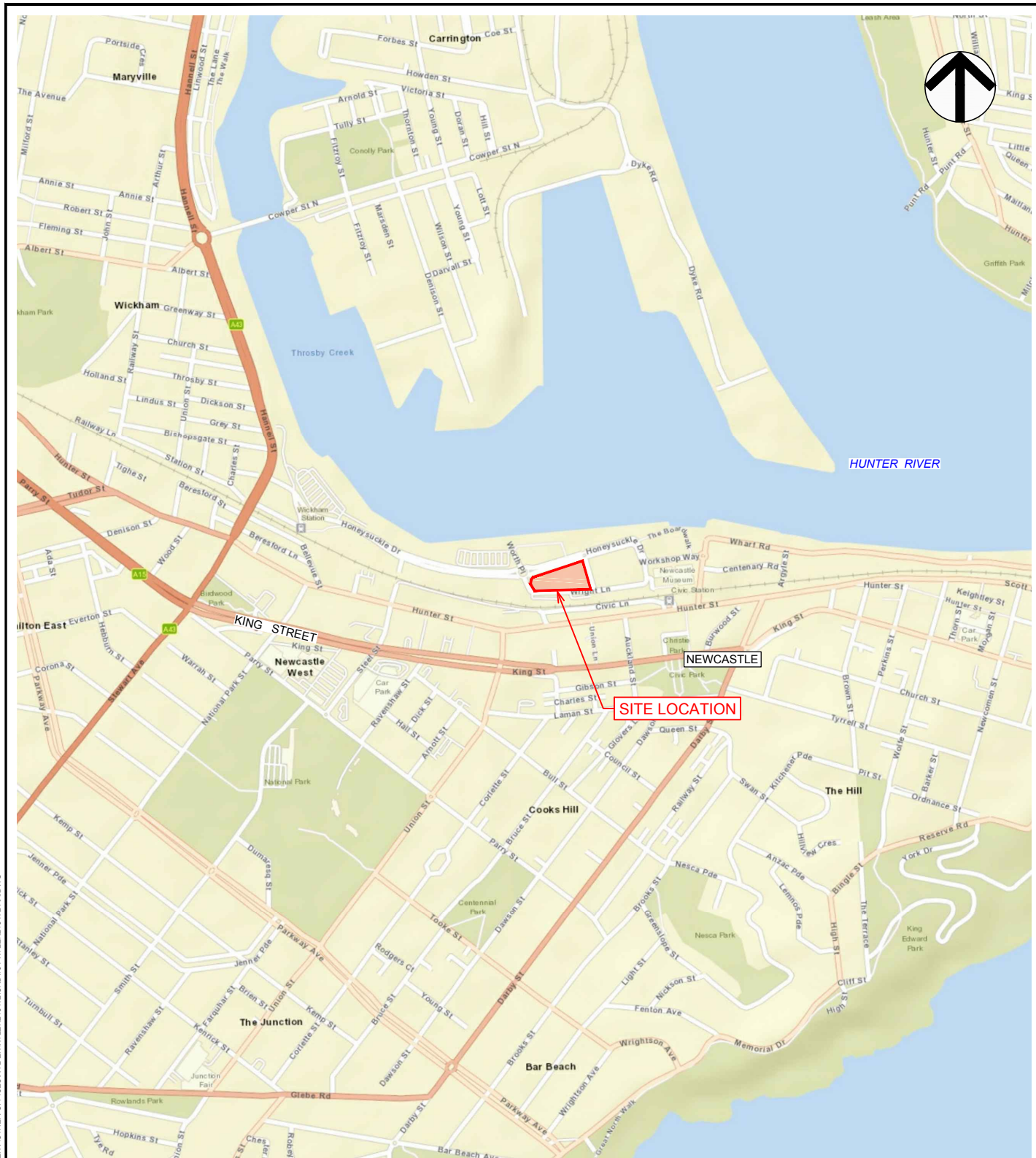
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### **Responsibility**

Environmental reporting relies on interpretation of factual information using professional judgement and opinion and has a level of uncertainty attached to it, which is much less exact than other design disciplines. This has often resulted in claims being lodged against consultants, which are unfounded. As noted earlier, the recommendations and findings set out in this report should only be regarded as interpretive and should not be taken as accurate and complete information about all environmental media at all depths and locations across the site.


## **Appendix A - Figures**





Scale (metres) 1:15000

IMAGERY SOURCE: WORLD STREET MAP  
 SOURCES: ESRI, HERE, GARMIN, USGS, INTERMAP, INCREMENT P, NRCAN, ESRI JAPAN,  
 METI, ESRI CHINA (HONG KONG), ESRI KOREA, ESRI (THAILAND), NGCC, ©  
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drawn	SR / AW	 A TETRA TECH COMPANY	client:	UNIVERSITY OF NEWCASTLE		
approved	-		project:	HONEYSUCKLE CITY CAMPUS DEVELOPMENT 16 HONEYSUCKLE DRIVE, NEWCASTLE, NSW		
date	22 / 01 / 19		title:	SITE LOCATION PLAN		
scale	AS SHOWN		project no:	754-NTLEN213472-AA	figure no:	FIGURE 1
original size	A4				rev:	A





LEGEND

FORMER BOREHOLE LOCATION

BOREHOLE LOCATION

MONITORING WELL LOCATION

SURFACE SOIL SAMPLE LOCATION

revision	no.	description			drawn	approved	date
	A	ORIGINAL ISSUE					

10

0

10

30

50

Scale (metres) 1:1000

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drawn	SR / AW
approved	-
date	23 / 01 / 19
scale	AS SHOWN
original size	A3

coffey

A TETRA TECH COMPANY

client: UNIVERSITY OF NEWCASTLE	
project: HONEYSUCKLE CITY CAMPUS DEVELOPMENT 16 HONEYSUCKLE DRIVE, NEWCASTLE, NSW	
title: BOREHOLE LOCATION PLAN	
project no: 754-NTLEN213472-AA	figure no: FIGURE 2
rev: A	



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