

**Remediation Action Plan** 

Proposed Residential and Aged Care Development 309 King Street Newcastle West

Prepared for Graph Building (NSW) Pty Ltd

Project 81229.07 June 2019



# **Douglas Partners** Geotechnics | Environment | Groundwater

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The undersigned, on behalf of Douglas Partners Pty Ltd, confirm that this document and all attached drawings, logs and test results have been checked and reviewed for errors, omissions and inaccuracies.

	Date
Author Patrick Heads	21 June 2019
Reviewer C. Buynen	21 June 2019



Douglas Partners Pty Ltd ABN 75 053 980 117 www.douglaspartners.com.au 15 Callistemon Close Warabrook NSW 2304 PO Box 324 Hunter Region Mail Centre NSW 2310 Phone (02) 4960 9600 Fax (02) 4960 9601



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 Appendix A:
 About This Report

 Appendix B:
 Drawing 1 – Test Location Plan

 Fender Katsalidis Proposed Development Plans (Ref 17121)

 Drawing DA098

 Drawing DA099

 Drawing DA100

 Drawing DA201



## Remediation Action Plan Proposed Residential and Aged Care Development 309 King Street Newcastle West

## 1. Introduction

#### 1.1 General

This Remediation Action Plan (RAP) outlines the methods and procedures that will be used to remediate the identified localised heavy metal and asbestos-impacted filling at the site of the proposed residential and aged care development to be constructed as a part of the Wests City redevelopment, 309 King Street Newcastle West. The RAP was prepared at the request of Anthony Williams of Graph Building (NSW) Pty Ltd.

The RAP has been developed based on the results of previous assessments undertaken by Douglas Partners Pty Ltd (DP) (Refs 1 and 2), and has been prepared with reference to the NSW EPA 'Guidelines for Consultants Reporting on Contaminated Sites' (Ref 3), and NEPM (2013) (Ref 4).

## 1.2 Objectives

The objective of the RAP is to remediate the site in an acceptable manner, with minimal environmental impact, to a condition suitable for the proposed residential/aged care development.

This RAP provides the clean-up objectives, remediation acceptance criteria (RAC), principles, methods and procedures by which the remediation and validation of the site will be achieved. The action plan is not intended as a specification for contract.

The RAP also provides an outline working plan for the excavation, stockpiling, remediation and management of soil, water and sediment.

## 1.3 Proposed Development

It is understood that the overall development of the site will include:

- Demolition of the existing on-grade car park structure;
- Construction of two towers over 14 levels incorporating residential aged care facility (RACF) and independent living units (ILUs), serviced apartments and residential apartments as well as associated two basement-level parking in the western portion of the site.

This RAP provides remediation procedures for the proposed residential/aged care development. The proposed development is shown on the Fender Katsalidis plans (Ref 17121 Drawings DA098 to DA101, DA 201) in Appendix B.



## 2. Site Details

#### 2.1 Site Identification

The site is known as Part Lot 1 DP 826956 and comprises a trapezoidal shaped area of about  $6,600 \text{ m}^2$  and has a frontage of approximately 105 m to King Street and approximately 137 m to Bull Street. The overall site (Lot 1) is bound by King Street (north), Union Street (east), Ravensworth Street (west) and Bull Street (south), which is shown in Figure 1 below. The site surface comprises existing building and paved surfaces.

Reference to the NSW Contours Hunter and Central Coast LiDAR indicates site levels range from approximately RL 3 m AHD (in the west) to RL 8 m AHD (in the south-east).



Figure 1: Aerial photograph of site with approximate site extent (Source: Nearmap)



## 2.2 Background

#### 2.2.1 Preliminary Site Investigation

DP conducted a Preliminary Site Investigation (PSI) for the site and surrounding lots (Lot 1) in February 2015 (Ref 1). The assessment comprised a review of site history, site walkover and report preparation. On the basis of the desktop review, available site history information and observations made during the site inspection, sources of potential contamination were identified for the site as follows:

- Imported fill materials (TRH, BTEX, PAH, metals, pesticides, hazardous building materials);
- Demolition of structures (hazardous building materials);
- Former Hunter Water works depot, including mechanical works, possible fuel/chemical storage (TRH, BTEX, VOC, metals);
- Former hardware business (possible chemical storage and fuel storage which may be sources of TRH, BTEX, PAH, pesticides, solvents and heavy metals);
- Possible Masonite manufacture (TRH, BTEX, PAH, VOC and heavy metals);
- Glass, wallpaper, oil and colour merchants at the site (TRH, BTEX, PAH, VOC and heavy metals);
- Motor parts and automotive dealers (TRH, BTEX, PAH, VOC and heavy metals); and
- Observations of fibro fragments at the surface (i.e. possible asbestos containing materials).

#### 2.2.2 Targeted Site Investigation (Contamination)

DP conducted a targeted site investigation for contamination across the overall development area (i.e. Lot 1 - residential/aged care development and adjacent proposed car park) in September 2018 (Ref 2). The assessment comprised subsurface investigation, soil sampling, groundwater well installation, groundwater sampling, laboratory testing for a range of contaminants and preparation of a report. The subsurface investigation targeted areas of potential contamination such as the former Hunter Water depot, former mechanics/car sales area and general site filling. The test location plan from the assessment is presented in Appendix B.

The results of the assessment indicated the following:

- General absence of gross petroleum hydrocarbon, PAH, pesticide and PCB impacts;
- Presence of contaminated (likely imported) filling within the site, generally comprising sand with ash and slag components (encountered in Bores 4 and 7). Heavy metal concentrations (copper, lead and zinc) in the filling exceeded the adopted health-based land use criteria. The heavy metal impacted filling generally comprised grey/dark grey gravelly sand filling (ash/slag);
- A moderate propensity for lead to leach from the heavy metal-impacted filling, based on the ASLP leachability testing results;
- Some minor building rubble was encountered in filling across the site. Bonded fibre cement fragments (possible asbestos-containing materials – ACM) were also observed at the site surface during the previous assessment (Ref 1). It is noted that the fragments were located in an area that has subsequently been paved for car parking;



- The majority of soil samples tested are classified as 'General Solid Waste' based on total and leachable (TCLP) concentrations of contaminants, however, some fill samples from Bores 4 and 7 indicated total and/or leachable concentrations above 'General Solid Waste' and 'Restricted Solid Waste' criteria (i.e. 'Hazardous Waste'). The possible depth and extent of impacted soils has not been confirmed;
- The general absence of gross impact in groundwater at the sampled locations;
- Presence of elevated concentrations of heavy metals (namely chromium, copper and zinc) in all groundwater samples. It is noted that previous groundwater testing in the Newcastle area has identified heavy metal impact (i.e. results were considered to be typical of regional groundwater quality); and
- The general absence of elevated concentrations of lead in groundwater.

Based on the results of the investigation, remediation/management was recommended to render the site suitable for the proposed overall development with respect to site contamination, due to the presence of localised heavy metal (copper, lead and zinc) impacted fill, plus previously identified fibre cement sheeting (i.e. possible ACM at the site surface). Remediation options for the site included on-site management of heavy metal and asbestos contamination, or excavation and off-site disposal of contamination.

Given the excavations required for construction of the proposed residential/aged care development (i.e. the proposed two-level basement), off-site disposal of heavy metal and asbestos impacts was considered to be the most likely remediation option for the site. The remediation procedures for this RAP have assumed off-site disposal of impacted soils.

## 3. Soil Remediation Strategy

A range of possible options were considered for the soil remediation strategy. These were:

- No Action;
- On-site management of contaminated soils;
- On-site treatment and re-use;
- Off-site disposal of contaminated material to a licensed landfill.

Each of the possible strategy options will have an associated cost and timing impact that will need to be carefully considered by the client. The client may wish to consider implementing different strategies for different parts of the site.

The following is an overview of each strategy and how DP considers they may be applicable to the contamination identified at the site.

#### No Action

The 'No Action' option involves no active remediation response to the contamination identified on the subject site, and would rely on natural attenuation processes. This option was considered not appropriate as it does not actively address, remediate, alleviate, and/or manage the long and short-term human health and environmental risk of the contamination already identified on-site.



#### **On-Site Management of Contaminated Soils**

On-site management of contaminated soils involves placement/retention of the contaminated soils within the site area such that the proposed development is constructed over the contaminated soils, minimising the potential for access to the contaminated soils. The management of contaminated soils at the site requires the preparation and implementation of a long-term Environmental Management Plan (EMP) at the site, which outlines the procedures used to render the site suitable for the proposed development. The EMP also provides the procedures for managing contaminated soils should access to the soils be required following construction. On-site management of contaminated materials also requires that a notice be on the Section 10.7 Planning Certificate.

On-site management of contaminated soils was not considered to be the most appropriate remediation strategy for the proposed development due to the proposed bulk excavation of soils required for the construction of the proposed two-level basement.

If however the client wishes to further assess on-site management through identification of specific areas which may be able to be retained (and not requiring excavation), then DP could prepare a specific RAP for this proposal.

#### **On-Site Treatment of Contaminated Soils**

On-site treatment of contaminated soils involves a physical or chemical process that would allow retention of remediated soils on site for beneficial re-use, or retention of contaminated soils combined with on-site management of soils.

On-site treatment of the identified heavy metal contaminated soils is not likely to be viable due to the localised and/or sporadic nature of the contamination.

On-site treatment of asbestos impacted soils could be considered and may be technically feasible. Onsite treatment of asbestos impacted soil is dependent on successful removal of asbestos containing materials (i.e. bonded asbestos) from within the soil / fill matrix to acceptable levels for the proposed landuse. Additional testing of the asbestos impacted soils would be recommended to further assess the requirements for remediation and the likelihood of successful remediation outcomes. The sporadic nature of the contamination could render the treatment for asbestos as not practical or economical.

#### Off-Site Disposal of Contaminated Material to a Licensed Landfill

Off-site disposal of heavy metal and asbestos impacted soils is proposed as the preferred remediation strategy as it is expected to render the site suitable for the proposed development with minimal long term restrictions placed on the subject site. A large proportion of the impacted soils are to be excavated for construction.

#### 4. Scope of Work

The objective of the RAP is to provide procedures to remediate the site in an acceptable manner, with minimal environmental impact, to a condition suitable for the proposed residential/aged care development.

The following general remediation procedure provides for off-site disposal of contaminated material.

The proposed remediation procedure comprises the following elements:



- Inception meeting with the project manager and remediation contractor to discuss remediation requirements;
- Additional inspection / assessment within areas of filling identified in the targeted assessment (Ref 2) and in areas of former structures to assess for further sources of contamination including possible asbestos containing materials and heavy metal impact (this will require excavating test pits);
- Removal/segregation and off-site disposal of heavy metal and asbestos contaminated materials by an appropriately licensed contractor, following waste classification and clearance / validation by a suitably qualified consultant;
- Preparation of a soil stockpiling area for temporary storage to allow waste classification for off-site disposal;
- Visual inspection and stripping of contaminated material where identified within the site (i.e. contaminated filling, additional areas of asbestos etc.);
- Collection of validation samples in the above areas to confirm the removal of contaminated materials;
- Classification of contaminated soils for off-site disposal;
- Classification of imported materials for on-site use (if required);
- Inclusion of the results of remediation in the validation report for the site.

## 5. Remediation Goals and Acceptance Criteria

#### 5.1 Introduction

The proposed Remediation Acceptance Criteria (RAC) for soils remaining on-site with respect to the proposed landuse and identified contaminants are provided in Table 1 and 2 below. On the basis of the findings of the investigation, the general contaminants of concern are heavy metals and ACM within soil. It is considered that the validation analysis should focus on the identified areas of concern and their associated contaminants. In order to provide for contingency situations, however, RAC are also established for other contaminants. This should, however, only be used as and when required (i.e. if signs of such contaminants are observed, suspected or found). It is noted that the ground floor of the development comprises commercial/retail landuse, with upper floors comprising residential landuse with minimal access to soil. On this basis, the RAC for commercial landuse has been adopted for site remediation.

## 5.2 Health-based Investigation/Screening Levels

The analytical results from validation testing will be assessed against the following as provided in Schedule B1 of the National Environment Protection Council (NEPC) National Environment Protection (Assessment of Site Contamination) Measure 1999 (amended 2013) (Ref 4):

- Health-based investigation levels (heavy metals, PAH, pesticides, PCB);
- Health-based screening levels and management limits (petroleum hydrocarbons);
- Health screening levels for asbestos in soil.



Although the investigation levels are not intended to be used as clean up levels, they establish concentrations above which further appropriate investigation (e.g. Tier 2) should be undertaken. If the concentrations of contaminants in the remaining soils (i.e. following remediation) are within the investigation levels, it is considered that the site would be suitable for the intended landuse.

	Analyte	HIL D (mg/kg)
Heavy Metals	Arsenic	3000
	Cadmium	900
	Chromium (VI)	3600
	Copper	240000
	Lead	1500
	Manganese	60000
	Mercury (inorganic)	730
	Nickel	6000
	Zinc	400000
PAH	Benzo(a)pyrene TEQ <sup>(1)</sup>	40
	Total PAH	4000
OCP/ OPP	Aldrin + Dieldrin	45
	Chlordane	530
	DDT+DDE+DDD	3600
	Endosulfan	2000
	Endrin	100
	Heptachlor	50
	Methoxychlor	2500
	Chlorpyrifos	2000
PCBs <sup>(2)</sup>		7

Table 1:	Remediation Action Criteria – Metals, PAH, Pesticides, P	СВ
	(HIL D – Commercial / Industrial)	

Notes to Table 1:

(1) Sum of carcinogenic PAHs

(2) Non dioxin-like PCBs only



#### Table 2: Soil Health Screening Levels (HSLs) for Vapour Intrusion (HSL-D Commercial/Industrial) – Petroleum Hydrocarbons

Analyte		HSL	D – Sand (m	Intrusive	
		0 to 1 m	1 to 2 m	2 to 4 m	Maintenance Worker 0 to 2 m (mg/kg)
TRH	$C_6 - C_{10}$ (less BTEX) [F1]	260	370	630	NL
	>C <sub>10</sub> -C <sub>16</sub> (less Naphthalene) [F2]	NL	NL	NL	NL
BTE	Benzene	3	3	3	77
Х	Toluene	NL	NL	NL	NL
	Ethyl Benzene	NL	NL	NL	NL
	Xylene	230	NL	NL	NL
PAH	Naphthalene	NL	NL	NL	NL

Notes to Table 2:

NL -The solubility limit is defined as the groundwater concentration at which the water cannot dissolve any more of an individual chemical based on a petroleum mixture. The soil vapour which is in equilibrium with the groundwater will be at its maximum. If the derived groundwater HSL exceeds the water solubility limit, a soil-vapour source concentration for a petroleum mixture could not exceed a level that would result in the maximum allowable vapour risk for a given scenario. For these scenarios no HSL is presented for these chemicals. These are denoted as not limiting 'NL'.

Analyte		Management Limit (Coarse materials) mg/kg		
TRH	$C_6 - C_{10}$ (F1)	700		
	>C <sub>10</sub> -C <sub>16</sub> (F2)	1,000		
	>C <sub>16</sub> -C <sub>34</sub> (F3)	3,500		
	>C <sub>34</sub> -C <sub>40</sub> (F4)	10,000		

Notes to 3:

Separate management limits for BTEX and naphthalene are not available hence these should not be subtracted from the relevant fractions to obtain F1 and F2.

Table 4:	Soil Health	Screening	Levels for	Asbestos	in	Soil
	oon neutri	oorconing		A3863103		0011

Form of Asbestos	Commercial/Industrial D (w/w)
Bonded ACM	0.05%
FA and AF (all landuses)	0.001%
All forms	No visible asbestos for surface soil



## 5.3 Ecological Investigation/Screening Levels

Use of Ecological Investigation/Screening Levels (EIL/ESL) as part of remediation action criteria is not considered to be relevant for the proposed car park development due to the following:

- The fill materials present across the site are likely to be typical of the fill conditions across the broader Newcastle area;
- The site will be capped with concrete slabs and pavements. Localised landscape areas will comprise raised garden beds with 'clean' imported soils;
- The site is not considered to comprise an area of ecological significance due to the former landuse and filling conducted; and
- The site is extensively covered by pavements and as such would have limited environmental value related to terrestrial ecosystems.

#### 5.4 General

In addition to the above analytical criteria, the soil should be assessed based on the basis of aesthetic considerations. The soil should be free from odours and deleterious materials. Odour will be assessed on the basis of olfactory observations made by the environmental consultant.

Conformance with the RAC (for soils remaining on site) will be attained when either all validation samples meet the specified RAC, or, as a minimum for chemical contamination, the 95% UCL mean concentration value of each contaminant in the materials remaining on-site (validation samples) are below the respective RAC level, and no individual exceedance is greater than 2.5 times the RAC.

Materials proposed to be excavated and removed from the site for beneficial re-use should be assessed against the relevant resource recovery exemptions and orders (RRE and RRO).

In addition to the above, imported fill used to reinstate site excavations or raise site levels (if required) should be classified as Virgin Excavated Natural Material (VENM), Excavated Natural material (ENM) or meet the requirements of a relevant resource recovery order and should be accompanied by a certificate from the supplier, otherwise detailed assessment (including analysis of representative samples) will be required prior to use on-site.

Landfill disposal criteria for contaminants, in accordance with NSW EPA Waste Classification Guidelines (Ref 5), are presented in Tables 5 and 6 below. In addition, asbestos contaminated soil / fill will require disposal to a licensed landfill and be declared to contain asbestos for appropriate disposal.



#### Table 5: Landfill Disposal Criteria – Total Concentrations

CONTAMINANT THRESHOLD VALUES FOR CLASSIFYING WASTE BY CHEMICAL ASSESSMENT WITHOUT DOING THE LEACHING TEST <sup>(1)</sup>							
	Maximum V <i>Concentration</i> <u>witho</u>	CAS Registry					
Containinant	General Solid Waste CT1 (mg/kg)	Seneral Solid Waste CT1 (mg/kg) Restricted Solid Waste CT2 (mg/kg)					
Benzene	10	40	71-43-2				
Toluene	288	1152	108-88-3				
Ethyl Benzene	600	2400	100-41-4				
Xylenes (total)	1000	4000	1330-20-7				
C <sub>6</sub> -C <sub>9</sub> petroleum hydrocarbons	650	2600	-				
C <sub>10</sub> -C <sub>36</sub> petroleum hydrocarbons	10,000	40,000	-				
Lead	100	400	-				
Arsenic	100	400	-				
Cadmium	20	80	-				
Chromium (total)	100	400	-				
Mercury	4	16	-				
Nickel	40	160	-				
Polycyclic Aromatic Hydrocarbons (total)	N/A	N/A	-				
Benzo(a)pyrene	0.8	3.2	50-32-8				

Notes to Table 5:

(1) Adopted from Table 1 – Ref 5

N/A – Not Applicable (refer to Table 6)



LEACHABLE CONCENTRATION (TCLP) AND TOTAL CONCENTRATION (SCC) FOR CLASSIFYING WASTE BY CHEMICAL ASSESSMENT <sup>(1)</sup>							
	Maximum Values for <i>Leachable Concentration</i> and Total Concentration when used <u>together</u>						
	General S	olid Waste	Restricted	CAS			
Contaminant	Leachable Concentration TCLP1 (mg/L)	Total Concentration SCC1 (mg/kg)	Leachable Concentration TCLP2 (mg/L)	Total Concentration SCC2 (mg/kg)	Registry Number		
Benzene	0.5	18	2	72	71-43-2		
Toluene	14.4	518	57.6	2073	108-88-3		
Ethyl Benzene	30	1080	120	4320	100-41-4		
Xylenes (total)	50	1800	200	7200	1330-20-7		
C6-C9 petroleum hydrocarbons <sup>(2)</sup> N/A <sup>(2)</sup>		650	N/A <sup>(2)</sup>	2600	-		
C10-C36 petroleum N/A <sup>(2)</sup> hydrocarbons <sup>(2)</sup>		10000	N/A <sup>(2)</sup>	40000	-		
Lead	Lead 5 1500		20	6000	-		
Arsenic	5	500	20	2000	-		
Cadmium	1	100	4	400	-		
Chromium (total)	5	1900	20	7600	-		
Mercury	0.2	50	0.8	200	-		
Nickel	2	1050	8	4200	-		
Polycyclic Aromatic Hydrocarbons (total)	N/A	200	N/A	800	-		
Benzo(a)pyrene	0.04	10	0.16	23	50-32-8		

#### Table 6: Landfill Disposal Criteria – Leachable and Total Concentrations

Notes to Table 6:

(1) Adopted from Table 2 – Ref 5

(2) Petroleum hydrocarbons are assessed only by total concentration (SCC1 or SCC2)

N/A - Not applicable



## 6. Remediation

#### 6.1 Remediation Roles and Responsibilities

In order to achieve the goals of the remediation/earthworks programme, the roles and tasks identified for the contractor and consultants are presented in Table 5 below.

Table 5:	Remediation	Roles	and R	esponsibilities	s
					-

	Task	Description	Responsibility		
1.	Preliminaries				
(i)	Engage Remediation Contractor		Project Manager		
(ii)	Friable/non-friable Assessment	Asbestos consultant to determine whether asbestos contamination is friable or non-friable for the purposes of the WorkCover notification	Asbestos consultant		
(iii)	WorkCover Notification	Submission of 'Notification of Asbestos Removal Work' to NSW WorkCover	Remediation Contractor		
(iv)	Inception Meeting	Meeting between relevant parties (project manager, remediation contractor, consultant) to discuss tasks and responsibilities	Project Manager		
(v)	Preparation of Safety and Environmental Management Plans		Remediation Contractor		
(vi)	Site Inductions	Safety and environmental induction for all site workers	Remediation Contractor		
(vii)	Set up environmental control measures		Remediation Contractor		
2.	Remediation of Identified Impa	acts			
(i)	Mark out areas of identified contamination		DP		
(ii)	Additional investigation in fill areas	Further assessment of the extent of subsurface contamination	DP		
(iii)	Set up of air monitoring for asbestos remediation (if required)		Asbestos consultant		
(iv)	Set up stockpile/sorting areas	Preparation of stockpiling/sorting areas for remediation and/or temporary storage of contaminated materials	Remediation Contractor		
(v)	Remediation of near-surface impacts	Removal / segregation and off-site disposal of contaminated near-surface soil/fill material, under appropriate licence, in accordance with relevant statutory and regulatory requirements	Remediation Contractor		
(vi)	Handling of fill materials	Excavations, stockpiles, segregation, placement, compaction, and disposal of unsuitable fill materials	Remediation Contractor		
(vii)	On-site remediation of asbestos	Sorting, picking and handling of asbestos impacted	Remediation		
	impacted soils (if required)	soils	Contractor		
(viii)	Inspection of remediation works	Full time inspection associated with excavation, segregation and disposal of heavy metal and asbestos contaminated soils	DP		



	Task	Description	Responsibility
(ix)	Validation of remediated areas	Inspection and testing of remediated areas to validate the removal of contamination	DP
(x)	Classification of soils for off-site disposal	Contamination sampling and testing for waste classification for disposal of soils to a licensed landfill	DP
(xi)	Disposal of contaminated materials	Disposal of soils/materials to an appropriately licensed landfill	Remediation Contractor
(xii)	Classification of imported fill materials (if required)	Review of documentation, or assessment of materials via inspection and testing to confirm VENM or ENM status	DP/remediation contractor
3.	Reporting		
(i)	Submit tip dockets and tracking information for reporting purposes		Remediation Contractor
(ii)	Preparation of a validation report		DP

Prior to the commencement of remediation works, a site meeting between the project manager remediation contractor and DP should be held to confirm the above responsibilities and procedures in accordance with this remediation action plan.

Details of remediation methodologies are presented in the following sections.

## 6.2 Remediation of Asbestos Affected Soils

## 6.2.1 Methodology

The proposed remediation strategy is to identify and remove localised asbestos contamination from the surface, and within underlying filling (if present).

The following general procedures are suggested for the remediation and validation of asbestosimpacted soils prior to commencement of bulk earthworks and construction of the proposed car park:

- DP to identify and peg locations identified to contain asbestos fragments (ACM);
- Contractor to progressively excavate soils from affected areas under full-time inspection by DP;
- Contaminated material will be excavated/chased until visual evidence suggests the absence of such materials;
- DP to collect stockpile soil samples for waste classification purposes;
- Licensed contractor to load classified materials directly into appropriate trucks for transport and disposal to a licensed facility (Note: waste classification is required prior to off-site disposal), or material to be appropriately stockpiled to allow classification prior to removal;
- DP to inspect, observe and advise on the excavation/segregation of soils containing asbestos;
- DP to validate excavated area as discussed in Section 6.2.4.



Due to the variable nature of fill materials within the site, the presence of further ACM within the site cannot be precluded. Any excavation should therefore be conducted with reference to the unexpected finds protocol in Section 11. If further asbestos impacts are identified, they should be remediated with reference to the procedures in this RAP.

#### 6.2.2 Waste Classification of Affected Soils

Segregated asbestos-impacted stockpiles containing potentially contaminated materials must be classified with reference to the NSW EPA Waste Classification Guidelines (Ref 5) for disposal purposes.

For samples not classified as part of the targeted site investigation (Ref 2), representative samples will be collected from the asbestos-impacted segregated fill stockpiles, and analysed for the potential chemical contaminants as discussed in Section 2.2. The frequency of samples will depend on the size and composition/characteristics of the stockpile. A minimum frequency of one sample per 25 m<sup>3</sup> should be initially considered.

The results of analysis and disposal options will be reported in a brief waste classification report to be prepared by DP.

## 6.2.3 Provision for Stockpiling of Asbestos-Affected Soils

The following procedure is recommended for stockpiling of segregated asbestos impacted materials (if required):

- DP to nominate designated stockpile area in consultation with the contractor;
- The proposed stockpile area should be inspected to confirm the absence of deleterious or potentially contaminated materials at the surface prior to the placement of materials;
- Stockpile areas should be demarcated by the remediation contractor (i.e. fence/pickets and hazard tape) to prevent access, and clearly delineate the stockpiles;
- Stockpiles that are observed to contain or potentially contain asbestos materials should be lightly conditioned by sprinkler and covered by plastic or similar to prevent dust blow (undertaken by the remediation contractor refer to Section 10.5);
- Measures should be taken by the remediation contractor to prevent the migration of stockpile materials (i.e. perimeter bunds, hay bales, silt fences, etc.);
- A record of stockpile locations, dimensions, descriptions, environmental controls, etc. should be maintained by the contractor.

Excavation, handling, transport etc. of asbestos-impacted materials should be undertaken by the licensed contractor with reference to the appropriate regulatory guidelines. The contractor should provide proposed containment and protection measures as part of a site Environmental Management Plan (see Section 10).



## 6.2.4 Validation of Excavations/Stripped Surfaces

The following procedure is recommended for the validation of identified localised areas of asbestos contamination following stripping/removal:

- The stripped surface should be inspected by DP to confirm the absence of visible asbestos materials;
- Validation samples for asbestos testing will be collected by DP as follows:
  - o From a systematic grid (with a minimum density of 10 m by 10 m) over the stripped surface, with a minimum of two samples per stripped area;
  - o A higher frequency of testing may be adopted by DP, subject to the abundance of bonded asbestos materials observed;
  - o Asbestos analysis will be conducted by a NATA registered laboratory on samples collected to validate the removal of materials containing asbestos fragments.
- Validation samples are to be collected beneath former contaminated soil stockpile areas following soil removal.

The above analysis will be utilised to confirm the absence of asbestos in the materials tested. Based on site observations, asbestos materials are generally likely to be present within near surface materials, however, the presence of further asbestos in filling across the site cannot be ruled out.

If validation results exceed the RAC, further removal (additional stripping/excavation) will be required, followed by additional validation sampling and analysis, until the RAC is met. It is noted that at least seven working days are required for standard turnaround laboratory analysis.

It is noted that the RAC relates to soils remaining on the site. If off-site re-use of the underlying soils is required, the validation results should meet the requirements of the relevant RRO.

## 6.2.5 Loading and Transport of Contaminated Materials

Transport of contaminated material off the site should be via a clearly demarcated haul route and this route exclusively should be used for entry and egress of vehicles used to haul identified contaminated materials within and away from the site.

Removal of waste materials from the site should only be carried out by a licensed contractor holding appropriate licences, consents and approvals from NSW EPA and/or other Authorities to transport and dispose the waste materials according to the classification guidelines (Ref 5).

Details of all contaminated materials removed from the site should be documented by the contractor with copies of weighbridge slips, trip tickets and consignment disposal confirmation (where appropriate). Such information should be provided to DP for reporting purposes. A site log/tracking sheets should be maintained by the remediation contractor for stockpiles (numbered locations), to enable the tracking of disposed loads against on-site origin and location of the materials and corresponding (validation) sample numbers.



Measures should be implemented to minimise the potential for contaminated material to be spilled onto public roadways or tracked off-site on vehicle wheels. Such measures could include the deployment of a vehicle washing/cleaning facility, which should be placed at a location before the egress point of the site. The facility should be able to handle all vehicles and plant operating on site (if required). Residue from the cleaning facility will be deemed contaminated unless shown by validation to be below RAC criteria.

The proposed waste transport route should be notified to the local Council and truck dispatch should be logged and recorded by the contractor for each load leaving the site. The waste tracking procedure should be confirmed by DP.

## 6.3 Remediation of Heavy Metal Impacted Soils

#### 6.3.1 Methodology

Based on the results of laboratory testing, there was one location (Bore 4/0.4) containing elevated concentrations of heavy metals (copper, zinc and lead) above the adopted criteria for the residential development/aged care development, with a further slightly elevated concentration of lead in Bore 7/0.5. It is noted that lead concentrations encountered in Bore 4 also exceeded commercial landuse criteria. The proposed remediation strategy is to remove the localised affected filling and dispose to a licensed landfill. The heavy-metal impacted filling generally comprised grey/dark grey sandy gravel (ash and slag) filling.

The following general procedures are recommended for the remediation and validation of heavy metalaffected soils:

- DP to identify and peg locations identified to contain heavy metal contamination;
- Contractor to progressively excavate affected soils from affected areas under full-time inspection by DP;
- Contaminated material will be excavated/chased from until visual evidence indicates the absence of such materials;
- DP to validate excavated areas as discussed in Section 6.3.3;
- Contractor to dispose of the excavated soils to an appropriately licensed landfill, following waste classification of the soils.

Procedures for stockpiling of excavated soil/fill materials are discussed in Section 6.3.2 below.

Due to the variable nature of fill materials within the site, the presence of further heavy-metal impacted soils within the site cannot be precluded. Any excavation should therefore be conducted with reference to the unexpected finds protocol in Section 11. If further heavy metal impacts are identified, they should be remediated with reference to the procedures in this RAP.

#### 6.3.2 Stockpiling of Heavy Metal Contaminated Soils

Heavy metal contaminated soil should be placed on site in a specified area, prepared by the contractor as follows:



- Nominate stockpile area on-site, away from the possible excavation of contaminated soil, and as far as practicable from adjacent residences or other sensitive landuses (e.g. residences, schools);
- Provision should be made to allow for expansion of the stockpile area should this be required during the course of the works;
- Block any drainage pits (if present) within the stockpile area to minimise the risk of leachate from contaminated soil entering the stormwater system;
- Surround the stockpile with erosion/sediment control measures (e.g. silt fence, clean soil bund or similar);
- Barricade the perimeter of the stockpiled material.

## 6.3.3 Validation of Excavations/Stripped Surfaces

The following procedure is recommended for validation of identified areas of heavy metal contaminated soils following stripping / removal:

- The stripped surface should be inspected by DP to confirm the visual absence of potentially contaminated filling/soils;
- Validation samples for chemical testing will be collected by DP at a sampling density of at least a 10 m x 10 m grid over the stripped area;
- Chemical analysis will be conducted by DP at a NATA registered laboratory on samples collected to validate the removal of materials containing heavy metal contamination;
- Validation samples should also be collected on former temporary stockpile areas following removal of soils.

The above analysis will be utilised to compare contaminant levels to the RAC in the validated areas.

If validation results exceed the RAC, further removal (additional scraping/excavation) will be required, followed by additional validation sampling and analysis, until the RAC are met. Note that at least seven working days are required for laboratory analysis. Excavation of contaminated material will be limited to the extent of site boundaries.

It is noted that the RAC relates to soils remaining on the site. If off-site re-use of the underlying soils is required, the validation results should meet the requirements of the relevant RRO.

## 6.3.4 Fill Stockpile Classification and Disposal/Re-use Options

Segregated fill stockpiles containing potentially contaminated materials should be classified in accordance with the NSW EPA Waste Classification Guidelines (Ref 5) for disposal purposes.

In the event that soils will be disposed off-site, representative samples should be collected by DP from the segregated fill stockpiles, and analysed for the potential chemical contaminants as discussed in Section 7.3. The frequency of samples will depend on the size and composition/characteristics of the stockpile. A minimum frequency of one sample per 25 m<sup>3</sup> should be initially considered.

The results of analysis will be utilised to confirm options for off-site disposal, or re-use at the site, as follows:



- Satisfies RAC:
  - o Re-use on site, subject to geotechnical suitability as engineered fill;
  - o Dispose off-site to a licensed landfill.
- Satisfies RAC and off-site re-use criteria:
  - o Re-use on site, subject to geotechnical suitability as engineered fill;
  - o Dispose off-site to a licensed landfill;
  - o Re-use off-site, subject to geotechnical suitability and classification as VENM or ENM or a relevant RRO.
- Exceeds RAC but satisfies landfill disposal guidelines (Ref 5):
  - o Dispose off-site to a licensed landfill.
- Exceeds RAC and exceeds landfill disposal guidelines:
  - o Develop on-site remediation strategy and continue until guidelines are satisfied;
  - o Carry out appropriate immobilisation for off-site disposal to licensed landfill (subject to regulatory approvals).

Any materials proposed to be re-used on another site should be appropriately segregated and assessed against the relevant RRO/RRE. It is noted that the acceptance criteria for classification and VENM/ENM or a relevant RRO may be lower than the RAC for materials to remain on the site. Additional stripping and validation may therefore be required to meet the relevant RRO for off-site re-use of soils.

## 6.3.5 Loading and Transport of Contaminated Materials

The procedures for the loading and transport of contaminated material are as detailed in Section 6.2.5 for asbestos affected material.

## 7. Sample Collection and Analysis

#### 7.1 Sample Collection and Handling

Sampling will be directly from the exposed surface of excavation, or, in the case of stockpiles, from various depths between the surface and the base. Sampling data should be recorded to comply with routine Chain of Custody requirements.

The general sampling, handling, transport and tracking procedures comprises:

- The use of stainless steel sampling equipment;
- The use of disposable gloves for each sampling event;
- washing of all sampling equipment in contact with the sample, in a 3% solution of phosphate free detergent (Decon 90) then rinsing with distilled water prior to each sample being collected;
- Transfer of the sample immediately into new glass jars;



- Collection of 10% replicate samples for QA/QC purposes;
- Collection of replicate soil samples in zip-lock plastic bags for PID screening;
- Labelling of the sample containers with individual and unique identification including Project Number and Sample Number;
- Placement of the containers into a chilled, enclosed and secure container for transport to the laboratory; and
- Use of chain of custody documentation so that sample tracking and custody can be crosschecked at any point in the transfer of samples from the field to hand-over to the laboratory.

#### 7.2 Sample Holding Times

Maximum sample holding times are as follows:

- Metals 6 months (if required);
- TRH/BTEX 7 days;
- PAH 14 days;
- Asbestos no maximum holding time.

All samples must be collected in appropriate containers, and stored and transported at 4°C.

## 7.3 Validation Sample Analysis

#### 7.3.1 Asbestos Contaminated Near Surface Soils

Validation samples for excavated/stripped near surface asbestos impacted soils should be analysed for asbestos.

Samples for waste classification of asbestos-impacted soils for off-site disposal purposes should be analysed for the following:

- Total Recoverable hydrocarbons (TRH);
- Benzene, Toluene, Ethylbenzene and Xylene (BTEX);
- Polycyclic Aromatic Hydrocarbons (PAHs);
- Polychlorinated Biphenyls;
- Heavy Metals (Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Nickel and Zinc).

Soils proposed to be re-used off site should be analysed in accordance with the relevant RRO.

#### 7.3.2 Heavy Metal Impacted Soils

Analysis for validation of heavy metal impacted soils should include Arsenic (As), Cadmium (Cd), Copper (Cu), Lead (Pb), Mercury (Hg), Nickel (Ni) and Zinc (Zn).



Samples for waste Classification of heavy metal impacted soils should be analysed for TRH, BTEX, PAH, PCB, and metals.

The analytical programme will be reviewed following excavation, segregation and sampling. Leachability (TCLP) analysis may be required for stockpile samples if total contaminant levels are found to exceed 'General Solid Waste' Criteria.

Soils proposed to be re-used off site should be analysed in accordance with the relevant RRO.

#### 7.3.3 Imported Fill

Any materials which are imported onto the site (e.g. to backfill excavations) should be classified as Virgin Excavated Natural Materials (VENM), Excavated Natural Material (ENM) or classified under an appropriate resource recovery order, and an appropriate report must be made available to the environmental consultant prior to the importation of the material.

In the absence of confirming the source and suitability of imported fill for use on site, the VENM or ENM material should be assessed with reference to the Excavated Natural Material Order 2014 (Ref 6) and analysed for the following:

- Total Recoverable hydrocarbons (TRH);
- Benzene, Toluene, Ethylbenzene and Xylene (BTEX);
- Polycyclic Aromatic Hydrocarbons (PAHs);
- Organochlorine pesticides (OCP);
- Polychlorinated Biphenyls (PCB);
- Heavy Metals (Arsenic, Cadmium, Chromium, Copper, Lead, Nickel, Mercury, and Zinc);
- pH, Electrical Conductivity; and
- Foreign Materials (Rubber, plastic, bitumen, paper, cloth, paint and wood (NSW RTA Test Method T276)).

## 8. Quality Assurance Plan

#### 8.1 Field QA

Sampling accuracy and precision should be maintained through the analysis of 10% field duplicate / replicate samples.

Appropriate sampling procedures should be undertaken to minimise potential for cross contamination, for example:

- Standard operating procedures are followed;
- Site safety plans are developed prior to commencement of works;
- Replicate field samples are collected and analysed;
- Samples are stored under secure, temperature controlled conditions;



• Chain of custody documentation is employed for the handling, transport and delivery of samples to the selected laboratory.

## 8.2 Laboratory Quality Assurance and Quality Control

DP's preferred laboratory routinely undertakes in-house QA/QC procedures involving the routine testing of:

- Reagent blanks;
- Spike recovery analysis;
- Laboratory duplicate analysis;
- Analysis of control standards;
- Calibration standards and blanks;
- Statistical analysis of QC data.

#### 8.3 Achievement of Data Quality Indicators

Based on the analysis of quality control samples i.e. duplicates/replicates and in-house laboratory QA/QC procedures, the following data quality indicators will be required to be achieved:

- Conformance with specified holding times;
- Accuracy of spiked samples within the laboratory's acceptable range (typically 70% to 130% for inorganic contaminants and greater for some organic contaminants);
- Field and laboratory duplicates and replicates samples will have a precision average of +/- 50% relative percent difference (RPD). Elevated RPDs may be present due to heterogeneity of materials; and
- Field duplicates/replicates will be collected at a frequency of 10% of all samples.

Based on a fulfilment of the data quality indicators, an assessment of the overall data quality will be presented in the final validation report.

#### 8.4 Validation Reporting

A validation report will be prepared by DP with reference to the NSW EPA Contaminated Sites Guidelines for Consultants Reporting on Contaminated Sites (Ref 3) and other appropriate guidance documentation, and be submitted to the client at the completion of the remediation works programme.

The validation report should include details of the total volume of contaminated materials removed from site, indicate the final disposal destination of the materials removed from site, present detailed analytical results, and provide comment on the suitability of the site for residential/aged care landuse following remediation.

Details of any soils removed from the site for beneficial reuse should also be included in the validation report.



## 9. Work Health and Safety

#### 9.1 Introduction

All site work must be undertaken in a controlled and safe manner with due regard to potential hazards, training and safe work practices. The work should comply with WHS policies specified by the relevant authorities. It is recommended that the contractor prepare a project-specific environmental management and WHS plan to supplement the measures presented in this RAP.

#### 9.2 Personnel and Responsibilities

Before undertaking works on site, all personnel will be advised of the officer responsible for implementing health and safety procedures. All personnel should read and understand the Occupational Health and Safety Plan prior to commencing site works. Contractors employed at the site will be responsible for ensuring that their employees are aware of, and comply with the requirements of the safety plan.

The contractor is responsible for all on-site activities including handling of fill materials – excavation, stockpiling, segregation, placement of fill, etc.

#### 9.3 Hazards at the Site

#### 9.3.1 Chemical Hazards

Chemical compounds or substances that may be present on site include heavy metals and asbestos.

The possible risks to site personnel associated with the above analytes include:

- Ingestion of contaminated soil or water;
- Dermal contact with contaminated soil or water;
- Inhalation of dusts or aerosols containing contaminants.

#### 9.3.2 Physical Hazards

Potential hazards associated with the works may include but not limited to the following:

- Heat exposure;
- Excavations;
- Buried services;
- Noise;
- Dust;
- Electrical equipment;
- Heavy equipment and truck operation.



#### 9.4 Safe Work Practices

Personnel will endeavour, wherever possible, to avoid direct contact with potentially contaminated material. Surface or groundwater should not be ingested or swallowed, and direct skin contact with soil and water should be avoided.

Subject to the site controller's requirements, all personnel on site will be required to wear the following protection at all times:

- Steel-capped boots and high visibility clothing;
- Safety glasses or safety goggles with side shields meeting AS 1337 requirements (as necessary);
- Hard hat meeting AS 1801 requirements;
- Hearing protection meeting AS 1270 requirements when working around machinery or plant equipment if noise levels exceed exposure standards.

#### 9.5 Asbestos

In the event that personnel are required to work in areas of potential contact with asbestos containing materials, the following additional protection will be required:

- Disposable coveralls to prevent contact with asbestos materials;
- Particulate respirator (Class P2) or equivalent.

Excavation, handling, stockpiling, transport etc. of materials containing asbestos should be undertaken by a licensed contractor in accordance with relevant regulatory requirements.

#### 9.6 Emergency Response Plan

An essential component of the WHS Plan will involve development of an Emergency Response Plan for all aspects of site works. This will include provisions for the safety of personnel working on site in the event of an emergency situation. Any emergency will be reported immediately to the site office and/or the Site Safety Officer, and the appropriate emergency assistance should be sought by telephoning 000.

The works contractor will be responsible for ensuring that site personnel are aware of the emergency services available and appropriate contact details. A Site Safety Officer must be available on-site during remediation works.

## 10. Environmental Management Plan

#### **10.1** Introduction

The contractor should undertake the work with due regard to the minimisation of environmental effects and to meet regulatory and statutory requirements.



The contractor should have in place a Construction Environmental Management Plan (CEMP) so that work on the site complies with, but not limited to, the requirements of the following legislation:

- Protection of the Environment Operations Act;
- Contaminated Land Management Act;
- Dangerous Goods Act;
- Construction Safety Act;
- Work Health and Safety Act (SafeWork NSW);
- Council Development Approval Conditions.

The contractor should also be responsible that the site works comply with the following conditions:

- Wastes generated at the site are disposed in an appropriate manner;
- Fugitive dust leaving the confines of the site is minimised;
- No water containing any suspended matter or contaminants leaves the site in a manner which could pollute the environment;
- Vehicles should be cleaned and secured so that no mud, soil or water are deposited on any public roadways or adjacent areas;
- Noise and vibration levels at the site boundaries comply with the legislative requirements.

In order to achieve a minimisation of environmental effects, the following measures are recommended, and should be adopted by the appointed contractor.

#### **10.2 Traffic Management**

All vehicular traffic should use only routes approved by Council, to and from the selected landfill where off-site disposal is undertaken. All loads should be tarpaulin covered and lightly wetted to minimise the potential for materials or dust are dropped or deposited outside or within the site.

Each vehicle exiting the site should be inspected for cleanliness before being logged out as clean (wheels and chassis), or hosed down into a wheel wash or wash down bay until designated as clean.

Wheel wash silt residues should be collected periodically and either returned to the excavation area or included in the remediation stockpile. Such material will be treated as contaminated unless analysis proves otherwise.

#### 10.3 Excavations

Records of all excavations and stockpile locations should be maintained. A site diary should also be maintained by the contractor to record daily progress, abnormal occurrences, incidents, and truck movements.



All excavations should be made with due regard to the stability of adjacent footings and structures (if applicable). It will be the contractor's responsibility to provide adequate battering, shoring and/or underpinning to protect adjacent structures (if required).

No person should be permitted to enter an unsupported excavation where it is more than 1.2 m deep or where it is considered to be unstable, irrespective of depth.

#### **10.4 Stormwater Management and Control**

Appropriate measures should be taken to minimise the potential for potentially contaminated water to leave the site. Such measures could include:

- Appropriate construction of the remediation stockpile area (if required), with regular checks for integrity and repairs if/when required;
- Construction of diversion bunds to divert stormwater from contaminated areas and remediation stockpiles;
- Provision of sediment traps including geotextiles or hay bales.

Discharge of any waters should meet the consent conditions from the appropriate authority. This should be verified by sampling and analyses undertaken by the contractor. For example, if excavations fill with water during validation works (i.e. due to rainfall), the water will require analysis to determine appropriate options for discharge (i.e. disposal to stormwater, sewer or collection by a licensed contractor).

#### 10.5 Control of Dust and Odour

Control of dust and odour during the course of the remediation works should be maintained by the contractor and may include, but not necessarily be limited to, the following:

- The use of a water cart, as and when appropriate, to eliminate windblown dust;
- Use of sprays / sprinklers to prevent dust blow from stockpiles;
- Covering of stockpiles with plastic sheeting or geotextile membranes;
- Restriction of stockpile heights to 2 m above surrounding site level;
- Ceasing works during periods of inclement weather such as high winds or heavy rain;
- Regular checking of the fugitive dust and odour issues. Undertake immediate remediation measures to rectify any cases of excessive dust or odour.

#### 10.6 Noise Control

Noise and vibration will be restricted to reasonable levels. All plant and machinery used on site should not breach statutory noise levels. Working hours will be restricted to those specified by Council.



#### 10.7 Groundwater

Previous investigation at the site indicated the absence of gross contamination in groundwater at the tested locations. Some elevated heavy metal concentrations (namely chromium, copper and zinc) were noted in the previous investigation. The results of groundwater testing suggest the general absence of gross groundwater impact from the upper heavy metal- impacted filling within the site.

Active groundwater remediation is not considered to be necessary within the site based on the results of testing. The heavy metal concentrations observed in groundwater are considered to be typical of regional groundwater quality. Preliminary options for the disposal of extracted groundwater (if required) are as follows:

- Re-injection of extracted groundwater within the site;
- Infiltration of extracted groundwater within the site (i.e. within a temporary dam or excavation);
- Sewer disposal of extracted groundwater, subject to additional assessment to characterise the groundwater with reference to Hunter Water disposal guidance; and
- Collection and disposal of extracted groundwater to an appropriately licensed facility.

Extraction and disposal of groundwater should be conducted in accordance with the appropriate regulatory and statutory requirements, and following approvals from the relevant regulators (i.e. Council, NSW Office of Water). Requirements for possible stormwater disposal of extracted groundwater (if possible) should be confirmed by the appropriate regulatory authority.

#### 10.8 Long-Term Site Management

Based on the proposed remediation methodology, it is noted that a long-term site management plan is not required following completion of remediation and validation of identified contamination.

## 11. Unexpected Finds Protocol

#### 11.1 General

If gross soil contamination is identified on-site during remediation works, the materials should be appropriately investigated by a suitably qualified environmental consultant and either managed on site (if appropriate) or disposed off-site to a licenced landfill following classification. The unexpected finds protocol for additional contamination encountered during works is presented below.

#### **11.2 Unexpected Finds Protocol**

Given the historical landuse and presence of filing, there is a potential for unexpected additional contamination to be encountered in soil during construction works. Contamination encountered during previous works included potential ACM at the surface/in filling and heavy-metal impacted filling (grey sandy gravel filling – ash/slag). The following protocol provides guidance on management of contamination not anticipated or known prior to commencement that may be encountered during construction works:



- Excavation, handling loading and transport of contaminated materials should be undertaken by a licensed contractor in accordance with the appropriate regulatory approvals and legislative requirements;
- The progress of site excavations during construction should be inspected by the contractor during earthworks. Potential soil contamination may include stained soils, odorous soils, soils containing asbestos including fibro fragments, soils containing building rubble (i.e. bricks, tiles, concrete, timber etc.) and slag / ash inclusions;
- If potentially contaminated soils are encountered (i.e. visual or olfactory indication of contamination), excavation of filling/soils should cease. The site foreman is to be notified and the affected area closed off by the use of barrier tape and warning signs. Warning signs shall be specific to the contamination encountered (where appropriate) and shall comply with the Australian Standard 1319 Safety Signs for the Occupational Environment;
- The environmental consultant is to be notified to inspect the area and assess the presence of contamination and determine the extent of investigation / remediation works to be undertaken (with reference to the relevant contaminated site guidelines). A report detailing this information will be compiled by the consultant and provided to the construction manager;
- The identified contamination should be managed / remediated as advised by the consultant. This may include segregation and removal of the impacted materials, and validation of the area;
- If the assessment of impacted materials indicates that the materials are not suitable to remain on-site or be classified for re-use on another site, the materials should be classified for disposal to an appropriately licensed landfill with reference to the NSW EPA Waste Classification Guidelines (Ref 5);
- The licensed contractor is to load classified materials directly into appropriate trucks for transport and disposal to a licensed facility (note: waste classification is required prior to off-site disposal);
- All works should be undertaken by a contractor holding the appropriate licence and permits for the works in accordance with statutory and regulatory requirements;
- Documentary evidence (weighbridge dockets) of correct disposal is to be provided to the construction manager;
- Excavation / construction in the affected area cannot recommence until validation indicates the absence of contamination or appropriate management of contamination has occurred, based on the advice of the environmental consultant. A written validation report is to be provided by the consultant that the area is safe to be accessed and worked;
- Details of the incident are to be recorded in the site record system.

## 11.3 Reporting

A record of the unexpected finds and remediation / management conducted should be maintained by the contractor and should include the following details:

- Date;
- Location;
- Assessment and confirmation of the contamination status of soils (including results of testing);
- Assessment of remediation / management options;



- Record of remediation / management undertaken to address the identified contamination;
- Final report upon completion of validation presenting the results of the assessment and remediation / management conducted.

## 12. Conclusions

This RAP provides the clean-up objectives, remediation acceptance criteria (RAC), principles, methods and procedures by which the remediation and validation of the site will be achieved.

Prior to commencement of remediation and construction works, it is recommended that a site inception meeting is held between the developer, remediation contractor and consultant to discuss the remediation and validation process and to identify the tasks and responsibilities for the remediation of the site to a condition suitable for the proposed residential/aged care development.

## 13. References

- 1. Douglas Partners Pty Ltd, "Report on Preliminary Site Investigation (Contamination), Proposed Site Redevelopment, Cnr King and Union Streets Newcastle West, prepared for Hansen Yuncken, Project 81229.04, February 2015.
- Douglas Partners Pty Ltd, "Report on Geotechnical Investigation and Targeted Site Investigation (Contamination), Wests Newcastle, 309 King Street Newcastle West, prepared for Graph Building (NSW) Pty Ltd, Project 81229.06, September 2018.
- 3. NSW EPA Contaminated Sites (2011), 'Guidelines for Consultants Reporting on Contaminated Sites', August 2011.
- 4. National Environment Protection Council (2013), 'National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013', 11 April 2013.
- 5. NSW EPA, "Waste Classification Guidelines: Part 1 Classifying Waste", November 2014.
- 6. NSW EPA, 'Resource Recovery Order under Part 9, Clause 93 of the Protection of the Environment Operations (Waste) Regulation 2014 - The excavated Natural Material Order 2014' and NSW PA 'Resource Recovery Exemption under Part 9, Clauses 91 and 92 of the Protection of the Environment Operations (Waste) Regulation 2014 The Excavated Natural Material Exemption 2014'.



## 14. Limitations

Douglas Partners (DP) has prepared this report for this project at 309 King Street Newcastle West with reference to DP's proposal dated 19 October 2018 and acceptance received from Anthony Williams of Graph Building (NSW) Pty Ltd dated 28 September 2018. The work was carried out under DP's Conditions of Engagement. This report is provided for the exclusive use of Graph Building (NSW) Pty Ltd for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of DP, does so entirely at its own risk and without recourse to DP for any loss or damage. In preparing this report DP has necessarily relied upon information provided by the client and/or their agents.

The results provided in the report are indicative of the sub-surface conditions on the site only at the specific sampling and/or testing locations, and then only to the depths investigated and at the time the work was carried out. Sub-surface conditions can change abruptly due to variable geological processes and also as a result of human influences. Such changes may occur after DP's field testing has been completed.

DP's advice is based upon the conditions encountered during the previous investigation. The accuracy of the advice provided by DP in this report may be affected by undetected variations in ground conditions across the site between and beyond the sampling and/or testing locations. The advice may also be limited by budget constraints imposed by others or by site accessibility.

This report must be read in conjunction with all of the attached and should be kept in its entirety without separation of individual pages or sections. DP cannot be held responsible for interpretations or conclusions made by others unless they are supported by an expressed statement, interpretation, outcome or conclusion stated in this report.

This report, or sections from this report, should not be used as part of a specification for a project, without review and agreement by DP. This is because this report has been written as advice and opinion rather than instructions for construction.

Possible asbestos-containing materials have been detected by observation on the surface of the site. Building demolition materials, such as concrete and brick were also located in previous below-ground filling, and these are considered as indicative of the possible presence of hazardous building materials (HBM), including asbestos.

Although the sampling plan adopted for the previous investigation was considered appropriate to achieve the stated project objectives, there are necessarily parts of the site that have not been sampled and analysed. This is either due to undetected variations in ground conditions or to budget constraints (as discussed above), or to parts of the site being inaccessible and not available for inspection/sampling. It is therefore considered possible that HBM, including asbestos, may be present in unobserved or untested parts of the site, between and beyond sampling locations, and hence no warranty can be given that additional asbestos is not present.



The contents of this report do not constitute formal design components such as are required, by the Health and Safety Legislation and Regulations, to be included in a Safety Report specifying the hazards likely to be encountered during construction and the controls required to mitigate risk. This design process requires risk assessment to be undertaken, with such assessment being dependent upon factors relating to likelihood of occurrence and consequences of damage to property and to life. This, in turn, requires project data and analysis presently beyond the knowledge and project role respectively of DP. DP may be able, however, to assist the client in carrying out a risk assessment of potential hazards contained in the Comments section of this report, as an extension to the current scope of works, if so requested, and provided that suitable additional information is made available to DP. Any such risk assessment would, however, be necessarily restricted to the environmental components set out in this report and to their application by the project designers to project design, construction, maintenance and demolition.

**Douglas Partners Pty Ltd** 

## Appendix A

About This Report



#### Introduction

These notes have been provided to amplify DP's report in regard to classification methods, field procedures and the comments section. Not all are necessarily relevant to all reports.

DP's reports are based on information gained from limited subsurface excavations and sampling, supplemented by knowledge of local geology and experience. For this reason, they must be regarded as interpretive rather than factual documents, limited to some extent by the scope of information on which they rely.

#### Copyright

This report is the property of Douglas Partners Pty Ltd. The report may only be used for the purpose for which it was commissioned and in accordance with the Conditions of Engagement for the commission supplied at the time of proposal. Unauthorised use of this report in any form whatsoever is prohibited.

#### **Borehole and Test Pit Logs**

The borehole and test pit logs presented in this report are an engineering and/or geological interpretation of the subsurface conditions, and their reliability will depend to some extent on frequency of sampling and the method of drilling or excavation. Ideally, continuous undisturbed sampling or core drilling will provide the most reliable assessment, but this is not always practicable or possible to justify on economic grounds. In any case the boreholes and test pits represent only a very small sample of the total subsurface profile.

Interpretation of the information and its application to design and construction should therefore take into account the spacing of boreholes or pits, the frequency of sampling, and the possibility of other than 'straight line' variations between the test locations.

#### Groundwater

Where groundwater levels are measured in boreholes there are several potential problems, namely:

 In low permeability soils groundwater may enter the hole very slowly or perhaps not at all during the time the hole is left open;

- A localised, perched water table may lead to an erroneous indication of the true water table;
- Water table levels will vary from time to time with seasons or recent weather changes. They may not be the same at the time of construction as are indicated in the report; and
- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must first be washed out of the hole if water measurements are to be made.

More reliable measurements can be made by installing standpipes which are read at intervals over several days, or perhaps weeks for low permeability soils. Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from a perched water table.

#### Reports

The report has been prepared by qualified personnel, is based on the information obtained from field and laboratory testing, and has been undertaken to current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal, the information and interpretation may not be relevant if the design proposal is changed. If this happens, DP will be pleased to review the report and the sufficiency of the investigation work.

Every care is taken with the report as it relates to interpretation of subsurface conditions, discussion of geotechnical and environmental aspects, and recommendations or suggestions for design and construction. However, DP cannot always anticipate or assume responsibility for:

- Unexpected variations in ground conditions. The potential for this will depend partly on borehole or pit spacing and sampling frequency;
- Changes in policy or interpretations of policy by statutory authorities; or
- The actions of contractors responding to commercial pressures.

If these occur, DP will be pleased to assist with investigations or advice to resolve the matter.

## About this Report

#### **Site Anomalies**

In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, DP requests that it be immediately notified. Most problems are much more readily resolved when conditions are exposed rather than at some later stage, well after the event.

#### **Information for Contractual Purposes**

Where information obtained from this report is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. DP would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

#### **Site Inspection**

The company will always be pleased to provide engineering inspection services for geotechnical and environmental aspects of work to which this report is related. This could range from a site visit to confirm that conditions exposed are as expected, to full time engineering presence on site.

## Appendix B

Drawing 1 - Test Location Plan Proposed Development Plans (Fender Katsalidis Ref 17121) Drawing DA098 Drawing DA099 Drawing DA100 Drawing DA101 Drawing DA201



NOTE: Base drawing from Nearmap Aerial Photo Image dated 30.01.2014

50 100m 75 1:1000 @ A3



CLIENT: Graph Building (NSW) Pty Ltd			Site Plan
OFFICE: Newcastle	DRAWN BY: PLH		Preliminary Site Investigation
SCALE: 1:1000@A3 sheet	DATE: 02.08.2018	•	Cnr King Street and Union Street, Newcastle West



Locality Plan

## LEGEND

- + Approximate CPT Location
- Approximate Borehole Location
- W Approximate Groundwater Well Location
- ↔ Approximate Previous Borehole Test Location (1990)
- ↔ Approximate Previous CPT Test Location (1984)
- Approximate Lot Boundary



PROJECT No:	81229.07
DRAWING No:	1
REVISION:	0





#### FENDER KATSALIDIS

PENDER CALI SALIDIS WWV.FKAUSTRALIA.COM L21, 259 GEORGE STREET, SYDNEY NEW SOUTH WALES 2000 AUSTRALIA TELEPHONE: H61 2 8216 3500 FENDER KATSALIDIS (AUST) PTY LTD ACN 092 943 032



ISSUE PURPOSE DEVELOPMENT APPLICATION







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LEVEL 12	RL 42.600					(			
LEVEL 11	RL 39.500	R C C C C C C C C C C C C C C C C C C C			G1				
LEVEL 10	RL 36.400	G3							
LEVEL 9	RL 33.300								
LEVEL 8	RL 30.200								
LEVEL 7	RL 27.100				G1				
LEVEL 6	RL 24.000	(G3)							
LEVEL 5	RL 20.900				G1		RL 21.90		
LEVEL 4	RL 17.800	RL 18.80							
LEVEL 3	RL 14.700								
LEVEL 2	RL 11.600	G		C2	G				
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						G3		HORIZONTAL AND VERTI	CAL LOUVRES
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TIMBER COMPOSITE FEATURE UPSTANDS AND ENTRY CANOPY



PENDER CALI SALIDIS WWV.FKAUSTRALIA.COM L21, 259 GEORGE STREET, SYDNEY NEW SOUTH WALES 2000 AUSTRALIA TELEPHONE: H61 2 8216 3500 FENDER KATSALIDIS (AUST) PTY LTD ACN 092 943 032

ISSUE PURPOSE DEVELOPMENT APPLICATION

