



# **Douglas Partners**

*Geotechnics | Environment | Groundwater*

**Integrated Practical Solutions**

Remediation Action Plan

BaptistCare Seniors Housing Project  
1 Martins Lane and 3A Homelands Avenue,  
Carlingford

Prepared for  
TSA Management Pty Ltd

Project 92284.09  
October 2022



## Document History

### Document details

<b>Project No.</b>	92284.09	<b>Document No.</b>	R.003.RAP
<b>Document title</b>	Remediation Action Plan BaptistCare Seniors Housing Project		
<b>Site address</b>	1 Martins Lane and 3A Homelands Avenue, Carlingford		
<b>Report prepared for</b>	TSA Management Pty Ltd		
<b>File name</b>	92284.09.R.003.RAP.Rev1		



### Document status and review

Status	Prepared by	Reviewed by	Date issued
Draft A	Paula Maurici	Glyn Eade	02 September 2022
Revision 0	Paula Maurici	Glyn Eade	18 October 2022
Revision 1	Paula Maurici	Glyn Eade	20 October 2022

### Distribution of copies

Status	Electronic	Paper	Issued to
Draft A	1	-	William Tseng, TSA Management Pty Ltd
Revision 0	1	-	William Tseng, TSA Management Pty Ltd
Revision 1	1	-	Damien Backshall, TSA Management Pty Ltd

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.

	Signature	Date
<b>Author</b>		20 October 2022
<b>Reviewer</b>		20 October 2022



## Table of Contents

	Page
1. Introduction.....	1
2. Proposed Development.....	2
3. Scope of Work.....	3
4. Site Description .....	3
5. Environmental Setting.....	6
6. Previous Reports and Site History .....	7
6.1 DP (2016) PSI.....	8
6.2 DP (2018a) HAZMAT Survey .....	9
6.3 DP (2018b) RAP .....	9
6.4 DP (2019a) DGI .....	10
6.5 DP (2019b) SCI.....	11
6.6 DP (2020a) VR.....	12
6.7 DP (2020b and 2022a) GRs .....	13
6.8 DP (2022b) The CSL .....	13
7. Conceptual Site Model.....	13
8. Remediation Extent.....	16
9. Remediation Options Assessment.....	16
10. Preferred Remediation Strategy .....	17
10.1 Rationale.....	17
10.2 Sequence of Remediation .....	17
10.2.1 Site Establishment .....	18
10.2.2 Remediation Sequence Overview.....	18
10.2.3 Task 1: Delineation and Possible Excavation and Off-Site Disposal of Impacted Fill at BH2 and BH3 .....	19
10.2.4 Task 2: Data-gap Investigation at 3A Homeland Avenue Carlingford .....	19
10.2.5 Task 3: Balance of Fill.....	20
11. Assessment Criteria .....	21
11.1 Remediation Acceptance Criteria .....	21
12. Validation Plan .....	21
12.1 Data Quality Objectives .....	21
12.2 Validation Assessment Requirements .....	21
12.3 Visual Inspections .....	22

12.4	Validation Sampling .....	22
13.	Waste Disposal .....	23
14.	Imported Material .....	24
15.	Quality Assurance and Quality Control .....	24
16.	Management and Responsibilities .....	25
16.1	Site Management Plan.....	25
16.2	Site Responsibilities.....	25
16.3	Contingency Plan and Unexpected Finds Protocol .....	25
17.	Validation Reporting.....	26
17.1	Documentation.....	26
17.2	Reporting .....	26
18.	Conclusions.....	27
19.	References.....	27
20.	Limitations .....	28
Appendix A:	Drawings	
	About this Report	
Appendix B:	Remediation Acceptance Criteria	
Appendix C:	Tabulated Summary Results from Previous Report(s)	
Appendix D:	Remediation Options Assessment and Evaluation	
Appendix E:	Data Quality Objectives and Quality Assurance Quality Control	
Appendix F:	Contingency Plan and Unexpected Finds Protocol	
Appendix G:	Site Management Plan	

## Remediation Action Plan

### BaptistCare Seniors Housing Project and 3A Homeland Avenue 1 Martins Lane and 3A Homelands Avenue, Carlingford

---

#### 1. Introduction

Douglas Partners Pty Ltd (DP) has prepared this Remediation Action Plan (RAP) for a BaptistCare Seniors Living Village and Respite Centre located at 1 Martins Lane and 3A Homelands Avenue, Carlingford (hereinafter referred to as 'the site'). The work was carried out at the request of Mr William Tseng of TSA Management Pty Ltd and was conducted in general accordance with DP proposal 92284.08.P.000 dated 29 June 2022.

The following key guidelines were consulted in the preparation of this report:

- NEPC *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [the 'NEPM']* (NEPC, 2013);
- NSW EPA *Guidelines for Consultants Reporting on Contaminated Land* (NSW EPA, 2020); and
- CRC CARE *Remediation Action Plan: Development - Guideline on Establishing Remediation Objectives* (CRC CARE, 2019a).

The remediation objectives, devised in accordance with CRC (2019a), are to:

- Address potentially unacceptable risks to relevant environmental values from contamination; and
- Render the site suitable, from a contamination perspective, for the proposed development.

This RAP provides details of the work that will be required at the site to meet these remediation objectives.

The proposed development involves construction of a BaptistCare Seniors Living Village and Respite Centre which includes a Residential Care Facility (RCF), Independent Living Units (ILUs), a Respite Care Centre and associated building works. More information is provided in Section 2 - Proposed Development.

Based on available information, it is considered that the remediation works outlined in this report constitute Category 2 Remediation in accordance with NSW DUAP/EPA *Managing Land Contamination, Planning Guidelines, SEPP 55 - Remediation of Land* (NSW DUAP/EPA, 1998). Under Clause 4.13 of *SEPP (Resilience and Hazards) 2021*, the local Council should be notified of the proposed commencement of the remediation work at least 30 days before commencement. The site is subject to a Planning Secretary's Environmental Assessment Requirements (SEARs SSD33631237).

TSA Management Pty Ltd has engaged NSW EPA accredited site auditor Rowena Salmon (of Ramboll Australia Pty Ltd) to complete a site audit under the *Contaminated Land Management Act 1997* (NSW), which involves their review of this RAP and associated reports.

It should be noted that this RAP does not form a detailed specification for the proposed site remediation works, but rather represents a planning document which outlines the means by which site remediation can be achieved.

The site layout is shown on Drawing 1, Appendix A. This report must be read in conjunction with all appendices including the notes provided in Appendix A.

## 2. Proposed Development

The subject site comprises 1 Martins Lane and 3A Homelands Avenue, Carlingford.

This State Significant Development Application seeks approval for the redevelopment of the Site for the purposes of seniors housing including independent living units, a residential care facility and respite day centre. Specifically, this SSD application seeks approval for:

- Demolition and site preparation works;
- Construction of a Residential Care Facility (RCF) comprising:
  - o Ninety-six single rooms;
  - o On-site kitchen and laundry facilities;
  - o On-site ancillary services including café, salon, gym and multipurpose rooms; and
  - o Basement car parking comprising 24 visitor, 20 staff spaces and an Ambulance Bay.
- Construction of Independent Living Units (ILUs) comprising:
  - o 66 two bedroom and 64 three bedroom units;
  - o On-site kitchen and laundry facilities;
  - o Recreational facilities including library, cinema, function room and gym;
  - o On-site ancillary services including hairdresser, beautician, and allied health services; and
  - o Basement car parking containing 232 spaces.
- Construction of a Respite Care Centre at 3A Homelands Avenue, comprising:
  - o Office;
  - o Activities and function space; and
  - o Dining area.
- Building identification signage and wayfinding;
- Associated landscaping and public domain works; and
- Inground building services works and utility works.

This report will be provided as part of the State Significant Development Application (PDA-32772507) to address *Condition 17 - Contamination and Remediation - In accordance with SEPP 55, assess and quantify any soil and groundwater contamination and demonstrate that the site is suitable (or will be suitable, after remediation) for the development.* It is also noted that SEPP 55 has been repealed and replaced by SEPP - Resilience and Hazards 2021 and Planning Secretary's Environmental Assessment Requirements (SEARs SSD33631237).

Proposed Development Plans are provided in Appendix A.

### 3. Scope of Work

The scope of works to achieve the objective is as follows:

- Summarise the findings of previous investigations conducted to inform the status of contamination and contamination risk at the site;
- Present a conceptual site model (CSM) to list potential and likely contamination source, pathway and receptor linkages to address potentially unacceptable risks to relevant environmental values from contamination;
- Define the anticipated extent of remediation;
- Assess, select and justify a preferred approach to management and / or remediation to render the site suitable for its proposed use, and which will minimise potentially unacceptable risk to human health and / or the environment and which includes the consideration of the principles of ecologically sustainable development;
- Select an appropriate remediation strategy to render the site suitable, from a contamination perspective, for the proposed development;
- Establish the remediation acceptance criteria (RAC) to be adopted for validation of remediation;
- Identify how successful implementation of the RAP will be validated;
- Outline waste classification, handling and tracking requirements;
- Outline environmental safeguards required to complete the remediation works;
- Include contingency plans and an unexpected finds protocol; and
- Identify the need for, and nature of, any long-term management and / or monitoring following the completion of management / remediation and, if required, provide an outline of an environmental management plan.

### 4. Site Description

Site identification details are presented below.

Site Address	1 Martins Lane and 3A Homelands Avenue, Carlingford
Legal Description	Part of Lot 1, DP 1033201 and Lot 2, DP 364225 Lot 1, DP 26212
Area	~17,200 m <sup>2</sup>

Zoning	<p>Parramatta LEP (2011) SSDA and SEARs SSD33631237</p> <p>Rezoned as R4 (high density residential) Previously R2 (low density residential)</p> <p>The site includes land identified on the Biodiversity Values Map which is excluded from the operation of the Housing SEPP. Notwithstanding, DP understands that Seniors Housing is permissible on this portion of the site under the PLEP 2011</p> <p>Main features including sediment mounds and temporary sediment basins are shown on Drawing 2 in Appendix A. Mature tree zones are not shown on the drawing but may be present on the site.</p>
Local Council Area	Parramatta City Council (PCC)
Current Use	Vacant site and residential house (currently leased)
Surrounding Uses	<p>North: Site A to the north - 162 affordable living units (four residential apartment buildings), site validated awaiting imported landscaping. Further to the north, Pennant Hills Road beyond which is low density residential housing (subject to approval DA242/2020);</p> <p>South: Low density residential housing;</p> <p>East: A laneway beyond which is low density residential housing; and</p> <p>West: Low density residential housing.</p>

The property is an irregular-shaped land parcel covering an area of approximately 17,200 m<sup>2</sup>, accessed via Martins Lane or Homelands Avenue, in Carlingford.

At the time this RAP was prepared, Site B was unoccupied and generally covered by grass, as all structures had been demolished some time prior to the commencement of field work. The premises on Lot 1, DP 26212 was being leased as a residential house.

The site boundary is shown in Figure 1 below and on Drawing 1 in Appendix A.



Figure 1: Site Location (boundary shown in red dashed line)

## 5. Environmental Setting

Details on the environmental setting of the site are outlined below.

Regional Topography	Based on regional topography, the site is located on the southern side of an east-west striking ridgeline (i.e., Pennant Hills Road). The ground surface across the property generally falls with a moderate slope towards the south, with levels ranging from approximately RL 92 m relative to the AHD at the northern boundary of the site, to RL75 m where Martins Lane meets Homelands Avenue.
Site Topography	Based on the observed topography and review of local contour lines which indicate an elevation of 98 m AHD at the most northern end of the site and 76 m AHD at the most southern end of the site.
Soil Landscape	Reference to the Sydney 1:100 000 Soils Landscape Sheet indicates that the site is located within the Glenorie soil landscape, which is an erosional soil comprising shallow to moderately deep red podzolic soils on crests; moderately deep red and brown podzolic soils on upper slopes; deep yellow podzolic soils along drainage lines.
Geology	Reference to the Sydney 1:100 000 Geological Series Sheet indicates that the site is underlain by Ashfield Shale of Triassic age which typically comprises a residual clay profile overlying variable weathered black to dark grey shale, laminite and siltstone.
Acid Sulfate Soils	Reference to the 1:25 000 Acid Sulphate Soil Risk map indicates that the site is not located within or close to an area with a risk for acid sulphate soils.
Surface Water	Vineyard Creek is located approximately 460 m to the south of the site. Vineyard Creek flows south into the Parramatta River which subsequently flows east into Sydney Harbour. Based on the observed topography surface water is anticipated to flow south towards Vineyard Creek. Groundwater flow is expected to reflect the surface water flow and also flow towards Vineyard Creek.
Groundwater	<p>Free groundwater was observed at only one test location, BH6, at a depth of 1.7 m (RL 92.7 m) whilst augering. Groundwater levels were measured at a depth of 2.1 m (RL 80.8 m) and 3.1 m (RL 76.3 m AHD) in boreholes BH208 and BH206, respectively, after being purged in Site A (adjacent to the subject site). The elevation of the site suggests that the regional groundwater table would be well below the proposed bulk excavation levels on the site. It is therefore considered likely that the groundwater encountered in BH206 and BH208 is associated with temporary 'perched' groundwater. It should be noted that groundwater levels are transient and that fluctuations may occur in response to climatic and seasonal conditions.</p> <p>A search of the NSW Office of Water groundwater database revealed that there are eight registered groundwater bores within a 500 m radius of the site, with wells ranging from 5.0 to 8.2 m depth for monitoring purposes with no standing water level registered on the records.</p>

The sequence of subsurface materials encountered within the boreholes drilled for the previous investigation, in increasing depth order, were summarised as follows:

- Fill:** Typically asphalt or concrete and topsoil over silt, clay, sand with gravel fill and road base to depths of 0.1 m to 1.6 m.
- Fill included dark brown and red brown and orange silty clay with varying levels of gravel, sand and anthropogenic inclusions. Anthropogenic materials included brick, mixed gravel, ceramic, terracotta pipe, concrete pipe, sand bedding, metal, plastic, wood, tile, asphalt, bitumen and glass inclusions from 0.1 to 2.2 m below ground level (bgl).
- Old bottles (glass and porcelain) were observed in fill at BH1-1 to 1.1 m depth and TP128 (0.2 to 0.5 m bgl). Fragments of black slag were observed in TP243 from 0 to 0.1 m. Ash was noted in TP238 at 1.0 m depth. Charcoal with gravel were observed in fill at TP117 to 0.5 m depth. An area of buried burnt material (asbestos containing material or potential asbestos containing material (ACM or PACM) was observed adjacent to the basin at TP226. In addition, at TP226 at 1.9 m depth, PACM was noted. PACM was noted at TP236 at 1.0 m depth. Confirmed ACM was observed in TP119 (0.4 to 0.6 m bgl), however this fill type was present to 1.2 m depth in TP119. ACM was observed in TP125 (0.3 to 0.5 m bgl) and TP127 (0 to 0.2 m bgl). Also in TP 125, asbestos pipe running north / south was noted at the bottom of the pit at a depth of 1.5 m.
- A slight hydrocarbon odour was noted at TP125 (0.3 to 0.6 m bgl) and TP130 (0.35 to 0.7 m bgl).
- Clay:** Stiff to very stiff clay to depths of 0.8 m to 3.2 m bgl (not present in BH4), underlain by very stiff to hard clays to depths of 0.8 m to 4.35 m bgl (not present in BH8 and BH10). The depths of clay typically increase from north to south, along the western boundary and appears consistent along the eastern boundary with clay to depths of 1.7 m to 1.8 m bgl.
- Laminite/Siltstone:** Varying strengths of siltstone, over
- Sandstone:** Sandstone was encountered at relatively shallow depths, in boreholes towards the lower southern end of the site (BH1, BH2, BH3, BH9, BH203, BH206, BH208, BH209).

## 6. Previous Reports and Site History

The following relevant reports have been prepared for the site and are discussed below:

The following relevant reports have been prepared for the site and are discussed below:

- DP *Preliminary Site Investigation, Baptist Care Social Housing Project , 1 Martins Lane and 3A Homelands Avenue, Carlingford*, Project No. 85665.01.R.001.Rev0, dated 22 November 2016 (DP, 2016) (the 'PSI');
- DP *Hazardous Building Materials Report, Baptist Care Social Housing Project , 1 Martins Lane and 3A Homelands Avenue, Carlingford*, Project No. 85665.03.R.001.Rev1, dated 27 March 2018 (DP, 2018a) (the 'HAZMAT survey');

- DP Remediation Action Plan, Baptist Care Social Housing Project , 1 Martins Lane and 3A Homelands Avenue, Carlingford, Project No. 85665.02.R.001.Rev1, dated 22 August 2018 (DP, 2018b) (the '2018 RAP');
- DP Data-Gap Investigation, Baptist Care Social Housing Project , 1 Martins Lane and 3A Homelands Avenue, Carlingford, Project No 92284.00.R.002.Rev1, dated 26 July 2019 (DP, 2019a) (the 'DGI');
- DP Supplementary Contamination Investigation, Baptist Care Social Housing Project , 1 Martins Lane and 3A Homelands Avenue, Carlingford, Project No 92284.02.R.001.Rev2, dated 26 July 2019 (DP, 2019b) (the 'SCI');
- DP Report on Validation Assessment, Baptist Care Social Housing Project 1 Martins Lane and 3A Homelands Avenue, Carlingford, Project No 92284.04.R.002.Rev0, dated 11 March 2020 (DP, 2020a) (the 'VR');
- DP Report on Geotechnical Investigation, Baptist Care Social Housing Project , 264-1 Martins Lane and 3A Homelands Avenue, Carlingford, Project No 92284.05.R.002.Rev1, dated 28 February 2020 (DP, 2020b) (the 2020 'GR'); and
- DP Report on Geotechnical Investigation, Baptist Care Social Housing Project , 1 Martins Lane and 3A Homelands Avenue, Carlingford, Project No 92284.08.R.001.Draft A, currently underway (DP, 2022a) (the 2022 'GR').
- DP Report on Geotechnical Investigation, Baptist Care Seniors Housing Project, 1 Martins Lane and 3A Homelands Avenue, Carlingford, Project No 92284.08.R.001.Rev2, dated 19 October 2022 (DP, 2022a) (the 2022 'GR'); and
- DP Contamination Summary Letter (CSL), Baptist Care Seniors Housing Project, 1 Martins Lane and 3A Homelands Avenue, Carlingford, Project No 92284.09.R.002.Revision 1, dated 19 October (DP, 2022b) (the 'CSL').

Sample locations from all previous investigations are shown on Drawing 2 in Appendix A.

## 6.1 DP (2016) PSI

The objectives of the PSI were to identify past and present potentially contaminating activities and sources, conduct limited intrusive sampling and analysis of soil samples for contaminants of potential concern (CoPC), and establish if further investigation, remediation or management was required. The PSI scope of works included a desktop review, a site walkover and interview with the site maintenance supervisor; and intrusive investigations at eight borehole locations on the subject site (BH1 to BH6 and BH9 to BH10) conducted in conjunction with a preliminary geotechnical investigation to depths of between 6 m and 10.22 m bgl. The PSI borehole locations are shown on Drawing 2 in Appendix A.

Review of historical aerial photographs indicated that site was used for rural residential land use until the mid-1950s. The development of the site was conducted in stages since prior to 1960, initially in the northeast, then south, followed by the central and northwest portions of the site. Identified CoPC were defined as to include metals, total recoverable hydrocarbons (TRH), benzene, toluene, ethylbenzene, xylene (BTEX), polycyclic aromatic hydrocarbons (PAH), polychlorinated biphenyls (PCB), organochlorine pesticides (OCP), phenols and asbestos.

The laboratory analysis results reported concentrations of all analysed CoPC to be below the adopted SAC except for:

- Lead in BH6 at depths of 0.5 m and 1.0 m (2,600 mg/kg and 5,300 mg/kg, respectively compared to the adopted human health SAC of 1,200 mg/kg); and
- Zinc in BH6 at a depth of 0.5 m (740 mg/kg compared to the adopted ecological SAC of 510 mg/kg).

Concentrations of total TRH (F2 and F3) were identified in BH2 and BH3, to be below the human health and ecological criteria adopted in the PSI, however, following Auditor review the concentrations were above the amended screening criteria (and SAC) adopted in the 2018 RAP. TRH at BH2 and BH3 have subsequently been identified as potential areas of contamination.

DP advised that fill sampled and tested at the site should be classified as **Special Waste (Asbestos)** until such time that further assessment can be made.

Based on the results of the PSI, it was considered that the site could be made suitable for the proposed land use subject to preparation and implementation of a RAP.

## 6.2 DP (2018a) HAZMAT Survey

A hazardous building materials (HAZMAT) survey was conducted to assess the location, extent and condition of asbestos-containing materials (ACM) and other hazardous building materials within the existing buildings prior to demolition. The survey included a visual inspection of the site, supplemented by a program of sample collection and laboratory analysis of nominated areas/items, including lift wells and light fittings.

One or more hazardous materials, including friable and non-friable asbestos, lead paint, lead dust, PCB and synthetic mineral fibres, were observed in all of the eight buildings inspected. Limited or no access was available to certain areas of the site and for this reason, it was recommended that the presence of hazardous materials in these areas should be presumed.

It was concluded that any hazardous building materials should be managed in accordance with the requirements of the *NSW Work Health and Safety (WHS) Act 2011 (WHS Act)*, *NSW WHS Regulation 2017 (WHS Regulation)* and relevant Codes of Practice, Australian Standards and guidelines.

It was further recommended that hazardous building materials should be removed prior to any significant disturbance including maintenance, refurbishment and demolition work.

## 6.3 DP (2018b) RAP

The 2018 RAP was prepared to provide a strategy for remediation of the lead contamination at BH6 and provide a sampling plan to address data gaps identified in the PSI.

The proposed remediation included the excavation and off-site disposal (following delineation) of the lead-contaminated material identified at BH6. The 2018 RAP also provided a sampling plan for:

- Delineating the lead contamination at BH6;

- Investigating groundwater in the vicinity of BH6; and
- Soil investigations for the remainder of the site including targeting a former maintenance and services department and two grease traps. Most of the remaining proposed sampling locations were grid-based and were situated in or adjacent to the footprints of buildings.

#### 6.4 DP (2019a) DGI

The DGI was undertaken to address the data gaps identified in the 2018 RAP, and to conduct soil investigations across the remainder of the site to align with the minimum number of sample locations required in NSW EPA (1995), *Contaminated Sites - Sampling Design Guidelines* (EPA, 1995) (now superseded).

The DGI was conducted during demolition of the last remaining building in the south of the site, and the removal of hardstands, asbestos pipes and asbestos-impacted soils across the extent of the site.

The DGI included the following works relating to the subject site:

- Site inspections;
- Delineation of the identified lead impacted soil including the excavation of nine test pits in a grid-based formation surrounding BH6, and analysis of 37 samples for lead;
- Intrusive investigations on a systematic grid pattern at 19 locations across the site, and the analysis of 69 soil samples for the CoPC identified in the PSI; and
- Completion of a limited groundwater investigation including the installation of one groundwater well hydraulically downgradient of BH6, and sampling and analysis of groundwater for lead.

Sample locations and results are listed in Table D1 Appendix D of this RAP.

Results reported the following:

- Multiple fill types were reported across the site to depths ranging between 0.2 m and greater than 2 m, with demolition waste identified at several locations;
- Concentrations of lead in delineation samples at BH6 were within the SAC. As such, the lead impacted fill within the site was delineated to an approximate 100 m<sup>2</sup> area surrounding BH06;
- Results of the groundwater analysis indicated that lead identified at BH6 was unlikely to have impacted the underlying groundwater;
- Concentrations of CoPC in all fill and natural samples were within the adopted SAC, except for hydrocarbons beneath the southern car park at BH2 and BH3 which exceeded the adopted human health and ecological criteria. As such it is possible that the reported TRH is an indicator of contamination in fill underlying the asphalt from previous fuel/oil spills, or from buried fill. Assessment of the underlying fill following the removal of the car park was recommended;
- Fragments of bonded ACM were identified at three locations across the site in TP119, TP125 and TP127; and
- Fibrous asbestos or asbestos fines (FA/AF) were not identified during the investigation.

Based on the results of the DGI, DP identified the following, namely:

- Lead impacted fill within the site was delineated to cover an approximate 100 m<sup>2</sup> area surrounding BH06;
- Lead identified at BH6 was unlikely to have impacted the underlying groundwater regime; Concentrations of asbestos were identified above the adopted site assessment criteria; and
- Concentrations of TRH at BH2 and BH3 represent a potential area of contamination.

It was recommended that assessment of the car park be conducted at a later stage of development, to confirm contamination following removal of the asphalt.

DP recommended the following was conducted to make the site suitable for the proposed use:

- Remediation of lead impacted fill at and surrounding BH06;
- Remediation of asbestos impacted fill within the site; and
- Remediation of TRH impacted fill at BH2 and BH3.

It was subsequently understood that the 2018 RAP would require updating to document a strategy to remediate the identified TRH impact.

DP recommended that the Site Auditor review and provide comment on the findings of the DGI prior to further works being conducted.

## 6.5 DP (2019b) SCI

This SCI was conducted to further investigate the asbestos-impacted fill at the site and further delineate the lead-impacted fill at BH6.

Soil investigations for asbestos included intrusive investigations on a systematic grid pattern at 27 locations (listed in Table D2 Appendix D of this CSL), and sample collection and subsequent analysis of soil samples with reference to the WA DoH (2011) asbestos guidelines (WA DoH, 2021). A discussion of the findings of the SCI, incorporating the findings of the DGI, is provided below.

Sample locations and results are listed in the tables in Appendix C of this RAP.

In the SCI, fill was identified in all test pit locations to depths generally ranging between 0.2 m and 2.2 m bgl. Multiple fill types were present across the site and at varying depths within the fill. Building demolition waste was identified within the fill at multiple locations. A clear pattern of the fill types within the site associated with historic development of the site was not evident.

Fragments of bonded ACM were identified in fill at three test pit locations (TP119, TP125 and TP127). The concentration of asbestos in ACM were below the adopted Health Screening Levels for Asbestos for residential apartments (land use category B).

Based on the results of the SCI, DP recommended that the RAP should be updated to incorporate the following:

- *Remediation and validation of ACM impacted fill*
- *An asbestos finds protocol to manage any further asbestos observed during site development works;*
- *Controls to limit the potential for ACM being in surface soils at the completion of the development; and*
- *The remediation and validation of the BH6 lead impacted fill will be provided in the Validation Report.*

Lead was identified at concentrations exceeding the adopted SAC at BH6 during the PSI and was delineated to an area of approximately 100 m<sup>2</sup> in the DGI. Based on the findings of the DGI it was considered likely that the impacted material was localised to the immediate surrounds of BH6.

During the SCI approximately 10 m<sup>3</sup> of soil was excavated at BH6 and the base and walls sampled and analysed with reference to the validation strategy detailed in the 2018 RAP. The final excavation for BH6 measured approximately 2.5 m (wide) by 3.0 m (long) and 1.4 m in depth. Based on the results obtained during the PSI (including toxicity characteristic leaching procedure analysis) and results of the SCI the lead impacted fill was classified as **Hazardous Waste** with reference to NSW EPA (2014) *Waste Classification Guidelines Part 1: Classifying Waste*.

DP understands that the stockpiled material was disposed by Salcorp as Hazardous Waste on 16 April 2019. DP was not on site to oversee the excavation and removal of the stockpile. Disposal dockets for the Hazardous Waste will be required to be provided to DP for validation purposes. Given the waste stockpile was placed on hardstand prior to disposal, DP does not consider that validation sampling of the stockpile footprint was required.

## 6.6 DP (2020a) VR

The validation report provided a summary of the remediation works conducted at Site A (adjacent site) and the remediation of the material around BH6 (on-site).

The excavation, validation and offsite disposal of lead impacted soil at BH6 was discussed as part of the SCI (Section 6.5 above). At the time of the SCI reporting, tipping dockets were not available. Tipping dockets associated with the off-site disposal of lead at BH6 were subsequently provided and discussed in Section 9.1 of the VR as follows:

*It was a requirement of the SCI that disposal dockets for the disposed hazardous waste excavated from BH6 (Drawing 2) was [were] provided to DP for the purposes of validation. A review of Transport Certificate (No. 2T00978765) provided in Appendix F, reported that 22.98 of Hazardous waste was disposed to Environmental Treatment Solutions Pty Ltd, 79 Marshals Lane, Blayney on 16 April 2019. DP considers that the volume disposed is consistent with the volume excavated from BH6.*

## 6.7 DP (2020b and 2022a) GRs

Geotechnical reports were prepared in 2020 and 2022. The 2020 GR was conducted in conjunction with the previous environmental work. The investigation included the drilling of 16 boreholes and laboratory testing of selected samples (BH101 to BH107 and BH201 to BH209).

Groundwater was not observed during auger drilling of the boreholes. The essential use of water as a drilling fluid during the coring of boreholes BH101 to BH105 and BH201 to BH209 precluded any further groundwater observations during drilling. On completion of drilling, BH103, BH206 and BH208 were purged of drilling fluids using a bailer. A summary of the groundwater levels measured in the boreholes that were purged ranged from RL 91.4 m AHD (in BH103) to RL 76.3 m AHD (in BH 206).

It was noted that groundwater levels are transient and that fluctuations may occur in response to climatic and seasonal conditions.

The 2022 GR involved drilling of two boreholes (BH301 and BH302) and laboratory testing of selected samples. Borehole BH302 was located at 3A Homelands Ave. Fill at this location was noted to be from 0.0 to 0.3 m depth and comprise topsoil (sandy clay) over silty clay filling. No anthropogenic inclusions were noted on the log for BH302. Borehole 301 was drilled in Site B and contained 0.5 m of fill over clay.

## 6.8 DP (2022b) The CSL

The purpose of CSL was to summarise the relevant information on contamination at the site from the previous environmental and geotechnical reports (as listed above) and comment on the suitability of the data for determining the remediation requirements for the site.

Based on the information provided in the CSL, DP considered that the site could be made suitable for the proposed residential development subject to the implementation of an updated RAP.

## 7. Conceptual Site Model

The data collected during previous investigations generally confirmed that for certain potential contaminant sources outlined in the preliminary CSM in DP (2016), potentially complete pathways to the identified receptors exist, whereas for others, they do not. The source (and associated CoPC), pathway and receptor linkages are summarised in Table 1.

### Potential Sources (S)

Based on the previous investigations, the following remaining potential sources of CoPC have been identified.

- S1: TRH-impacted fill in the vicinity of BH2 and BH3 ('Remediation Area 1'):
  - o CoPC: TRH.
- S2: Fill of unknown origin at 3A Homelands Avenue, Carlingford (possible Remediation Areas):
  - o Various CoPC and may include metals, TRH, BTEX, PAH, PCB, OCP, phenols and asbestos.

- S3: Asbestos-impacted fill - balance of site (potential for ACM finds - possible Remediation Areas):
  - o CoPC: asbestos (i.e., as bonded asbestos containing material (ACM) and / or fibrous asbestos and asbestos fines (FA and AF)).

### **Potential Receptors (R)**

The following potential human receptors have been identified:

- R1: Current users (vacant development site and residential).
- R2: Construction and maintenance workers.
- R3: End users (residential - aged care residents, workers and visitors).
- R4: Adjacent site users (residential).

The following potential environmental receptors have been identified:

- R5: Surface water [Vineyard Creek is located approximately 460 m to the south of the site. Vineyard Creek flows south into the Parramatta River which subsequently flows east into Sydney Harbour].
- R6: Groundwater.
- R7: Terrestrial ecosystems.

### **Potential Pathways (P)**

The following potential pathways have been identified:

- P1: Ingestion and dermal contact.
- P2: Inhalation of dust and/or vapours.
- P3: Surface water run-off.
- P4: Leaching of contaminants and vertical migration into groundwater.
- P5: Lateral migration of groundwater providing base flow to water bodies.
- P6: Inhalation, ingestion and absorption.

A summary of the potentially complete exposure pathways for the proposed land use is shown in the table below.

**Table 1: Summary of Potentially Complete Exposure Pathways (Proposed Land Use)**

Source and CoPC	Transport Pathway	Receptor	Action Required
S1: All TRH-impacted fill in the vicinity of BH2 and BH3 (Remediation Area 1) CoPC: TRH	P1: Ingestion and dermal contact. P2: Inhalation of dust and / or vapours.	R1: Current site users. R2: Construction and maintenance workers. R3: End users.	Further delineation and/or remediation required Remediation options to be provided in this RAP.
	P3: Surface water run-off. P5: Lateral migration of groundwater providing base flow to water bodies.	R5: Surface water. R6: Groundwater.	
	P4: Leaching of contaminants and vertical migration into groundwater.	R6: Groundwater.	
	P6: Inhalation, ingestion and absorption.	R7: Terrestrial ecosystems.	
S2: Fill of unknown origin at 3A Homelands Avenue, Carlingford (possible remediation areas) COPC include metals, TRH, BTEX, PAH, PCB, OCP, phenols and asbestos	P1: Ingestion and dermal contact. P2: Inhalation of dust and / or vapours.	R1: Current site users. R2: Construction and maintenance workers. R3: End users.	An additional intrusive soil investigation is recommended to assess possible contamination across the site. This will cover data-gaps (such as under the existing house and in exclusion zones previously inaccessible for sampling). Soil investigation results will establish the requirement for a groundwater investigation.
	P3: Surface water run-off. P5: Lateral migration of groundwater providing base flow to water bodies.	R5: Surface water.	
	P4: Leaching of contaminants and vertical migration into groundwater.	R6: Groundwater.	
	P6: Inhalation, ingestion and absorption.	R7: Terrestrial ecosystems.	
S3: Balance of site (Potential for ACM finds in fill - possible remediation areas) COPC: ACM and / or FA and AF	P2: Inhalation of dust and/or vapours	R1: Current site users. R2: Construction and maintenance workers. R3: End users. R4: Adjacent site users.	To be managed under a Contingency Plan and Unexpected Finds Protocol (Appendix F)

## 8. Remediation Extent

The extent of the remediation is defined as:

- Remediation Area 1 - area of fill where concentrations of TRH have been identified above the adopted SAC (i.e., BH2 and BH3). DP recommends that additional assessment is conducted at BH2 and BH3 to assess the contamination status at these locations and establish if remediation is warranted;
- Remediation Area 2 - Data-gap Investigation Area - 3A Homelands Ave (Lot 1, DP 26212 - approximately 0.08 hectares) - since intrusive works were prohibited due to several ecological exclusion zones, only limited geotechnical information is available for this site. Additional environmental sampling for this site is outlined in the data-gap scope in this RAP (Section 10.2.4); and
- Remediation Area 3 - Remainder of the site - although fragments of bonded ACM were identified in fill at three test pit locations (TP119, TP125, TP127), the concentration of asbestos in the ACM were below the adopted HSL for asbestos for residential apartments (land use Category B). As such, DP consider that the balance of fill within the site can generally be characterised as impacted with ACM at concentrations below the adopted SAC. DP considers that there is the potential for further localised areas of fill impacted with ACM above the RAC being present at the site. Extensive earthworks at the site are expected as part of the proposed development which may encounter such localised pockets. Asbestos identified during site development works should be managed under an asbestos finds protocol provided in Appendix F. Controls to prevent cross contamination, and ACM being present of the site surface, are also required.

## 9. Remediation Options Assessment

The objective of the remediation options assessment and evaluation is to establish a preferred remediation strategy. The process involves canvassing various remedial options which may be viable and then ranking each option based on several evaluation criteria. The remediation options assessment was conducted with reference to CRC CARE *Remediation Action Plan: Development - Guideline on Performing Remediation Options Assessment* (CRC CARE, 2019b).

The remediation options assessment is included in Appendix D and Table 2 below.

**Table 2: Soil Remediation Option Evaluation**

Option	ACM	TRH
1. On-site treatment	<b>Unsuitable</b> Treatment of ACM-impacted soils not accepted by NSW EPA as a remediation option. <sup>1</sup>	<b>Unsuitable</b> The soil could be subject to ex-situ treatment. Cost likely to be prohibitive compared to other options.

<sup>1</sup> NSW EPA Position statement — WA guidelines for asbestos contaminated sites dated April 2022

<b>Option</b>	<b>ACM</b>	<b>TRH</b>
<b>2. Off-site treatment</b>	<b>Unsuitable</b> DP is not aware of any ACM treatment facilities in NSW	<b>Unsuitable</b> Possible ACM in TRH impacted fill, treatment is not considered a suitable option
<b>3. Consolidation and isolation</b>	<b>Suitable</b> Fragments and affected soil can be collected, contained and capped on site beneath an engineered barrier.	<b>Suitable</b> Can be contained and capped on site beneath an engineered barrier subject to leachability analysis.
<b>4. Excavate and remove off site</b>	<b>Suitable</b> Removes the contaminated soil from the site. Option removes the historical legacy issues.	<b>Suitable</b> Removes the contaminated soil from the site. Option removes the historical legacy issues.

## 10. Preferred Remediation Strategy

### 10.1 Rationale

The rationale for the selection of the preferred remediation strategy is outlined in Appendix D. The preferred remediation strategy is for:

- Remediation Area 1: Delineation and possible excavation and off-site disposal for the TRH impacted area (if required) - option 4;
- Remediation Area 2: Data-gap investigation - remediation strategy to be developed following further investigation; and
- Remediation Area 3:
  - o Excavation and off-site disposal of fill with asbestos above the RAC asbestos, where encountered during earthworks - option 4; or
  - o Retain fill on-site but buried at depth, therefore no asbestos remaining at the surface of the site (i.e., cap and contain asbestos impacted fill) of fill with asbestos below the RAC - option 3.

### 10.2 Sequence of Remediation

The detailed procedures and sequence for the remediation work will rest with the contractor and will depend upon the equipment to be used and the overall sequence of the remediation or development. It is the contractor's responsibility to devise a safe work method statement and to implement proper controls that enable the personnel undertaking the remediation to work in a safe environment.

This RAP does not relieve the contractor(s) of their ultimate responsibility for occupational health and safety of their workforce and to prevent contamination of areas outside the immediate workspace. This RAP sets out the minimum standards and guidelines for remediation that will need to be used in preparing a method statement.

Asbestos remediation works must be conducted by an appropriately licensed asbestos remediation contractor and in accordance with *Work Health and Safety Regulation NSW 2011* and any other applicable SafeWork NSW or Safe Work Australia regulations or guidelines.

Furthermore, the remediation contractor must be licensed for Class B asbestos removal. A Class B licence is suitable the remediation given that asbestos at the site has been identified in a bonded (non-friable) form (i.e., ACM in good condition). In the event that FA/AF are observed during the remediation, works shall cease until a Class A asbestos removal license is obtained by the remediation contractor. Additionally, a licenced asbestos assessor must undertake air quality monitoring if FA or AF are identified.

The licensed asbestos remediation contractor must give written notice to SafeWork NSW at least five days before remediation work commences.

### **10.2.1 Site Establishment**

Prior to the implementation of remediation, the site is to be established in accordance with all NSW legislative requirements.

### **10.2.2 Remediation Sequence Overview**

The general sequence of remediation shall be determined by the Contractor and should consider the following recommended sequence:

- Task 1: Delineation and possible excavation and off-site disposal of Remediation Area 1 - Impacted Fill at BH2 and BH3:
  - o Inspection and possible additional sampling in vicinity of Remediation Area 1 and if required:
    - Waste classification of unsuitable / surplus fill;
    - Disposal of unsuitable / surplus fill; and
    - Validation of remediation excavation.
- Task 2: Data gap Investigation of 3A Homelands Ave, Carlingford:
  - o Additional test pitting and sampling at 3A Homelands Ave.
- Task 3: Balance of Fill:
  - o Asbestos in fill to be handled as unexpected finds during excavation of the site (Appendix F); and
  - o For fill remaining on the site (which is considered to potentially contain asbestos) to be capped and contained at depth as outlined in Section 10.2.3 below.

### 10.2.3 Task 1: Delineation and Possible Excavation and Off-Site Disposal of Impacted Fill at BH2 and BH3

With respect to BH2 and BH3, following the removal of the asphalt from the car park in the south and prior to the removal of underlying materials, the appointed Environmental Consultant is to inspect the underlying material for signs of contamination (i.e., staining and odours). If contamination is identified, further sampling of the surrounding soils to delineate the extent of contamination is to be conducted as follows:

- One soil sample at 1.0 m distance (or as established by the Environmental Consultant based on site observations) in each cardinal direction (north, east, south and west) from BH2 and / or BH3, and analysis for TRH at a National Association of Testing Authorities (NATA) accredited laboratory;
- If exceedances of the RAC are identified in the 1 m sample locations, additional samples will be analysed in a concentric fashion surrounding samples that fail the RAC; and
- Once the extent of contamination has been identified, remediation of the soils is to be conducted as follows:
  - o Excavation of impacted fill or to the extent of contamination concentrations above the RAC as determined by delineation sampling following removal of the pavement;
  - o Validation of the remediation excavations in accordance with this RAP;
  - o Off-site disposal of the impacted fill to an appropriately licenced landfill in accordance with EPA (2014); and
  - o A survey of the final remediation excavation areas is to be conducted by a licenced surveyor as directed by the Project Principal (or Principals) and provided to the Environmental Consultant prior to final validation.

### 10.2.4 Task 2: Data-gap Investigation at 3A Homeland Avenue Carlingford

This investigation will be conducted post demolition and clearance at which point the potential risk associated with asbestos (and other potential hazardous building materials) in building demolition waste can most effectively be assessed.

The NSW EPA's *Contaminated Land Guidelines Sampling design part 1 - application* (2022) provides several different sampling strategies. For systematic sampling for site characterisation (for a DSI) it recommends a minimum of 8 systematic grid-based sampling locations for a site of up to 0.08 hectares (ha). Additional locations would be required to assess point sources of potential contamination if any were found during the data-gap investigation.

The data-gap investigation will comprise:

- A site walkover to observe situations that indicate a potential for contamination and identify any environmental receptors;
- Excavation of eight test pits to either a maximum of 3.0 m depth or 0.5 m depth into natural in systematic grid-based sampling locations;
- Analyse samples for CoPC as outlined in the CSM in Section 7;
- Compare results to the RAC provided in Appendix B; and

- Provision of a contamination report for additional assessment of site suitability; identification (and delineation where possible) of contamination requiring remediation or management; additional waste classification assessment and advice on requirements for an update to the RAP as required.

### 10.2.5 Task 3: Balance of Fill

If asbestos is encountered prior to, or during, site development works the 'Asbestos Finds Protocol' provided in Appendix F will apply. This includes (*inter alia*):

- Upon discovery of suspected ACM, the Site Manager (on behalf of the Principal) is to be notified and the affected area closed;
- An Environmental Consultant is to be notified to inspect the area, confirm the presence of asbestos and assess the concentration of asbestos in soil with reference to the RAC;
- The assessment should be completed with reference to the methodology provided in the UFP in Appendix F;
- Where the concentration of asbestos in fill is identified to be above the RAC, the impacted fill will require off-site disposal as outlined in Appendix F and Section 13 of this RAP;
- Further works in the identified area should only continue following confirmation from the Environmental Consultant as outlined in the UFP.
- Documentary evidence (weighbridge dockets from the licensed landfill/waste receiver) of correct disposal is to be provided to the principal (or their representative) and environmental consultant;
- At the completion of the excavation, validation of the remediated location is to be undertaken by the environmental consultant in accordance with Section 12 of this RAP; and
- If required, the fill remaining in the inspected area can be covered / sealed by an appropriate physical barrier layer of non-asbestos containing material prior to sign-off as outlined below.

On completion of the development, existing fill within the site must be covered. The covering material should comprise:

- A minimum depth of 0.1 m of imported soil classified with reference to the RAP. The client may opt to bury the material at a greater depth. Should ground floor apartments include private gardens, burial of fill at a minimum depth of 0.5 m is required for those gardens; and
- Where fill is to be placed under a building slab or within a proposed road, the building slab or road construction materials (sub-base, base course and asphalt) are considered as suitable cover.

DP understands that some areas of the site (potentially roads) may be dedicated to Council at the completion of the development. Prior to development, the client should obtain written acceptance and approval from Council if these areas are to contain existing on-site fill.

## 11. Assessment Criteria

### 11.1 Remediation Acceptance Criteria

In the absence of a Tier 2 site-specific assessment from which site-specific clean-up criteria can be derived, generic Tier 1 site assessment criteria have been adopted as the Remediation Acceptance Criteria (RAC).

The RAC adopted are informed by the CSM which identified human and environmental receptors to potential contamination on the site. The RAC comprise investigation and screening levels for residential apartments (land use category B) from National Environmental Protection Council, *National Environment Protection (Assessment of Site Contamination) Measure* 1999, amended 2013 (ASC NEPM) which is endorsed by the NSW EPA.

The investigation and screening levels applied in the current investigation comprise levels adopted for a residential with minimal soil access (HILB) land use scenario. The derivation of the SAC is included in Appendix B and the adopted SAC are listed on the summary analytical results in Appendix C.

## 12. Validation Plan

### 12.1 Data Quality Objectives

The data quality objectives (DQO) for the validation plan are included in Appendix E.

### 12.2 Validation Assessment Requirements

The following site validation work will be required:

- Field assessment by the Environmental Consultant comprising:
  - o Visual inspection, including taking photographs for record purposes;
  - o Collecting validation samples from excavations resulting from the removal of contaminated soils; and
  - o Collecting validation / characterisation samples for materials to be re-used on-site.
- Where fill containing ACM below the RAC remains on-site, surveying by a Licenced Surveyor comprising:
  - o Survey of the extent and levels of the base of the excavations; and
  - o Survey of the extent and levels of the top of the capping layer.
- Laboratory analysis of validation samples at a NATA accredited laboratory for:
  - o The CoPC relevant to the remediation area; and
  - o Quality control (QC) samples in accordance with Section 15.
- Comparison by the Environmental Consultant of the laboratory results with the SAC and / or RAC as appropriate (refer to Section 11); and

- Preparation by the Environmental Consultant of a Site Remediation and Validation Report (SRVR) detailing the methods and results of the remediation works and validation assessment.

### 12.3 Visual Inspections

All areas to be assessed and validated will first be subject to a visual inspection by the Environmental Consultant. Any areas of fill / ACM / staining (as appropriate for the remediation) must be remediated according to this RAP prior to validation sampling.

### 12.4 Validation Sampling

The sampling frequency will depend on the volume or area to be assessed and the previous results. The following approximate sampling frequencies will be adopted but may be modified by the Environmental Consultant to consider previous results, where applicable.

Small to medium excavations (base <500 m<sup>2</sup>):

- Base of excavation: one sample per 25 m<sup>2</sup> to 50 m<sup>2</sup> or part thereof, with a minimum of three samples collected; and
- Sides of excavation: one sample per 10 m to 20 m length or part thereof with a minimum of one sample per wall. Additional samples will be collected at depths of concern where there is more than one depth of concern, with a minimum of one sample per 1.5 m depth in fill.

Large excavations (base ≥500 m<sup>2</sup>):

- Base of excavation: sampling on a grid at a density in accordance with Table A in NSW EPA (2022). *Contaminated Land Guidelines Sampling design part 1 - application* NSW Environment Protection Authority or a minimum of 10 samples. In sub-areas with any specific signs of concern, a higher sampling density may be required; and
- Sides of excavation: one sample per 20 m length or part thereof with a minimum of one sample per wall. Additional samples will be collected at depths of concern where there is more than one depth of concern, with a minimum of one sample per 1.5 m depth in fill.

Where contaminated soils are stored or treated on bare soils, the footprint of the stockpile will require validation following removal of the contaminated soils.

Validation samples will be analysed by a NATA accredited laboratory for the CoPC relevant to the remediation area.

Validation sample test results will be compared to the RAC, as per the DQO (Appendix E). Where the RAC are considered to have not been met, the remediation excavation(s) will be expanded to 'chase-out' impacted material, as instructed by the Environmental Consultant, with the validation sampling then continuing into the extended excavation. This process will continue until the impacted material has been fully chased out.

### 13. Waste Disposal

Any waste disposed off-site must be initially classified by the Environmental Consultant in accordance with:

- NSW EPA *Waste Classification Guidelines, Part 1: Classifying Waste* (NSW EPA, 2014a);
- NSW EPA *Waste Classification Guidelines, Part 2: Immobilisation of Waste* (NSW EPA, 2014b);
- NSW EPA *Waste Classification Guidelines, Part 4: Acid Sulfate Soils* (NSW EPA, 2014c); and
- NSW EPA *Addendum to the Waste Classification Guidelines (2014) - Part 1: Classifying Waste* (NSW EPA, 2016) [addendum for per- and poly-fluoroalkyl substances (PFAS)].

Disposal of waste must be to an appropriately licensed waste facility, as per *Protection of the Environment Operations Act 1997* NSW (POEO Act) and the *Protection of the Environment (Waste) Regulation 2014* NSW.

Samples will be collected from stockpiles / *in situ* fill at various depths to characterise the full depth of the material. The frequency is to be established by the Environmental Consultant based on the risk of contamination and heterogeneity of the material.

The suggested sampling frequency for the initial assessment of stockpiles comprising similar materials shall be:

- One sample per 25 m<sup>3</sup> for stockpiles up to 200 m<sup>3</sup>, with a minimum of three per stockpile; and
- One sample per 50 m<sup>3</sup> to 100 m<sup>3</sup> for stockpiles greater than 200 m<sup>3</sup>, by applying statistical analysis with reference to EPA Victoria *Soil Sampling* (EPA Victoria, 2009). DP notes a minimum of 10 samples is required for statistical analysis.

It may be possible to classify excavated soil / fill for reuse on another site under a relevant NSW EPA resource recovery order (RRO) so that it can be used on other sites under the requirements of the corresponding NSW EPA resource recovery exemption (RRE). For this option, the frequency of sampling should be in accordance with the relevant RRO and the contaminants to be analysed will be established by the Environmental Consultant. The Environmental Consultant will provide a report confirming the suitability of the spoil for reuse under a RRO, or otherwise.

All waste must be tracked by the Remediation Contractor from 'cradle to the grave'. Copies of all consignment notes / disposal dockets (or similar) and Environment Protection Licences for receipt and disposal of the materials must be maintained by the Remediation Contractor as part of the site log and must be provided to the Environmental Consultant for inclusion in the SRVR.

## 14. Imported Material

Any soil, aggregate etc imported for the remediation works must have contaminant concentrations that meet the relevant criteria outlined in Section 11 and have no aesthetic issues of concern. Imported materials will only be accepted for use at the site if:

- It can legally be accepted onto the site (e.g., classified as virgin excavated natural material (VENM), accompanied by a report / certificate prepared by a qualified Environmental Consultant);
- Visual inspection by the Environmental Consultant of the imported soil confirms that the soil has no apparent signs of potential concern and is consistent with those described in the supporting classification documentation; and
- The materials are validated (sampled) by the Environmental Consultant as being suitable for use at the site.

The classification report / certificate for all material proposed for import must be reviewed and approved in writing by the Environmental Consultant prior to import. Materials to be imported may need to meet geotechnical requirements which are to be assessed by others, as required.

If permitted by the development consent and approved by the site owner, Remediation Contractor and Environmental Consultant and Site Auditor, material classified under a NSW EPA RRO may also be accepted, provided the material can be used on site in accordance with the corresponding RRE. This could include excavated natural material (ENM), classified under 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* (NSW EPA, 2014d).

The requirement for check-sampling of RRO material is to be established by the Environmental Consultant depending on the source of the material, adequacy of the supporting documentation provided and inspection(s) of material. Quarried material / VENM may need little or no check sampling.

Any imported recycled aggregates must be sampled at a frequency of sampling of one sample per 25 m<sup>3</sup>, with a minimum of three samples per load. The recycled aggregate will not be permitted to be used on site until the results of the inspection and laboratory analysis have been approved in writing by the Environmental Consultant.

## 15. Quality Assurance and Quality Control

Field quality assurance and quality control (QA / QC) testing will include the following:

- 10% sample intra-laboratory analysis, analysed for the same suite as primary sample;
- 5% sample inter-laboratory analysis, analysed for the same suite as primary sample;
- 5% sample intra-laboratory analysis, analysed for the same suite as primary sample;
- Rinsate samples (where re-useable sampling equipment is used), analysed for the suite of analytes analysed by the majority of the primary samples; and
- Trip spike and trip blank samples (analysed for BTEX) (approximately one per batch of samples).

This frequency above it not considered relevant for samples taken solely for asbestos analysis.

The laboratory will conduct analysis in accordance with its NATA accreditation, including in-house QA / QC procedures.

The QC analytical results will be assessed using the following criteria:

- Sampling location rationale met the sampling objective;
- Standard operating procedures (SOP) are followed;
- Appropriate QC samples are collected / prepared 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;
- Conformance with specified holding times;
- Accuracy of spiked samples within the laboratory's acceptable range (typically 70-130% for inorganic contaminants and greater for some organic contaminants); and
- Field and laboratory duplicate and replicate samples will have a precision average of +/- 30% relative percentage difference (RPD).

## **16. Management and Responsibilities**

### **16.1 Site Management Plan**

A General Site Management Plan (GSMP) for the operational phase of site remediation is included in Appendix G. The management plan includes soil, noise, dust, work health safety (WHS), remediation schedule, hours of operation and incident response. The Remediation Contractor is to implement the (GSMP) for the duration of remedial works by incorporating the plan into their over-arching Construction Environmental Management Plan (CEMP).

### **16.2 Site Responsibilities**

The GSMP (Appendix G) provides a summary of the general program management and associated responsibilities. Contact details for key utilities are also included in the event of needing to respond to any incidents.

### **16.3 Contingency Plan and Unexpected Finds Protocol**

Plans for contingency situations (e.g., encountering asbestos in fill), along with an Unexpected Finds Protocol (UFP) for dealing with unexpected finds during remediation work / earthworks, are included in Appendix F.

## 17. Validation Reporting

### 17.1 Documentation

The following documents will need to be collated and reviewed by the Environmental Consultant as part of the validation assessment (including those items that are prepared by the Environmental Consultant):

- Any licences and approvals required for the remediation works;
- Waste classification report(s);
- Transportation Record: comprising a record of all truck-loads of soil (including aggregate) entering the site, including truck identification (e.g., registration number), date, time, source site, load characteristics (e.g., type of material, i.e., quarried aggregate, etc.), approximate volume, use (e.g., general site raising, service trenches, etc.);
- Disposal docket(s): for any soil disposed off-site. The Remediation Contractor will supply records of: transportation records, spoil source, spoil disposal location, receipt provided by the receiving waste facility / site. Note: A record of the building materials disposed off-site is also to be kept and provided to the Principal, on request;
- Imported materials records: records for any soil imported onto the site, including source site, classification reports, inspection records of soil upon receipt at site and transportation records;
- Records relating to any unexpected finds and contingency plans implemented;
- Laboratory certificates and chain-of-custody documentation;
- Inspection records from the Environmental Consultant;
- Photographic records by all contractors and consultants of the works conducted within their purview of responsibilities;
- Surveys pre- and post-installation of geotextile marker layer and clean fill cap;
- Airborne asbestos monitoring records (if asbestos works are conducted); and
- Interim / final visual and sampling clearances for any asbestos related works (if asbestos works are conducted).

### 17.2 Reporting

A SRVR report will be prepared by the Environmental Consultant in accordance with NSW EPA *Guidelines for Consultants Reporting on Contaminated Land*. Contaminated Land Guidelines: NSW Environment Protection Authority (NSW EPA) (2020).

The SRVR shall describe the remediation approach adopted, methodology, results and conclusion of the assessment and make a statement regarding the suitability of the site for the proposed development (residential aged care facility).

## 18. Conclusions

It is considered that the site can be rendered suitable for the proposed seniors housing (residential) development subject to implementation of this RAP.

## 19. References

- CRC CARE. (2019a). *Remediation Action Plan: Development - Guideline on Establishing Remediation Objectives*. National Remediation Framework: CRC for Contamination Assessment and Remediation of the Environment.
- CRC CARE. (2019b). *Remediation Action Plan: Development - Guideline on Performing Remediation Options Assessment*. National Remediation Framework: CRC for Contamination Assessment and Remediation of the Environment.
- EPA Victoria. (2009). *Soil Sampling*. Publication IWRG702, June 2009: Environment Protection Authority Victoria, Melbourne, Australia.
- NEPC. (2013). *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM]*. Australian Government Publishing Services Canberra: National Environment Protection Council.
- NSW DUAP/EPA. (1998). *Managing Land Contamination, Planning Guidelines, SEPP 55 – Remediation of Land*. NSW Department of Urban Affairs and Planning / Environment Protection Authority.
- NSW EPA. (2014a). *Waste Classification Guidelines, Part 1: Classifying Waste*. NSW Environment Protection Authority.
- NSW EPA. (2014b). *Waste Classification Guidelines, Part 2: Immobilisation of Waste*. NSW Environment Protection Authority.
- NSW EPA. (2014c). *Waste Classification Guidelines, Part 4: Acid Sulfate Soils*. NSW Environment Protection Authority.
- NSW EPA. (2014d). *Resource Recovery Order under Part 9, Clause 93 of the Protection of the Environment Operations (Waste) Regulation 2014, The excavated natural material order 2014*. NSW Environment Protection Authority.
- NSW EPA. (2016). *Addendum to the Waste Classification Guidelines (2014) - Part 1: Classifying Waste*. NSW Environment Protection Authority.
- NSW EPA. (2020). *Guidelines for Consultants Reporting on Contaminated Land*. Contaminated Land Guidelines: NSW Environment Protection Authority.
- WA DoH. (2021). *Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia*. WA Department of Health.

## 20. Limitations

Douglas Partners (DP) has prepared this report for this project at 264-268 Pennant Hills Road, Carlingford (the site) in accordance with DP's proposal 92284.08 dated 29 June 2022 and acceptance received from William Tseng on behalf of TSA Management Pty Ltd dated 5 July 2022. This report is provided for the exclusive use of TSA Management 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 this 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.

The assessment of atypical safety hazards arising from this advice is restricted to the environmental components set out in this report and based on known project conditions and stated design advice and assumptions. While some recommendations for safe controls may be provided, detailed 'safety in design' assessment is outside the current scope of this report and requires additional project data and assessment.

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.

Asbestos has been detected by observation or by laboratory analysis, either on the surface of the site, or in fill materials at the test locations sampled and analysed. Although the sampling plan adopted for this investigation is 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 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 asbestos is not present.

---

**Douglas Partners Pty Ltd**

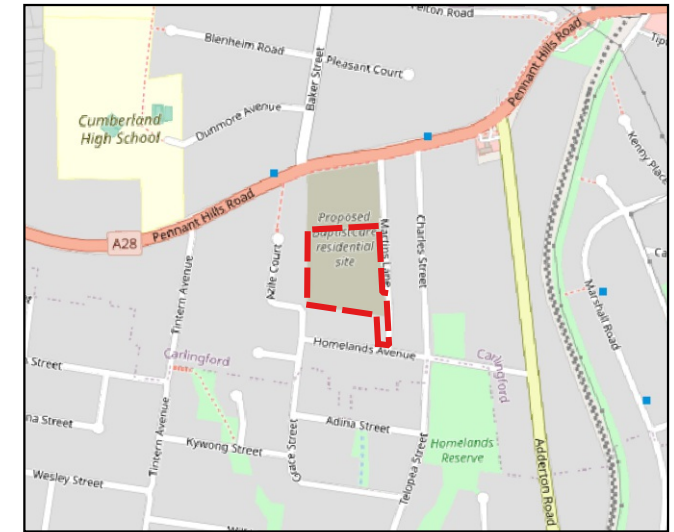
---

## Appendix A

---

[Drawings](#)

[About this Report](#)



Locality Plan

Notes:  
1. Basemap from metromap.com.au (Dated 13.06.2022)

0 10 20 30 40 50 m

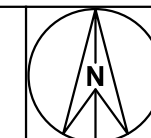
**LEGEND**

 Approximate Site Boundary

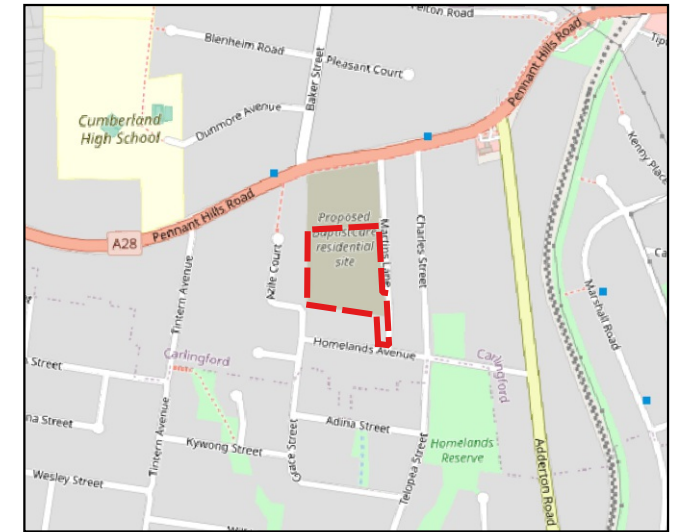


CLIENT: TSA Management Pty Ltd  
OFFICE: Sydney  
SCALE: 1:800 @ A3  
DRAWN BY: MG  
DATE: 20.10.2022

TITLE: **Remediation Action Plan - Site Location and Boundary**  
**BaptistCare Seniors Housing Project**  
**1 Martins Lane and 3A Homelands Avenue, Carlingford**



PROJECT No: 92284.09  
DRAWING No: 1  
REVISION: 0



**Locality Plan**

NOTE:  
Mature tree zones are currently being defined by the arborist and are not shown on this drawing

**LEGEND**

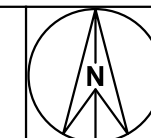
- Approximate Site Boundary
- Temporary Sediment Basins
- Sediment Mounds
- Approximate (known) Removed /

Notes:  
1. Basemap from metromap.com.au (Dated 13.06.2022)



CLIENT: TSA Management Pty Ltd  
OFFICE: Sydney      DRAWN BY: MG  
SCALE: 1:800 @ A3      DATE: 20.10.2022

TITLE: **Remediation Action Plan - Approx. Location of Features**  
**BaptistCare Seniors Housing Project**  
**1 Martins Lane and 3A Homelands Avenue, Carlingford**

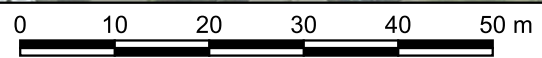


PROJECT No: 92284.09  
DRAWING No: 2  
REVISION: 0



Locality Plan

Notes:  
 1. Basemap from metromap.com.au (Dated 13.06.2022)



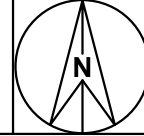
**LEGEND**

- Approximate Site Boundary
- Borehole Location (DP, 92284.08, 2022)
- SCI Test Pit Location (DP, 92284.02, 2019)
- DGI Test Pit Location (DP, 92284.00.R.002, )
- DGI Delineation Sample Locations (DP, 92284.00, 2019)
- Borehole Location (DP, 85665.05, 2019)
- PSI Borehole Location (DP, 85665.00, 2016)



CLIENT: TSA Management Pty Ltd	DRAWN BY: MG
OFFICE: Sydney	DATE: 20.10.2022
SCALE: 1:800 @ A3	

TITLE: **Remediation Action Plan - Previous Sample Locations**  
**BaptistCare Seniors Housing Project**  
**1 Martins Lane and 3A Homelands Avenue, Carlingford**



PROJECT No:	92284.09
DRAWING No:	3
REVISION:	0



FOR LANDSCAPE INFORMATION REFER TO LANDSCAPE ARCHITECTS DRAWINGS

DRAFT - FOR SUBMISSION



Builder/Contractor shall verify job dimensions before any job commences.  
 Figured dimensions take precedence over drawings and job dimensions.  
 All shop drawings shall be submitted to the Architect/Consultant, and manufacturer shall commence prior to return of inspected shop drawings by the Architect/Consultant.

Rev.	Date	By	Ckd	Description
01	22/07/2022			FOR INFORMATION
02				
03	2/09/2022	RJ	RJ	FOR COORDINATION
04	16/09/2022			FOR SUBMISSION

- |  |   |  |   |
|--|---|--|---|
| <b>Consultants</b><br>Planning Consultant<br>Landscape Architect<br>Services Consultant<br>Structural Consultant<br>Civil Engineer<br>Arborist<br>BCA<br>Fire Engineer | - Ethos Urban<br>- Oculus<br>- JN<br>- Stantec<br>- Stantec<br>- CPS<br>- BM+G<br>- Innova Services | <b>Project Manager</b><br><b>Wind Consultant</b><br><b>Access Consultant</b><br><b>Traffic Consultant</b><br><b>Connecting with Country</b><br><b>Comms &amp; Engagement</b><br><b>Quantity Surveyor</b><br><b>Waste</b> | - TSA<br>- Windtech<br>- ABS Access<br>- SECA Solutions<br>- FCAD<br>- WSP<br>- RLB<br>- Elephants Foot |
|--|---|--|---|

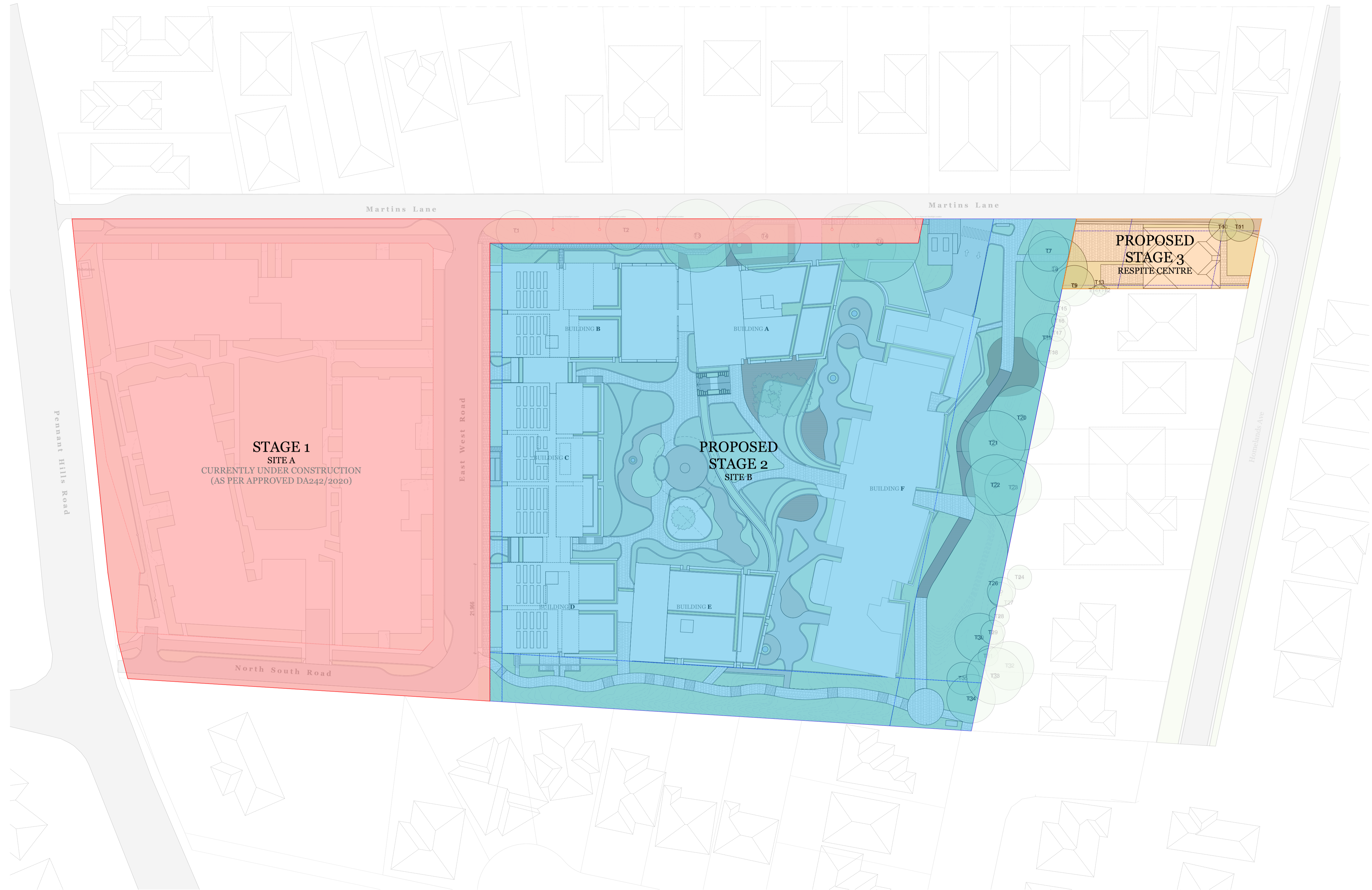
DKO Architecture (NSW) Pty Ltd  
 42 Davies Street  
 Surry Hills, NSW 2010  
 T +61 2 8346 4500  
 info@dko.com.au  
 www.dko.com.au  
 ARN: 81956706590  
 NSW: Nominated Architects  
 Koos de Keijzer 5767  
 David Randerson 8542



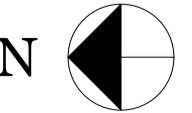
Project Name: Carlingford Site B  
 Project Number: 1  
 Project Address: 1 Martins Lane, Carlingford, NSW 2118

Drawing Series: Overall Site Plan 1:250  
 Drawing Name: DA105  
 Drawing Number: DA105  
 Revision: 03  
 Drawing Date: September 2022

© DKO Architecture (NSW) Pty Ltd  
 Except as allowed under copyright act, no part of this drawing may be reproduced or otherwise dealt with without written permission of DKO Architecture.



**DRAFT - FOR SUBMISSION**



Rev.	Date	By	Ckd	Description
03	16/09/2022			FOR SUBMISSION

Builder/Contractor shall verify job-dimensions before any job commences. Figured dimensions take precedence over drawings and job-dimensions. All shop drawings shall be submitted to the Architect/Consultant, and manufacture shall not commence prior to return of inspected shop drawings by the Architect/Consultant.

- |  |   |   |   |
|--|---|---|---|
| <b>Consultants</b><br>Planning Consultant<br>Landscape Architect<br>Services Consultant<br>Structural Consultant<br>Civil Engineer<br>Arborist<br>BCA<br>Fire Engineer | - Ethos Urban<br>- Oculus<br>- JN<br>- Stantec<br>- Stantec<br>- CFS<br>- BM+G<br>- Innova Services | <b>Project Manager</b><br>Wind Consultant<br>Access Consultant<br>Traffic Consultant<br>Connecting with Country<br>Comms & Engagement<br>Quantity Surveyor<br>Waste | - TSA<br>- Windtech<br>- ABS Access<br>- SECA Solutions<br>- FCAD<br>- WSP<br>- RLB<br>- Elephants Foot |
|--|---|---|---|

DKO Architecture (NSW) Pty Ltd  
 42 Davies Street  
 Surry Hills, NSW 2010  
 T +61 2 8346 4500  
 info@DKO.com.au  
 www.DKO.com.au  
 ARN: 81956706590  
 NSW: Nominated Architects  
 Koos de Keijzer 5767  
 David Randerson 8542



Project Name: Carlingford Site B  
 Project Number: Project No.  
 Project Address: 1 Martins Lane, Carlingford, NSW 2118

Drawn By: [Blank]  
 Checked By: [Blank]  
 Date: September 2022  
 Scale: [Blank]

Drawing Series: [Blank]  
 Drawing Name: [Blank]  
 Drawing Number: **DA106**  
 Revision: **03**

Site Series: Staging Plan 1:500



# Martins Lane



**DRAFT - FOR SUBMISSION**



Builder/Contractor shall verify job dimensions before any job commences.  
Figured dimensions take precedence over drawings and job dimensions.  
All shop drawings shall be submitted to the Architect/Consultant, and manufacture shall not commence prior to return of inspected shop drawings by the Architect/Consultant.

Rev.	Date	By	Ckd	Description
01	22/07/2022			FOR INFORMATION
02	2/09/2022	RJ	RJ	FOR COORDINATION
03	16/09/2022			FOR SUBMISSION

- |  |   |   |   |
|--|---|---|---|
| <b>Consultants</b><br>Planning Consultant<br>Landscape Architect<br>Services Consultant<br>Structural Consultant<br>Civil Engineer<br>Arborist<br>BCA<br>Fire Engineer | - Ethos Urban<br>- Oculus<br>- JN<br>- Stantec<br>- Stantec<br>- CFS<br>- BM+G<br>- Innova Services | <b>Project Manager</b><br>Wind Consultant<br>Access Consultant<br>Traffic Consultant<br>Connecting with Country<br>Comms & Engagement<br>Quantity Surveyor<br>Waste | - TSA<br>- Windtech<br>- ABS Access<br>- SECA Solutions<br>- FCAD<br>- WSP<br>- RLB<br>- Elephants Foot |
|--|---|---|---|

DKO Architecture (NSW) Pty Ltd  
42 Davies Street  
Surry Hills, NSW 2010  
T +61 2 8346 4500  
info@dko.com.au  
www.dko.com.au  
ABN: 81956706590  
NSW: Nominated Architects  
Kees de Keijzer 5767  
David Randerson 8542



Project Name: Carlingford Site B  
Project Number: Carlingford No. 1  
Project Address: 1 Martins Lane, Carlingford, NSW 2118

Drawing Series: Plans  
Drawing Name: Level 1 Floor Plan 1:250  
Drawing Number: DA201  
Revision: 03  
Date: September 2022

© DKO Architecture (NSW) Pty Ltd  
Except as allowed under copyright act, no part of this drawing may be reproduced or otherwise dealt with without written permission of DKO Architecture.

# Martins Lane

PROPOSED LOADING ZONE



	RV ADMINISTRATION
	RV AMENITY
	RV WELLNESS

### PAVEMENT PATTERN KEY:

	INDOORS - FULLY ENCLOSED AND CONDITIONED
	UNDERCROFT - AWNING OVER, WEATHER PROTECTED, OPEN TO THE SIDE
	OUTDOORS - FULLY OPEN TO AIR, NO AWNING

**DRAFT - FOR SUBMISSION**



Builder/Contractor shall verify job dimensions before any job commences. Figured dimensions take precedence over drawings and job dimensions. All shop drawings shall be submitted to the Architect/Consultant, and manufacturer shall not commence prior to return of inspected shop drawings by the Architect/Consultant.

Rev.	Date	By	Ckd	Description
01	22/07/2022			FOR INFORMATION
002	2/09/2022	RJ	RJ	FOR COORDINATION
03	16/09/2022			FOR SUBMISSION

- |  |   |
|--|---|
| <p><b>Consultants</b></p> <ul style="list-style-type: none"> <li>Planning Consultant - Ethos Urban</li> <li>Landscaping Architect - Oculus</li> <li>Services Consultant - JIN</li> <li>Structural Consultant - Stantec</li> <li>Civil Engineer - Stantec</li> <li>Arboreal - CFS</li> <li>BCA - BM+G</li> <li>Fire Engineer - Innova Services</li> </ul> | <p><b>Project Manager</b> - TSA</p> <ul style="list-style-type: none"> <li>Wind Consultant - Windtech</li> <li>Access Consultant - ABS Access</li> <li>Traffic Consultant - SECA Solutions</li> <li>Connecting with Country Comms &amp; Engagement - FCAD</li> <li>Quantity Surveyor - WSP</li> <li>Waste - RLB</li> <li>Elephants Foot - Elephants Foot</li> </ul> |
|--|---|

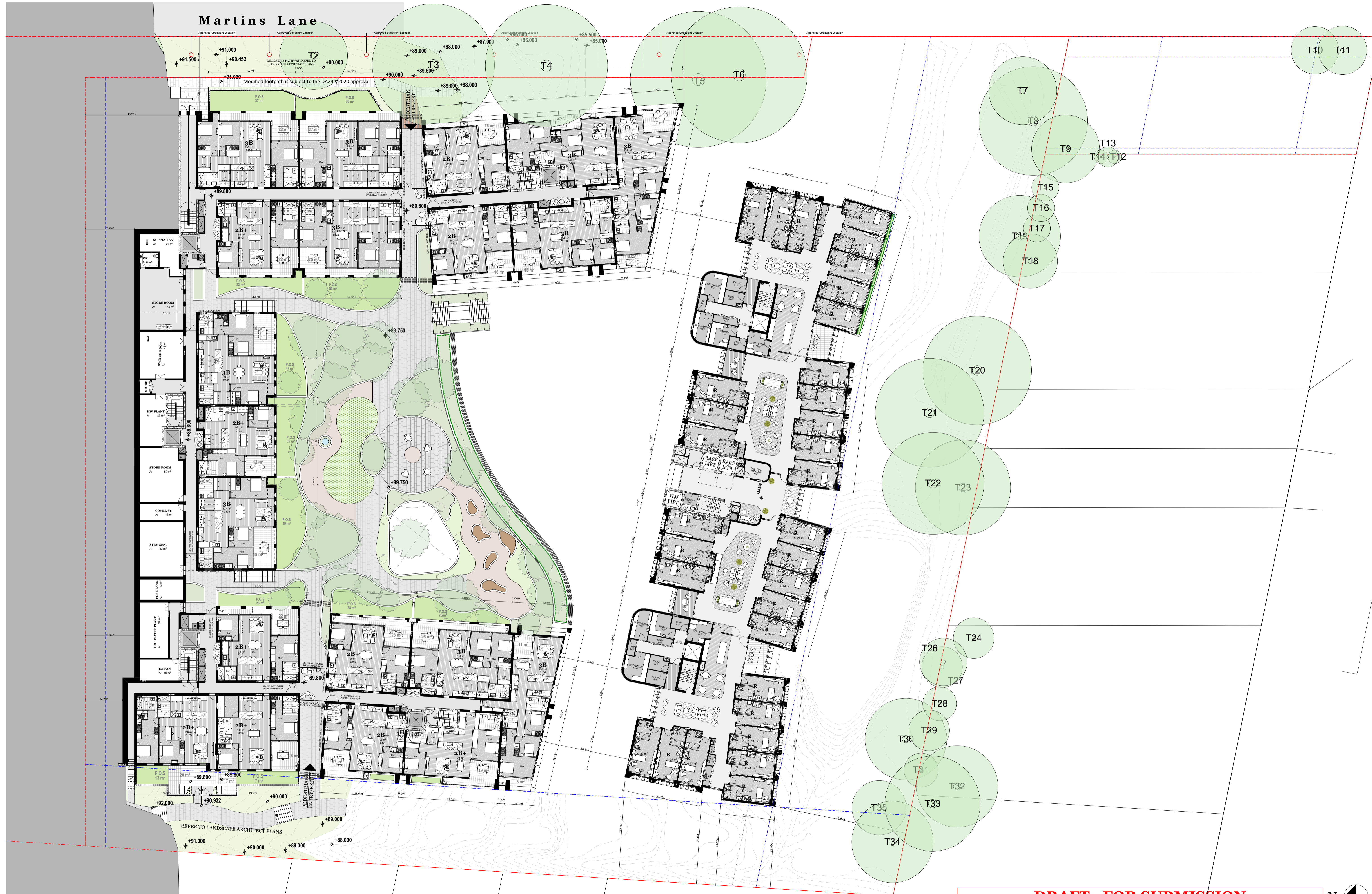
DKO Architecture (NSW) Pty Ltd  
42 Davies Street  
Surry Hills, NSW 2010  
T +61 2 8346 4500  
info@dko.com.au  
www.dko.com.au  
ABN: 81965706590  
NSW: Nominated Architects  
Kees de Keijzer 5767  
David Randerson 8542



Project Name: Carlingford Site B  
Project Number: 1  
Project Address: 1 Martins Lane, Carlingford, NSW 2118

Drawing Series: Plans  
Drawing Name: Level 2 Floor Plan 1:250  
Drawing Number: DA202  
Revision: 03  
Date: September 2022

# Martins Lane



**DRAFT - FOR SUBMISSION**



Builder/Contractor shall verify job-dimensions before any job commences.  
Figured dimensions take precedence over drawings and job-dimensions.  
All shop drawings shall be submitted to the Architect/Consultant, and manufacture shall not commence prior to return of inspected shop drawings by the Architect/Consultant.

Rev.	Date	By	Ckd	Description
01	22/07/2022			FOR INFORMATION
02	2/09/2022	RJ	RJ	FOR COORDINATION
03	16/09/2022			FOR SUBMISSION

- |  |   |   |   |
|--|---|---|---|
| <b>Consultants</b><br>Planning Consultant<br>Landscape Architect<br>Services Consultant<br>Structural Consultant<br>Civil Engineer<br>Arborist<br>BCA<br>Fire Engineer | - Ethos Urban<br>- Oculus<br>- JN<br>- Stantec<br>- Stantec<br>- CFS<br>- BM+G<br>- Innova Services | <b>Project Manager</b><br>Wind Consultant<br>Access Consultant<br>Traffic Consultant<br>Connecting with Country<br>Comms & Engagement<br>Quantity Surveyor<br>Waste | - TSA<br>- Windtech<br>- ABS Access<br>- SECA Solutions<br>- FCAD<br>- WSP<br>- RLB<br>- Elephants Foot |
|--|---|---|---|

DKO Architecture (NSW) Pty Ltd  
 42 Davies Street  
 Surry Hills, NSW 2010  
 T +61 2 8346 4500  
 info@dko.com.au  
 www.dko.com.au  
 ABRN: 81956706590  
 NSW: Nominated Architects  
 Koos de Keijzer 5767  
 David Randerson 8542

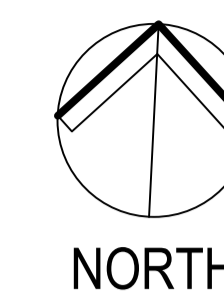


Project Name: Carlingford Site B  
 Project Number: Project No.  
 Project Address: 1 Martins Lane, Carlingford, NSW 2118

Drawing Series: Plans  
 Drawing Name: Level 3 Floor Plan 1:250  
 Drawing Number: **DA203**  
 Revision: **03**

Drawn By: [Blank]  
 Checked By: [Blank]  
 Date: September 2022  
 Scale: [Blank]

THESE DESIGNS, DRAWINGS AND SPECIFICATIONS ARE COPYRIGHT AND THE PROPERTY OF SCP CONSULTING AND MUST NOT BE USED, REPRODUCED OR COPIED WHOLLY OR IN PART WITHOUT THE WRITTEN PERMISSION OF SCP CONSULTING



NOTE:  
REFER TO PUBLIC DOMAIN  
PACKAGE FOR ANY WORKS  
EXTERNAL TO SITE.

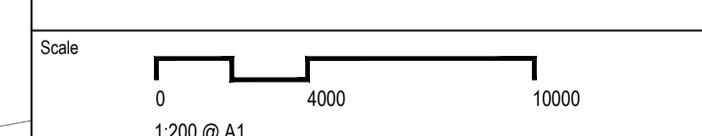
Rev	Revision Description	Date
04	ISSUE FOR TENDER	22.01.2021
03	RE-ISSUE FOR DEVELOPMENT APPLICATION	08.10.2020
02	ISSUE FOR DA	05.02.2020
01	ISSUE FOR DA	18.02.2020

**scp** engineers and development consultants  
 L2 Danchen House  
 507 Kent St Sydney NSW 2000  
 ABN 80 003 076 024  
 T (02) 9267 9312  
 mail@scpsconsult.com.au  
 www.scpsconsult.com.au

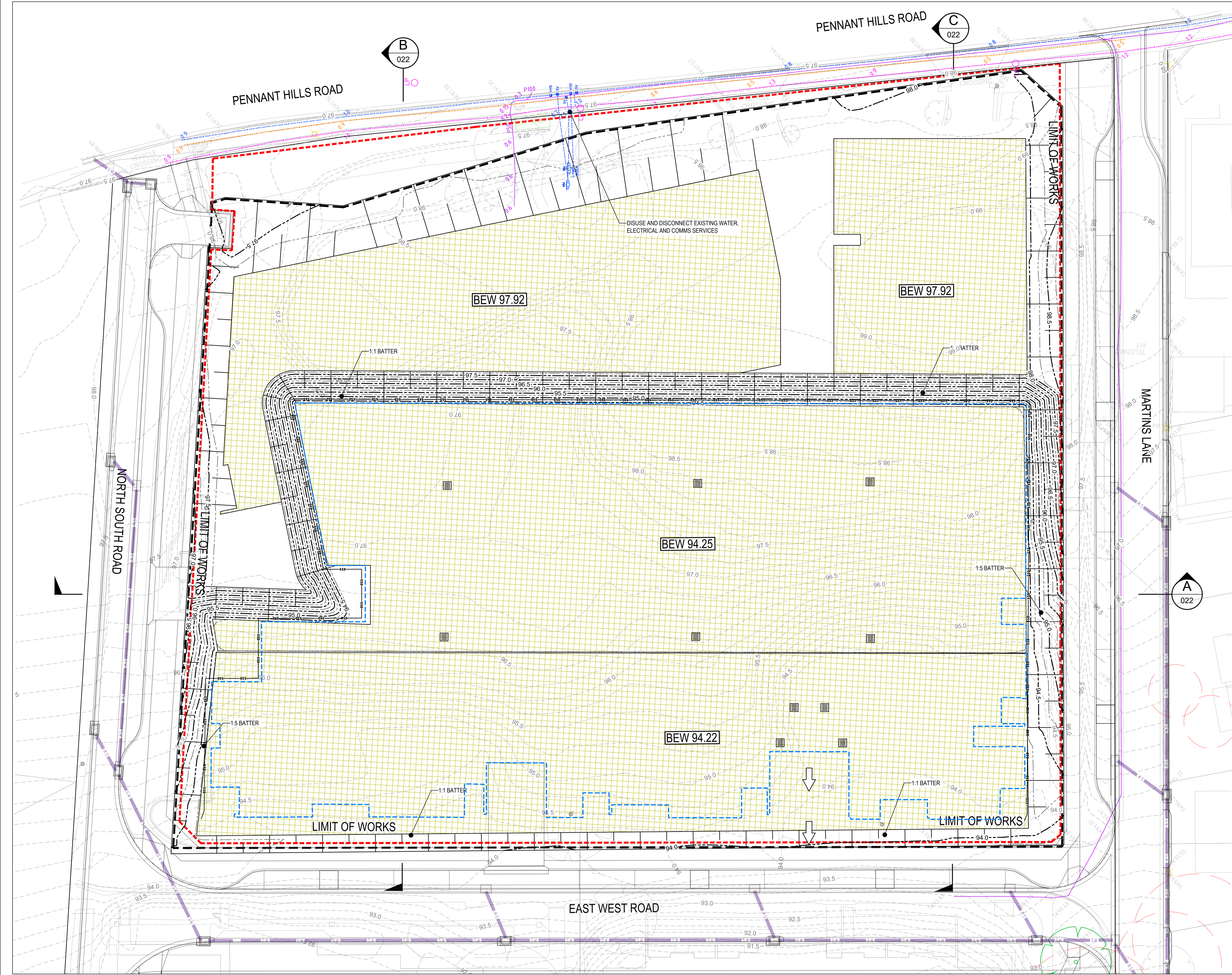


Project  
**BAPTISTCARE CARLINGFORD**  
**246 - 268 PENNANT HILLS RD,**  
**CARLINGFORD**

Title  
**BULK EARTHWORKS PLAN**



Drawn	Checked	Approved	Revision
LW	BSh	JC	
Project Number <b>160060</b>	Drawing Number <b>254590-2-CD-000-020</b>		<b>04</b>



22/01/2021 11:11:17 AM  
 SCP Consulting Pty Ltd K:\0000011111\Comp\proj\_BaptistCare\_Carlingford\BaptistCare\_Carlingford\_160060\_254590-2-CD-000-020\_Bulk Earthworks Plan.dwg  
 PLOTTED BY CAD

# About this Report

# Douglas Partners



## 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**

---

### Remediation Acceptance Criteria

## Appendix B: Remediation Acceptance Criteria

### 1 Martins Lane and 3A Homelands Avenue, Carlingford

---

#### B1.0 Introduction

##### B1.1 Guidelines

The following key guidelines were consulted for deriving the remediation acceptance criteria (RAC):

- NEPC National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [the 'NEPM'] (NEPC, 2013).
- CRC CARE *Health screening levels for petroleum hydrocarbons in soil and groundwater* (CRC CARE, 2011).
- HEPA *PFAS National Environmental Management Plan (NEMP)* (HEPA, 2020).
- ANZG *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZG, 2018).
- NHMRC *Guidelines for Managing Risks In Recreational Water* (NHMRC, 2008).
- ANZECC *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC, 2000).

##### B1.2 General

In the absence of a Tier 2 site-specific assessment from which site-specific clean-up criteria can be derived, generic Tier 1 site assessment criteria have been adopted as the remediation acceptance criteria (RAC).

The RAC adopted are informed by the CSM which identified human and environmental receptors to potential contamination on the site. The RAC comprise investigation and screening levels for residential (senior living) high-rise buildings and apartments (land use category B) from National Environmental Protection Council, *National Environment Protection (Assessment of Site Contamination) Measure 1999, amended 2013 (ASC NEPM)* which is endorsed by the NSW EPA.

NEPC (2013) defines the various as follows:

- Bonded ACM: Asbestos-containing material which is in sound condition, bound in a matrix of cement or resin, and cannot pass a 7 mm x 7 mm sieve;
- FA: Fibrous asbestos material including severely weathered cement sheet, insulation products and woven asbestos material. This material is typically unbonded or was previously bonded and is now significantly degraded and crumbling; and
- AF: Asbestos fines including free fibres, small fibre bundles and also small fragments of bonded ACM that pass through a 7 mm x 7 mm sieve.

Table 1 below presents the adopted remediation acceptance criteria (RAC) for asbestos impacted fill at the site.

**Table 1: Remediation Acceptance Criteria for Asbestos in Soil**

<b>Contaminant of Concern</b>	<b>RAC</b>	<b>Comment</b>
Bonded ACM	0.04%	Fill impacted with bonded ACM above the RAC will be remediated through Remediation Option 4 – Off-site disposal.
FA / AF	0.001%	Fill impacted with AF / FA above the RAC will be remediated through Remediation Option 4 – Off-site disposal. FA / AF has not been observed at the site by DP or reported in laboratory certificates of analysis. The RAC for FA / AF will only be applicable if indicators of FA/AF (i.e., pipe lagging, insulation, weathered ACM that can be crushed or pulverised using the hand, fragments of ACM < 7 mm) are encountered during development works.
All forms of Asbestos	No visible asbestos in surface soils	Fill impacted with bonded ACM below the RAC will be remediated through Remediation Option 3 – On-site burial. Existing fill retained within the site will require burial at a minimum depths (below 100 mm) discussed in Section 11.5.

### B1.3 Other Contaminants of Potential Concern

The RAC for TRH (and other CoPC that may be identified during validation or site development works) are presented in Tables 2 to 5. The following presumptions / inputs are noted:

- Health investigations levels (HIL) shown in Table 2 apply to the top 3 m of soil;
- Listed Health Screening Levels (HSL) for vapour intrusion are for the most conservative of any soil type (clay, sand or silt) and for a depth of 0 m to <1 m. Further consideration to soil type and soil depth will need to be given by the environmental consultant if concentrations are above the conservative HSL shown in Table 2;
- Ecological Investigation Levels (EIL) apply to the top 2 m of soil in areas of the proposed development that have ecological value. The *Interactive (Excel) Calculation Spreadsheet* was used for calculating the EIL which have been based on the following inputs:
- The soil contamination is considered to be 'aged' (>2 years) given the historical site use;
- Traffic volumes are high;
- A pH of 5.8 has been adopted based on the average pH values obtained from the fill samples from the site during the PSI and DGI;
- A conservative clay content of 5%. It is noted that soils of natural origin will likely have a much higher clay content based on test results from the PSI, DGI and SCI;
- A Cation Exchange Capacity (CEC) of 9.5 cmolc/kg has been adopted based on the average CEC values obtained from the fill samples the site during the PSI and DGI; and

- A conservative organic carbon content of 0.5%.

Further consideration to the soil type and parameters will need to be given by the environmental consultant if concentrations are above the EIL shown in Table 3.

Ecological Screening Levels (ESL) (Table 3) apply to the top 2 m of soil profile in areas of the proposed development that have ecological value. [An ESL has not been adopted for benzo(a)pyrene given that CRC CARE (2017), *Risk-based Management and Remediation Guidance for Benzo(a)pyrene*, CRC CARE Technical Report no. 39 suggests that an ESL of above 21 mg/kg would be appropriate and, therefore, an ESL of this magnitude would not be a driver for remediation given the adopted HIL of 4 mg/kg for benzo(a)pyrene TEQ];

- Management Limits (Table 5) are for the most conservative of any soil type (clay, sand or silt).

**Table 2: Remediation Acceptance Criteria (HIL and HSL)**

Contaminant	HIL Residential B (mg/kg)	HSL B for Vapour Intrusion (mg/kg)
<b>Metals and Inorganics</b>		
Arsenic	500	-
Cadmium	150	-
Chromium (VI)	500	-
Copper	30 000	-
Lead	1200	-
Mercury (inorganic)	120	-
Nickel	1200	-
Zinc	60 000	-
<b>TRH</b>		
C6 – C10 (less BTEX)	-	45
>C10-C16 (less Naphthalene)	-	110
<b>BTEX</b>		
Benzene	-	0.5
Toluene	-	160
Ethylbenzene	-	55
Xylenes	-	40
<b>PAHs</b>		
Carcinogenic PAHs (as Benzo(a)pyrene TEQ)	4	-
Naphthalene	-	3
Total PAH	400	-

Contaminant	HIL Residential B (mg/kg)	HSL B for Vapour Intrusion (mg/kg)
<b>OCP</b>		
DDT+DDE+DDD	600	-
Aldrin + Dieldrin	10	-
Chlordane	90	-
Endosulfan (total)	400	-
Endrin	20	-
Heptachlor	10	-
HCB	15	-
Methoxychlor	500	-
<b>OPP</b>		
Chlorpyrifos	340	-
<b>Other Organics</b>		
PCB (non dioxin- like PCB only)	1	-

**Table 3: Remediation Acceptance Criteria (EIL)**

Analyte		EIL (mg/kg)
Metals	Arsenic	100
	Chromium (III)	330
	Copper	110
	Lead	1100
	Nickel	150
	Zinc	460
OCP	DDT	180
PAH	Naphthalene	170

**Table 4: Remediation Acceptance Criteria (ESL)**

Analyte		ESL (mg/kg)	Comments
TRH	C <sub>6</sub> – C <sub>10</sub> (less BTEX)	180*	All ESLs are low reliability apart from those marked with * which are moderate reliability
	>C <sub>10</sub> -C <sub>16</sub> (less Naphthalene)	120*	
	>C <sub>16</sub> -C <sub>34</sub>	300	
	>C <sub>34</sub> -C <sub>40</sub>	2800	
BTEX	Benzene	50	
	Toluene	85	
	Ethyl Benzene	70	
	Xylenes	105	

**Table 5: Remediation Acceptance Criteria - Management Limits**

<b>Analyte</b>		<b>Management Limits (mg/kg)</b>
TRH	C <sub>6</sub> – C <sub>10</sub>	700
	>C <sub>10</sub> -C <sub>16</sub>	1000
	>C <sub>16</sub> -C <sub>34</sub>	2500
	>C <sub>34</sub> -C <sub>40</sub>	10000

## B1.4 Aesthetics

Clause 3.6, Schedule B1 of NEPC (2013) outlines aesthetic considerations when undertaking a site assessment. Some examples of characteristics or situations that may need to be considered in the assessment outcome include odorous soils, hydrocarbon sheen (e.g., surface water), soil staining, significant quantities of anthropogenic wastes and putrescible refuse.

The assessment of such finds at the site will be as stated in the unexpected finds protocol (UFP and contingencies presented in Appendix F in the RAP. If the assessment identified no unacceptable human health or ecological risk, the find might be removed on the grounds of aesthetics or relocated (e.g., at depth).

## B2.0 Waste Management

### B2.1 Classification Assessment for Off-Site Disposal

All wastes will be assessed in accordance with the Protection of the Environment Operations (POEO) Act 1997.

For disposal to landfill, this will comprise assessment in accordance with the NSW Environment Protection Authority (EPA) *Waste Classification Guidelines* (2014).

For re-use off-site, soil will be assessed in accordance with other EPA guidance or licences under the POEO Act, and may include:

- Resource recovery orders issued by EPA under the Protection of the Environment Operations (Waste) Regulation 2014; and
- Guidance on assessment of VENM.

## B2.2 VENM

The POEO Act defines virgin excavated natural material (VENM) as:

*'natural material (such as clay, gravel, sand, soil or rock fines):*

*(a) that has been excavated or quarried from areas that are not contaminated with manufactured chemicals, or with process residues, as a result of industrial, commercial, mining or agricultural activities and*

*(b) that does not contain any sulfidic ores or soils or any other waste and includes excavated natural material that meets such criteria for virgin excavated natural material as may be approved for the time being pursuant to an EPA Gazettal notice.'*

VENM is a waste that has been pre-classified as general solid waste (non-putrescible) under EPA (2014b).

Additional advice is provided on the EPA web site 'Virgin Excavated Natural Material' (<http://www.epa.nsw.gov.au/waste/virgin-material.htm>)

Assessment of soils off-site disposal or of VENM will be conducted in accordance with Section 13 of the RAP.

Imported VENM will also be required to be compared against the RAC as listed in Appendix B. Sampling requirements for imported materials are outlined in Section 14 of the RAP.

For the purpose of providing a screening criteria to compare laboratory results against for assessing VENM, the published background concentrations in ANZECC/NHMRC (1992) *Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites, Environmental Soil Quality Guidelines* Background A [ANZECC A] have been adopted. In the case of organics, where no reference values exist the practical quantification limit (PQL) has been adopted as the screening level.

## B2.3 Imported Material under a Resource Recovery Order

As stated in Section 14, all proposed imported soils / aggregates must legally be able to be imported to the site, and suitable in accordance with the requirements of this RAP. Soils and aggregates proposed to be imported to the site must comprise one of the following:

- VENM; or
- Materials complying with a Resource Recovery Order (RRO) allowing land application.

Refer to Section 14 of the RAP for further information on import requirements.

### B3.0 References

- ANZECC. (2000). *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*. Australia and New Zealand Environment and Conservation Council.
- ANZG. (2018). *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*. Canberra, ACT: Australian and New Zealand Governments and Australian state and territory governments.
- CRC CARE. (2011). *Health screening levels for petroleum hydrocarbons in soil and groundwater*. Parts 1 to 3, Technical Report No. 10: Cooperative Research Centre for Contamination Assessment and Remediation of the Environment.
- HEPA. (2020). *PFAS National Environmental Management Plan (NEMP)*. Version 2.0: Heads of EPAs Australia and New Zealand and Australian Government Department of the Environment.
- NEPC. (2013). *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM]*. Australian Government Publishing Services Canberra: National Environment Protection Council.
- NHMRC. (2008). *Guidelines for Managing Risks In Recreational Water*.
- NHMRC, NRMCC. (2016). *Australian Drinking Water Guidelines 6 2011, Version 3.2*. Canberra: National Health and Medical Research Council, National Resource Management Ministerial Council.

---

**Douglas Partners Pty Ltd**

---

## **Appendix C**

---

Tabulated Summary Results from Previous Report(s)



**Table B2- Summary of Asbestos Results**

Sample Location	Sample Depth	Weight of 10 Litre Bulk Sample (kg)	Number of fragments > 7mm	Condition of Fragments (good/poor)	Size range of Fragement (mm)	Weight of Screened ACM (g)	Concentration of asbestos in ACM in soil (% w/w)*	Weight of 500mL Sample (g)	Weight of AF or FA (g)**	Concentration of FA and AF in soil ACM (% w/w)
HSL for Asbestos in soil							0.040			0.001
<b>Source 1 (TP104 and TP211) and Source 2 (Type 3 Fill)</b>										
TP111	0-0.3	12	-	-	-	-	<0.04	830.74	-	<0.001
TP112	0.1-0.2	9.1	-	-	-	-	<0.04	-	-	-
TP113	0-0.2	9	-	-	-	-	<0.04	547.43	-	<0.001
TP114	0.1-0.3	9.7	-	-	-	-	<0.04	682.15	-	<0.001
TP114	0.65-0.85	9.7	-	-	-	-	<0.04	603.39	-	<0.001
TP115	0.8-0.9	9.2	-	-	-	-	<0.04	-	-	-
TP115	0-0.2	10.4	-	-	-	-	<0.04	725.45	-	<0.001
TP116	0-0.2	12.4	-	-	-	-	<0.04	604.28	-	<0.001
TP117	0-0.2	12.4	-	-	-	-	<0.04	-	-	-
TP118	0.4-0.5	9.3	-	-	-	-	<0.04	-	-	-
TP118	0-0.2	12.4	-	-	-	-	<0.04	642.39	-	<0.001
TP119	0.4-0.6	11.3	1	Good	65	21	0.0279	945.14	-	<0.001
TP119	0-0.2	9	-	-	-	-	<0.04	394.96	-	<0.001
TP119	1.2-1.3	11.1	-	-	-	-	<0.04	686.13	-	<0.001
TP120	0.2-0.4	9.3	-	-	-	-	<0.04	-	-	-
TP120	0-0.2	8.6	-	-	-	-	<0.04	425.22	-	<0.001
TP121	0-0.2	12.4	-	-	-	-	<0.04	640.48	-	<0.001
TP122	0-0.2	10.4	-	-	-	-	<0.04	762.87	-	<0.001
TP123	0.2-0.4	12.5	-	-	-	-	<0.04	-	-	-
TP123	0-0.2	11	-	-	-	-	<0.04	561.14	-	<0.001
TP124	0.4-0.6	13.3	-	-	-	-	<0.04	-	-	-
TP124	0-0.2	14	-	-	-	-	<0.04	720.41	-	<0.001
TP125	0.3-0.5	10.4	-	-	-	0.4542***	<0.04	389.67	-	<0.001
TP125	0.6-0.7	13.9	-	-	-	-	<0.04	-	-	-
TP126	0.3-0.5	11.2	-	-	-	-	<0.04	-	-	-
TP126	0.5-0.7	12.8	-	-	-	-	<0.04	-	-	-
TP126	0-0.2	9.8	-	-	-	-	<0.04	644.39	-	<0.001
TP127	0-0.2	9.5	1	Good	40	18.2	0.0287	-	-	-
TP128	0.1-0.2	13.1	-	-	-	-	<0.04	1027.31	-	<0.001
TP128	0.2-0.4	12.4	-	-	-	-	<0.04	-	-	-
TP128	0.5-0.7	12.7	-	-	-	-	<0.04	-	-	-
TP218	0-0.1	12.2	-	-	-	-	<0.04	-	-	-
TP218	0.3	10.2	-	-	-	-	<0.04	-	-	-
TP218	0.5	11.5	-	-	-	-	<0.04	-	-	-
TP219	0-0.1	12.2	-	-	-	-	<0.04	541.12	-	<0.001
TP219	0.4-0.5	11.8	-	-	-	-	<0.04	-	-	-
TP220	0-0.1	12.9	-	-	-	-	<0.04	-	-	-
TP220	0.2	12.5	-	-	-	-	<0.04	-	-	-
TP220	0.5	11.8	-	-	-	-	<0.04	-	-	-
TP221	0-0.1	12.2	-	-	-	-	<0.04	-	-	-
TP221	1	11.8	-	-	-	-	<0.04	-	-	-
TP222	0-0.1	11.6	-	-	-	-	<0.04	-	-	-
TP222	0.2-0.4	11.5	-	-	-	-	<0.04	-	-	-
TP223	0-0.1	12.4	-	-	-	-	<0.04	-	-	-
TP224	0-0.1	13.1	-	-	-	-	<0.04	-	-	-
TP225	0-0.1	13.5	-	-	-	-	<0.04	-	-	-
TP226	0-0.1	12.8	-	-	-	-	<0.04	-	-	-
TP226	1	12.9	-	-	-	-	<0.04	-	-	-
TP226	1.9	12.2	-	-	-	-	<0.04	442.19	-	<0.001
TP277	0-0.1	11.4	-	-	-	-	<0.04	-	-	-
TP228	0-0.1	14.2	-	-	-	-	<0.04	528.8	-	<0.001
TP229	0-0.1	12.5	-	-	-	-	<0.04	-	-	-
TP229	1	12.9	-	-	-	-	<0.04	-	-	-
TP230	0-0.1	13.6	-	-	-	-	<0.04	-	-	-
TP230	1	12.7	-	-	-	-	<0.04	-	-	-
TP231	0-0.1	13.7	-	-	-	-	<0.04	-	-	-
TP232	0-0.1	13	-	-	-	-	<0.04	-	-	-
TP234	0-0.1	12.2	-	-	-	-	<0.04	553.32	-	<0.001
TP234	1	13.8	-	-	-	-	<0.04	-	-	-
TP235	0-0.1	12.7	-	-	-	-	<0.04	-	-	-
TP235	1	12.5	-	-	-	-	<0.04	-	-	-
TP236	0-0.1	12.9	-	-	-	-	<0.04	-	-	-
TP236	1	12.2	-	-	-	-	<0.04	623.59	-	<0.001
TP236	2	13.5	-	-	-	-	<0.04	-	-	-
TP237	0-0.1	11.6	-	-	-	-	<0.04	-	-	-
TP238	0-0.1	12.9	-	-	-	-	<0.04	-	-	-
TP238	1	11.9	-	-	-	-	<0.04	-	-	-
TP239	0-0.1	12.4	-	-	-	-	<0.04	-	-	-
TP240	0-0.1	13.2	-	-	-	-	<0.04	-	-	-
TP241	0-0.1	12.4	-	-	-	-	<0.04	-	-	-
TP242	0.1-0.2	14	-	-	-	-	<0.04	-	-	-
TP243	0-0.1	12.1	-	-	-	-	<0.04	604.47	-	<0.001
TP244	0-0.1	11.6	-	-	-	-	<0.04	-	-	-
TP244	0-0.4	12.2	-	-	-	-	<0.04	-	-	-
TP245	0-0.1	10.9	-	-	-	-	<0.04	-	-	-
BH6-1-1	-	11.6	-	-	-	-	<0.04	623.63	-	<0.001
BH6-1-2	-	12.5	-	-	-	-	<0.04	-	-	-
BH6-1-3	-	12.6	-	-	-	-	<0.04	594.44	-	<0.001

**Notes**

HSL for Asbestos in soil

-

\*

\*\*

\*\*\*

Table 7 of Schedule B(1), NEPC (2013) for low density residential land use

Not analysed

Based on % w/w asbestos in soil assuming 15% asbestos in ACM

Based on the weight of asbestos in FA and AF as calculated by Envirolab. Values excludes calculated weight of bonded ACM greater than > 7mm in samples

ACM as reported by Envirolab in the 500ml soil sample

---

## **Appendix D**

---

### Remediation Options Assessment and Evaluation

## Appendix D

### Remediation Options Assessment

#### 1 Martins Lane and 3A Homelands Avenue

---

#### D1.0 Assessment of Remediation Options

Several remediation options were reviewed with reference to the principles and criteria defined in relevant documents, including, the following:

- National Environment Protection Council, National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013", 11 April 2013 (ASC NEPM); and
- NSW EPA. (2017). *Guidelines for the NSW Auditor Scheme (3<sup>rd</sup> Edition)*. NSW Environment Protection Authority.

ASC NEPM states that the preferred hierarchy of options for site clean-up and / or management are as follows:

- On-site treatment of the contamination so that it is destroyed, or the associated risk is reduced to an acceptable level; and
- Off-site treatment of excavated soil, so that the contamination is destroyed, or the associated risk is reduced to an acceptable level, after which soil is returned to the site; or

If the above are not practicable,

- Consolidation and isolation of the soil on site by containment with a properly designed barrier; and
- Removal of contaminated material to an approved site or 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.

#### D1.1 Remediation Goal

The main objective of site remediation will be to render the site compatible with the proposed use (residential aged care facility within limited soil access) and the construction works will not pose an unacceptable risk to human health or the local environment.

## D1.2 Extent of Remediation

The extent of the remediation is defined as:

- Remediation Area 1 - area of fill where concentrations of total recoverable hydrocarbon (TRH) have been identified above the adopted site assessment criteria (SAC) (i.e., BH2 and BH3). DP recommends that additional assessment is conducted at BH2 and BH3 to assess the contamination status at these locations and establish if remediation is warranted;
- Remediation Area 2 - Data-gap Investigation Area - 3A Homelands Ave (Lot 1, DP 26212 - approximately 0.08 hectares) - since intrusive works were prohibited due to access constraints, only limited geotechnical information is available for this site. Additional environmental sampling for this site is outlined in the data-gap scope in this RAP (Section 10.2.4); and
- Remediation Area 3 - Remainder of the site - although fragments of bonded asbestos containing material (ACM) were identified in fill at three test pit locations (TP119, TP125, TP127), the concentration of asbestos in the ACM were below the adopted HSL for asbestos for residential apartments (land use Category B). As such, DP consider that the balance of fill within the site can generally be characterised as impacted with ACM at concentrations below the adopted SAC. DP considers that there is the potential for further localised areas of fill impacted with ACM above the RAC being present at the site. Extensive earthworks at the site are expected as part of the proposed development which may encounter such localised pockets. Asbestos identified during site development works should be managed under an asbestos finds protocol provided in Appendix F. Controls to prevent cross contamination, and ACM being present of the site surface, are also required.

With respect to BH2 and BH3, following the removal of the asphalt from the car park in the south and prior to the removal of underlying materials, the environmental consultant is to inspect the underlying material for signs of contamination (i.e., staining and odours). If contamination is identified, further sampling of the surrounding soils to delineate the extent of contamination is to be conducted as follows:

- One soil sample at 1.0 m distance (or as established by the environmental consultant based on site observations) north, east, west and south from BH2 and / or BH3, and analysis for TRH at a National Association of Testing Authorities (NATA) accredited laboratory;
- If exceedances of the remediation acceptance criteria (RAC) are identified in the 1.0 m sample locations, additional samples will be collected in a concentric fashion surrounding samples that fail the RAC; and
- Once the extent of contamination has been identified, remediation of the soils is to be conducted as per Section 10.2.1.

If no signs of contamination are observed, the locations of BH2 and BH3 are to be re-sampled for TRH to assess whether the contamination reported in the Preliminary Site Investigation (PSI) can be replicated.

The extent of remediation may also include other areas within the site based on validation sampling (see Section 12.4) and any contamination identified during site development.

If fill within the site is characterised as being impacted with ACM at concentrations below the adopted SAC, the RAC may be adopted as covering of existing on-site fill (see Section 9). If this is the case, the extent of remediation may include all areas where fill is present.

### D1.3 Remediation Options

The NSW EPA's preferred hierarchy of options for site remediation are set out in Section 16 of the National Environment Protection (Assessment of Site Contamination) Measure 1999 and Section 4.3.2 of the NSW EPA *Contaminated Land Management, Guidelines for the NSW Site Auditor Scheme (3<sup>rd</sup> edition)*, and are as follows:

- On-site treatment so that the contamination is destroyed, or the associated risk is reduced to an acceptable level.
- Off-site treatment of excavated soil, so the contamination is destroyed, or the associated risk is reduced to an acceptable level, after which the soil is returned to the site.

If the above two options are not practicable, the remaining options are:

- Consolidation and isolation of the soil on site by containment with a designed barrier.
- Removal of the contaminated material to an approved facility.

Based on the contamination reported at the site, the suitability of the above options have been considered in Table 1 below.

**Table 1: Soil Remediation Option Evaluation**

<b>Option</b>	<b>ACM</b>	<b>TRH</b>
<b>1. On site treatment</b>	<b>Unsuitable</b> Treatment of ACM-impacted soils not accepted by NSW EPA as a remediation option.	<b>Unsuitable</b> The soil could be subject to ex-situ treatment. Cost likely to be prohibitive compared to other options.
<b>2. Off site treatment</b>	<b>Unsuitable</b> DP is not aware of any ACM treatment facilities in NSW.	<b>Unsuitable</b> Given that the contamination is co-located with ACM (at TP104), treatment is not considered a suitable option.
<b>3. Consolidation and isolation</b>	<b>Suitable</b> Fragments and affected soil can be collected, contained and capped on site beneath an engineered barrier.	<b>Suitable</b> Can be contained and capped on site beneath an engineered barrier subject to leachability analysis.
<b>4. Excavate and remove off site</b>	<b>Suitable</b> Removes the contaminated soil from the site and any associated historical legacy.	<b>Suitable</b> Removes the contaminated soil from the site and any associated historical legacy.

## D1.4 Preferred Remediation Strategy

To prevent the requirement for ongoing management of contaminated soils at the site, the client has indicated the preferred remediation strategies detailed in Table 2, below.

**Table 2: Preferred Remediation Strategies**

Area of Concern	Description	Remediation Strategy
BH2 and BH3	TRH impacted fill	Assessment of material following removal of the asphalt carpark in the south-eastern portion of the site. If required - Option 4: Off-site disposal for material exceeding the RAC.
3A Homelands Avenue	Data gap	Intrusive Investigation recommended Option 4: Off-site disposal for material exceeding the RAC.
Balance of fill on the site	Fill potentially impacted by ACM below the RAC	Implementation of finds protocol. Option 3: Covering of fill to minimum depths specified in the RAP at the completion of the development.
	Fill potentially impacted by ACM above the RAC	Implementation of finds protocol. If areas exceeding the RAC are found, Option 4: Off-site disposal for material exceeding the RAC.

---

**Douglas Partners Pty Ltd**

---

## **Appendix E**

---

Data Quality Objectives and Quality Assurance Quality Control

## Appendix E

### Data Quality Objectives & Quality Control/Quality Assurance (QA / QC)

#### 1 Martins Lane and 3A Homelands Avenue, Carlingford

---

#### E1.0 Introduction

The objective of the validation plan presented in Section 12 of the Remediation Action Plan (RAP) is to assess the results of post remediation testing against the Remediation Acceptance Criteria (RAC) stated within the RAP and to provide information on any environmental impacts which may have resulted from the works.

The validation assessment will be conducted with reference to the seven step data quality objectives (DQOs) as outlined in NEPC (2013), described below. The DQO in NEPC (2013) is in turn, based on the DQO process outlined in USEPA (2006), and associated guidelines.

#### E2.0 Data Quality Objectives

Step	Summary
1: State the problem	The site requires remediation and validation of the remediation work in order to render it suitable for recreational land use.
2: Identify the decisions / goal of the study	The key contaminants of potential concern (CoPC) impacting the site are: <ul style="list-style-type: none"> <li>• TRH; and</li> <li>• Asbestos.</li> </ul> The validation sampling results will be compared against the RAC. The success of the validation will be based on a comparison of the analytical results for all CoPC to the adopted RAC.
3: Identify the information inputs	Relevant inputs to the decision include: <ul style="list-style-type: none"> <li>• Results analysed for the relevant CoPC;</li> <li>• Field and laboratory QA / QC data to assess the suitability of the environmental data for the validation assessment; and</li> <li>• Results compared with the RAC.</li> </ul>
4: Define the study boundaries	The site boundary as shown on Drawing 1, Appendix A.
5: Develop the analytical approach (or decision rule)	The decision rule is to compare all analytical results with the adopted RAC. QC results are to be assessed according to their relative percent difference (RPD) values. For field duplicates and laboratory results, RPDs should generally be below 30% or 50% for TRH; for field blanks, results should be at or less than the limits of reporting (NEPC, 2013).

Step	Summary
6: Specify the performance or acceptance criteria	<p>Baseline condition: Contaminants at the site and/or statistical analysis of data exceed the RAC and pose a potentially unacceptable risk to receptors (null hypothesis).</p> <p>Alternative condition: Contaminants at the site and statistical analysis of data complies with the RAC and as such, do not pose a potentially unacceptable risk to receptors (alternative hypothesis).</p> <p>Unless conclusive information from the collected data is sufficient to reject the null hypothesis, it is presumed that the baseline condition is true.</p>
7: Optimise the design for obtaining data	<p>Sampling design and procedures to be implemented to optimise data collection for achieving the DQOs include the following:</p> <ul style="list-style-type: none"> <li>• National Association of Testing Authorities (NATA) accredited laboratories using NATA endorsed methods will be used to perform laboratory analysis whenever possible; and</li> <li>• Adequately experienced environmental scientists / engineers will conduct field work and sample analysis interpretation.</li> </ul>

## E2.1 Field Quality Assurance and Quality Control

Soil sampling will be carried out in accordance with DP standard operating procedures. The general sampling and sample management procedures is as follows:

- Collect soil samples from the excavator bucket at the nominated sample depth;
- Transfer samples in laboratory-prepared glass jars with Teflon lined lids by hand, capping immediately and minimising headspace within the sample jar;
- Collect replicate samples in zip-lock bags for fieldscreening using a pre-calibrated photoionisation detector (PID);
- Collect ~500 ml samples for asbestos analysis;
- Where asbestos containing materials (ACM), potential ACM or copious quantities of building rubble are observed in fill, a 10 L bulk sample will be collected from the fill (for on-site sieving / screening as described below);
- Wear a new disposable nitrile glove for each sample point thereby minimising potential for cross-contamination;
- Label sample containers with individual and unique identification details, including project number, sample location and sample depth (where applicable);
- Place samples into a cooled, insulated and sealed container for transport to the laboratory; and
- Use of chain-of-custody documentation.

Where reusable sampling equipment is used (e.g., stainless steel trowel), the sampling equipment will be decontaminated between use. The decontamination procedure will involve a three stage wash. The equipment will be rinsed first with tap water to remove sediment, followed by a Liquinox solution and, finally, demineralised water.

Field testing using a pre-calibrated PID is to be conducted in accordance with DP standard operating procedures. The procedure for use of the PID is as follows:

- Calibrate the PID with isobutylene gas at 100 ppm and with fresh air prior to commencement of each successive day's field work;
- Allow the headspace in the PID zip-lock bag samples to equilibrate; and
- Screen using the PID.

For the assessment of subsurface ACM, the following procedure will be used:

- Weigh each bulk sample;
- Screen each bulk sample through a  $\leq 7$  mm aperture sieve;
- Weigh all retrieved potential ACM fragments; and
- Calculate the asbestos concentration (% w/w) in soil as per the procedure described in NEPC, *National Environment Protection (Assessment of Site Contamination) Measure 1999* (as amended 2013).

QA / QC procedures will be adopted throughout the field sampling program to assess sampling precision and accuracy and prevent cross-contamination.

The following samples will be used / collected for QA / QC purposes:

- A minimum of 10% blind replicate samples will be collected. One blind replicate sample for every 20 primary samples analysed at the primary laboratory (i.e., intra-laboratory analysis). One blind replicate sample for every 20 primary samples analysed at a secondary laboratory (i.e., intra-laboratory analysis);
- One trip spike and trip blank for BTEX for each day of sampling. Trip spikes and trip blanks will be subject to the same conditions in the field as collected soil samples; and
- A rinsate sample for each day of sampling if decontamination of sampling equipment is required. The rinsate sample will be collected by running demineralised water over the decontaminated sampling equipment directly into sampling bottles provided by the laboratory.

## **E2.2 Laboratory Quality Assurance and Quality Control**

Laboratory analysis of all samples is to be conducted by laboratories with NATA accreditation for the analyte being tested and with appropriate QA / QC assessment. It is noted the friable asbestos / asbestos fines (FA/AF) analysis as per NEPC (2013) is not a NATA accredited laboratory test and hence is exempt from this requirement.

At least two laboratories will be required to conduct the testing, a primary laboratory, and secondary laboratory (to be confirmed) which will analyse inter-laboratory replicate samples. In this regard replicates are to be analysed at a rate of one replicate sample per 10 primary samples. At least 50% of the replicates are to comprise inter-laboratory analysis.

Samples are to be analysed for the contaminants of concern (TRH and asbestos) identified for the sampling purpose.

Laboratory QA / QC will include the following:

- Samples will be analysed using NATA accredited methods;
- Samples will be analysed within the recommended holding times;
- The practical quantitation limits (PQL) will be appropriate for the assessment of risk for each analyte;
- The quality assurance / quality control (QA / QC) protocols and results reported by the laboratories comply with their NATA accreditation and are consistent with the requirements of NEPC (2013);
- The contract laboratories will conduct in-house QA / QC procedures involving the routine testing of:
  - Reagent blanks;
  - Spike recovery analysis;
  - Laboratory duplicate analysis;
  - Analysis of control standards; and
  - Calibration standards and blanks.

### **E3.0 Limits for QA / QC Samples**

For QA / QC samples field samples, the following limits will be adopted:

- For replicate samples, a relative percentage difference (RPD) of 30% for organics;
- For trip spikes, 60% to 140% of the spike (BTEX) concentrations;
- For trip blanks, less than the practical quantitation limits (for BTEX); and
- For rinsate samples, less than the practical quantitation limits although trace concentrations of some metals may also be acceptable.

Limits for laboratory QA / QC samples will depend on the laboratories' internal QA / QC system. Typical laboratory limits for laboratory QA / QC samples are as follows:

- Blank: less than the PQL;
- Duplicate: for  $>10 \times$  PQL, the RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range of 20 - 50%;
- Matrix Spike: generally, 70-130% recovery for inorganics / metals and 60-140% recovery for organics;
- Laboratory Control Sample (LCS): generally, 70-130% recovery for inorganics / metals and 60-140% recovery for organics; and
- Surrogate Spike: generally, 70-130% recovery for inorganics/metals and 60-140% recovery for organics.

## E4.0 Data Quality Indicators

Field and laboratory test results will be considered useable for the assessment after evaluation against the following data quality indicators (DQIs) in Table 1:

**Table E1: Data Quality Indicators**

<b>Data Quality Indicator</b>	<b>Method(s) of Achievement</b>
Completeness	Planned systematic and selected target locations sampled; Preparation of field sheets, sample location plan and chain of custody (COC) records; Laboratory sample receipt information received confirming receipt of samples intact and appropriateness of the chain of custody; Samples analysed for contaminants of potential concern (COPC) identified in the Conceptual Site Model (CSM); Completion of COC documentation; NATA endorsed laboratory certificates provided by the laboratory; and Satisfactory frequency and results for field and laboratory QC samples.
Comparability	Using appropriate techniques for sample recovery, storage and transportation, which were the same for the duration of the project; Works undertaken by appropriately experienced and trained DP environmental scientist / engineer; Use of NATA registered laboratories, with test methods the same or similar between laboratories; and Satisfactory results for field and laboratory QC samples.
Representativeness	Target media sampled; Spatial distribution of sample locations; Sample numbers recovered and analysed are considered to be representative of the target media and complying with DQOs; Samples were extracted and analysed within holding times; and Samples were analysed in accordance with the analysis request.
Precision	Acceptable RPD between original samples and replicates; and Satisfactory results for all other field and laboratory QC samples.
Accuracy	Satisfactory results for all field and laboratory QC samples.

---

**Douglas Partners Pty Ltd**

---

## **Appendix F**

---

### Contingency Plan and Unexpected Finds Protocol

## Appendix F

### Contingency Plans and Unexpected Finds

#### 1 Martins Lane and 3A Homelands Avenue, Carlingford

---

##### F1.0 General

Where the site conditions are found to be different than that anticipated during the remediation works, the proposed remediation approach may not be appropriate for the contamination encountered. In such cases the appointed Environmental Consultant is to re-assess the contamination and remediation approach and inform the Site Auditor. Where necessary the Environmental Consultant will prepare an addendum to this Remediation Action Plan (RAP). Any addendum is to be reviewed and agreed by the Site Auditor before its implementation.

##### F2.0 Contingency Plan

This contingency plan has been developed to provide guidance on processes to follow if either additional contamination such as asbestos is encountered in fill during the remediation or future civil and construction works. The following sub-sections outline the procedures to be implemented for various unexpected finds scenarios. Any unexpected finds shall be surveyed by the Site Manger (or their representative) and the location documented.

##### F2.1 Asbestos Contamination

###### F2.1.1 Assessment of the Impacted Material

If additional asbestos is encountered during earthworks, the impacted material is to be assessed with a sampling plan designed by the Environmental Consultant in accordance with WA DoH *Guidelines for the Assessment, Remediation and Management of Asbestos Contaminated Sites in Western Australia* (WA DoH, 2021)

The impacted material is to be assessed against the following site assessment criteria (SAC) for asbestos (derived from Schedule B1 of the NEPC (2013)), namely:

- 0.001% asbestos for fibrous asbestos and asbestos fines (FA and AF);
- 0.04% w/w asbestos (HSL B) for bonded asbestos containing material (ACM), for the impacted (soil) volume - depending on the location on the site; and
- No visible asbestos for surface soils.

### **F2.1.2 Remediation Options**

Depending on the extent of remediation required several remediation options may be considered:

- Removal of asbestos-impacted fill and disposal off-site; or
- Management of asbestos impacted fill on site beneath a physical barrier (i.e., cap and contain).

### **F2.1.3 Protocol for Managing Asbestos Finds**

Upon discovery of suspected asbestos impacted fill:

- The Site Manager is to be notified and the affected area closed off to unauthorised persons using barrier tape and warning signs. Warning signs shall be specific to Asbestos Hazards and shall comply with the relevant Australian Standard;
- The Environmental Consultant (or Occupational Hygienist) is to be notified to inspect the area and confirm the presence of asbestos and establish the extent of remediation works to be conducted;
- An assessment report detailing this information will be compiled by the Environmental Consultant (or Occupational Hygienist) and provided to the Principal's Representative (and Environmental Consultant if prepared by the Occupational Hygienist);
- The assessment of results together with a suitable management plan shall be provided by the Principal's Representative to the Consent Authority (if required by the development consent) and Site Auditor for written approval prior to the removal of ACM;
- Make the appropriate notifications to SafeWork NSW prior to works; and
- The agreed management / remedial strategy shall be implemented.

The impacted soil will be stockpiled for:

- Waste classification (The Environmental Consultant is to sample the stockpile(s) in accordance with Section 13 prior to off-site disposal);
- Comparison to the adopted RAC to assess if the material is suitable to be retained on-site (at depth);
- In dry and windy conditions, the stockpile will be lightly wetted and covered with plastic sheet whilst awaiting remediation / disposal;
- All work associated with asbestos in soil will be conducted by an appropriately licenced contractor;
- Monitoring for airborne asbestos fibres as per NOHSC Guidance *Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres 2nd Ed* (NOHSC, 2005) is to be conducted during the soil excavation and remediation (if undertaken);
- Documentary evidence (weighbridge dockets) of correct disposal is to be provided to the Environmental Consultant;
- At the completion of the excavation, a clearance inspection is to be carried out and written confirmation is to be provided by the Environmental Consultant (or Occupational Hygienist) that the area is safe to be accessed and worked. The Environmental Consultant is to complete validation sampling of the resultant excavation in accordance with Section 12 of the RAP; and

All details of the assessment and remedial works are to be included in the Site Remediation and Validation Report (SRVR).

## **F3.0 Unexpected Finds Protocol**

### **F3.1 Introduction**

This Unexpected Finds Protocol (UFP) has been developed to provide guidance on processes to follow if any unexpected find is encountered during the remediation or future civil and construction works. Any unexpected finds should be surveyed by the Site Manager (or their representative) and the location documented.

### **F3.2 Soil Exhibiting Signs of Contamination**

Although the site has been subjected to a detailed investigation, there remains a potential for soil contamination to be present between sampled locations. If signs of apparent soil contamination are encountered during remediation, civil or construction works, the following protocols will ensue:

- The Site Manager is to be notified and the affected area closed off by the use of barrier tape and warning signs;
- The Environmental Consultant is to be notified to inspect the area and assess the significance of the potential contamination and establish the extent of remediation works to be conducted. An assessment report detailing this information will be compiled by the Environmental Consultant and provided to the Principal's Representative;
- The assessment results together with a suitable management plan shall be provided by the Principal's Representative to the Consent Authority (if required by the development consent) and Site Auditor; and
- The agreed management / remedial strategy shall be implemented.

The impacted soil will be stockpiled for:

- Remediation (if evaluated to be feasible by the Environmental Consultant); or
- Waste classification (The Environmental Consultant is to sample the stockpile(s) in accordance with Section 13; prior to off-site disposal;
- In dry and windy conditions, the stockpile will be lightly wetted and covered with plastic sheet whilst awaiting remediation / disposal;
- Documentary evidence (weighbridge dockets) of correct disposal is to be provided to the Environmental Consultant;
- At the completion of the excavation, the Environmental Consultant is to complete validation sampling of the resultant excavation in accordance with Section 12; and
- All details of the assessment and remedial works are to be included in the Site Remediation and Validation Report (SRVR).

### F3.3 Storage Tank(s)

Upon discovery of any underground storage tanks (USTs), or associated infrastructure, the Remediation Contractor is to inform the Principal's Representative and the Environmental Consultant. The process for dealing with AST(s)/UST(s) is as follows.

According to NSW EPA (2019), a duly qualified contractor must be engaged to:

- Remove all flammable and / or combustible liquid and dispose of it appropriately;
- Remove any residual flammable vapour for safe disposal; and
- Remove the associated tank infrastructure / pipework.

The tank infrastructure must be correctly disposed of in accordance with requirements outlined in NSW EPA (2020).

Along with the tank and pipework removal:

- Fill / soil around any UST/AST and infrastructure should be carefully excavated and stockpiled by the qualified contractor pending assessment by the Environmental Consultant;
- Stockpiles are to be placed on designated hardstand (if present) or area covered with plastic to minimise the potential for contaminating soils beneath;
- Any remaining fill / soil in the tank pit observed to have obvious contamination (hydrocarbon impacts) should be excavated and stockpiled pending assessment by the Environmental Consultant;
- The Environmental Consultant is to sample the stockpile(s) of potentially contaminated material in accordance with Section 13;
- The Environmental Consultant is to complete validation sampling of the resultant excavation in accordance with Section 12;
- Following successful validation of the UST infrastructure, backfill the excavation (if required) with material / backfill deemed suitable by the Environmental Consultant. This may include the soil / fill excavated from the tank pit, pending the outcome of the assessment of this stockpiled material by the Environmental Consultant; and
- All details of the assessment and remedial works are to be included in the SRVR.

An underground petroleum storage system (UPSS) validation report must be prepared by the Environmental Consultant in accordance with the NSW EPA *Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation 2019 (UPSS Regulation)* (NSW EPA, 2020b), under the Protection of the Environment Operations Act (POEO) Act 1997.

## F4.0 References

NEPC. (2013). *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM]*. Australian Government Publishing Services Canberra: National Environment Protection Council.

NOHSC. (2005). *Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres 2nd Ed.* Canberra, April 2005, NOHSC:3003: National Occupational Health and Safety Commission, Commonwealth of Australia.

NSW EPA. (2014). *Investigation of Service Station Sites*. NSW Environment Protection Authority.

NSW EPA. (2020). *Underground Petroleum Storage Systems - Guidelines for implementing the Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation 2019*. Doc Ref: EPA 2020P2700: NSW Environment Protection Authority.

NSW EPA. (2020b). *Underground Petroleum Storage Systems - Guidelines for implementing the Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation 2019*. Doc Ref: EPA 2020P2700: NSW Environment Protection Authority.

WA DoH. (2021). *Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia*. WA Department of Health.

---

**Douglas Partners Pty Ltd**

---

## **Appendix G**

---

Site Management Plan

## Appendix G

### Site Management Plan

#### 1 Martins Lane and 3A Homelands Avenue, Carlingford

---

##### G1.0 Introduction

This Site Management Plan (SMP) has been developed to minimise potentially adverse impacts on the environment, and worker and public health as a result of the proposed remediation works.

The Remediation Contractor must have in place a Construction Environmental Management Plan (CEMP) (or similar) which is specific to the equipment used for the remediation and the proposed methods to be adopted by the Remediation Contractor (RC). This SMP has been prepared to augment the Contractor's plan and contains general details for aspects of the work, as per reporting requirements for a Remediation Action Plan (RAP) under NSW EPA *Guidelines for Consultants Reporting on Contaminated Land* (NSW EPA, 2020).

Apart from the management principles outlined in this SMP, the Remediation Contractor must also ensure compliance with all relevant environmental legislation and regulations, including (but not limited to) the following:

- Contaminated Land Management Act 1997 NSW (CLM Act);
- *Protection of the Environment Operations Act 1997* NSW (POEO Act);
- *Protection of the Environment Legislation Amendment Act 2011* NSW;
- *Protection of the Environment Operations Amendment (Scheduled Activities and Waste) Regulation 2008* NSW;
- *Environmentally Hazardous Chemicals Act 1985* NSW;
- *Environmental Offences and Penalties Act 1989* NSW;
- *Pesticide Act 1999* NSW and *Pesticides Regulation 2017*; and
- *Work Health and Safety Act 2011* Cth (WHS Act) and *Work Health and Safety Regulations 2011* Cth.

##### G2.0 Roles and Responsibilities

###### G2.1 Principal

The Principal is responsible for the environmental performance of the proposed remediation works, including implementation of acceptable environmental controls during remediation works. The Principal will retain the overall responsibility for ensuring this RAP is appropriately implemented. The Principal is to nominate a representative (the Principal's Representative), who is responsible for overseeing the implementation of this RAP. The actual implementation of the RAP will, however, be conducted by the Principal Contractor ('the Contractor') on behalf of the Principal.

The Principal is responsible for providing appropriate information to the Contractor to allow them to safely plan the required works. This includes the asbestos register for the site and this RAP.

The Principal is also responsible for implementing an appropriate communications plan.

## **G2.2 Principal Contractor / Site Manager**

The Contractor will be the party responsible for daily implementation of this RAP and shall fulfil the responsibilities of the Contractor as defined by SafeWork NSW. It is noted that the Contractor may appoint appropriately qualified sub-contractors or sub-consultants to assist in fulfilling the requirements of the procedures. The Contractor will appoint a Site Manager.

The Contractor is also presumed to be the Remediation Contractor, however, the 'remediation' aspects of the overall project could be delegated (sub-contracted) to a separate Remediation Contractor. The Contractor is also presumed to be the Asbestos Contractor, however, the 'asbestos remediation' aspects of the overall project could be delegated (sub-contracted) to a separate Asbestos Contractor.

In addition to the implementation of the RAP it will be the Contractor's responsibility to:

- Obtain / ensure relevant sub-contractors obtain specific related approvals as necessary to implement the earthworks including permits for removal of asbestos-containing material, SafeWork NSW notification etc.;
- Develop or request and review any site plans to manage the works to be conducted;
- Ensure that all remediation works and other related activities are conducted in accordance with this RAP;
- Maintain all site records related to the implementation of this RAP;
- Ensure sufficient information is provided to engage or direct all required parties, including sub-contractors, to implement the requirements of the RAP other than those that are the direct responsibility of the Contractor;
- Manage the implementation of any recommendation made by those parties in relation to work conducted in accordance with the RAP;
- Inform, if appropriate, the relevant regulatory authorities of any non-conformances with the procedures and requirements of the RAP in accordance with the procedures outlined in this document;
- Retain records of any contingency actions;
- On completion of the project, to review the RAP records for completeness and update as necessary; and
- Recommend any modification to general documentation which would further improve the environmental outcomes of this RAP.

### **G2.3 Surveyor**

The project surveyor will be a registered surveyor engaged by the Contractor to undertake surveying works as required by this RAP.

### **G2.4 Asbestos Contractor**

The Asbestos Contractor will be responsible for undertaking all asbestos work involving asbestos impacted fill and will hold a Class A licence issued by SafeWork NSW for the removal of asbestos, on the basis that the asbestos identified at the site to date has included both friable and bonded asbestos.

The Asbestos Contractor can be the same entity as the Principal Contractor.

### **G2.5 Sub-Contractors**

All sub-contractors will be inducted onto the site, informed of their responsibilities in relation to this RAP and sign their agreement to abide by the RAP requirements. Where necessary, sub-contractors will also be trained in accordance with the requirements of this document. All sub-contractors must conduct their operations in accordance with the RAP as well as all applicable regulatory requirements.

### **G2.6 Environmental Consultant**

The Environmental Consultant will provide advice on implementing the RAP. The Environmental Consultant will be responsible to:

- Undertake any required assessments where applicable (e.g., waste classification and validation);
- Provide advice and recommendations arising from monitoring and / or inspections; and
- Notify the Client with any results of assessments, and any observed non-conformances.

### **G2.7 Licenced Asbestos Assessor**

A Licenced Asbestos Assessor (who can be from the same entity as the Environmental Consultant) will be required to be engaged independently of the Asbestos Contractor to conduct the following:

- Review and approve documentation prepared by the Asbestos Contractor;
- Prepare any WHS plans and advice required by the Contractor;
- Conduct airborne asbestos monitoring;
- Conduct clearance inspections (if required);
- Provide advice and recommendations arising from monitoring and / or inspections; and
- Notify the client with the results of any assessments and any observed non-conformances.

## G2.8 Site Workers

All workers on the site are responsible for observing the requirements of this RAP and other management plans. These responsibilities include the following:

- Being inducted on the site and advised of the general nature of the remediation/environmental issues at the site;
- Being aware of the requirements of this plan / RAP;
- Wearing appropriate personal protective equipment (PPE) as required by this plan;
- Only entering restricted areas when permitted;
- Requesting clarification when unclear of requirements of this or any other plans, e.g., safe work method statements (SWMS); and
- Stormwater management.

## G2.9 Stormwater

Stormwater must be managed during the remediation works such that potential adverse impacts from surface runoff (e.g., cross contamination, mobilisation of contaminants in soil particles, etc.) are appropriately mitigated. Accordingly, the Remediation Contractor will take appropriate measures which may include:

- Construction, where necessary, of stormwater diversion channels, bunding and linear drainage sumps with catch pits in and around the remediation areas to divert stormwater from the contaminated areas;
- Provision of appropriately located sediment traps including geotextiles; and
- Discharge of excess water in excavations / low points on a regular basis to limit the potential for flooding.

## G2.10 Dewatering of Excavations

Any runoff or seepage water accumulated in site excavations that requires removal must initially be sampled and tested for suspended solids, pH and any contaminants of potential concern (CoPC) as identified by the Environmental Consultant. The options for management of excavation pump-out water, dependent upon the test results, are for disposal of the water as follows:

- Discharge to stormwater with prior approval from Council. Provided the test results comply with relevant ANZG *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZG, 2018). The Environmental Consultant must consider the most appropriate criteria to be used;
- Discharge to sewer with prior approval from Sydney Water. This option would require the analysis of a longer list of analytes; and
- Pumping by a liquid waste contractor for removal of the water off-site, in accordance with regulatory requirements.

## **G3.0 Soil Management Plan**

### **G3.1 Excavation and Stockpiling of Contaminated Material**

Contaminated material shall be excavated and stockpiled at a suitably segregated location(s) away from sensitive areas (e.g., water bodies, drainage lines, stormwater pits, etc) and ongoing excavations and in a manner that will not cause nuisance to the neighbouring properties. Soil stockpiles are to be managed as follows:

- All stockpiles of contaminated material shall be surrounded by star pickets and marking tape or other suitable material to clearly delineate their boundaries;
- Stockpiles shall be lightly conditioned by sprinkler or covered by geotextile or similar cover to prevent dust generation;
- Any stockpile to remain on-site overnight should be adequately secured in order to reduce the risk of sediment runoff; and
- Should the stockpile remain on-site for over 24 hours, geotextile silt fences must be erected to prevent losses by surface erosion.

All movement of soil within the site and off-site is to be tracked by the Remediation Contractor, from cradle to grave. Copies of tracking records must be provided to the Environmental Consultant.

### **G3.2 Loading and Transport of Contaminated Material**

Transport of contaminated material from the site shall be via a clearly delineated haul route and this route shall be used exclusively for entry and egress of vehicles used to transport contaminated materials within and away from the site. The proposed waste transport route (to be established by the Remediation Contractor) will be notified to Council and truck dispatch shall be logged and recorded by the Contractor for each load leaving the site. A record of the truck dispatch will be provided to the Environmental Consultant.

All haulage routes for trucks transporting soil, materials, equipment or machinery to and from the site should be selected to meet the following objectives:

- Comply with all road traffic rules;
- Minimise noise, vibration and dust to adjacent premises; and
- Utilise State roads and minimise use of local roads as far as practicable.

The remediation work will be conducted such that all vehicles:

- Conduct deliveries of soil, materials, equipment or machinery only during the specified hours of remediation;
- Have securely covered loads to prevent any dust or odour emissions during transportation; and
- Exit the site in a forward direction.

In addition, measures will be implemented to ensure no contaminated material is spilled onto public roadways or tracked off-site on vehicle wheels. Roadways will be kept clean throughout the remediation works and will be broomed, if necessary, to achieve a clean environment.

All loads will be securely covered and may be lightly wetted, if required, to ensure that no materials or dust are dropped or deposited outside or within the site. Prior to exiting the site each truck should be inspected by Contractor personnel and either noted as clean (wheels and chassis) or brushed down prior to leaving the site. Any soil spilled onto surrounding streets will be cleaned by mechanical or hand methods, on a daily basis.

Removal of waste materials from the site shall only be carried out by contractors holding the appropriate license(s), consent or approvals to dispose the waste materials according to the waste classification and with the appropriate approvals obtained from the EPA, where required.

#### **G4.0 Noise and Vibration Control Plan**

All equipment and machinery should be operated in an efficient manner to minimise the emission of noise. The use of any plant and/or machinery should not cause unacceptable vibrations to nearby properties and should meet with Council requirements.

#### **G5.0 Dust Control Plan**

Dust emissions must be confined within the site boundary as far as is practicable. The following dust control procedures will be employed to comply with this requirement, as necessary:

- Erection of dust screens around the perimeter of the site (as applicable);
- Securely covering all loads entering or exiting the site;
- Use of water sprays across the site to suppress dust;
- Covering of all stockpiles of contaminated soil remaining on site more than 24 hours; and
- Include wheel wash (if applicable); and
- Keeping excavation and stockpile surfaces moist.

Regular checking of the fugitive dust issues is to be conducted. Remedial measures are to be conducted to rectify any cases of excessive dust.

Air monitoring may be required during removal of asbestos from buildings and when handling / exposed soils impacted by ACM are on site, as directed by the Occupational Hygienist. Air monitoring devices are to be kept at locations nominated by an appointed Occupational Hygienist, which will generally be at the works area boundaries. If during the course of the works asbestos fibres are detected at concentrations above acceptable limits, the remediation works will cease, and dust prevention measures improved. Should asbestos air monitoring be identified by the Occupational Hygienist to be required, then information regarding asbestos air monitoring requirements should be incorporated into an Asbestos Management Plan / Asbestos Removal Plan.

## G6.0 Odour Control Plan

No odours should be detected at any boundary of the site during remediation works by an authorised Council Officer relying solely on sense of smell. The following procedures should be employed to comply with this requirement:

- Use of appropriate covering techniques such as plastic sheeting, polythene or geotextile membranes to cover excavation faces or stockpiles;
- Fine spray of water and/or hydrocarbon mitigating agent on the impacted areas/materials;
- The use of water spray, as and when appropriate;
- Use of sprays or sprinklers on stockpiles or loads to lightly condition the material;
- Restriction of stockpile heights to ~4 m above surrounding site level. If required, restrict uncovered stockpiles to appropriate sizes to minimise odour generation;
- Ceasing works during periods of inclement weather such as high winds or heavy rain;
- Regular checking of the fugitive dust and odour issues to ensure compliance. Conduct immediate remediation measures to rectify any cases of excessive dust or odour (e.g., use of misting sprays or odour masking agent);
- Adequate maintenance of equipment and machinery to minimise exhaust emissions; and
- Preparation of a Work Health and Safety Plan (WHSP).

### G6.1 General

It is the Remediation Contractor's responsibility to devise a SWMS<sup>1</sup> (or series thereof, for various respective tasks) and to implement proper controls that enable the personnel undertaking the remediation to work in a safe environment. This RAP and SMP does not relieve the Remediation Contractor or other contractors of their ultimate responsibility for occupational health and safety of their workforce and to prevent contamination of areas outside the 'remediation' workspace. This RAP and SMP sets out general procedures and the minimum standards and guidelines for remediation that will need to be used in preparing the SWMS.

This SMP has been prepared with reference to CRC CARE *Remediation Action Plan: Implementation - Guideline on Health and Safety* (CRC CARE, 2019). The requirements of this SMP must be incorporated into the Remediation Contractor's SWMS.

All site work must be conducted in a controlled and safe manner with due regard to potential hazards, training and safe work practices. To attain this the SWMS developed by the Remediation Contractor must comply with policies specified in the Work Health and Safety Regulation 2011.

All appropriate permits, licences and notifications required for the remediation activities must be obtained prior to the commencement of works.

---

<sup>1</sup> Either a SWMS or construction environmental management plan (CEMP), or other equivalent document incorporating health and safety aspects of the proposed remedial works.

## **G6.2 Site Access**

Appropriate fencing and signage must be installed around and within the site to prevent unauthorised access and restrict access to remediation areas and/or deep excavations. Access restrictions and administrative arrangements for management of entry of workers or related personnel on site is the responsibility of the Remediation Contractor.

Any existing pits or unstable areas on site that may generate potential safety, or operational risk should be demarcated and taped off, with appropriate rectification action conducted (e.g., backfilling of pits).

## **G6.3 Personnel and Responsibilities**

Before conducting works on site, all personnel will be made aware of the officer responsible for implementing WHS procedures. All personnel must read and understand this WHSP and over-arching SWMS prior to commencing site works and sign a statement to that effect. Contractors employed at the site will be responsible for ensuring that their employees are aware of, and comply with, the requirements of this WHSP and Remediation Contractor's SWMS.

## **G6.4 Chemical Contamination Hazards**

Chemical compounds or substances that may be present in the soils at the site include the key CoPC TRH and asbestos. There is also a lower probability of other contaminants being present. Additional CoPC may be established through the Stage 2 DSI.

- The risks associated with the identified contaminants (TRH and asbestos) to site personnel and workers involved in the remediation works are associated with:
- Ingestion of contaminated soil;
- Dermal contact with contaminated soil; and
- Inhalation of dusts or vapours of the CoPC.

Personnel will endeavour, wherever possible, to avoid direct contact with potentially contaminated material. Workers must avoid the potential exposures listed above as far as is practicable. Appropriate personal protective equipment (PPE) must be used to mitigate potential risks.

Hands should be washed following field work and prior to eating and drinking.

## **G6.5 Physical Hazards**

The following physical hazards are associated with conditions that may be created during site works:

- Heat exposure;
- Excavations;
- Buried services;
- Noise;

- Dust;
- Electrical equipment;
- Heavy equipment and truck operation; and
- Asbestos.

Safe work practices must be employed to manage the physical risks identified above. For the most part these risks can be managed through appropriate demarcation, access controls and the use of appropriate PPE.

## **G6.6 Safe Work Practices**

The appropriate safe work practices should be clearly defined by the Remediation Contractor in their SWMS. As a minimum, all personnel on site will be required to wear the following PPE:

- Steel-capped boots (mandatory);
- High visibility clothing / vest (mandatory);
- Safety glasses or safety goggles with side shields requirements (as necessary);
- Hard hat (as necessary);
- Appropriate respiratory protective equipment for any works involving asbestos (as necessary); and
- Hearing protection when working in the vicinity of machinery or plant equipment if noise levels exceed exposure standards (as necessary).

Each item of PPE should meet the corresponding relevant Australian Standard(s).

Specific safe work practices will be adopted when working with asbestos, in accordance with (but not limited to) the following codes of practice:

- SafeWork NSW Code of Practice, How to Manage and Control Asbestos in the Workplace (SafeWork NSW, 2019a);
- SafeWork NSW Code of Practice, How to Safely Remove Asbestos (SafeWork NSW, 2019b);
- WorkCover NSW Managing Asbestos in or on Soil (WorkCover NSW, 2014);
- NOHSC Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres 2nd Ed (NOHSC, 2005); and
- Remediation Schedule and Hours of Operation.

The remediation works will be conducted within the days and hours specified by Council in the development consent.

## G7.0 Response to Incidents

The key to effective management of incidents is the timely action taken before any situation reaches a reportable or critical level. Therefore, surveillance activities are extremely important, and should be conducted for the measures prescribed herein and any other measures prescribed in any additional environmental management plan developed subsequently. During construction activities on the site, the following inspection or preventative actions should be performed by the Remediation Contractor:

- Regular inspection of works;
- Completion of routine environmental checklists and follow-up of non-compliance situations;
- Maintenance and supervision on-site; and
- An induction process for site personnel involved in the remediation works that includes relevant information on environmental requirements and ensures that all site personnel are familiar with the site emergency procedures.

An emergency response plan will be in place for all aspects of site works. Any emergency will be reported immediately to the site office and / or the Site Manager (and Safety Officer), and the appropriate emergency assistance should be sought. The Site Manager should be responsible for initiating an immediate emergency response using the resources available on the site. Where external assistance is required, the relevant emergency services should be contacted. A table such as that in Table 1 below, containing contact details for key personnel who may be involved in an environmental emergency response should be completed and be readily available to personnel at all times. This Table should be completed, and thereafter amended, as required.

The Remediation Contractor will be responsible for ensuring that site personnel are aware of the emergency services available and the appropriate contact details. A site Safety Officer should be contactable, or available, on-site during remediation and development works.

Contact details for key utilities are included in the event of needing to respond to incidents.

**Table 1: Summary of Roles and Contact Details**

<b>Role</b>	<b>Personnel / Contact</b>	<b>Phone Contact Details</b>
Principal	TBC	TBC
Principal's Representative	TBC	TBC
Site Manager	TBC	TBC
Remediation Contractor and Builder	TBC	TBC
Site Office	TBC	TBC
Environmental Consultant	TBC	TBC
Consent Authority	TBC	TBC
Regulator	NSW EPA (pollution line and general enquiries)	131 555
Utility Provider	Water (Sydney Water Corporation)	13 20 92

Role	Personnel / Contact	Phone Contact Details
Utility Provider	Power (Ausgrid)	13 13 88
Utility Provider	Gas (Jemena Limited)	131 909
Utility Provider	Telecommunications (Telstra Corporation Limited)	13 22 03
Utility Provider	Telecommunications (Optus)	1800 505 777
Utility Provider	Telecommunications (NBN Co Limited)	1800 687 626

## G8.0 References

ANZG. (2018). *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*. Canberra, ACT: Australian and New Zealand Governments and Australian state and territory governments.

CRC CARE. (2019). *Remediation Action Plan: Implementation - Guideline on Health and Safety*. National Remediation Framework: CRC for Contamination Assessment and Remediation of the Environment.

NOHSC. (2005). *Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres 2nd Ed*. Canberra, April 2005, NOHSC:3003: National Occupational Health and Safety Commission, Commonwealth of Australia.

NSW EPA. (2020). *Guidelines for Consultants Reporting on Contaminated Land*. Contaminated Land Guidelines: NSW Environment Protection Authority.

SafeWork NSW. (2019a). *Code of Practice, How to Manage and Control Asbestos in the Workplace*. August 2019.

SafeWork NSW. (2019b). *Code of Practice, How to Safely Remove Asbestos*. August 2019: SafeWork NSW, NSW Government.

WorkCover NSW. (2014). *Managing Asbestos in or on Soil*. March 2014: WorkCover NSW, NSW Government.

---

**Douglas Partners Pty Ltd**