



# **Douglas Partners**

*Geotechnics | Environment | Groundwater*

Integrated Practical Solutions

Remediation Action Plan

DHL Stage 1

Part of 1953 - 2109 Elizabeth Drive, Badgerys Creek NSW

Prepared for

DHL Supply Chain (Australia) Pty Limited

Project 86548.20

September 2024



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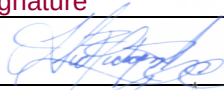
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The undersigned, on behalf of Douglas Partners Pty Ltd, confirm that this document and all attached drawings, logs and test results have been checked and reviewed for errors, omissions and inaccuracies.

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Appendix A: Drawings 1 and 2

Appendix B: About this Report

## Remediation Action Plan

### DHL Stage 1

#### Part of 1953 - 2109 Elizabeth Drive, Badgerys Creek NSW

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## 1. Introduction

Douglas Partners Pty Ltd (DP) has prepared this remediation action plan (RAP) for the proposed Warehouse Development at DHL Stage 1 located at Part of 1953 - 2109 Elizabeth Drive, Badgerys Creek NSW ("the site"). The investigation was commissioned by Lloyd Henderson of DHL Supply Chain (Australia) Pty Limited and was undertaken in accordance with DP's proposal 86548.12.P.001.Rev0 dated 4 August 2023. It is understood based on documents provided by DHL, that the site is approximately 11.9 hectares (ha) in size. The RAP is required to support the State Significant Development Application (SSD 70818708) for the SSDA 1 area (Stage 1), as shown in Drawing 1, Appendix A which also shows the location of the wider Northern Gateway – "TNG site", the wider DHL site, and the subject site.

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) [NEPM]* (NEPC, 2013);
- NSW EPA *Guidelines for Consultants Reporting on Contaminated Land* (NSW EPA, 2020);
- CRC CARE *Remediation Action Plan: Development - Guideline on Establishing Remediation Objectives* (CRC CARE, 2019a); and
- NSW Department of Planning and Environment, *Planning Guidelines, State Environmental Planning Policy (Resilience and Hazards) 2021*.

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.

The Department of Planning and Environment provided industry specific Secretary's Environmental Assessment Requirements (SEARs) to the applicant for the preparation of an Environmental Impact Statement for the proposed development on 22 May 2024.

This report addresses the following SEARs:

| SEARs Reference | Key Assessment Requirement                                                                                                                                                                                                             | Section where SEARs is addressed in this Report or Previous Report/s                                                                                                   | Comment                                                                                 |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 12              | Assess potential impacts on soil resources and related infrastructure and riparian lands on and near the site, including soil erosion, salinity and acid sulfate soils                                                                 | Refer Section 7 - Addressed as part of the Land Capability assessment (DP 2019a) for Stage 1 of The Northern Gateway and the Preliminary Site Investigation (DP 2019b) |                                                                                         |
|                 |                                                                                                                                                                                                                                        | Addressed as part of the Salinity assessment for Stage 1 of The Northern Gateway. (86548.06.R.001.Rev3)                                                                |                                                                                         |
| 16              | In accordance with Chapter 4 of SEPP (Resilience and Hazards) 2021, assess and quantify any soil and groundwater contamination and demonstrate that the site is suitable (or will be suitable, after remediation) for the development. | Refer to Section 8 (Table 1) and Section 21 of this RAP                                                                                                                | This document concludes that the site can be made suitable for the proposed development |
| 17              | If buildings are proposed to be demolished or altered, provide a hazardous materials survey.                                                                                                                                           | Refer to the hazardous building material report (86548.20.R.003.Rev1)                                                                                                  |                                                                                         |

## 1.1 Background

The findings of the previous investigations including a detailed site investigation (DSI)<sup>1</sup> of the subject site (see Section 7) and wider surrounds (referred to as the wider Northern Gateway – “TNG site” and the wider DHL site) has established there is no evidence of widespread or significant contamination across the site, however, localised contamination in some areas of environmental concern (AECs) was observed as requiring further investigation, delineation and/or remediation. These AECs and associated contaminants of potential concern (COPC) requiring further works are summarised in Table 1 (Section 8) and shown in Drawing 2, Appendix A.

This RAP is required to establish appropriate remediation objectives, strategies, methodologies, and validation processes to remediate AEC (if required) in accordance with EPA requirements. It also details the requirements and methodologies for further investigation of the identified AEC which required further assessment and to determine the extents of AEC as potentially requiring remediation.

<sup>1</sup> DP Report on Site Review Detailed Site Investigation for Contamination, DHL Stage 1, Part of 1953 – 2109 The Northern Road, Badgerys Creek, NSW, report reference 86548.20.R.001.Rev0 dated 21 July 2023 (DP, 2023 – ‘the DSI Stage 1’)

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 (Resilience and Hazards) 2021*. Under Clause 4.13 of *SEPP (Resilience and Hazards) 2021*, the Council should be notified of the proposed commencement of the remediation work at least 30 days before commencement.

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.

## 2. Proposed Development

It is understood that the wider a 25 hectare (ha) DHL site is to be developed to provide general commercial/industrial land use.

It is understood, based on documents provided by DHL, that the 11.9 ha Stage 1 site is proposed to provide two large scale warehouse facilities, dock offices, hardstand and car parking, and higher order employment land uses. The site layout including the location of Stage 1 is presented in Drawing 1.

## 3. Objectives of the RAP

The main objective of this RAP is to facilitate the remediation of the site in an acceptable manner, with minimal environmental impact, to a condition suitable for the proposed development.

The specific objectives of this RAP are therefore to provide a strategy for site remediation which:

- Minimises impacts from the site on the environment and on public health and safety during site remediation;
- Maximises the protection of workers involved with site remediation;
- Renders the site safe, from an environmental perspective, for the proposed land use and substantially reduces potential exposure pathways to contaminants in accordance with remediation acceptance criteria (RAC) as defined in this RAP; and
- Minimises impacts on the local environment during and following site remediation.

## 4. Scope of Work

The scope of the RAP has been established on the basis of the previous investigations and comprises:

- Summarise the findings of previous investigations and identify issues at the site as requiring further investigation used 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;



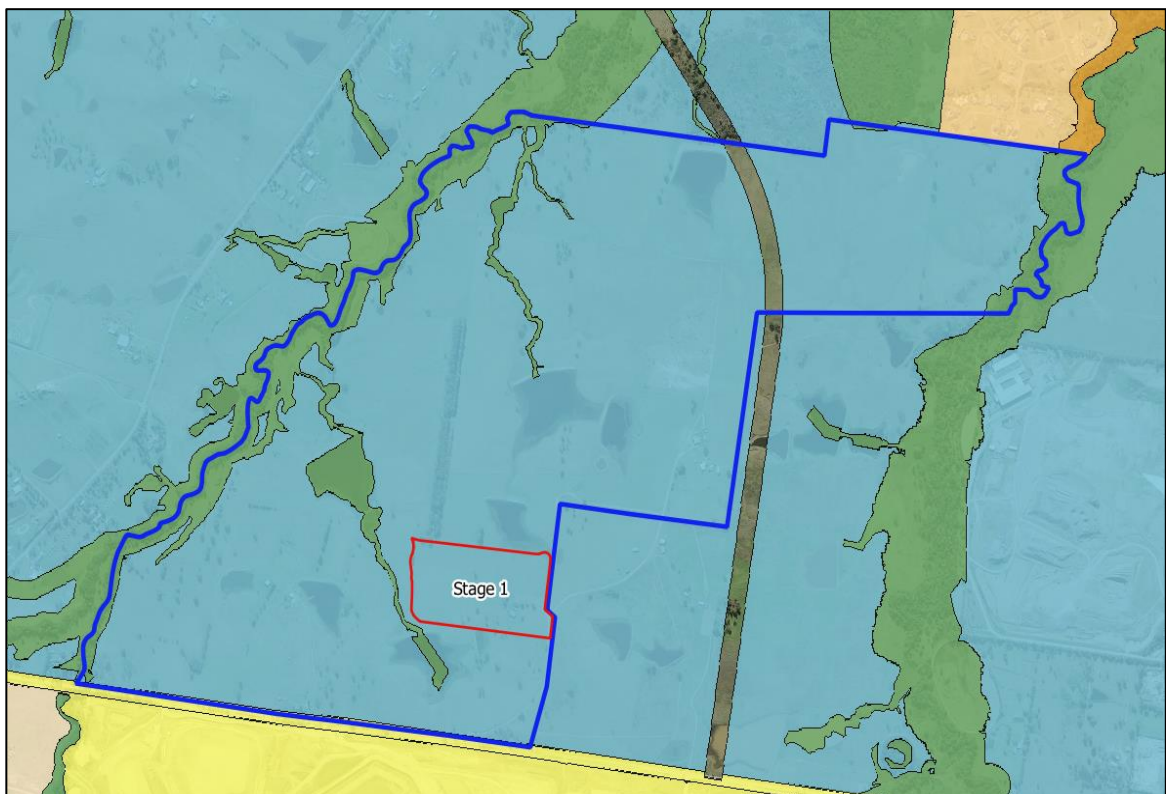
- Define the anticipated extent of remediation (subject to more accurate delineation);
- Assess, select and justify a preferred approach to remediation to render the site suitable for its proposed use, and which will minimise potentially unacceptable risk to human health and/or the environment and which 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 demonstrated/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.

## 5. Site Description

|                                |                                                                                                                                                                                                                                                                                                     |
|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Site Address                   | Part of 1953 - 2109 Elizabeth Drive, Badgerys Creek                                                                                                                                                                                                                                                 |
| Legal Description              | Part Lot 1 on Deposited Plan (D.P) 1306448 (includes Stage 1)                                                                                                                                                                                                                                       |
| Area                           | Stage 1: Approximately 11.9 ha<br>Broader DHL site: 25 ha                                                                                                                                                                                                                                           |
| Zoning                         | ENT Enterprise and ENZ Environment and Recreation adjacent to the south west site boundary<br>See Figure 1 below for current zoning.                                                                                                                                                                |
| Local Council Area             | Penrith City Council                                                                                                                                                                                                                                                                                |
| Current Use                    | Vacant land and a former residence in the southern portion. The majority of the site is grass-covered with tree growth around the former residence.                                                                                                                                                 |
| Recent and historical land use | Recently (in 2020) a horse-riding school was situated in proximity of the site and the site was presumably used for horse riding and agistment. The site was historically used primarily for rural residential and pastoral land use which included injecting portions of the land with food wastes |

|                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Surrounding Uses | <p>North – DHL stage 2, followed by continuation of the TNG site (vacant, pastoral and rural residential) followed by bushland and residential land use (Luddenham suburb)</p> <p>East – Vacant pastoral Western Sydney University site, followed by SUEZ Kemps Creek Resource Recovery Park and landfill (adjacent to Badgerys Creek) – a licenced waste facility and operates under an Environmental Protection Licence (Licence No. 4068).</p> <p>South – continuation of TNG site (vacant and pastoral) followed by Elizabeth Drive and the followed by commercial and rural residential properties (part of Badgerys Creek)</p> <p>West – continuation of TNG site (vacant and pastoral) followed by Cosgroves and Oaky Creek, followed by commercial and rural residential properties (part of Luddenham)</p> |
|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

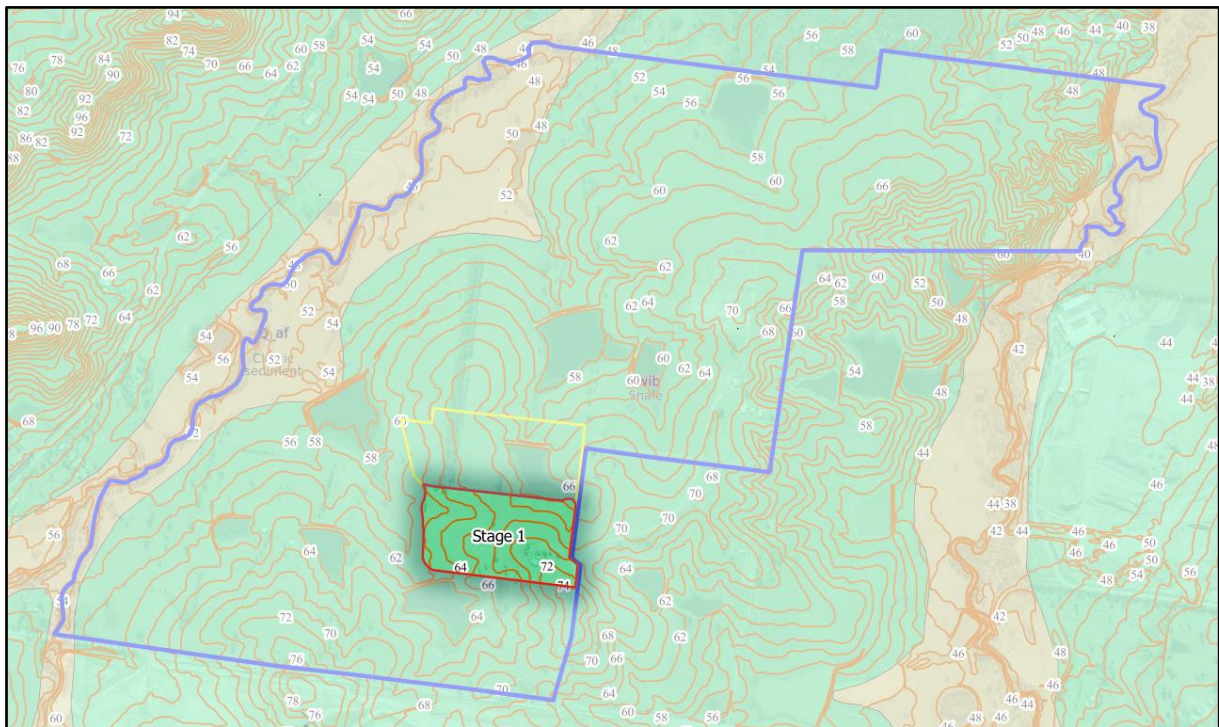
The site boundary is shown in Figure 1.



**Figure 1: Current zoning including ENT Enterprise (blue) and ENZ Environment and Recreation (green) – site boundary in red, TNG boundary in blue.**

## 6. Environmental Setting

|                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Regional Topography | The regional topography is generally characterised as gently undulating.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Site Topography     | Gently undulating terrain ranges from approximately 74 m from the highest part of the site in the south east, to the lowest part of the site (approx. RL 62) in the north, near a farm dam north of the site. Ground surface slopes within the site are typically less than five degrees. Ground surface slopes steepen considerably within the gullies, although the overall slope heights are generally less than 1 m.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Soil Landscape      | The site comprises Blacktown soil landscapes (Bannerman <i>et al</i> , 1990).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Geology             | The site is underlain by the Bringelly Shale Formation (Twib). This unit typically comprises shale, carbonaceous claystone, claystone, laminite, fine to medium-grained lithic sandstone, rare coal and tuff (NSW, DoM & E, 1991).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Acid Sulfate Soils  | The site is not mapped within, or close to an area identified as a risk for acid sulfate soils (NSW DoE & CC, 1998).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Surface Water       | Cosgroves Creek and Oaky Creek to the west; the distance from the current site is approximately 1250 m east and 780 m west respectively.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Groundwater         | <p>The unweathered shale rock unit has very low hydraulic conductivity and the few bores drilled into the unweathered shales in the Sydney area are generally dry or yielding small flows of saline groundwater, typically with total dissolved salts (TDS) contents of 10 000 mg/L to 30 000 mg/L (Old, 1942; McNally, 2004). Groundwater flow is likely to be dominated by fracture flow with resultant low yields (typically &lt;1 L/s) in bores.</p> <p>A search of the NSW Department of Planning, Industry and Environment groundwater bore database undertaken by DP in July 2021 indicated that there are no registered groundwater bores on the site.</p> <p>Twelve groundwater bores are located within 1.8 km of the site and toward the east on the SUEZ Recycling and Resource Recovery Waste Facility site. The total drill depth ranged from 17 m to 37 m depth, though no groundwater information was available for the bores.</p> |



**Figure 2: Geology Landscape Mapping**

## 7. Previous Reports and Site History

The following previous reports are relevant to this RAP:

- DP Report on Soil Assessment, 1984 - 2107 Elizabeth Drive, Badgerys Creek, Project 36288, dated 16 January 2004 (DP 2004);
- EI Australia Pty Ltd (EI) Report on Preliminary Site Investigation, 1953-2109 Elizabeth Drive, Badgerys Creek, NSW, Report E23773.E.01\_Rev0, dated 30 May 2018 (EI 2018).
- DP, Report on Geotechnical Land Capability Assessment, The Northern Gateway, 1953 – 2109 Elizabeth Drive, Badgerys Creek, Project 86548.00.R.001.Rev1, November 2019 (DP 2019a);
- DP, Report on Preliminary Site Investigation, The Northern Gateway, 1953 – 2109 Elizabeth Drive, Badgerys Creek, Project 86548.00.R.002.Rev1, November 2019 (DP 2019b);
- DP, Report on Sampling and Analysis Quality Plan, The Northern Gateway, 1953 – 2109 Elizabeth Drive, Badgerys Creek, NSW, Project 86548.03, Rev. 1 (DP, 2020);
- DP Report on Site Review Detailed Site Investigation for Contamination DHL Stage 1, Part of 1953 – 2109 Elizabeth Drive, Badgerys Creek, NSW, report reference 86548.20.R.001.Rev0 dated 8 August 2023 (DP, 2023a – ‘the DSI – Stage1’);
- DP Report on Hazardous Building Materials (HBM) Survey, DHL Stage 1, Part of 1953 – 2109 Elizabeth Drive, Badgerys Creek, NSW, report reference 86548.20.R.003.Rev0 dated 8 August 2023 (DP, 2023b – ‘the HBM’); and
- DP Review of Supplementary Contamination Investigation – DHL Stage 1, Part of 1953 – 2109 Elizabeth Drive, Badgerys Creek, NSW, report reference 86548.14.R.006.Rev0 dated 17 August 2023 (DP, 2023c – ‘the SCI’).



Key findings of the review of relevance to this report are summarised below:

## **7.1 DP 2004 – Soil Assessment**

The DP (2014) investigation was undertaken to evaluate the soil conditions within areas of the site which had been injected with food wastes. The scope of the assessment included the collection of three to five surface soil samples and assessment of soil analytical results from eight paddock areas at the site, of which one area is within the current site (Area 16). Based on the results of the testing and site observations, it was considered that given the condition of the site, it would be compatible with a variety of land uses, including commercial and industrial developments. However, further investigation of hydrocarbons that were detected would be required to confirm this. It is noted that the DP (2014) investigation was undertaken prior to key guidance on per- and polyfluoroalkyl substance (PFAS) impact.

## **7.2 EI 2018 – Preliminary Site Investigation**

The EI (2018) assessment comprised a qualitative assessment of the site from a contamination perspective. The scope of the assessment included a site inspection and site history search. The EI (2018) assessment generally concluded that the wider site could be made suitable for development subject to further investigations of possible localised contamination sources, including:

- A scientific animal research farm known as the McMaster Field Station operated by the CSIRO, where animal health, reproduction, parasitological and other pastoral issues were studied. From 1996 until present date, the site has been used to graze cattle, and (more recently) for commercial purposes including firewood storage and mulching;
- Homesteads with associated sheds;
- Isolated dumping; and
- Two petroleum storage tanks were present on the wider TNG site but not within DHL Stage 1 area;

## **7.3 DP 2019b – Preliminary Site Investigation**

DP (2019b) undertook a Preliminary Site Investigation (PSI) of the TNG site to evaluate the contamination status of the site regarding its compatibility, from a contamination perspective, for the proposed mixed-use development. The scope of the PSI included a desktop review, a site walk over and limited intrusive soil sampling and analysis. Based on the desktop review, site walk over and geotechnical field observations, several areas were identified as Potential Areas of Environmental Concern (PAEC). Based on the findings of the limited intrusive investigation and the desktop assessment, three PAECs were declared Areas of Environmental Concern, of which there are two within the current site (AECs 18 and 36), and one AEC (19) located immediately adjacent to the southeast of the subject site, required further investigation. The AECs generally fall within the following categories:

- Structures – i.e.: degradation and demolition of structures and leaks and spills;
- Ground disturbances/Fill;
- Timber power poles.

## 7.4 DP 2020 – Sampling and Analysis Quality Plan

DP (2020) prepared a Sampling and Analysis Quality Plan (SAQP) for the DSI of the wider TNG site, the scope of which included a review of previous investigations, a site walk over and a data gaps assessment to establish what data is needed to assess whether or not the site is suitable for the proposed development, from a contamination assessment. The SAQP defined the number, type and locations for soil and groundwater sampling to assess the site in particular data gaps. The SAQP also presented a methodology for sample collection, preservation and storage and establish data quality objectives (DQOs) as well as quality assurance and quality control (QA/QC) procedures.

The SAQP documents the targeted sampling approach and analysis of the three identified AEC relevant to this RAP at the subject site as well as the remaining AEC at the wider DHL site and TNG site.

## 7.5 DP 2023a – Detailed Site Investigation

The scope of this DSI included a review of the SAQP, a detailed site walk over of AECs and an intrusive investigation including test pits in AECs and across the remainder (background) of the site relevant to the subject site, collection of surface soil samples in the vicinity of timber power poles, soil vapour and groundwater sampling and analysis across the wider TNG site.

Soil analytical results were assessed against SAC and reviewed alongside observations made in the detailed site walk over. The findings of the DSI established that there was no evidence of widespread or significant contamination across the site. Localised contamination in some AECs was observed as requiring further investigation, delineation and/or remediation.

The AECs relevant to the subject site requiring further works are summarised below:

- AEC 36 – An exceedance of Metals (As) was recorded for surface soils around one of the two power poles assessed at the site. It is noted that exceedances of metals, TRH, benzo(a)pyrene, total PAHs and total PCBs have been observed next to power poles from elsewhere across the wider TNG site. It is noted that the number of exceedances observed in the DSI for the wider TNG site indicate additional targeted investigations of all power poles will be required to establish and further define which are suitable to be retained on site and which will require remediation;
- AEC 19 (Located immediately adjacent to the site) – ACM impact on the ground surface, a targeted investigation (double density, with reference to NSW EPA 1995 guidelines) should be undertaken to ascertain the extent of asbestos impact here. Where observed, ACM fragments on the surface should be removed by hand and the process documented in a RAP; and
- Background Areas - The DSI identified concentrations of nickel in shallow soil at levels exceeding the ecological SAC investigation levels (45 mg/kg) at Pit 408 (94 mg/kg). Further investigation was required to assess whether the nickel exceedance was either an anomalous isolated occurrence or indicative of more extensive nickel impact to site soil that may require remediation.

Based on the results, the DSI considered that the site is suitable for rezoning and development from a contamination perspective subject to the above additional investigations and/or remediation works being undertaken prior to subdivision.

## 7.6 DP 2023b – Hazardous Building Material

The purpose of HBM (2023) survey was to assess the on-site buildings located in the south eastern portion of the site for potential hazardous building material existing within the subject site from a management perspective, and not for the purpose of pre-demolition.

The HBM survey comprised a non-destructive, non-intrusive visual inspection of safely accessible areas to assess the general location, extent, and condition of asbestos-containing materials (ACM) and other HBM including lead paint, lead dust, synthetic mineral fibre (SMF) and polychlorinated biphenyls (PCBs) in fluorescent light fittings. Samples of suspected ACM, lead paint and dust were collected by DP using hand tools. SMF insulation and light fittings suspected of containing PCBs were assessed primarily by visual inspection.

The HBM survey identified hazardous materials in two structures within the subject site as follows:

- *Building HS* (house structure) - contains non friable asbestos within interior ceiling and walls sheeting. Lead was also detected in exterior and interior paint from the building, and it presented elevated lead dust concentration ( $\geq 0.5 \text{ mg/m}^2$ ); and
- *Building GS* (garage structure) - contains lead in interior and exterior paint(s), elevated lead dust concentration ( $\geq 0.5 \text{ mg/m}^2$ ) and SMF was detected through the ceiling cavity.

## 7.7 DP 2023c – Supplementary Contamination Investigation

The Supplementary Contamination Investigation (SCI) was required to further investigate the AEC identified by the DSI and associated contaminants of potential concern (CoPC) relevant to subject site to determine the vertical and lateral extend of the contamination issues and/or whether remediation is required.

SCI fieldwork was completed at the site on 14 to 20 December 2022 and 7 to 9 February 2023 to assess the AEC identified as requiring further investigation and included completion of the following scope of work:

- AEC36 - Power pole delineation soil sampling in the vicinity of PP10 - To assess the lateral extent of impact initial sampling was completed at 1 m and 1.5 m lateral step outs to the North, East, South and West of power pole PP10, and at depths of 0.1 m and 0.3 m for vertical delineation. Delineation samples sent for laboratory analysis of PAH;
- AEC36 - Collection of a surface soil sample from the base of power pole PP11 that had previously not been assessed. The sample was sent for laboratory analysis for power pole related COPC including PAH and TRH;
- Background areas - To further investigate the extent of nickel impact to soils in the vicinity of pit 408 collection of shallow fill samples (at depths of 0.0-0.2 m bgl) at the four cardinal points (north, east, south and west) approximately 2.0 m and 4.0 m from Pit 408. The 2 m samples and the 0.4 mbgl (from Pit 408) were sent to the laboratory for analysis of nickel;
- AEC19 - Excavation of two strip trenches in the vicinity of Pit 591 (AEC19) with an excavator to visually identify/confirm the extent of fill in the area and the depth to natural soils. Collection of five 10 L bulk and five 500 mL soil samples from each metre of fill encountered within the area to be inspected and analysed, respectively, in accordance with WA DoH 2021; and

- On-site buildings - Collection of soil surface samples (0 - 0.1 mbg) in the vicinity of the exterior walls of the buildings (HS and GS) - one sample was collected for every approximate 10 m surrounding each structure wall. Laboratory analysis of the samples collected in the vicinity of the dwellings and sheds for COPC including asbestos, lead, TRH, BTEX, PAHs, OCPs, OPPs, PCBs and Phenols.

The results of the SCI identified the following AEC relevant to the subject site as requiring risk management and/or remediation as summarised below:

- AEC 36: The results of power pole delineation sampling at power pole (PP10), identified the lateral extents of surface topsoil, as requiring remediation across an approximate area of 4 m<sup>2</sup> to a vertical depth of approximately 0.3 m bgl.

Exceedances for ESLs and or public open space criteria only (without exceeding commercial/industrial criteria) were not considered to warrant remediation of soil in the vicinity of the power pole (PP11) given the primary commercial/industrial land use of the site and the limited potential for public or ecological access to soil.

- Building Footprints: No remediation works are warranted for soils in the vicinity of the on-site buildings in their current state. As well as following the recommendations of the HBM report, the footprints should be inspected by an Environmental Consultant after demolition for residual building materials and filling below the footprint. If filling or residual building materials are present, a targeted building footprint investigation should be undertaken.
- AEC 19 (Located immediately adjacent to the site): Whilst the fill in the vicinity of pit 591 is considered suitable from a contamination perspective to remain on-site, given the presence of ACM identified on the surface, minor remediation will be required to ensure that no visible asbestos remains in surface soils in the vicinity of pit 591. It is noted that the area identified within AEC19 as requiring remediation is not within the Stage 1 boundary.

The identified AEC are considered typical of other rural properties in the area and are generally considered relatively localised, limited in extent and not representative of widespread gross contamination of the site and are readily amenable to clean-up through conventional remediation approaches.

Based on the results of the SCI, it was considered that the site can be made suitable for the proposed commercial/industrial development subject to implementation of the recommendations in Table 1.

## 8. Contamination Summary

The previous investigations at the site have identified the following AEC relevant as shown in the below Table 1 as requiring either remediation or further investigation for the site to be suitable for the proposed land use.



**Table 1: Identified Areas of Environmental Concern (AEC) and Associated COPC**

| Location of Impact/AEC | Source/COPC                                                                                                              | Further Assessment/Delineation Action Required                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|------------------------|--------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Background Areas       | Pit 408 – nickel in surface soils                                                                                        | <p>The DSI (2023a) identified concentrations of Nickel in shallow soil at levels exceeding the ecological SAC investigation levels at Pit 408 (94 mg/kg) exceeding the EIL (45 mg/kg).</p> <p>SCI (2023c) results of nickel delineation sampling at Pit 408 did not identify concentration of metals (Ni) at levels exceeding the EILs in samples collected, therefore the metals impact to soils in the vicinity of pit 408 is considered highly limited in extent.</p> <p>The previously identified exceedances are considered isolated anomalous occurrences and not representative of widespread metal impact to site surfaces.</p> <p>Based on the results of the SCI, no further investigations or remediation works are considered warranted in the vicinity of pit 408.</p>                                                                                                                                                                                                                |
| AEC 36                 | Timber Power Poles – Heavy metals, TRH, benzo(a)pyrene, total PAHs and total PCBs                                        | <p>The DSI (2023a) identified fill impacted soils with concentrations of Heavy Metals (As) exceeding the human health and ecological levels at one timber power pole location.</p> <p>Results of power pole delineation sampling at PP10 during SCI (2023) identified the lateral extents of surface topsoil, as requiring remediation, to be limited to within 1 m (north, south, east and west) of the power pole across an approximate area of 4 m<sup>2</sup> to a vertical depth of approximately 0.3 m bgl.</p> <p>Exceedances for ESLs and or public open space criteria only (without exceeding commercial/industrial criteria) were not considered to warrant remediation of soil in the vicinity of the remaining power pole given the primary commercial/industrial land use of the site and the limited potential for public or ecological access to soil. Therefore, remediation and/or further investigation is not considered to be required for soils in the vicinity of PP11.</p> |
| General (whole site)   | Building footprints in south eastern portion of site – heavy metals, TRH, BTEX, OCP, OPP, PCB, PAH, phenols and asbestos | <p>Structures are known to be present at the site that contain hazardous materials.</p> <p>During SCI (2023), concentrations of metals (including copper and zinc) were identified in sample (GS-1/0.1) collected in the vicinity of one of the on-site buildings (GS) at levels exceeding the EILs criteria.</p> <p>The identified metal exceedances of EILs were not considered to present an unacceptable ecological or human health risk or prevent the proposed overall commercial/industrial use of the site given:</p> <ul style="list-style-type: none"> <li>The results are well below the HILs (copper HIL – 17000 mg/kg and Zinc HIL – 7400 mg/kg) and therefore do not present a human health risk;</li> <li>The marginal nature of the identified EIL exceedances – the concentrations of metals were not detected at levels exceeding 250% of their respective EILs.</li> </ul>                                                                                                      |

| Location of Impact/AEC                   | Source/COPC                                         | Further Assessment/Delineation Action Required                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|------------------------------------------|-----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                          |                                                     | <ul style="list-style-type: none"> <li>Vegetation in the vicinity of on-site building of the subject site (GS) appeared to be healthy and in good condition in relation to surrounding areas indicating no significant ecological impact related to the metals (HS); and</li> <li>The proposed commercial/industrial setting of the site, particularly in the vicinity of where onsite buildings are located, is likely to be covered by either asphalt or concrete, as part of the commercial/industrial development, ecological access to site's soils is considered to be highly limited.</li> </ul> <p>Consequently, results identified that no remediation works are warranted for soils in the vicinity of the on-site buildings in their current state. As well as following the recommendations of the HAZMAT<sup>1</sup>, the footprints should be inspected by an Environmental Consultant after demolition for residual building materials and filling below the footprint. If filling is present, a targeted building footprint investigation should be undertaken.</p> |
| AEC 19<br>(located adjacent to the site) | Filling/ACM impact on the ground surface – asbestos | <p>The DSI (2023) identified ACM impact on the ground surface in the vicinity of pit 591.</p> <p>SCI (2023) included a targeted investigation of the area in which asbestos (in the form of ACM) was detected, however did not exceed the SAC (HSLD - 0.05% w/w), in the 10 L bulk samples collected from fill in the AEC19 (pit 591).</p> <p>The SCI identified that the fill in the vicinity of pit 591 was considered suitable from a contamination perspective to remain on-site however minor remediation will be required, on off-site areas, to ensure no visible asbestos remains in surface soils in the vicinity of pit 591. The SCI trenches, sample locations and estimated extent of surface soils requiring remediation (not within the Stage 1 boundary) are shown on Drawing 3, Appendix A.</p>                                                                                                                                                                                                                                                                     |

<sup>1</sup>: Hazardous materials building assessment reported under separate cover (reference 86548.20.R.003.Rev0).

## 9. Conceptual Site Model

A CSM was documented in the SAQP (DP, 2020) and updated during the DSI (DP, 2021). The data collected for the SCI confirmed that certain potential contaminant sources pose a potentially complete pathway to the identified receptor(s) whilst others do not. No other sources of contamination have been identified as a result of the testing.

The CSM has therefore been updated from the findings of the DSI relevant to the subject site refer to Table below.

**Table 2: Updated Summary of Potentially Complete Exposure Pathways (Proposed Land Use)**

| Source                                                                                                    | Transport Pathway                                                                                                                                                                                               | Receptor                                  | Remediation Action Required                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-----------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>AEC 36</b>                                                                                             |                                                                                                                                                                                                                 |                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Timber treatment and PCBs in transmission box(es):<br>Metal, TRH, benzo(a)pyrene, total PAHs, total PCBs. | Direct contact of contaminated ground, ingestion and dermal contact with soil or water, inhalation of dust, leaching of contaminants and vertical migration into groundwater, lateral migration of groundwater. | Future site users<br>Ecological receptors | The results of power pole delineation sampling for PP10 identified the lateral extents of surface topsoil as requiring remediation, to be limited to within 1 m (north, south, east and west) of the power pole across an approximate area of 4 m <sup>2</sup> to a vertical depth of approximately 0.3 m bgl.<br><br>The remediation and validation methodology of soil in the vicinity of power pole PP10 is documented in this RAP.                                                                                                                                                                                                       |
| <b>General (southeastern portion of the site)</b>                                                         |                                                                                                                                                                                                                 |                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Building footprints – heavy metals, TRH, BTEX, OCP, OPP, PCB, PAH, phenols and asbestos                   | Inhalation of dust                                                                                                                                                                                              | Future site users<br>Adjacent land users  | Results identified that no remediation works are warranted for soils in the vicinity of the on-site buildings in their current state. As well as following the recommendations of the HAZMAT <sup>1</sup> , the footprints should be inspected by an Environmental Consultant after demolition for residual building materials and filling below the footprint. If filling is present, a targeted building footprint investigation should be undertaken.                                                                                                                                                                                     |
| <b>AEC 19 (adjacent to the site)</b>                                                                      |                                                                                                                                                                                                                 |                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Filling/ACM impact on the ground surface – asbestos                                                       | Inhalation of dust                                                                                                                                                                                              | Future site users<br>Adjacent land users  | Whilst the fill in the vicinity of pit 591 is considered suitable from a contamination perspective to remain on-site, minor remediation will be required to ensure that no visible asbestos remains in surface soils in the vicinity of pit 591. Whilst the area identified within AEC19 as requiring remediation is not within the site boundary, it is recommended that additional inspections should be completed nearby or within the Stage 1 boundary prior to any significant soil disturbance. If ACM is encountered on site surfaces nearby or within site boundary, remediation will be required likely in the form of emu picking. |

## 10. Remediation Goal

The goal/objective of the remediation programme is to render the site suitable for the proposed development.

## 11. Remediation Extents, if Required

The extent of any remediation (if required) will be determined during a further investigation of the identified AEC at the site.

The actual extents (the final remediation extents), however, will be established at the completion of any excavations during remediation, if required.

## 12. Roles and Responsibilities

To achieve the objective of the remediation programme (refer to section 10), the following roles and responsibilities have been initially identified:

### **The Developer**

- Overall responsibility of the implementation of the RAP and forthcoming Remedial Works Plan;
- Overall development project management;
- Safety of the overall development project;
- Engage a suitably qualified Principal Contractor and Environmental Consultant;
- Final approval for the import of any contractor-nominated materials;
- Liaison with the Regulator (Council), Principal Contractor and Environmental Consultant during the remediation process; and
- Submission of validation report(s) to Penrith City Council (consent authority).

### **Principal Contractor (who must have appropriate experience in the remediation and management of contaminated sites)**

- Overall earthworks and civil construction project management including material tracking procedures;
- Overall remediation project management;
- Ensure and manage safety of all personnel on site;
- Ensure appropriate health and safety plans are prepared prior to the works being undertaken;
- Ensure necessary approvals and notifications have been obtained prior to remedial works commencing and waste removal;
- Ensure that any asbestos remediation works must be undertaken by an appropriately licensed asbestos contractor and in accordance with *Work Health and Safety Regulation NSW 2017* and any other applicable Safe Work NSW or Safe Work Australia regulations or guidelines;
- Engage a surveyor to conduct surveys of the resultant remediation footprints; and
- Liaise with the Developer and Environmental Consultant during the remediation process.

### **Asbestos Contractor (can be the same entity as the Principal Contractor)**

- Will be a suitably licensed and qualified contractor (AS A or AS B Licence holder); and
- Will be responsible for the handling/removal of the asbestos-cement fragments or any other ACM which would be classified as asbestos works.

**Environmental Consultant**

- Prepare this Remedial Works Plan on the basis of the findings of the delineation assessment;
- Full time remediation monitoring when required;
- Periodic inspections during remediation works;
- Preparation of amendments or variations to the RAP (if required);
- Undertake airborne asbestos monitoring (as required);
- Attendance following encountering unexpected finds and provision of advice;
- Sampling for waste classification of any materials requiring off-site disposal;
- Preparation of waste classification documentation;
- Validation sampling of remediation areas and assessment of laboratory reports;
- Review of documentation associated with any proposed imported materials;
- Approval for the import of any contractor nominated materials; and
- Provision of a site remediation and validation report with conclusions regarding overall site suitability.

**Occupational Hygienist (can be the same entity as the Environmental Consultant)**

- Should be suitably qualified/licenced in accordance with the WHS Regulations 2017;
- Prepare any WHS plans and advice requested by the Contractor;
- Undertake airborne asbestos monitoring (as required);
- Undertake visual clearance inspections;
- Provide advice and recommendations arising from monitoring and/or inspections;
- Notify their client (either Principal Contractor or the Developer) with the results of any assessments and any observed non-conformances in a timely manner; and
- Issue clearance certification.

Prior to the commencement of remediation works, a site meeting between the Developer, the Principal Contractor and Environmental Consultant is recommended to confirm responsibilities and procedures in accordance with the agreed management plan.

## **13. Remediation Options**

### **13.1 Remediation Hierarchy**

The preferred hierarchy of options for site remediation, if required, and/or management is set out in s.6(16) Assessment of Site Contamination Policy Framework of Schedules A and B of NEPC (2013), as follows:

1. on-site treatment of the contamination so that it is destroyed or the associated risk is reduced to an acceptable level; and
2. 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 is not practicable:

3. consolidation and isolation of the soil on site by containment with a properly designed barrier; and
4. removal of contaminated material to an approved site or facility, followed, where necessary, by replacement with appropriate material.

The preferred remediation hierarchy for the site is referenced in Section 4.3 of *Contaminated Sites: Guidelines for the NSW Site Auditor Scheme (3<sup>rd</sup> edition)*, (NSW EPA, 2017). These guidelines state that site auditors must ensure that adequate consideration has been given to the nature and extent of contamination, and the risks which the contamination may be posing to human health and the environment.

An evaluation on of the remediation options are discussed in Table 3 below. The methods deemed appropriate are discussed in Sections 13.1.1 to 13.1.3 below.

**Table 3: Remediation Options Evaluation**

| Remediation Option                                                     | Review                                                                                                                                                                                                                                                                                                                |
|------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Option 1 – On-Site treatment                                           | Suitable for some asbestos (as ACM impact to surface soils to maximum depths of 10 cm) and petroleum impact (if encountered) only. Less feasible for PAH impacted soil. Unsuitable for ACM impact to fill, AF/FA, lead or PCB impact                                                                                  |
| Option 2 – Off- Site treatment                                         | Generally not appropriate given that this option is considered less desirable from a sustainability (environmental, economic and social) perspective given the substantial costs and effects on local roads and neighbourhoods associated with transporting contaminated soil to another site for off-site treatment. |
| Option 3 – On-site Capping                                             | Advantages: <ul style="list-style-type: none"> <li>• Would completely contain asbestos-impacted fill</li> <li>• Would contain any potential lead or PCB impact (subject to leachate testing)</li> <li>• Reduced waste transport and disposal costs</li> </ul>                                                         |
|                                                                        | Disadvantages: <ul style="list-style-type: none"> <li>• Requirement for design of the capping system.</li> <li>• Requirement for a long-term environmental management plan (LTEMP)</li> <li>• May result in the recording of contamination on title</li> </ul>                                                        |
| Option 4 – Removal of all fill to an appropriate facility for disposal | Advantages: <ul style="list-style-type: none"> <li>• Removes the contamination from the site</li> <li>• Allows for greater options for future land use</li> <li>• Potentially removes the ongoing liability from the site</li> <li>• Removes the need for a LTEMP</li> </ul>                                          |
|                                                                        | Disadvantages: <ul style="list-style-type: none"> <li>• Cost of transport and waste disposal and potential wastage of the State's landfill resources.</li> <li>• Potentially exposes workers and adjacent site users to contaminants.</li> </ul>                                                                      |



### 13.1.1 On-Site Treatment (of ACM)

In the case of surface soil (to maximum depths of 10 cm) impacted with asbestos, this management option entails physical treatment of the impacted soil on-site with the removal of the asbestos.

Generally, the physical treatment of surface soil impacted with ACM would comprise hand picking or “emu-bobbing” the ACM, with any ACM collected and disposed of at an appropriately licensed landfill<sup>2</sup>

The treatment is followed by validation sampling and lab analysis of each treated batch to validate that any remaining ACM within the treated soils are below the adopted land use criteria.

While the treated surface soils may be re-usable on site based on the validation inspections and ACM concentration in the validation samples being less than the adopted land use criteria, ACM may (most likely) still be present within the treated surface soils and as such, the treated surface soil would still require covering with a minimum of 0.1 m of non-impacted materials (excluding topsoil).

If encountered, the treatment of the petroleum contamination in soils is technically straight forward. The on-site remediation would generally comprise “landfarming” utilising micro-organisms naturally found in soils to reduce TRH concentrations and in accordance with NSW EPA *Best Practice Note: Landfarming*, April 2014.

Treatment of non-petroleum related PAH in soils is technically feasible, e.g. by direct fired thermal desorption, although treatment trials would need to be conducted to confirm the suitability of the subject material for treatment and costs to treat soil using this method can be high.

The advantages of the above on-site treatment options are the potential for reduction of concentrations of the contaminants to levels suitable for re-use on the site with minimal, if any, future management requirements. However, the above on-site treatment options could be expensive for small volumes.

### 13.1.2 Removal Off-site to a Licensed Waste Facility

Removal to landfill involves physically excavating and moving impacted soil and building and demolition waste to an off-site licensed waste facility with subsequent validation of the resultant remedial excavation.

As part of the management of aesthetic considerations, any stockpiles or oversized waste materials would also be collected and disposed of at an appropriately licensed facility during this physical treatment process.

Disposal of any contaminated soils, asbestos or building and demolition waste off-site is technically a straightforward option and could be completed in a relatively short time scale prior to development of the site. The option would remove from the site any ongoing maintenance and risk legacy associated with the contamination.

However, off-site disposal can be an expensive option dependent on the quantity and type of materials being removed.

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<sup>2</sup> Currently there are some uncertainties regarding the new EPA’s position statement on “emu picking” in response of the revised Guidelines for the Assessment, Remediation and Management of Asbestos Contaminated Sites in Western Australia (the WA Asbestos Guidelines) by the West Australian Department of Health on 24 August 2021

### 13.1.3 Physical Barrier Layer

Physical barrier layers (*i.e.* capping contaminated material beneath hardstand or non-impacted material) limit access to the impacted soil, mitigate surface water infiltration through the underlying material (where necessary) and control or reduce migration of the contaminants into the surrounding environment (where necessary).

Physical barrier layers can include compacted clean fill, low permeability soils such as clays, synthetic membranes such as high-density polyethylene (HDPE), geotextile fabrics, geosynthetic clay liners, bituminous materials, paving or concrete.

Appropriate site grading and drainage systems may also be required to remove water from the capped areas (pavements and slabs) and to control surface run-off. Concrete barriers, bituminous pavements and various membranes may be vulnerable to cracking or shearing, depending on their proposed use, and may require appropriate inspection and maintenance.

The geotechnical suitability of the placed material would also need to be considered if the cell was located within a structural portion of the site or beneath a road.

The containment cell would likely require an associated long term environmental management plan, notice on title and agreement and/or planning consent from the local authority in accordance with section 3.4.6 NSW EPA *Guidelines for the NSW Site Auditor Scheme (3<sup>rd</sup> Edition)*, April 2006. Natural material generated during the excavation of the cell could be used to reinstate site levels.

If the capping of a containment cell extends to a depth greater than 3 m below final ground level, the associated environmental management plan and notice on title may not be required (refer to NSW EPA *Guidelines for the NSW Site Auditor Scheme (3<sup>rd</sup> Edition)*, April 2006).

## 13.2 Preferred Remediation Strategy

The preferred remediation strategy needs to achieve an appropriate balance between the benefits and effects of the available remediation options, based on the following considerations/criteria:

- Protecting the health of site users during and post-development;
- Protecting the health of users of neighbouring properties;
- Protecting the local environment and ecosystems;
- Minimising the ongoing requirement for maintenance or management of the remediation method;
- Minimising the overall environmental impact of the development, including traffic and the volume of wastes disposed to landfill; and
- Cost and effectiveness (including costs and risks associated with technical difficulties of the strategy and with the duration of the strategy).

Based on the results of the previous investigations completed as per Section 7, any remediation is to be completed as per the most appropriate remediation strategy, determined by the Environmental Consultant and DHL. It is noted that one of, or a mix of, the remediation strategies may be utilised to achieve the desired outcomes (*i.e.* the suitability of the site for the proposed development).

## 14. Remediation Acceptance Criteria

The remediation works will need to be validated as meeting an acceptable standard for the proposed land use. The validation will be undertaken by the environmental consultant by means of monitoring/inspections, field screening, recovery and analysis of samples, review of disposal dockets (if fill is disposed from site) and review of contractor quality control documentation, as discussed below.

The RAC applied in the current investigation are informed by the CSM which identified human and environmental receptors to potential contamination at the site. Analytical results are assessed (as a Tier 1 assessment) in the first instance against the RAC comprising primarily the investigation and screening levels of Schedule B1 of NEPC (2013).

The following inputs are relevant to the selection and/or derivation of the RAC:

- Land use: in the first instance commercial/industrial (DP notes that the site is proposed commercial/industrial land use scenario criteria being used as an initial screening tool); and
- Soil type: Dominantly clay.

### 14.1 Soil Health Investigation and Screening Levels

The generic health investigation levels (HIL) and health screening levels (HSL) are considered to be appropriate for the assessment of human health risk via all relevant pathways of exposure associated with contamination at the site. The adopted soil HIL and HSL for the contaminants of concern are in Table 4 and 5.

**Table 4: Health Investigation Levels (mg/kg)**

| Contaminant         | HIL-D   |
|---------------------|---------|
| <b>Metals</b>       |         |
| Arsenic             | 3000    |
| Cadmium             | 900     |
| Chromium (VI)       | 3600    |
| Copper              | 240 000 |
| Lead                | 1500    |
| Mercury (inorganic) | 730     |
| Nickel              | 6000    |
| Zinc                | 400 000 |
| <b>PAH</b>          |         |
| B(a)P TEQ           | 40      |
| Total PAH           | 4000    |
| <b>Phenols</b>      |         |
| Phenol              | 240 000 |
| <b>OCP</b>          |         |
| DDT+DDE+DDD         | 3600    |
| Aldrin and dieldrin | 45      |

| Contaminant  | HIL-D |
|--------------|-------|
| Chlordane    | 530   |
| Endosulfan   | 2000  |
| Endrin       | 100   |
| Heptachlor   | 50    |
| HCB          | 80    |
| Methoxychlor | 2500  |
| <b>OPP</b>   |       |
| Chlorpyrifos | 2000  |
| <b>PCB</b>   |       |
| PCB          | 7     |

**Table 5: Health Screening Levels (mg/kg)**

| Contaminant  | HSL-D       | HSL-D       | HSL-D       | HSL-D   |
|--------------|-------------|-------------|-------------|---------|
| SILT         | 0 m to <1 m | 1 m to <2 m | 2 m to <4 m | 4 m+    |
| Benzene      | 4           | 50          | 140         | 320     |
| Toluene      | 5700        | 63 000      | NL          | NL      |
| Ethylbenzene | 1500        | 19 000      | 54 000      | NL      |
| Xylenes      | 1000        | 13 000      | 38 000      | NL      |
| Naphthalene  | 4           | 50          | 150         | 350     |
| TRH F1       | 850         | 11 000      | 33 000      | 77 000  |
| TRH F2       | 670         | NL          | NL          | NL      |
| CLAY         | 0 m to <1 m | 1 m to <2 m | 2 m to <4 m | 4 m+    |
| Benzene      | 5           | 80          | 230         | 530     |
| Toluene      | 6500        | 100 000     | NL          | NL      |
| Ethylbenzene | 1800        | 31 000      | NL          | NL      |
| Xylenes      | 1200        | 21 000      | NL          | NL      |
| Naphthalene  | 4           | 85          | 240         | 560     |
| TRH F1       | 1000        | 19 000      | 55 000      | 130 000 |
| TRH F2       | 800         | NL          | NL          | NL      |

Notes: TRH F1 is TRH C<sub>6</sub>-C<sub>10</sub> minus BTEX

TRH F2 is TRH >C<sub>10</sub>-C<sub>16</sub> minus naphthalene

The soil saturation concentration (C<sub>sat</sub>) is defined as the soil concentration at which the porewater phase cannot dissolve any more of an individual chemical. The soil vapour that is in equilibrium with the porewater will be at its maximum. If the derived soil HSL exceeds C<sub>sat</sub>, a soil vapour source concentration for a petroleum mixture could not exceed a level that would result in the maximum allowable vapour risk for the given scenario. For these scenarios, no HSL is presented for these chemicals and the HSL is shown as 'not limiting' or 'NL'

## 14.2 Asbestos in Soil

Based on the CSM and/or current site access limitations, a detailed asbestos assessment was not considered to be warranted at this stage for the majority of the site. However, due to the history of widespread use of ACM products across Australia, ACM can be encountered unexpectedly and sporadically at a site.

Health Screening Levels (HSLs) for asbestos in soil, which are based on likely exposure levels for different scenarios, have been adopted in NEPC (2013) from the Western Australian Department of Health (WA DoH) publication Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia 2009 (WA DoH 2021).

On the basis of the proposed land use, and in accordance with Table 7, Schedule B1, NEPC (2013), the adopted asbestos HSLs are summarised in Table 6.

**Table 6: Health Screening Levels for asbestos**

| <b>Contaminants</b> |                       | <b>HSL D</b>                                                       | <b>EIL / ESL</b> | <b>Adopted RAC</b> |
|---------------------|-----------------------|--------------------------------------------------------------------|------------------|--------------------|
| <b>Asbestos</b>     | (ACM)                 | 0.05% w/w                                                          | -                | 0.05% w/w          |
|                     | FA and AF             | 0.001% w/w                                                         | -                | 0.001% w/w         |
|                     | All types of asbestos | No visible asbestos on the ground surface.                         |                  |                    |
| <b>Aesthetic</b>    |                       | No visible construction demolition materials on the ground surface |                  |                    |

## 14.3 Ecological Investigation Levels

Ecological investigation levels (EIL) and added contaminant limits (ACL), where appropriate, have been derived in NEPC (2013) for arsenic, copper, chromium (III), nickel, lead, zinc, DDT and naphthalene. The adopted EIL, derived using the interactive (excel) calculation spreadsheet on the NEPM toolbox website are shown in Table 8, with inputs into their derivation shown in Table 7.

**Table 7: Inputs to the Derivation of the Ecological Investigation Levels**

| Variable            | Input             | Rationale                                                                                                         |
|---------------------|-------------------|-------------------------------------------------------------------------------------------------------------------|
| Age of contaminants | "Aged" (>2 years) | Given the potential sources of soil contamination are from historic use, the contamination is considered as aged. |
| pH                  | 6.6 pH Units      | Based on the average of 54 soil analytical results (ranging from 4.6 to 7.8 pH units)                             |
| CEC                 | 5.94 cmolc/kg     | Based on the average of 4 soil analytical results (ranging from 3.8 to 11pH units) from the DSI.                  |
| Clay content        | 40%               | The soil at the site was dominantly silty clays                                                                   |
| Traffic volumes     | low               | Most of the site is not exposed to public roads, with the site considered to be located within a low traffic area |
| State/Territory     | NSW               | -                                                                                                                 |

**Table 8: Ecological Investigation Levels (mg/kg)**

| Contaminant   | EIL- D |
|---------------|--------|
| <b>Metals</b> |        |
| Arsenic       | 160    |
| Copper        | 350    |
| Nickel        | 730    |
| Chromium III  | 1100   |
| Lead          | 1800   |
| Zinc          | 1100   |
| <b>PAH</b>    |        |
| Naphthalene   | 370    |
| <b>OCP</b>    |        |
| DDT           | 640    |

## 14.4 Ecological Screening Levels

Ecological screening levels (ESL) are used to assess the risk of selected petroleum hydrocarbon compounds, BTEX and benzo(a)pyrene to terrestrial ecosystems. The adopted ESL are shown in Table 9.

**Table 9: Ecological Screening Levels (mg/kg)**

| Contaminant  | Soil Type    | ESL-D |
|--------------|--------------|-------|
| Benzene      | Fine         | 95    |
| Toluene      | Fine         | 135   |
| Ethylbenzene | Fine         | 185   |
| Xylenes      | Fine         | 95    |
| TRH F1       | Coarse/ Fine | 215   |
| TRH F2       | Coarse/ Fine | 170   |
| TRH F3       | Fine         | 2500  |
| TRH F4       | Fine         | 6600  |
| B(a)P        | Fine         | 0.7   |

Notes: ESL are of low reliability except where indicated by \* which indicates that the ESL is of moderate reliability

TRH F1 is TRH C<sub>6</sub>-C<sub>10</sub> minus BTEX

TRH F2 is TRH >C<sub>10</sub>-C<sub>16</sub> including naphthalene

In the case of benzo(a)pyrene, any exceedances of the ESL should be further assessed against ecological guidance provided in CRC Care Technical Report No. 39 which is 33 mg/kg for urban residential and public open space, and 172 mg/kg for commercial and industrial land use.

## 14.5 Ecological Soil Guideline Values

The interim ecological soil guideline values (EGV) derived from Table 3 of HEPA (2020) are summarised in Table 10.

**Table 10: Ecological Soil Guideline Values (mg/kg) – All Land Uses**

| Contaminant | Direct Exposure | Indirect Exposure |
|-------------|-----------------|-------------------|
| PFOS        | 1               | 0.01              |
| PFOA        | 10              | NC                |
| PFHxS       | NC              | NC                |

Notes: NC no criterion



## 14.6 Management Limits

In addition to appropriate consideration and application of the HSL and ESL, there are additional considerations which reflect the nature and properties of petroleum hydrocarbons, including:

- Formation of observable light non-aqueous phase liquids (LNAPL);
- Fire and explosion hazards; and
- Effects on buried infrastructure eg: penetration of, or damage to, in-ground services.

The adopted management limits are summarised in Table 11.

**Table 11: Management Limits (mg/kg)**

| Contaminant | Soil Type | ML-D   |
|-------------|-----------|--------|
| TRH F1      | Fine      | 800    |
| TRH F2      | Fine      | 1000   |
| TRH F3      | Fine      | 5000   |
| TRH F4      | Fine      | 10 000 |

Notes: TRH F1 is TRH C<sub>6</sub>-C<sub>10</sub> including BTEX  
TRH F2 is TRH >C<sub>10</sub>-C<sub>16</sub> including naphthalene

## 15. Remediation Strategies

Based on the results of the previous investigations completed as per Sections 7 and 8, any remediation is to be completed as per the most appropriate remediation strategy, determined by the Environmental Consultant and DHL. It is noted that one of, or a mix of, the remediation strategies may be utilised to achieve the desired outcomes (i.e. the suitability of the site for the proposed development).

It is noted that as this RAP does not form a detailed specification for the proposed site remediation or construction works. As such, this report does not include estimation of the volume of material requiring handling and management at the site.

The detailed procedures and sequence for the remediation work will depend on the results of the forthcoming targeted investigations and any residual impact resulting from the demolition of the building. Procedures and sequences of any remediation will also rest with the contractor and may depend upon the final detailed design of the development, the equipment to be used and the overall finalised 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, earthworks and construction works 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.

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

Remediation and earthworks involving asbestos must be undertaken by an appropriately licensed asbestos remediation contractor, and in accordance with *Work Health and Safety Regulation NSW 2017* and any other appropriate SafeWork NSW regulations or Safe Work Australia guidelines. As per SafeWork NSW requirements, the licensed asbestos remediation contractor must give written notice to SafeWork NSW at least five days before remediation work commences.

For all works requiring a Class B asbestos removal license it is recommended that air quality monitoring for airborne asbestos fibres should be conducted on a daily basis when works involving the excavation and transport of ACM and potential asbestos impacted soils are being conducted within the site. Air quality monitoring must be undertaken by a licenced asbestos assessor for all works requiring a Class A asbestos removal license.

### 15.1 Site Establishment

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

While not a requirement for Class B asbestos removal, it is recommended that air quality monitoring for airborne asbestos fibres using the Membrane Filter Method in accordance with the *Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres* (NOHSC: 3003, April 2005) should be undertaken prior to commencement of works (baseline) and on a daily basis when works involving the excavation, transport or stockpiling of asbestos impacted and potentially impacted soils/materials are being conducted within the site. If friable asbestos is recorded during the remediation works, air quality monitoring will be required to be carried out by a suitably licensed asbestos assessor.

In the event of detections of airborne asbestos fibres during the works, the Principal Contractor should make appropriate modifications to works methods, as required.

### 15.2 Remediation Supervision and Periodic Site Inspections

DP recommends that the remediation works should be undertaken under the full-time presence of an Environmental Consultant to reduce the potential for over excavation, the mixing of contaminated materials and the mixing of the various waste streams (e.g. General Solid Waste and Special Waste - Asbestos).

The Environmental Consultant will conduct regular periodic site inspections during remediation works, when any issue of concerns are identified and to facilitate inspection of the remediation progress. A record of the inspections, observations and remediation actions will be provided as part of the site remediation and validation report. This will include a photographic record of key moments.

### 15.3 On-site Treatment of Asbestos (ACM) in Surface Soils such as AEC19, if Required

Whilst the area identified by the SCI within AEC19 as requiring remediation is not within the site boundary, it is recommended that additional inspections should be completed nearby and within the Stage 1 boundary prior to any significant soil disturbance of the area. In the event that low concentrations of ACM are encountered within surface soils (to maximum depths of 10 cm) within the site boundary, treatment of the surface soils/filling may be adopted and remediation should be conducted as follows:

1. The Environmental Consultant is to undertake air monitoring during the works;
2. Given that ACM is considered likely localised to the ground surface, the licensed asbestos contractor should hand-pick ACM from surface soils. A thorough 1 m grid-based inspection should be undertaken to collect ACM;
3. The licensed asbestos contractor should mechanically rake/turn the surface at the AEC19 location, excavate the surface soil (topsoil), any fill and aggregate. Clods of clay must be broken down/crushed as part of the spreading process. Each raking event should be recorded, which will specify the date, time, location, volume of material being treated, description of the soil, number of passes, number of asbestos finds per pass, and photographed;
4. The raked surface should be re-inspected on a 1 m-grid based transect with any visible ACM hand-picked;
5. Steps 2 and 3 are to be repeated until no ACM is observed during three consecutive inspections by the Environmental Consultant;
6. Double bag bonded ACM fragments for temporary storage whilst on site in a secure designated area awaiting off-site disposal; and
7. Following removal of the surface materials, the site surface will be validated by the environmental consultant as per Section 16.4.

### 15.4 Excavation of PAH Impacted Soils Surrounding Power Poles (AEC 36)

One timber power pole (PP10) on-site has been identified as requiring remedial works and excavation as listed in Table 2, Section 9. In addition, it is understood that remaining power poles will likely also be removed for the proposed development.

The below is a general remediation strategy which will apply to any power pole identified as requiring remediation or removal:

- Remove all power poles from the site as requiring remediation (Those listed in Table 2, Section 9). Given that the power poles are treated timber they are considered building and demolition waste and are therefore pre-classified as General Solid Waste (non – putrescible) in accordance with NSW Environment Protection Authority (EPA) Waste Classification Guidelines, Part 1: Classifying Waste, November 2014 (EPA, 2014). Disposal of power poles is required to a facility which can legally receive such waste. Given the chemical content of the power poles, they would be deemed unacceptable for any recycling or resource recovery activities;
- Preparation of a waste classification report by the appointed Environmental Consultant to facilitate appropriate off-site disposal of the power pole impacted soil to a licensed facility (the results obtained in DP [2023a] and DP [2023c] may be used to supplementary any waste classification);

- Excavate the topsoil around the power poles to expose underlying natural clay and stockpile the excavated soils on an impermeable membrane. The lateral extent of the topsoil excavation is to extend to at least 1.0 m from the base of the power pole;
- Extend the topsoil excavation to a depth of 0.3 m below the base of the pole within an initial 0.3 m radius. DP has previously used a 0.6 m diameter auger to successfully remediate impacted clay from the base of power poles. Stockpile excavated clay material surrounding power poles separately to the above topsoil;
- Collect validation samples from the bases and walls of the excavations as per the procedures outlined in Section 16.6. If a validation sample exceeds the RAC, chase out and resample the excavation as required until the RAC are met;
- Backfill excavations with either VENM or using a suitable material from within the site;
- If required, undertake waste classification sampling of the stockpiled excavated material as per Section 15.7 and dispose of the excavated material off-site to a licensed waste disposal facility; and
- Survey the full extent of the remediation areas and produce survey drawings showing the lateral extent of remediation excavations, relative to the proposed final development layout.

### **15.5 Off-site Removal (For Other AEC or COPC, if encountered, which are deemed Unsuitable to Remain On-site)**

In the event that other AEC or COPC are encountered, and off-site disposal is considered suitable, the remediation of impacted fill should be conducted as follows:

- Preparation of a waste classification report by the appointed Environmental Consultant to facilitate appropriate off-site disposal of the following identified issues to a licensed facility (the results obtained in DP [2021a] may be used to supplementary any waste classification):
- If remedial works are related to asbestos, undertake air monitoring during the works, (Environmental Consultant);
- Excavation of impacted fill under the supervision of the Environmental Consultant. Excavation should progress to 0.1 m into the underlying natural soils;
- Disposal to a waste facility licensed to receive the waste;
- Validation inspection of the resultant remediation footprint as per Section 16.4.1 (for asbestos) of Section 16.6 (for other COPC);
- If a validation sample exceeds the RAC provided in Section 14, chase out the impacted soil as considered appropriate. Re-sample the resulting excavation and re-excavate as required until the RAC are met;
- Once the remediation areas/excavations have been successfully validated, survey the full extent of the remediation area or excavation and produce survey drawings showing the depth and extent of the remediation; and
- Disposal dockets for all material removed from the site are to be provided to the Environmental Consultant for inclusion in the validation report.

## 15.6 Capping/Containment of Soils (if Preferred and/or Materials Deemed Suitable)

If the capping/containment contingency is adopted, any material which exceeds the RAC for asbestos and or other COPC (if deemed suitable to remain on-site based on further site-specific risk assessment) can either be left in-situ or can be placed within a designated fill location and capped with an engineered barrier.

If excavation of the fill is to be completed in portions of the site for placement within a specific area of the site, then a designated stockpiling area should be established at the site so that all excavated material requiring containment can be consolidated in one area prior to placement within the containment cell.

The capping/containment area requires the following:

- If excavating and placement within a designated area of the site, the area should have a suitable size to house all impacted material and taking into account soil bulking factor;
- Survey of any excavated area selected as a containment area;
- The Remediation Contractor shall place any excavated impacted material into the area;
- The surface of the containment area, and after placement of any excavated impacted material, shall be covered using a coloured geotextile cover layer to act as a physical marker for any future excavation works. Geo-textile fabric requirements are discussed in Section 15.6.1;
- Suitable soil cover shall be placed above the geotextile cover **which meets the minimum requirements as set out in section 15.11 (Materials for use in backfilling and importing)**; and
- If areas of the site are proposed to be unsealed in the proposed development, the top of the capping area (i.e. the geotextile cover) shall be a minimum 0.5 m below the final site level; or
- If areas of the site are proposed to be covered with either asphalt, concrete, “astroturf” or “soft-fall” safety surface material in the proposed development the top of the capping area (i.e. the geotextile cover) shall be a minimum 0.2 m below the final site level.

Any excavation of impacted materials should be conducted as follows.

- Excavation of the impacted fill to the underlying natural soils in the presence of the Environmental Consultant;
- Either (i) stockpiling in a designated location for future burial, or (ii) placement in the prepared containment/capping area;
- Collect validation soil samples from the base of any excavations as per Section 16.5 (for asbestos) and/or 16.7 (other COPC);
- If a validation sample result exceeds the RAC, chase out the impacted soil using an excavator/backhoe or a larger diameter auger as considered appropriate;
- Re-sample the resulting excavation and re-excavate as required until the RAC are met; and
- Once the excavation has been validated, backfill the excavation with validated virgin excavated natural material (VENM) or excavated natural material (ENM); or a suitable validated material from natural soil within the site. Refer to Section 15.11 for details on validation of backfill material.

The Remediation Contractor shall survey the base and top of the containment/capping area and confirm the construction with drawings/surveys. It will be necessary to include the survey as part of the Validation Report and the Environmental Management Plan (EMP). If capping is required, and after the containment area has been determined, a work method statement must be prepared by DP to provide clear instruction to the remediation contractor on the requirements for construction.

An EMP will need to be prepared and a notification on planning certificate will be required (Section 10.7 Certificate (formerly Section 149 Certificate)). The EMP will provide ongoing control measures to aid in the management of the risks associated with impacted filling at the site to protect human health and the environment.

Consultation must be completed with the consent authority and owner to determine the most suitable enforcement mechanism for the implementation of the EMP however suitable enforcement mechanisms may include either:

- Making the completion and implementation of an EMP a condition of consent on the development application for the site; or
- Notating the EMP and the extent of remedial works on the land title for the property.

#### **15.6.1 Geo-textile Fabric Requirements**

A geo-textile barrier is to be incorporated into the capping layer to provide a warning of the underlying soil contamination. In accordance with Western Australian Department of Health *Guidelines for the Assessment, Remediation, and Management of Asbestos Contaminated Sites in Western Australia*, (DoH 2021) the geotextile fabric should meet the following conditions:

- Water permeable;
- Highly Visible;
- Rot-proof and chemically inert;
- High tensile strength;
- Coverage of the contaminated areas and 0.5 m beyond boundary if practical; and
- Parallel Sheets to be fixed together or overlaid by 0.2 m.

#### **15.7 Stockpiling of Contaminated Material**

It is recommended that material handling is minimised as much as possible. Where possible, the excavated contaminated soil should be appropriately classified and disposed of off-site directly to a waste facility licensed to receive it instead of stockpiling/storing them on site.

If required, contaminated soil shall be stockpiled at a suitably designated location. Dust control is recommended for all stockpiled materials and should include light conditioning with water for exposed materials or covering with an anchored geotextile or similar.

Should the stockpiled materials remain on-site for over 48 hours they should be appropriately managed to prevent fugitive dust leaving the site (e.g. light wetting or covering with anchored geotextile depending on weather conditions) and geotextile silt fences or hay bales should be erected around each stockpile to prevent losses by surface erosion.

Removal of stockpiles should include over excavation of underlying soils to a depth of 0.1 m. Following the removal of stockpiled soil, the footprint of the stockpiles should be validated by laboratory analysis in accordance with Sections 16.4 and/or 16.7.

### **15.8 Waste Classification Assessment and Material Disposal**

Excavated hazardous waste soil should be disposed of to landfill in accordance with requirements set out in NSW EPA (2014).

If additional soil sampling for waste classification assessment is considered necessary to characterise soils excavated during chasing out of impacted material, additional samples should be collected and tested for, as a minimum, TRH, BTEX, metals, PAH, phenols, OCP, OPP, PCB and asbestos (ACM, FA and AF). The testing frequency of shall be determined by the Environmental Consultant. Sample results from DP (2021a) may be utilised to supplement waste classification.

### **15.9 Loading and Transport of Spoil**

All transport of waste and off-site disposal to a waste facility licensed to receive it must be conducted in accordance with the requirements of the *Protection of the Environment Operations Act* (1997) (POEO Act 1997). All required licences and approvals required for disposal of the material must be obtained prior to removal of the materials from the site.

Transport of spoil shall be via a clearly delineated, pre-defined haul route, which should be lightly conditioned with water (dust suppression, ie: hose, water cart) and have designated site egress locations with wheel washing facilities.

Removal and disposal of impacted soils shall only be carried out by a licensed contractor holding the appropriate licence, consent or approvals to dispose of the waste materials according to the classification outlined in EPA (2014) and with the appropriate approvals obtained from the NSW EPA (if required).

### **15.10 Disposal of Material**

All waste material removed from the site shall be disposed in accordance with the POEO Act 1997 and to a facility/site legally able to accept the material. Copies of all necessary approvals from the receiving site shall be obtained by Principal Contractor prior to any contaminated material being removed from the site. A record of the disposal of materials will be maintained by the Principal Contractor. All relevant analysis results shall be made available to the contractor and proposed receiving site/waste facility to enable selection of a suitable disposal location. Details of all contaminated materials removed from the site shall be documented by the Principal Contractor with copies of weighbridge slips, trip tickets and consignment disposal confirmation (where appropriate) and provided to the Environmental Consultant. A site log should be maintained by the Principal Contractor to track disposed loads against on – site origin.



DP notes that Part 5.6, Section 143 of the POEO Act 1997 states that is an offence for waste to be transported to a place that cannot lawfully be used as a facility to accept that waste. It is the duty of the owner and transporter of the waste to ensure that the waste is disposed of appropriately. DP accepts no liability for the unlawful disposal of waste materials from any site. DP accepts no responsibility for the material tracking, loading, management, transport or disposal of waste from the site. Before disposal of the material to a licensed landfill is undertaken, the waste producer will be required to obtain prior consent from the landfill.

### 15.11 Excavation Backfilling and Fill Importation

If imported fill is required to reinstate remedial excavations, or for other site uses, such material should be classified as VENM, ENM, or be in compliance with an appropriate NSW EPA Resource Recovery Order. It must be assessed as being suitable for use on site, from a contamination perspective, by the Environmental Consultant. As part of the Environmental Consultant's review of a proposed fill import source site, an imported material validation sampling plan should be nominated. The density of testing will be dependent on the source and type of the material and the proposed volume for importation. Anticipated sampling and analytical requirements are provided in Table 11.

**Table 11: Sampling and Analytical Requirements for Imported Material**

| Type | Minimum Sample Number / Frequency*                                   | Minimum analyte suite to include <sup>1</sup>                                                                                                                                         | Additional analysis as required                                                                                                                                                                                                                                               |
|------|----------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| VENM | 1 per 1000 m <sup>3</sup> , with a minimum of three samples          | Metals/metalloids, PAH, TRH/BTEX, phenol, PCB, OPP, OCP and asbestos                                                                                                                  | <ul style="list-style-type: none"> <li>- Any contaminant considered potentially present in the material based on site information</li> <li>- Salinity as per the Salinity Investigation and Management Plan<sup>3</sup> (the SMP) previously prepared for the site</li> </ul> |
| ENM  | Based on the Excavated Natural Material Order 2014 issued by NSW EPA | Mercury, cadmium, lead, arsenic, chromium (total), copper, nickel, zinc, electrical conductivity, pH, PAH, BTEX, TPH, rubber plastic bitumen paper cloth paint and wood and asbestos. | <ul style="list-style-type: none"> <li>- OCP plus any contaminant considered potentially present in the material based on site information</li> <li>- Salinity requirements as per the SMP</li> </ul>                                                                         |

Notes: 1: Not all samples necessarily require testing for all analytes.

Any VENM proposed for importation to the site must be accompanied by an appropriate classification report including information on the history of the source site, type of material and analytical results. Analytical results should be compared against published background criteria or analytical practical quantitation limits. The criteria are summarised in Table 12.

<sup>3</sup> DP (2021) *Salinity Investigation and Management Plan* (Ref.86548.06.R.001.Rev2) dated 8 December 2021 (the SMP)

**Table 12: VENM Importation Criteria (in mg/kg)**

| <b>Contaminant<sup>1</sup></b>    | <b>Berkman (2001)<sup>2</sup></b>                                                                                                                                                                                             | <b>Olszowy (1995)<sup>3</sup></b> | <b>Adopted Comparative Values<sup>4</sup></b> |
|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|-----------------------------------------------|
| <b>Metals</b>                     |                                                                                                                                                                                                                               |                                   |                                               |
| Arsenic (total)                   | 1-50                                                                                                                                                                                                                          | <5-40                             | 20                                            |
| Cadmium                           | 1                                                                                                                                                                                                                             | <0.5-14                           | 1                                             |
| Chromium (III)                    | 5-1000                                                                                                                                                                                                                        | 5-131                             | 75                                            |
| Copper                            | 2-100                                                                                                                                                                                                                         | <5-466                            | 100                                           |
| Lead                              | 2-200                                                                                                                                                                                                                         | 3-1465                            | 50                                            |
| Mercury                           | 0.03                                                                                                                                                                                                                          | <0.1-3.4                          | 0.5                                           |
| Nickel                            | 5-500                                                                                                                                                                                                                         | <5-160                            | 30                                            |
| Zinc                              | 10-300                                                                                                                                                                                                                        | 5-3820                            | 150                                           |
| <b>TRH</b>                        | For all organic contaminants, the analytical practical quantitation limits are used as the reference levels for VENM assessment. Special consideration may be given to low levels of naturally-occurring TRH or PAH in shale. |                                   |                                               |
| C <sub>6</sub> – C <sub>10</sub>  |                                                                                                                                                                                                                               |                                   |                                               |
| C <sub>10</sub> – C <sub>16</sub> |                                                                                                                                                                                                                               |                                   |                                               |
| C <sub>16</sub> – C <sub>34</sub> |                                                                                                                                                                                                                               |                                   |                                               |
| C <sub>34</sub> – C <sub>40</sub> |                                                                                                                                                                                                                               |                                   |                                               |
| <b>Total Phenols</b>              |                                                                                                                                                                                                                               |                                   |                                               |
| <b>PAH</b>                        |                                                                                                                                                                                                                               |                                   |                                               |
| Total                             |                                                                                                                                                                                                                               |                                   |                                               |
| Benzo(a)Pyrene                    |                                                                                                                                                                                                                               |                                   |                                               |
| <b>PCB</b>                        |                                                                                                                                                                                                                               |                                   |                                               |
| <b>OCP</b>                        |                                                                                                                                                                                                                               |                                   |                                               |
| aldrin                            |                                                                                                                                                                                                                               |                                   |                                               |
| dieldrin                          |                                                                                                                                                                                                                               |                                   |                                               |
| aldrin + dieldrin                 |                                                                                                                                                                                                                               |                                   |                                               |
| chlordane                         |                                                                                                                                                                                                                               |                                   |                                               |
| DDT (including DDD, DDE, DDT)     |                                                                                                                                                                                                                               |                                   |                                               |
| Heptachlor                        |                                                                                                                                                                                                                               |                                   |                                               |

Notes:

- Contaminant concentrations must also be evaluated against the RAC, where relevant.
- Berkman (2001) Field Geologists Manual
- Olszowy, H., P. Torr, and P. Imray. 1995. Trace element concentrations in soil from rural and urban areas of Australia. Contaminated Sites Monograph Series 4. South Australian Health Commission. Glenelg Press, Glenelg, Australia
- From the ENM Order

Where VENM, ENM, or other material in compliance with an appropriate NSW EPA Resource Recovery Order is proposed to be imported to the site, a source site inspection should be undertaken by the Environmental Consultant prior to importation to assess the consistency with the documentation and to assess whether any evidence of potential contamination is present. Inspection of material actually imported to the site should also be undertaken by the Environmental Consultant to assess the consistency with the source site inspection.

Consideration must also be given to the suitability of any material proposed for importation to the site based on both human health and ecological assessment criteria provided in DP (2021a) which have been adopted from the NEPM (2013).

Consideration must also be given to the geotechnical suitability of any material proposed for importation to the site.

## 16. Validation Plan

### 16.1 Validation Scope - Validation Data Quality Objectives (DQO)

The objective of the validation plan is to assess the results of post remediation testing against the RAC stated within this RAP and to provide information on environmental impacts which may have resulted from the works.

The validation assessment will be conducted in accordance with Data Quality Objectives (DQOs) and Quality Assurance/Quality Control (QA/QC) procedures to demonstrate the repeatability and reliability of the results.

The following DQOs will be adopted based on those provided in Appendix B, Schedule B2 of NEPC (2013). The DQO process is outlined as follows:

- State the Problem;
- Identify the Decision;
- Identify Inputs to the Decision;
- Define the Boundary of the Assessment;
- Develop a Decision Rule;
- Specify Acceptable Limits on Decision Errors; and
- Optimise the Design for Obtaining Data.

A checklist of Data Quality Indicators (DQI) will be completed as part of the validation assessment.

### 16.2 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.
- 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 16.8
- Comparison by the Environmental Consultant of the laboratory results with the SAC and/or RAC as appropriate (refer to Section 14); and

- Preparation by the Environmental Consultant of a validation report detailing the methods and results of the remediation works and validation assessment.

### 16.3 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 removed prior to validation sampling.

### 16.4 Validation of Areas of Treatment of ACM in Surface Soils, (low concentrations of ACM such as Off-site Portions of AEC19), if Required

Where any ACM impacted surface soils has been identified and has been hand-picked locations as a result of any remediation works, the Environmental Consultant will be required to validate the remediated area as follows:

- A visual inspection for signs of fill and anthropogenic material (including ACM) within the area and any associated former stockpile footprint on a 2 m grid;
- Validation sampling for asbestos (500 ml samples) at a rate of one sample per 10 m by 10 m grid over the footprint excavation (minimum of one sample);
- All 500 mL samples will be analysed at a NATA accredited analytical laboratory for determination of AF and FA concentrations; and
- Where analytical results indicated the presence of asbestos, or visual results indicate the presence of filling, chase out excavation of the contaminated materials will be required, followed by further validation sampling as detailed above.

#### 16.4.1 Validation of Any ACM Remedial Excavations or Additional Areas Where ACM Maybe Encountered at High Concentrations (exceeding land use criteria), if required

For any remediation areas where significant walls are formed by any excavations or additional ACM encountered at depth (> 0.1 m bgl) at high concentrations (exceeding land use criteria) or significant demolition waste encountered, validation sampling should be completed from the resultant excavation as follows:

- The results of the visual inspection will be confirmed through soil sampling at the densities equivalent to that required by Western Australia Department of Health (2021) *Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia* (WA DoH, 2021); and
- Where 'walls' are formed by a remedial excavation, strip trenches will also be excavated, at a rate of one strip trench per 10 m horizontal length or a minimum of 1 per sidewall, to confirm the extent of filling has been excavated;

- Sampling and analysis of any remaining fill soil in trenches completed in walls by the environmental consultant with reference to NEPC (2013) and WA DoH (2021) guidelines as follows:
  - o Collection of ~10 L bulk samples by the environmental consultant; and
  - o Collection of a 500 ml sample for each ~10 L bulk sample for laboratory analysis of AF and FA to calculate the asbestos %w/w and compare against the RAC.
- Where impacted fill (ACM and/or construction and demolition waste) is observed, or analytical results identify asbestos above the RAC, further chase out of that location will be required; and
- A survey of the final remediation excavation areas is to be undertaken and provided to the environmental consultant prior to final validation.

### 16.5 Validation of PAH Impacted Soil Surrounding Power Poles (AEC 36)

In the event that nearby fill or natural soil is to remain following removal of power poles and remediation of associated soils in the immediate vicinity of the former power poles, the sampling strategy listed below is applicable for validating former power pole excavations:

- Excavation Side Walls - Topsoil Excavation: One sample per side wall within the topsoil layer (*i.e.* four samples);
- Base - Underlying Topsoil: One sample per base of excavations;
- Excavation Side Walls - Clay Excavation: One sample from the northern and southern side walls within the clay layer (*i.e.* two samples);
- Base - Underlying base of former pole: One sample per base of excavations;
- QA/QC samples: As per Section 16.8; and
- Sample Analysis: All power pole validation samples will be analysed for PAH with approximately 10% of samples analysed for TRH. Compare the results against the RAC listed in Table 4.

The results of previous investigations on nearby sites indicated the detection of higher long chain TRH (in the range of TRH C<sub>16</sub> - C<sub>34</sub>) generally correlated with detection of PAHs therefore only 10% of the total samples collected will be additionally analysed for TRH.

### 16.6 Validation of Remedial Excavations of Soils Impacted by Other COPC (if Required)

Following the removal of impacted soils impacted by COPC (other than ACM), the environmental consultant will validate the remedial excavation footprint as follows:

1. Visual inspection of remedial excavation;
2. Sampling and analysis of the soil by the environmental consultant with reference to NEPC (2013) and guidelines as follows:
  - o For small to medium excavations (base <500 m<sup>2</sup>):
    - Base of excavation: one sample per 25 - 50 m<sup>2</sup> or part thereof; and
    - Sides of excavation: one sample per 10 m length or part thereof. Additional samples will be collected at depths of concern where there is more than one depth of concern (*e.g.* multiple filling horizons).

- o For Large excavations (>500 m<sup>2</sup>):
  - Base of excavation: sampling on a grid at a density in accordance with the EPA *Contaminated Sites: Sampling Design Guidelines* (1995); and
  - Sides of excavation: one sample per 20 m length or part thereof. Additional samples will be collected at depths of concern where there is more than one depth of concern (e.g. multiple filling horizons).
- 3. Analysis of collected samples for COPC specific to the excavation/area of the site;
- 4. Where the reported concentration of the COPC are greater than the RAC, further chase out of that location will be required and steps 1 to 3 will be repeated. The additional soil generated during the chase out will require remediation with reference to either Section 10.1 or 10.2; and
- 5. A survey of the final remediation excavation areas is to be undertaken and provided to the environmental consultant prior to final validation.

Development works within the site (other than remediation works detailed in this RAP) should only progress following written confirmation by the environmental consultant.

## 16.7 Sample Holding Times

Maximum recommended sample holding times are as follows:

- Asbestos – no maximum recommended holding time;
- Metals – six months; and
- Semi-volatiles - 14 days, and 40 days following extraction.

All chemical validation must be collected in appropriate cooled and sealed containers.

## 16.8 Quality Assurance Plan

### 16.8.1 Field QA

Quality Assurance (QA) and Quality Control (QC) procedures will be adopted throughout the field sampling programme to ensure sampling precision and accuracy and prevent cross contamination. The Environmental Consultant responsible for site validation should assess sampling accuracy and precision through the analysis of at least 5% field intra-laboratory replicate samples, 5% inter-laboratory replicate samples, as well as the collection of field rinsate samples of reusable sampling equipment at a rate of one per day of sampling operations.

Appropriate sampling procedures will be undertaken to minimise the potential for cross contamination, and will include the following:

- standard operating procedures are followed;
- site safety plans are developed prior to commencement of works;
- replicate field samples are collected and analysed;
- trip blanks and trip spikes are to be used when volatile contaminants are involved;
- equipment rinsate samples are analysed as part of the QC programme;

- samples are stored under secure, temperature controlled conditions; and
- chain of custody documentation is employed for the handling, transport and delivery of samples to the selected laboratory.

### **16.8.2 Laboratory QC**

A National Association of Testing Authorities (NATA) accredited laboratory will undertake in-house QC procedures involving the routine testing of:

- reagent blanks.
- spike recovery analysis.
- laboratory duplicate analysis.
- analysis of control standards.
- calibration standards and blanks; and
- statistical analysis of QC data including control standards and recovery plots.

### **16.9 Validation Reporting**

A site remediation and validation report or reports should be prepared by a suitably qualified Environmental Consultant with respect to the requirements of NSW EPA (2020) and NEPM (2013). The report shall be submitted to Council at the completion of the remediation works program.

The validation report shall confirm that the site has been remediated to a suitable standard for the proposed development.

The validation report will include, but not necessarily be limited to, the following elements:

- Summary of remediation works completed including photographic records during the works and of final excavations;
- Summary of validation data obtained;
- Summary of inspections undertaken during the works;
- Details of installed capping (if completed) including:
  - o Drawings showing the extent of capping including survey of clay capping confirming the minimum thickness; and
  - o Photographic record during the works and of the geotextile marker layer placement and capping placement;
- Review and summary of material tracking during the works including the final disposal destination of any materials removed from site and disposal dockets, where appropriate;
- Records of any imported materials;
- Summary of any unexpected finds; and
- Review and summary of survey records of remediation areas and excavations.



## 17. Soil Sample Collection and Handling

Sampling is anticipated to be required for:

- Validation at the lateral and vertical extents of the remedial excavations;
- Validation of the footprints of any temporary contaminated stockpile areas (where required);
- Assessment of any unexpected finds (where required);
- Assessment of imported materials to be used for backfilling or during construction (where required); and
- Assessment and waste classification of excess excavated soils for off-site disposal to a licenced landfill (where required).

Sampling data shall be recorded in order to comply with routine Chain of Custody requirements. The general sampling, handling, transport and tracking procedure comprises:

- The use of stainless steel sampling equipment;
- The use of disposable gloves for each sampling event;
- Washing of all sampling equipment that makes contact with the sample, in a 3% solution of phosphate-free detergent (Decon 90) then rinsing with distilled water prior to each sample being collected;
- Transfer of the sample immediately into new glass jars or appropriate sealable bags for samples to be analysed for asbestos;
- Collection of 10% replicate samples for QC purposes;
- Labelling of the sample containers with individual and unique identification including Project Number and Sample Number;
- Placement of the containers into a chilled, enclosed and secure container for transport to the laboratory; and
- Use of chain of custody documentation so that sample tracking and custody can be cross-checked at any point in the transfer of samples from the field to hand-over to the laboratory.

The sampling and handling process for samples to be sieved in the field for quantification of ACM comprises:

- Sampling should be undertaken by a competent person in the context of asbestos as defined in NEPM (2013);
- The use of appropriate personnel protective equipment;
- The use of disposable gloves for the collection of soil samples. The gloves will be replaced between each sample;
- Collection of a 10 L sample using hand tools to be manually screened on site through a 7 mm sieve, or (if clayey material) broken down and spread out in a 7 mm thick layer on a colour contrasting tarp, with any material larger than 7 mm examined for ACM or suspect material; and
- Replacement of sieved samples to the sample location at the depth of origin (as far as practicable);

## 18. General Unexpected Finds Protocol

An “Unexpected Finds Protocol” has been established to deal with unexpected findings and/or unplanned situations. Examples of what could potentially be considered an unexpected find include (without being limited to): encountering burial pits (such as substantial quantities of construction and demolition waste) abandoned fuel storage tanks, or grossly chemically contaminated soils.

This protocol is also applicable to any unexpected finds relating to potentially contaminated soils with a historical uncertainty that may be encountered during excavation works within the site.

The protocol is as follows:

1. The contractor(s) undertaking any remediation, civil or construction works should be provided with a copy of the RAP (plus any amendment or addendum), including this UFP. The contractor(s) should nominate their site (project) manager who will be responsible for implementing the UFP;
2. If suspected (unexpected) contaminated material is discovered/encountered on site, the site (project) manager is to be notified and the affected area closed off using barrier tape and warning signs (if appropriate) and sediment controls. Warning signs shall be specific to the findings and potential hazards and shall comply with the Australian Standard 1319-1994 – Safety Signs for the Occupational Environment;
3. A qualified Environmental Consultant is to be notified by the site manager to inspect the area and confirm the presence or otherwise of hazards or contamination, and to determine the optimal method and extent of investigation or remediation works to be undertaken. A report detailing this information will be compiled by the Environmental Consultant and provided to the site manager, who should disseminate it to the Principal (or their representative);
4. All work associated with the contaminated soil should be undertaken by an appropriately licensed contractor, as stipulated by the Environmental Consultant;
5. All works must comply with the provisions of the relevant legislation and guidelines;
6. Documentary evidence (weighbridge dockets) of appropriate disposal of the material is to be provided to the Principal (or their representative) if disposal occurs;
7. Details of all relevant activities are to be recorded in the site record system; and
8. Details of the remediation and validation works undertaken with respect to the unexpected find(s) must be incorporated into the final validation report as prepared by the Environmental Consultant.

## 19. Regulatory Approvals and Licenses

State Environmental Planning Policy (*Resilience and Hazards*) – Chapter 4 (SEPP *Resilience and Hazards*) aims to provide a state wide planning approach to the remediation of contaminated land. It is noted that SEPP (*Resilience and Hazards*) superseded the former SEPP No. 55 (*Remediation of Land*) in March 2022. Under clause 7(1) of SEPP *Resilience and Hazards*, the approval authority is required to consider whether the land is contaminated, and:

- a) if the land is contaminated, it is satisfied that the land is suitable in its contaminated state (or will be suitable, after remediation) for the purpose for which the development is proposed to be carried out; and

- b) if the land requires remediation to be made suitable for the purpose for which the development is proposed to be carried out, it is satisfied that the land will be remediated before the land is used for that purpose.

This RAP presents the proposed management and remediation options to address contamination at the site. Implementation of the RAP will satisfy the provisions of Clause 4.6 (1) of SEPP (*Resilience and Hazards*) for the proposed development.

Under SEPP *Resilience and Hazards*, remediation can either be classified as Category 1 or Category 2.

In accordance with Clause 9 of SEPP *Resilience and Hazards*, the definition of Category 1 remediation works which require development consent are as follows:

- a) designated development, or
- b) carried out or to be carried out on land declared to be a critical habitat, or
- c) likely to have a significant effect on a critical habitat or a threatened species, population or ecological community, or
- d) development for which another State Environmental Planning Policy or a Regional Environmental Plan requires development consent, or
- e) carried out or to be carried out in an area or zone to which any classifications to the following effect apply under an environmental planning instrument:
  - i) coastal protection,
  - ii) conservation or heritage conservation,
  - iii) habitat area, habitat protection area, habitat or wildlife corridor,
  - iv) environment protection,
  - v) escarpment, escarpment protection or escarpment preservation,
  - vi) floodway,
  - vii) littoral rainforest,
  - viii) nature reserve,
  - ix) scenic area or scenic protection,
  - x) wetland, or
- f) carried out or to be carried out on any land in a manner that does not comply with a policy made under the contaminated land planning guidelines by the council for any local government area in which the land is situated.

Based on available information, it is considered that the remediation works outlined in this report constitute Category 2 Remediation in accordance with Chapter 4 (SEPP *Resilience and Hazards*) NSW. Under Clause 4.13 of SEPP (*Resilience and Hazards*) 2021, the Council should be notified of the proposed commencement of the remediation work at least 30 days before commencement.

In addition to the above, any asbestos remediation works must be undertaken by an appropriately licensed asbestos contractor and in accordance with *Work Health and Safety Regulation NSW 2011* and any other applicable Safe Work NSW or Safe Work Australia regulations or guidelines.

## 20. Site Management Plan

### 20.1 Site Operations

It is the Developer's responsibility to ensure that appropriate personnel are appointed to manage and conduct the remediation and validation works.

The schedule of remediation works, including timing and staging is to be prepared by the Principal Contractor to meet the requirements of this RAP. Remediation works will be restricted to the hours set out by Penrith City Council. The Principal Contractor should undertake the work with due regard to the minimisation of environmental effects and to meet all statutory and regulatory requirements. The Principal Contractor shall have in place a Construction Environmental Management Plan (CEMP) so that work on the site complies with, but is not limited to, the requirements of the following legislation:

- *Protection of the Environment Operations Act 1997*;
- *Contaminated Land Management Act 1997*;
- *Dangerous Goods Act 1985*;
- *Work Health and Safety Act 2011*; and
- Council Development Approval Conditions.

The Contractor(s) shall also be responsible for ensuring that the site works comply with the following conditions:

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

In order to achieve a minimisation of environmental effects, the following measures are recommended, and should be adopted by the appointed contractor. The contractor's CEMP is to include:

- Contingency plans to respond to site incidents;
- Site management plan for the operation phase of remedial works;
- A remedial schedule and hours of operation (which will be subject to development consent conditions);
- Details of relevant contacts;
- Procedure(s) for dealing with unexpected finds (refer to Section 16) including waste management/recycling where relevant;
- Incident management/emergency response procedures; and
- Any community consultation requirements.

The CEMP should be reviewed, at least, by the Environmental Consultant.

## 20.2 Traffic Management

All vehicular traffic shall use only routes approved by Council, to and from the selected landfill where off-site disposal is undertaken. All loads shall be covered by tarpaulin (or similar) during transport and lightly wetted to minimise the potential for materials or dust are dropped or deposited outside or within the site. The proposed landfill should be consulted for any additional requirements such as additional analytical testing.

Each vehicle that has passed over potentially impacted soils on the site shall be inspected for cleanliness before being logged out as clean (wheels and chassis) or hosed down into a wheel wash or wash down bay until designated as clean, when exiting the site. Wheel wash silt residues should be collected periodically and either returned to the excavation area or included in the temporary remediation stockpile. Such material will be treated as contaminated unless assessment proves otherwise.

Details of all materials removed from the site shall be documented by the removal contractor with copies of relevant environmental protection licence for the waste landfill site used, demonstrating legality of disposal, weighbridge slips, trip tickets and consignment disposal confirmation (where appropriate) provided to the Principal Contractor and Environmental Consultant. A site log shall be maintained by the removal contractor to track disposed loads against on-site origin and location of the materials.

Truck dispatch shall be logged and recorded by the removal contractor for each load leaving the site. A record of the truck dispatch should be provided to the Principal Contractor and the Environmental Consultant.

## 20.3 Excavations

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

Contaminated or potentially contaminated material should be stockpiled at suitable locations within the site. All temporary stockpiles of contaminated material shall be secured and demarcated to clearly delineate their boundaries.

All excavations shall be made with due regard to the stability of adjacent footings and structures. It will be the contractor's responsibility to provide adequate battering, shoring and/or underpinning to protect adjacent structures (if required). No person shall be permitted to enter an unsupported excavation where it is more than 1.5 m deep or where it is considered to be unstable, irrespective of depth.

Records of all materials used to backfill excavations should also be maintained by the Principal Contractor.

## 20.4 Stormwater Management and Control

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

- Construction of diversion bunds to divert stormwater from contaminated areas and contaminated soil stockpiles;

- Provision of sediment traps including geotextiles or hay bales. This would be required for contaminated soil stockpiles to prevent losses by surface erosion; and
- Construction of sediment control basins (if required).

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

## 20.5 Control of Dust

Control of dust and odour during the remediation works shall be maintained by the Principal Contractor and may include, but not necessarily be limited to, the following:

- The use of a water cart or a long hose, as and when appropriate, to eliminate wind-blown dust;
- Use of sprays/sprinklers to prevent dust blow from the waste material removal works or stockpiles;
- Covering of stockpiles with plastic sheeting or geotextile membranes;
- Restriction of stockpile heights to 2 m above surrounding site level;
- Ceasing works during periods of inclement weather such as high winds or heavy rain;
- Regular checking of the fugitive dust issues. Undertake immediate remediation measures to rectify any cases of excessive dust; and
- Provision of temporary capping over site soils in areas of the site identified as not impacted by the waste material.

## 20.6 Noise Control

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

## 20.7 Workplace Health and Safety

The Principal Contractor should develop a site emergency response plan (ERP) and a work health and safety plan (WHSP). This will ensure the safety of the personnel working on site, should an emergency situation occur. The WHSP and ERP should include emergency contact phone numbers and details of local emergency facilities. Appropriate fencing and signage should be installed around and within the site to prevent unauthorised access to the site, restricted access to remedial areas (*e.g.* asbestos remediation areas) and deep excavations.

All asbestos works will be conducted by an appropriately licensed asbestos contractor and in accordance with SafeWork requirements.

All personnel on site should always be required to wear the following personal protective equipment (PPE) (as a minimum):

- Steel-capped boots;
- High visibility clothing;
- Hard hat meeting AS1801-1981 requirements; and
- Hearing protection meeting necessary requirements when working around machinery or plant equipment if noise levels exceed exposure standards.

The following additional PPE will be worn as required in association with asbestos related works:

- All PPE required by the licensed asbestos contractor (e.g. P2 disposable dust mask or a particulate half-face mask with a P3 filter, disposable coveralls);
- Safety glasses or safety goggles with side shields meeting AS 1337-1992 requirements (as necessary, particularly during demolition);
- Disposable coveralls (if necessary) to prevent contact with asbestos contaminated soil, materials or water;
- Nitrile work gloves meeting AS 2161-2000 requirements or heavy-duty gauntlet gloves; and
- Any additional protection identified by the Environmental Consultant or Contractor.

All Contractors are required to show compliance with the Work Health and Safety Regulation 2011, including the preparation of a Site Safety Management Plan and Safe Work Method Statements.

## 21. Conclusions

This RAP provides the overarching general mechanism by which the site can be made suitable with the proposed development.

It is considered that remediation and validation of identified contamination at the site undertaken in accordance with this RAP will satisfy the provisions of clause 4.6 (1) of SEPP (*Resilience and Hazards*), and render the site suitable from a contamination perspective. A remedial works plan should be prepared after a delineation assessment of each AEC to scope the actual works required based on the recommendation of this RAP.

In the event that contamination remains on site (i.e. contamination is capped), a LTEMP will be required to consider the site suitable for the proposed development. If required, the LTEMP is to be prepared and implemented in accordance with Table 2.7 of NSW EPA (2020) *Consultants Reporting on Contaminated Land: Contaminated Land Guidelines*. The LTEMP is to include:

- Provisions for the ongoing maintenance of the capping layer with associated recording of inspections/works completed;
- Methodology surrounding how to manage working with the cap and repairs to the cap when disturbed;
- Identifying who is responsible for the ongoing management of the cap; and
- Noting how the EMP is to be made legally enforceable (e.g. as a condition of consent).



## 22. References

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- DP *Report on Site Review Detailed Site Investigation for Contamination DHL Stage 1, Part of 1953 – 2109 Elizabeth Drive, Badgerys Creek, NSW*, report reference 86548.20.R.001.Rev0 dated 8 August 2023 (DP, 2023a – ‘the DSI – Stage1’);
- DP *Report on Hazardous Building Materials (HBM) Survey, DHL Stage 1, Part of 1953 – 2109 Elizabeth Drive, Badgerys Creek, NSW*, report reference 86548.20.R.003.Rev0 dated 8 August 2023 (DP, 2023b – ‘the HBM’); and
- DP *Review of Supplementary Contamination Investigation – DHL Stage 1, Part of 1953 – 2109 Elizabeth Drive, Badgerys Creek, NSW*, report reference 86548.14.R.006.Rev0 dated 17 August 2023 (DP, 2023c – ‘the SCI’)
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## 23. Limitations

Douglas Partners Pty Ltd (DP) has prepared this report for this project at DHL Stage 1, Part of 1953 – 2109 Elizabeth Drive, Badgerys Creek, NSW, in accordance with DP's proposal 86548.20 dated 27 July 2023 and acceptance received from DHL Supply Chain (Australia) Pty Limited. The work was carried out under DP's Conditions of Engagement. This report is provided for the exclusive use of DHL Supply Chain (Australia) Pty Limited 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 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

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**Douglas Partners Pty Ltd**

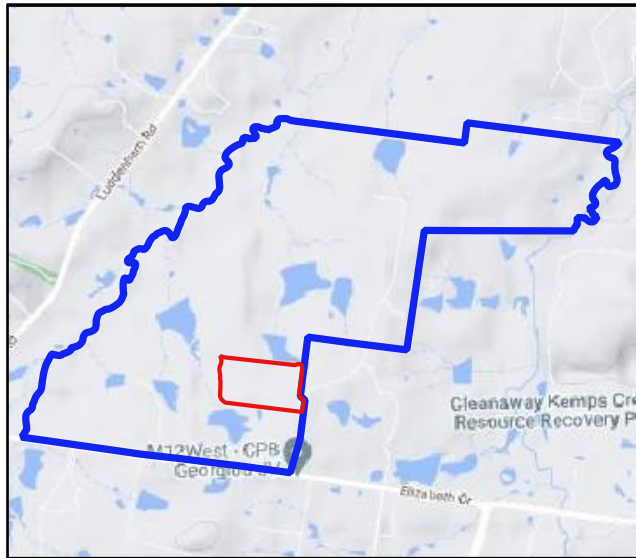
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## Appendix A

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Drawings



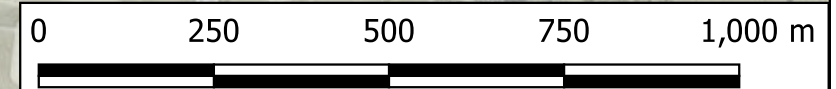


**Site Location**



**Legend**

- DHL Stage 1
- DHL Site Boundary
- The Northern Gateway Boundary (TNG)



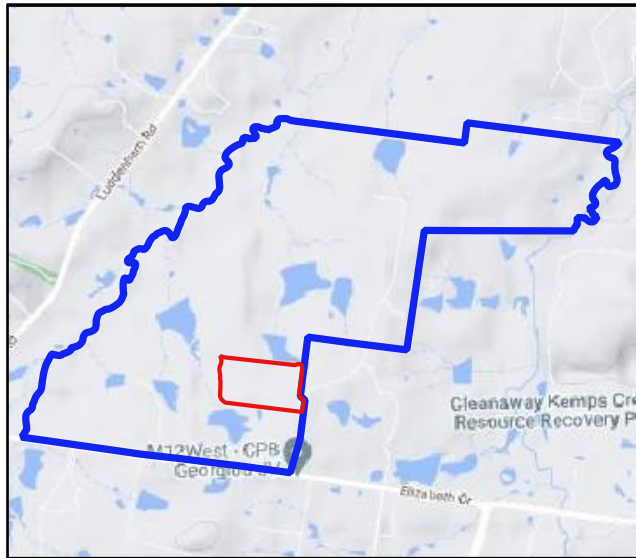
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| OFFICE: Macarthur                            | DRAWN BY: LAR     |
| SCALE: As shown                              | DATE: 1 June 2023 |

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Remediation Action Plan  
DHL Stage 1, Part of 1953 - 2109 Elizabeth Drive, Badgerys Creek, NSW

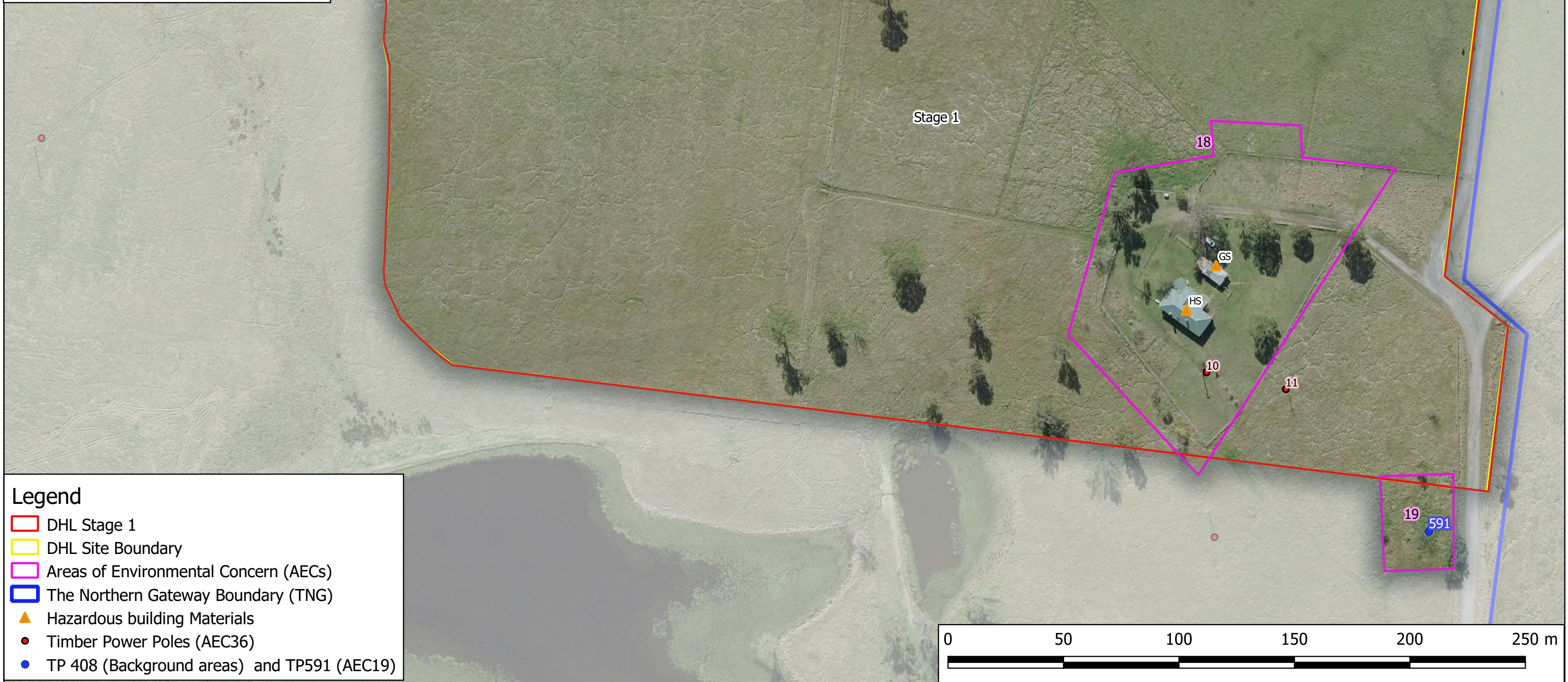


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| DRAWING No:             | 1 |
| REVISION:               | 0 |





Site Location



**Legend**

- DHL Stage 1
- DHL Site Boundary
- Areas of Environmental Concern (AECs)
- The Northern Gateway Boundary (TNG)
- Hazardous building Materials
- Timber Power Poles (AEC36)
- TP 408 (Background areas) and TP591 (AEC19)





## Legend

- DHL Stage 1
- Areas of Environmental Concern (AECs)
- Further Investigation - Stage 1
- Trenches
- Approximate Extent of Required Remediation



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## Appendix B

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About this Report



# 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

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## 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.