
**Volume 1 of 3
Report, Appendix A (A1)**

Remediation Action Plan

Proposed Industrial Development

49-61 Stephen Road, Banksmeadow

Prepared for ESR Australia

Project 219609.01

12 December 2024

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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.

Signature

Date

Author



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Reviewer



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Executive Summary

This remediation action plan (RAP) describes the work required to remediate the property at 49-61 Stephen Road, Banksmeadow (herein referred to as the 'site') associated with the proposed industrial warehouse development. The site boundary is shown on Drawing 1, Appendix A1. The RAP was developed to support the site's development application.

The RAP provides an overarching methodology to render the site suitable for the proposed industrial warehouse development from a contamination perspective. This in the context of other remedial works being undertaken on the site by the former owner, now tenant, Allnex Resins Australia Pty Ltd (Allnex), under the site's voluntary management proposal (VMP). The VMP remediation works (e.g. groundwater remediation) are not captured by this RAP.

The objectives of the RAP are to:

- Establish an appropriate remediation strategy so as to render the site suitable, from a site contamination perspective, for the proposed industrial warehouse development noting that remediation is also to be completed by Allnex via the VMP;
- Establish the site remediation acceptance criteria (RAC) to be adopted and the validation requirements to confirm the successful implementation of the remediation strategy;
- Provide general information on environmental safeguards required to complete the remediation works in an environmentally acceptable manner; and
- Provide general information to assist the generation of work health and safety (WHS) procedures required to complete the remediation works in a manner that would mitigate risk to the health of site workers or users.

The preferred remediation approach is as follows:

- Remediation and validation of the aboveground storage tank and underground storage tank farms;
- Placement of the soils with organochlorine pesticide (OCP) concentrations above the RAC in a containment cell lined with a low permeable liner;
- *Ex Situ* remediation (biopiles) of volatile organic compounds (VOC) and total recoverable hydrocarbons (TRH) / total petroleum hydrocarbons (TPH) contaminated soils from above the groundwater table;
- Capping of all asbestos and lead contaminated soils (i.e. all fill and non-validated natural soils) across the full extent of the site with a geotextile marker layer and minimum 1 m thick capping layer comprising imported soils. The capping layer is likely to be generally around 1.5-2 m thick to allow earthworks design levels to be achieved;
- Management of existing soils during the works which, in addition to any requirements outlined in the RAP, would involve as a general principle not placing any existing soils impacted with chemical contaminants within 1.5 m of the groundwater table without further consideration by the Environmental Consultant; and
- Assessment and validation of inground infrastructure (e.g. pits, sumps, drains and services) encountered during works that are considered to be of significant contamination concern.

Additionally, for commercial long term risk management of the site ESR Australia may also wish to consider:

- Placement of soils with elevated OCP concentrations (above ~40 mg/kg) and high lead concentrations (above ~15,000 mg/kg) in containment cell;
- *In situ* part immobilisation treatment of soils present below the groundwater table and contaminated with volatile contaminants (e.g. VOC, TRH / TPH); and
- Sealing of ground level building slabs which is good practice and should be considered to be required as part of the development works. The concrete slab is to be sealed using polyurethane sealants such as paint on sealants, mastics, and expansion bands (as appropriate) with these applied to all joints and each service conduit and internal risers that penetrates the ground floor building slabs.

Intrusive hazardous building materials (HBM) surveys are to be undertaken by the Occupational Hygienist on the existing buildings / structures and inground infrastructure (where appropriate) with subsequent appropriate removal of any identified HBM undertaken by a suitability qualified contractor prior to demolition. The Occupational Hygienist is to inspect the structure to confirm suitability of the HBM removal prior to demolition and provide written confirmation.

Prior to commencing remediation works relevant plans, including a remediation works plan and construction quality assurance plan, are to be developed by the Environmental Consultant and Remediation Contractor and provided to the Site Auditor for review and approval.

The successful completion of the remediation is to be validated and reported as outlined herein. A long term environmental management plan is to be generated for the site on completion of the development works (or remediation works if completed earlier and if appropriate) to address maintenance of the capping layer that has been constructed to generate a barrier between site users and retained contamination on the site.

In summary, it is considered that the site can be rendered suitable from a contamination perspective for its use as industrial warehouses subject to appropriate remediation, management and site validation in accordance with this RAP.

DP recommends that this RAP is reviewed following completion of the detailed design for the proposed development and prior to commencing remedial works. Moreover, the Environmental Consultant and Site Auditor is to be informed if there are any proposed changes to the remediation approach, and if so, this RAP must be updated in consultation with the relevant parties.

Planning Information

The following information has been provided by the project planner Urbis and is included herein at the request of Urbis and ESR Australia for reference to the reader.

Introduction

This report has been prepared to accompany a State Significant Development Application (SSDA) seeking consent for the construction and operation of a three-storey warehouse and distribution centre development at 49-61 Stephen Road, Banksmeadow (SSD-65924461).

Specifically, the project comprises:

- Demolition of all existing built form;
- Site preparation works, bulk earthworks and infrastructure/service provisions and/or augmentation;
- Removal of 90 trees on-site;
- Extensive remediation of the site;
- Construction and operation of two three-storey warehouse and distribution centre buildings including the following key components:
 - o Approximately 57,034 m² of total GFA comprising:
 - 51,195 m² of warehouse area;
 - 4,775 m² of office area;
 - 964 m² of lobby space; and
 - 100 m² café.
 - o Two warehouse buildings of three storeys containing:
 - Twelve (12) units within Warehouse A (three levels).
 - Twelve units within Warehouse B (three levels).
- Two hundred and forty-three (243) car spaces provided on the ground floor mezzanine carparking area.
- Fifty (50) ground floor carpark spaces off Coal Pier Road;
- Twenty (20) motorbike parking spaces;
- End of trip facilities;
- Site landscaping works totalling 5,327 m² (11.06% of the site); and
- Provision of building / business identification signage.

This report has been prepared in response to the requirements contained within the Secretary's Environmental Assessment Requirements (SEARs) dated 30 January 2023 and issued for the SSDA (SSD-65924461).

Specifically, this report has been prepared to respond to the SEARs requirement issued below.

SEARS Item	Description of Requirement	Section Reference
Key Issues (Dot Point 4)	In accordance with the Managing Land Contamination Planning Guidelines: SEPP 55 – Remediation of Land. - A remediation action plan (RAP) detailing the measures that will be undertaken to remediate and manage contamination identified at the site. - How the development will integrate with any Voluntary Management Proposal (VMP) applying to the site.	Report in full addresses requested documentation, namely the RAP and how the remediation works are to be implemented concurrently with the works required for the VMP.

This report also addresses the following ‘Government Authority Advice’ contained in Attachment 2 of the SEARs.

Agency / Item	Description of Requirement	Section Reference
Bayside Council (Item 33)	Subsurface development is likely to be impacted by the presence of contamination. Council offices advice that a detailed site investigations (DSI) and subsequent RAP shall accompany any future EIS.	Report in full addresses requested documentation, namely the RAP.
NSW Environment Protection Authority (Contamination & Remediation / Rehabilitation)	Appendix A, Section E: 6. Soils and Contamination: - Description of soils types, soil contamination and acid sulphate soils (ASS). - Proposal for site remediation. - Proposals from management of these soils.	Report in full addresses requested documentation, namely the proposed site remediation. Note: Whilst the RAP provides summary background information on site history and contamination this is provided in greater detail in the DSI.

The Site

The subject site is located at 49-61 Stephen Road, Banksmeadow, within the Bayside local government area. The site is legally described as Lot A in Deposited Plan 190526, Lot 1 in Deposited Plan 1095110, and Lot 1 in Deposited Plan 311767. The site is identified on Drawing 1, Appendix A1.

The site is located in the Banksmeadow Industrial Precinct, approximately 10km from Sydney CBD, 1.5 kilometres from Port Botany and 3km from Sydney Airport. The site is surrounded predominantly by a mix of industrial and warehouse and distribution uses to the north, east and south, and residential land uses to the west. The site is located in close proximity to existing employment and industrial areas including the Botany Port and Sydney Domestic and International Airport.

The site has been developed and currently accommodates the Allnex Resins manufacturing site. The site presents a two-storey office building towards the Stephen Road frontage, with 20 warehouse and ancillary use buildings as well as numerous chemical storage tanks.

Due to the existing and current use of the site and the handling and manufacturing of chemical products, the site is considered contaminated and is subject to Environmental Protection Agency notification. As part of site contamination management, a stormwater retention / remediation treatment pond is located along the Coal Pier Road frontage along the eastern boundary.

Existing planted vegetation is located along the site's boundaries predominately along the western and northern setback areas assisting in screening the development from Stephen Road and the Southgate Industrial Estate development to the north. A cleared grassed area is located to the rear of the site beside a stormwater retention and treatment pond.

Table of Contents

	Page No
1. Introduction.....	1
1.1 General.....	1
1.2 Site Identification	2
1.3 Proposed Development.....	3
2. The Objectives and Scope	4
3. Environmental Setting	4
4. Planning, Regulatory Records and Orders	6
4.1 Section 10.7 Planning Certificate.....	6
4.2 NSW EPA Notified Properties	7
4.3 Voluntary Management Proposal	7
4.4 Environment Protection Licence.....	9
4.5 Water Restrictions Order	9
5. Site Description	10
6. Previous Reports and Information.....	12
6.1 Detailed Site (Contamination) Investigation - JBS&G (2023)	12
6.2 BIP Orica Groundwater Information (2023)	16
6.3 Groundwater Remediation in the Central / Western Area of the Site and AECOM (2024).....	17
6.4 Supplementary Site (Contamination) Investigation – DP (2024).....	18
7. Conceptual Site Model.....	21
8. Party Responsibilities Post Sale	25
9. Remediation Extent and Options.....	26
9.1 Areas of Contamination Concern	26
9.2 Remediation Options	27
9.3 Preferred Remediation Approach.....	29
10. Adopted Remediation Strategy.....	31
10.1 Pre-Remediation Works – Hazardous Building Materials Survey and Demolition.....	32
10.2 Remediation of OCP and High Lead Impacted Soils.....	33
10.3 AST Farm Validation (Required)	36
10.4 UST Farm Validation (Required).....	38
10.5 <i>Ex Situ</i> Remediation of VOC and TRH /TPH Contaminated Soils from Above the Groundwater Table (Required).....	40

10.6	Remediation of Asbestos and Lead Contaminated Soils (Required)	45
10.7	General: Management of Existing Site Soils (Required)	48
10.8	General: Inground Infrastructure - Pits, Sumps, Drains and Services (Required)	48
10.9	Building Slabs Sealing (Recommended)	51
10.10	<i>In Situ</i> Remediation of VOC and TRH /TPH Contaminated Soils from Below the Groundwater Table (For Commercial Consideration – Recommended)	51
11.	Construction Quality Assurance	53
11.1	Geotextile	53
11.2	Containment Cell Liner	54
12.	Remediation Acceptance Criteria	55
12.1	Approach to Applying the Remediation Acceptance Criteria	55
12.2	Soil	55
12.3	Soil and Soil Vapour for Volatile Contaminants	58
12.4	Overarching Remediation Acceptance Criteria	60
13.	Regulatory Requirements	61
14.	Roles and Responsibilities	62
14.1	Principal	62
14.2	Principal Contractor	62
14.3	Remediation Contractor	63
14.4	Asbestos Contractor	64
14.5	Sub-Contractors	64
14.6	Environmental Consultant	64
14.7	Occupational Hygienist	65
14.8	Site Workers	65
15.	General Site Management of Soils	66
15.1	Stockpiling of Contaminated Soils	66
15.2	Waste Disposal	66
15.3	Importation of Soil	67
16.	Sample Collection and Analysis Requirements	71
16.1	Field Methods	71
16.2	Laboratory Analysis	72
17.	Environmental Management During Remediation	73
18.	Worker Health and Safety	75
18.1	Personal Protective Equipment	75
18.2	Specific Requirements for Chemical Contaminants	76

19.	Unexpected and Additional Finds Protocol.....	76
19.1	Unexpected and Additional Finds Protocol.....	76
19.2	Contingency Plan.....	77
20.	Validation Plan	77
20.1	Data Quality Objectives and Indicators	77
20.2	Validation Plans.....	78
20.3	Assessment and Validation Approach	78
20.4	Validation Inspection and Sampling	79
20.5	Documentation Requirements.....	80
20.6	Reporting.....	82
21.	Conclusions.....	82
22.	Long Term Environmental Management Plan (Post Remediation Works)	82
23.	Limitations	83

Appendix A: Drawings

A1: Investigation Drawings

A2: Proposed Development Drawings

A3: Site Survey

A4: DP (2023) Geotechnical Investigation - Extracted Drawings

Appendix B: About this Report

Appendix C: Site Contamination Regulation

C1: Allnex Voluntary Management Proposal

C2: Allnex Environment Protection Licence

C3: Temporary Water Restrictions Order 2024

Appendix D: Information Extracted from Provided Information and Reports

D1: JBS&G (2023) – Extracted Drawings, Summary Results Tables and Logs

D2: Orica Groundwater Data (December 2023) – Logs and Summary Results Tables

D3: AECOM (2024) – Extracted Drawings, Summary Results Tables

D4: DP (2024) – Extracted Drawings, Summary Results Tables and Logs

Appendix E: Site Photographs Extracted from DP (2024)**Appendix F:** Example Geotextiles**Appendix G:** Example Sealants**Appendix H:** Data Quality Objectives and Data Quality Indicators

Remediation Action Plan

Proposed Industrial Development

49-61 Stephen Road, Banksmeadow

1. Introduction

1.1 General

This remediation action plan (RAP) describes the work required to remediate the property at 49-61 Stephen Road, Banksmeadow (herein referred to as the 'site') associated with the proposed industrial warehouse development. The site boundary is shown on Drawing 1, Appendix A1. The RAP was developed to support the site's development application. Douglas Partners Pty Ltd (DP) was engaged by ESR Australia (ESR) to undertake this RAP with general reference to DP's proposal 219609.01.P.001.Rev0 dated 3 June 2023.

The RAP provides an overarching methodology to render the site suitable for the proposed industrial warehouse development from a contamination perspective. This in the context of other remedial works being undertaken by the former owner, now tenant, Allnex Resins Australia Pty Ltd (Allnex), under the site's voluntary management proposal (VMP)¹. The VMP remediation works (e.g. groundwater remediation) are not captured by this RAP.

The proposed development works are expected to require a net fill import to facilitate raising of the site, with existing soils to be remediated (where required) and covered with imported fill. Placement of the imported fill is also to be used as a capping layer to assist with addressing contamination in the fill (e.g. direct exposure to asbestos and lead, etc.).

The scope of remediation is based on the results of previous site contamination investigations and assessments (refer to Section 5). Following demolition of the site's existing buildings, pavements and other infrastructure (e.g. demolition of tank farms, etc.) targeted validation works are recommended to allow further refinement of the remedial works outlined herein and hence provide benefit to the remediation implementation and associated outcomes.

Preparation of this RAP was undertaken with reference to NSW Environment Protection Authority (EPA) guidelines and other relevant guidelines as outlined herein. The following key guidelines were consulted in the preparation of this report:

- Cooperative Research Centre for Contamination Assessment and Remediation of the Environment (CRC CARE), '*Remediation Action Plan Development, Guideline on Establishing Remediation Objectives*', dated 2019 (CRC Care, 2019);
- National Environment Protection Council (NEPC), '*National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013)*', dated 2013 (NEPC, 2013); and

¹ Allnex, '*Voluntary Management Proposal Under the Contaminated Land Management Act 1997*', 16 September 2020 (Allnex, 2020).

- NSW EPA, 'Contaminated Land Guidelines - Consultants Reporting on Contaminated Land', dated 2020 (EPA, 2020).

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 overarching means by which site remediation can be achieved. Moreover, it is anticipated that the RAP will be subject to site auditor review, under which circumstances update to the RAP is also likely to be required.

This report must be read in conjunction with all appendices including the notes provided in Appendix B.

1.2 Site Identification

Site Address	49-61 Stephen Road, Banksmeadow. ²
Legal Description	Lot A in Deposited Plan 190526; Lot 1 in Deposited Plan 311767; and Lot 1 in Deposited Plan 1095110.
Approximate Area	4.8 ha.
Zoning	IN1 – General Industrial.
Local Council Area	Bayside Council.
Current Use	Industrial – Resin manufacturer (Allnex). Note: DP understands that site is anticipated to be vacated by Allnex in 2027 (if not earlier) in preparation for the proposed redevelopment of the site.
Surrounding Uses	North: Industrial (warehouse)- Southgate Industrial Park. North-East: Logistics (shipping and containers) and warehouses, then the Botany Rail Line and Botany Industrial Park (BIP). East: Coal Pier Road and logistics (shipping and containers) and warehouses, then the Botany Rail Line and BIP. South: Industrial – logistics and fabrication / engineering yards then various industrial uses including warehousing and logistics, storage yards for construction and fit out / engineering materials, plant storage, mechanics, storage and chemical product manufacturing. West: Stephen Road then residential.

The site boundary is shown on Drawing 1, Appendix A1.

² Note: Given the site's location on the boundary between the suburbs of Banksmeadow and Botany, with the middle of Stephen Road being the dividing line, the property has been interchangeably referred to as both Banksmeadow and Botany as part of previous reports and documentation.

1.3 Proposed Development

Based on the information and layout plan drawings provided by ESR, the proposed development will comprise the construction of two three-storey warehouses, identified as Building A and Building B. These structures will be situated on the northern and southern sections of the site, respectively. Each storey within these warehouses will house four warehouse units, with each individual unit covering an area between approximately 1100 m² and 3300 m². Between the two warehouses on each storey hardstand areas will be suspended whilst a mezzanine carpark level is also located between the ground floor and level 1 warehouses. This, in essence, forming a single structure occupying the majority of the site footprint.

Ground floor carpark is also proposed in the eastern section of the site off Coal Pier Road, with motorbike parking spaces also incorporated.

Offices, personal amenities, end of trip facilities café, lobby and services are located at the western end of the shared hardstand and Warehouse A. Small dock offices and amenities are attached to the individual units.

To facilitate general vehicular, pedestrian and fire brigade access, light-duty pavements are proposed along the northern, north-eastern and south-western boundaries of the site connecting to Stephen Road in the north-western and south-western corners of the site. Main truck access will be established at the eastern end of the site with access via two driveways connected to Coal Pier Road. These driveways will feature heavy-duty pavements leading to the building's ground floor, as well as a circular ramp to access upper levels.

The ground floor of the warehouses and hardstand area have been designed for a finished floor level of reduced level (RL) 11.9 m Australian Height Datum (AHD). Bulk earthworks will be required to raise surface levels by approximately 1.5-2 m (assuming a bulk earthworks level of 11.6 m AHD) with some localised areas requiring deeper filling such as the north-eastern corner, and for backfilling of underground storage tank (UST) farms post removal. Perimeter retaining walls may be required and are likely to be similar in height to the raising of surface levels. Proposed levels will grade down to existing levels at the eastern site boundary where access driveways meet Coal Pier Road, and grade up at the western end of the site where access driveways meet Stephen Road.

Landscaping is primarily at the eastern and western ends of the site occupying the landscape and building setback zones and adjacent areas. In this regard, landscaping is also proposed at the eastern end of the site around the access ramp, sprinkler tanks and pump room with minor strips of landscaping also along the common property boundaries on the northern, north-eastern and southern sections of the site. The proposed works include retention of some existing trees within the site along the western boundary (adjacent to Stephen Road) and in the south-eastern corner of the site.

To facilitate the above works, demolition of all existing structures, removal of some trees, remediation, earthworks and installation of inground services will be undertaken.

Selected development drawings provided by ESR are included in Appendix A2 for reference.

2. The Objectives and Scope

The overall remediation goals are to:

- Render the site suitable for the proposed industrial warehouse development from a contamination perspective noting that remediation is also to be completed by Allnex via the VMP;
- Maintain records of the remediation (and associated earthworks) undertaken, including validation;
- Mitigate adverse impacts on surrounding land and waterways during the remediation by implementation of environmental management controls and procedures; and
- Assist the protection of workers involved with remediation and earthworks.

In this regard, the objectives of the RAP are to:

- Establish an appropriate remediation strategy so as to render the site suitable, from a site contamination perspective, for the proposed industrial warehouse development noting that remediation is also to be completed by Allnex via the VMP;
- Establish the site remediation acceptance criteria (RAC) to be adopted and the validation requirements to confirm the successful implementation of the remediation strategy;
- Provide general information on environmental safeguards required to complete the remediation works in an environmentally acceptable manner; and
- Provide general information to assist the generation of work health and safety (WHS) procedures required to complete the remediation works in a manner that would mitigate risk to the health of site workers or users.

3. Environmental Setting

Topography	A local high point is located about 100 m to the west of the site at approximately RL 22 m AHD. With respect to the site this high point falls to about RL 13 m AHD at the site's western boundary. More broadly, the area falls towards the south-east. Site topography is relatively flat to form the pad for the existing buildings (and surrounding pavements) at around RL 9-10 m AHD. Access ramps have been constructed at the western and eastern ends of the site, connecting the pad to Stephens Road at RL 13-14 m AHD and to Coal Pier Road at RL 5.3 m AHD respectively. To form the pad at the current levels historical cut (western end of the site) and fill (eastern end of the site) activities were likely undertaken. A copy of the site survey is included in Appendix A3 for reference.
Geology and Soil Landscape	Reference to the New South Wales Seamless Geology mapping indicates that the site is underlain by coastal deposits and dune facies. These

deposits are noted to comprise sand from marine deposits and aeolian reworked coastal sand dunes of the Holocene age (base) to current (top).

Reference to the Sydney 1:100,000 Soils Landscape Sheet indicates that the site is mapped as being underlain by aeolian Tuggerah soils for most of the site, with the eastern portion of the site (approximately 90 m wide section from the site boundary with Coal Pier Road) mapped as being underlain by disturbed terrain.

The Tuggerah soil landscape typically comprises gently undulating to rolling coastal dune fields comprising marine quartz sand, with shell fragments and interdune silt of Quaternary age. This landscape is generally highly permeable, very low to low in soil fertility and at risk of wind erosion.

The disturbed terrain is likely to comprise level to hummocky terrain extensively disturbed by human activity including complete disturbance, removal or burial of soil. Fill was likely used to raise and level the site for the current level pad. As the fill placed is anthropogenic the properties and materials are variable and subject to the materials placed.

Previous intrusive testing identified a general subsurface profile of:

- Fill – generally sand based and typically 1-2 m thick across the majority of the site, although this thickness does vary. Notably, fill depth increased at the eastern end of the site towards Coal Pier Road to around 7 m. Inclusions of sandstone, igneous and concrete gravel were recorded to varying quantities whilst fragment of asbestos containing material (ACM), ash, slag, clinker, asphalt, brick, glass wire, fabric, plastic and rootlets were generally minor in nature (although appeared to be more prevalent in the eastern unpaved areas);
- Natural soils – Typically grey and brown and primarily comprising sands. Occasional lenses or bands of hard peaty clay and clay were typically encountered between 8-13 m. Peaty clay and clay layers were more pronounced below about 13 m and were encountered within the dense to very dense sands and had some iron-stained laminations; and
- Bedrock is likely to be at depths in the order of 30 m or greater.

Acid Sulphate Soils

The ASS risk mapping indicates the site is mapped as being within an area of low probability of occurrence. Generally, the mapping indicates that the underlying soils are not anticipated to contain ASS although highly localised occurrences may occur, especially at a depth of greater than 3 m below the ground surface.

The western section of the site (approximately 20-30 m wide section from the site's boundary with Stephen Road) was outside the mapped zone, with the mapping indicating no data available for this area.

	DP (2024)³ included an assessment for ASS which identified ASS in natural soils near or below the water table and these should be assumed to require ASS management until demonstrated otherwise, noting that the ASS requiring management appears to be primarily below 8 m with the potential for some ASS in shallower soils below 4 m, such as in the vicinity of previous test location 203. Drawing 4, Appendix A1 shows the location of 203.
Surface Water	There is an open drainage channel along sections of Coal Pier Road with an open vegetated section starting about 200 m to the south / south-east of the site. The drainage channel appears to continue south, transversing under McPherson Street, before likely eventually discharging into Botany Bay, adjacent to the Port Botany container terminal. Botany Bay is located approximately 900 m south of the site and is the main surface water body down-gradient of the site.
Groundwater	Previous investigations have recorded groundwater typically between 4-6 m below ground level (bgl). These investigations have also tended to indicate a southerly groundwater flow direction for the western section of the site with this becoming more south-easterly on the eastern section of the site. Groundwater is impacted by a plume associated with the BIP, with impacts primarily associated with volatile chlorinated hydrocarbons (VCH). This and associated restrictions on groundwater use are discussed in the following sections. A search of the NSW Government online database of nearby groundwater bores undertaken as part of DP (2024) identified numerous wells on the site and in the local area. These are thought to be primarily associated with the BIP groundwater plume, with wells on the site also associated with the site's contamination.

4. Planning, Regulatory Records and Orders

4.1 Section 10.7 Planning Certificate

Section 10.7 (2) and (5) Planning Certificates, as included in Appendix F of JBS&G (2023)⁴, indicated the following key points:

- The size is zoned IN1 – General Industrial;
- The land is not in an area of outstanding biodiversity;

³ DP, 'Report on Supplementary Site (Contamination) Investigation, Proposed Industrial Development, 49-61 Stephen Road, Banksmeadow', DP reference: 219609.01.R.001.Rev0, five volumes, dated 27 September 2024 (DP, 2024).

⁴ JBS&G Australia Pty Ltd (JBS&G), 'Detailed Site Investigation, 49 to 61 Stephen Road, Botany NSW', JBS&G reference: 63638/148593 (Rev2) dated 19 January 2023 (JBS&G, 2023).

- The land is significantly contaminated within the meaning of the *Contaminated Land Management Act 1997* (CLM Act);
- The land is subject to a site audit statement; and
- Land is affected by a groundwater exclusion zone.

The certificates indicate that the site management orders, ongoing maintenance orders and VMP with respect to the CLM Act are not applicable. DP notes that, as indicated herein, the site is subject to a VMP.

4.2 NSW EPA Notified Properties

The site was previously notified to the NSW EPA under Section 60 of the CLM Act. NSW EPA determined that regulation of the site was required. This is currently managed via the VMP agreed between Allnex and NSW EPA (discussed further in Section 4.3).

Given the heavy industrial use of the area surrounding the site and in the Banksmeadow / Botany area more generally, multiple properties have been identified as being notified and listed on the NSW EPA database under the suburbs of Banksmeadow (10 properties notified with eight of these being regulated / regulation being finalised under the CLM Act or POEO Act) and Botany (six properties notified with one property, that being the site, being regulated under the CLM Act).

With the exception of the BIP property being regulated, which is known to be impacting the groundwater at the site and the surrounding region, there were no other notified properties adjacent or up-gradient that were considered to potentially impact the site. Moreover, it is noted that notified properties are located hydraulic down-gradient of the site and in closer proximity to the receiving water body, Botany Bay.

Locations of notified properties are shown on Drawing 2, Appendix A1 in DP (2024).

4.3 Voluntary Management Proposal

The site was, and remains, subject to a Declaration of Investigation Area under Section 15 of the CLM Act. This was due to the NSW EPA believing the site was contaminated with total petroleum hydrocarbons (TPH) and toluene, ethylbenzene and xylene (TEX). This resulted in subsequent investigations, development of RAPs, and agreement of VMPs (subsequently superseded by the current VMP).

Allnex agreed with the NSW EPA to the current VMP dated 16 September 2020, Allnex (2020), under Section 17 of the CLM Act. This was approved on 28 October 2020 by the NSW EPA (NSW EPA Notice No. 20201720). A copy of the current VMP is included in Appendix C1 for reference.

The VMP involves the following main components:

- Remediation of the groundwater in the central / western section of the site via enhanced *in situ* bioremediation (EISB);
- Monitoring of the EISB remediation;
- Shutdown of the boundary remediation system (BRS). The current BRS comprising air sparging and soil vapour extraction;

- Monitoring over a 12-month period following shutdown of the BRS; and
- Closure / surrender of the VMP.

AECOM Services Pty Ltd (AECOM) drawings in Appendix D3 and Drawings 2 and 3 in Appendix A1 show general locations of the EISB and BRS systems.

The objectives of the VMP are as follows:

- Achieve contaminant source depletion by reducing the average dissolved plume mass of total TEX compounds in the 12 groundwater wells located in the source area;
- Reduce groundwater concentrations of each TEX compound in five groundwater wells at the down-gradient (southern) site boundary; and
- After completion of the EISB remediation works:
 - o Confirm that no signs of rebound are observed after completion of the EISB remediation works; and
 - o Confirm natural attenuation is still occurring at the target area.

It is noted that meeting the VMP objectives will still allow contamination to migrate off-site on completion (e.g. at < 1 mg/L for each TEX compound). Given the NSW EPA's endorsement of the VMP, it is assumed that these concentrations would be acceptable as a remediation goal in the long-term.

The VMP requires '*review and full endorsement by the site auditor*' as various phases of the works are completed. Allnex has indicated that Rowena Salmon of Ramboll Australia Pty Ltd has been engaged to undertake the site auditor works for the VMP.

DP understands that the completion and removal of the VMP is, and remains post sale of the property to ESR, the responsibility of Allnex. This including any amendments / updates to the existing VMP, any future VMP's that supersede or are in addition to the current VMP and / or any ongoing requirements that may be agreed to and that allow the VMP to be removed / surrendered (e.g. an ongoing groundwater monitoring requirement, etc.).

It is noted that completion and removal of the VMP may be required to allow Allnex's surrender of their environment protection licence (EPL) for the site.

Additional VMP Works – South-Eastern Area

Whilst the VMP focuses on the central / western area of the site (i.e. in the vicinity of the Emulsions Plant and Beckamine Plant) with the primary contaminants of concern being TEX, JBS&G (2023) identified contamination, in particular total recoverable hydrocarbons (TRH) and TEX in groundwater wells JBMW07, JBMW12 and JBMW13 at the eastern end of the site, away from the current EISB groundwater remediation area. Information from JBS&G (2023) is included in Appendix D1 for reference. Groundwater well locations shown in this information are also indicated on Drawing 5, Appendix A1 for reference.

Undertaking 12 of the VMP requires the NSW EPA be notified when Allnex becomes aware of information or data indicating a material change in conditions at the site. Allnex and JBS&G considered that this threshold was reached by the results in the eastern section of the site, as per

the groundwater results from the aforementioned wells, and reported this to the NSW EPA on 9 December 2022. A copy of this notification is included in Appendix C1 for reference.

DP understands, from conversations with Allnex, that Allnex has discussed with NSW EPA about remediation of this area, which may include *inter alia* a BRS system. Furthermore, DP also understands that the remediation system is still to be designed, finalised and planning approval sought. DP is not aware if further investigations to inform the design and approach for the remediation system have been undertaken. Accordingly, further information on the system is not currently available to DP.

It is anticipated that the VMP will likely need to be completed, and its implementation will no longer be applicable to the site prior to completion of the new development.

4.4 Environment Protection Licence

Allnex currently has an EPL⁵ for the site to support their operations. This allows for chemical production and storage, including chemical production waste generation, chemical storage waste generation, dangerous goods and toxic substances production and contaminated groundwater treatment. The EPL requires a program of air and water monitoring (e.g. stormwater) as part of the licence's requirements.

It is noted that Condition R2 of the EPL requires notification of environmental harm to the NSW EPA within seven days of the date on which the incident occurred.

Moreover, it is noted under G3.1 that the remediation of TEX contamination program was completed on 28 March 2017. The objective of the pollution reduction program is instructed to have been to ensure that the licensee undertakes all necessary investigation and appropriate action to address TEX contamination at the premises within a reasonable timeframe. In this regard, notes on the EPA website indicated '*...the air sparge / soil vapour extraction strategy was approved by the EPA in a letter dated 28 March 2017 (EPA reference - DOC17/191449). The remediation strategy has been implemented and plume (TEX) concentration monitoring is ongoing...*'.

A copy of the EPL, including the latest variation which removed the requirements of the sampling associated with the former 2010 and 2012 VMPs, is included in Appendix C2 for reference.

It is anticipated that the EPL will likely need to be surrendered and no longer be applicable to the site prior to completion of the new development.

4.5 Water Restrictions Order

NSW Government, '*Temporary Water Restrictions Order for the Botany Sands Groundwater Source 2024*', dated 26 June 2024, has been applied to the site under the *Water Management Act 2000*. This replaces the previous Order dated 21 February 2018.

⁵ NSW EPA, '*Environment Protection Licence*', Licence Number 993, Issue date 11 August 2000 (latest version date 26 July 2021).

The site is located within Area 1 on Map A of the Order. With respect to Area 1, the Order prohibits the taking of water from those parts of the Botany Sands Groundwater Source. Notwithstanding, it does provide provisions for the taking of water for remediation, temporary construction dewatering, testing and monitoring purposes along with water supply work nominated by listed water access licences (if water is fit for purpose).

A copy of the TWRO and associated map showing the affected areas is included in Appendix C3 for reference.

5. Site Description

A site walkover was conducted by a DP environmental scientist over the course of DP's fieldwork in August and September 2023 associated with DP (2024). Photographs of main site features and general site uses taken during the walkover are included in Appendix E for reference. Main site features and general site uses are also indicated on Drawings 2 and 3, Appendix A1. The drawings and photographs more effectively illustrate the nature of the site's use. The following general comments were also provided in DP (2024), and have been included below, for context and reference:

- The site topography was generally consistent with that outlined in Section 3 with steep driveways down from Stephen Road in the north-western and south-western corners of the site and up from Coal Pier Road in the south-eastern corner of the site. These driveways meeting the existing pad level which was occupied by buildings and pavements (primarily concrete pavements);
- The majority of the site was used for operations, including operational manufacturing plants operating in five of the buildings. The majority of the other buildings were used for storage of finished products and production inputs (e.g. raw materials, chemicals, etc.);
- A building used for site operations offices, amenities and laboratories was present in the south-western quadrant of the site whilst a building in the north-eastern quadrant of the site was used as an engineering office / workshop and to house fire fighting infrastructure, including 450 m³ inground fire water tank;
- Numerous storage vessels and bunded areas were present across the site. Where these were in external areas they primarily comprised AST and UST farms and bunded storage areas. In this regard:
 - The main UST farms containing 12 large USTs were located in the central and northern sections of the site. The Northern UST Farm was supported by the adjacent pump room building. Three smaller USTs were present to the south and west of the pump room building;
 - The main external AST farms comprised the:
 - North-Eastern AST Farm. A sunken bunded AST farm in the north-eastern corner of the site which contains seven ASTs of varying sizes;
 - South-Eastern AST Farm located on the south side of the Nuodex Plant building which now holds three ASTs (formerly held six). An additional three ASTs are located opposite this farm within the separate larger bunded area;

- Central AST Farm located to the north of the Emulsions Plant building and thought to be the source of the central / western groundwater plume. It now holds three ASTs (formerly held 10); and
 - Western AST Farm located to the west of the Alkyd Resin Plant building containing nine ASTs.
- The eastern section of the site was the only area, with the exception of some minor landscaping along the northern and western site boundaries, where the site was not covered by concrete building slabs or pavements. This area included the stormwater first flush pit (understood to have a capacity of about 0.6 ML) which was lined and constructed at the level of Coal Pier Road. The pit was surrounded by grass with retaining walls covered in vegetation to the south and west. The retaining wall to the south raised to a site level about 3 m higher (~RL 8.7 m AHD) where a flat pad covered in gravel / road base like material and sporadic vegetation coverage was present, with denser vegetation around the perimeter of this pad. The retaining wall to the west of the first flush pit raised to a site level about 4.3 m higher (~RL 10 m AHD) where an open grassed area was present with dense vegetation present to the north, east and south of this grassed area where retaining walls were located;
 - Along the northern section of the eastern site boundary, the edge of the site battered down to the property boundary, demonstrating the site had been filled to make the level pad for the existing building and pavements;
 - Filling of the site was also evident along the access driveway from Coal Pier Road. To the north of the driveway was the filled area behind retaining walls at ~ RL 8.7 m AHD (as mentioned above) whilst to the south was a heavily vegetated area that fell away towards the site boundary and the adjacent property. Furthermore, to the north of the access driveway was a retaining wall along the southern site boundary with the site at a higher level than the adjacent property;
 - In addition to the AST farm, the north-eastern area was occupied by a staff car park, general storage areas and the dissolved air flotation water treatment system;
 - The BRS, including the associated shipping container which housed the treatment system, was observed to the south of the raw materials storage building and drum storage building, whilst the groundwater treatment system for the central / western plume was observed to the east of the drum storage building;
 - The western section of the site was occupied by the administration building and car parks; and
 - Areas where the substation had been relocated from and to, and the areas where diesel and petrol USTs had been removed (as mentioned in JBS&G (2023), see Section 6.1) were evident in the south-western quadrant of the site near the western staff car park.

6. Previous Reports and Information

Given the number of previous reports applicable to the property, this report does not seek to summarise all previous reports, rather it has focused on the more pertinent information required for this RAP. The more relevant reports were considered to be those which are representative of current site conditions, viz. those investigations undertaken since 2022.

The main investigation reports and information reviewed for this RAP were:

- JBS&G, '*Detailed Site Investigation, 49 to 61 Stephen Road, Botany NSW*', JBS&G reference: 63638/148593 (Rev2) dated 19 January 2023 (JBS&G, 2023);
- Information provided by Orica in December 2023 on groundwater monitoring of wells located on the site associated with the BIP groundwater monitoring program;
- AECOM, '*EISB Performance Report No.6, Allnex Botany Source Remediation Program: November 2023 to April 2024*', AECOM reference: 60539398 dated 1 July 2024 (AECOM, 2024) and associated general information on the remediation system; and
- DP, '*Report on Supplementary Site (Contamination) Investigation, Proposed Industrial Development, 49-61 Stephen Road, Banksmeadow*', DP reference: 219609.01.R.001.Rev0, five volumes, dated 27 September 2024 (DP, 2024).

Site conditions and contamination issues identified through previous investigations are discussed in subsequent sections of this report. For more detailed information reference should be made to the relevant report(s). Sample locations from the investigations listed in the following sub-sections are shown on Drawings 4, 4a, 5 and 6, Appendix A1. With respect to previous investigations, relevant drawings, logs and results have been included in Appendix D for reference.

6.1 Detailed Site (Contamination) Investigation - JBS&G (2023)

The following provides a summary of the site setting and findings outlined in the detailed site investigation undertaken by JBS&G for due diligence purposes to support the site's sale, JBS&G (2023). The investigation included a review of desktop information, drilling of 72 boreholes, 70 of which were subject to soil sampling (BH1-BH8 and BH10-BH71) and 13 which were converted to groundwater wells for subsequent sampling (along with groundwater sampling from 12 existing wells) and installation of sampling of 45 soil vapour pins. Extracted drawings, logs and results tables from JBS&G (2023) are included in Appendix D1 for ease of reference:

- The site has been used for chemical manufacturing since the mid-late 1940s and was potentially subject to some sand mining prior to this. It is currently used as a manufacturer of resins (and similar chemical products). Allnex has an EPL for the site to support these operations (EPL discussed previously in Section 4.4);
- Review of the pre-1943 oblique air photograph and the 1955 aerial photograph by JBS&G indicated that the Johnston & Johnston manufacturing plant was present on the adjacent property to the north, with expansion of the facility (within its property) indicated in the 1955 photograph review.

Note: Based on the site history information presented in the report, and supplemented by review of additional recent aerial photographs since 2005 as part of DP (2024), DP understands that the eastern property boundary previously extended further to the east prior to construction of Coal Pier Road in 2006. Associated with this, construction works in the

eastern section of the site were undertaken between 2006-2015 to form the current site features (e.g. stormwater first flush pit, access driveway off Coal Pier Road, the grassed and filled areas behind retaining walls, etc.);

- Soil and groundwater have been impacted by historical and /or current operations with impacted groundwater migrating off-site to the south. In 2012 a BRS comprising air sparging and soil vapour extraction systems was installed to assist with mitigating off-site migration of contaminants via groundwater. This was located along a 50 m section of the southern boundary, down-gradient of the Emulsions Plant and Beckamine Plant in the central / western section of the site where the main TEX groundwater impacts have been identified (further information on the BRS and groundwater remediation discussed in Section 6.3);
- The site was notified to the NSW EPA under the CLM Act due to the identified contamination at the site. The contamination is managed under the CLM Act via the site's VMP (further information on notified properties and the VMP in Sections 4.2 and 4.3);
- Multiple storage areas, aboveground storage tanks (ASTs) and USTs of varying sizes and containing various products (the majority of which were volatile organic compounds (VOC) in nature), were outlined in Table 3.3 of JBS&G (2023). These based on a summary of SafeWork NSW records for hazardous goods stored at the site;
- Twelve USTs⁶ were identified to be present on the site ranging in size between approximately 50,000-55,000 L. Of these, eight 55,000 L tanks are located in Northern UST Farm with the remaining four 50,000 L tanks located in the Central UST Farm. A further three USTs were located to the south of the Northern UST Farm and north of the Central AST Farm. Moreover, it was indicated that a 9,900 L diesel UST in the western staff car park and associated bowser were removed in August 2022. A nearby petrol UST located in the driveway between the diesel UST and the raw materials storage building was removed *circa* 2008;
- Fill was present across the site, generally to depths of between 1-2 m bgl in the central and western sections of the site, whereas the eastern section of the site, towards Coal Pier Road, fill was recorded at significantly deeper depths (e.g. BH57 recorded fill to 7 m bgl, whilst BH25, BH37, BH55, BH56, BH58 recorded fill to 4 m, 6.5 m, 6.2 m (refusal), 5 m and 5.5 m bgl respectively). The fill was underlain by natural sands. The deepest borehole (BH62) extended to 8 m and was terminated in the natural sands;
- Whilst the potential for ASS to be present was indicated to be low based on the mapping (low probability of occurrence below 3 m depth), hydrogen sulphide odours (which can be an indicator for ASS) were recorded at groundwater wells identified as MW05, JBMW01 and MW03/WG229S during sampling;
- Groundwater was generally at around 5 m bgl. Groundwater was indicated to flow in a southerly to south-easterly direction with the final receptor being Botany Bay. Moreover, it was noted that groundwater impacts from the BIP have resulted in restrictions on groundwater use in the area which also affects the site (e.g. restrictions on extraction, dewatering, reuse, etc.). Further information also included in Section 4.5;

⁶ DP understands that some of these USTs are divided internally to allow the holding of different chemicals within different sections of the tank.

- Whilst the investigation provided broad site coverage, the associated soil analysis was somewhat limited, particularly given the depth of the fill, groundwater impacts and contaminant detections in some soil samples. Of note from the analysis undertaken were elevated concentrations recorded for:
 - o Lead in samples BH22/0-0.1 (5,100 mg/kg), BH38/0.2-0.3 (3,500 mg/kg), BH65/1.5-1.6 (1,800 mg/kg), BH66/0-0.1 (8,500 mg/kg) and BH66/02-0.3 (2,100 mg/kg) compared to the NEPC (2013) human health screening criteria of 1,500 mg/kg;
 - o TRH in samples BH22/0.5-0.6 (C₁₀-C₄₀: 9,700 mg/kg), BH37/3.5-3.6 (C₆-C₁₀: 6,300; C₁₀-C₄₀: 5,730 mg/kg), BH57/4-4.1 (C₆-C₁₀: 4,200; C₁₀-C₄₀: 9,400 mg/kg), BH60/0.2-0.3 (5,250 mg/kg), BH65/6-6.1 (C₆-C₁₀: 710 mg/kg), BH66/2.9-3.0 (C₆-C₁₀: 6,200; C₁₀-C₄₀: 4,800 mg/kg). With respect to TRH C₁₀-C₄₀ exceedances, at least one of the sub-fractions exceeded their respective NEPC (2013) management limit criteria whilst C₆-C₁₀ exceedances were with respect to the management limit criteria of 700 mg/kg;
 - o TRH FI (C₆-C₁₀ minus sum of BTEX) in samples BH37/3.5-3.6 (2,600 mg/kg) and BH66/2.9-3.0 (5,600 mg/kg) exceeded the NEPC (2013) human health soil vapour intrusion screening criteria;
 - o Benzene in sample BH37/3.5-3.6 (4 mg/kg) was above the NEPC (2013) human health soil vapour intrusion screening criteria of 3 mg/kg;
 - o Organochlorine pesticides (OCP), in particular the sum of dichlorodiphenyltrichloroethane (DDT), dichlorodiphenyldichloroethylene (DDE) and dichlorodiphenyldichloroethane (DDD) in samples BH67/0.2-0.3 (11,580 mg/kg), BH67/0.3-0.4 (8,260 mg/kg) and HA106/0.2-0.3 (5,410 mg/kg) which exceeded the NEPC (2013) human health screening criteria of 3,600 mg/kg;
 - o Whilst not exceeding the soil assessment screening criteria adopted by JBS&G, elevated TEX was also encountered in the soil, most notably at BH37, BH57, BH66 and BH68.
 Note: Only limited information on soil contamination at depth was provided, especially in the likely groundwater impact zone between ~4-8 m bgl; and
 - o Asbestos was recorded above the assessment criteria at BH07, BH25, BH37, BH56, BH66. Friable asbestos was also recorded below assessment criteria at BH06, BH12, BH35, BH59 and BH65. Asbestos, in the form of bonded ACM was encountered on the surface at BH55, BH59, BH65 and BH66 and directly under the slab at BH51. In summary, about 18 % of the borehole locations that were tested for asbestos recorded the presence of asbestos.
- Groundwater contamination is present across the site, primarily for TEX, but other impacts such as metals and PFAS are also present. Of note:
 - o Petroleum hydrocarbon odours were observed in 11 wells, two of these also noting the potential additional presence of a solvent odour;
 - o Elevated TRH FI (C₆-C₁₀ minus sum of BTEX) concentrations were recorded at JBMW03 and JBMW07 (both located outside the current central / western remediation area) and at MW10, MW18 and MW41s (these three locations located within the current central / western groundwater remediation area);

- o TEX concentrations recorded in JBMW06, JBMW07, JBMW12 and JBMW13 which were at, or above concentrations recorded in the current groundwater remediation area (e.g. well MW18). JBMW12 and JBMW13 were installed after the initial investigation by JBS&G given the detections in JBMW07 (and to a lesser extent JBMW06). JBS&G noted that natural attenuation of the groundwater is occurring in this area;
- o Metal concentrations were similar across the site and JBS&G considered these to be representative of background levels. Where elevated metals were recorded JBS&G considered these to be localised in extent given that inferred down-gradient wells had similar concentrations to those observed across the remainder of the site; and
- o PFAS was detected in all groundwater samples. Per-fluorooctane sulfonate (PFOS) was above the 95% level of protection (LOP) screening criteria of 0.13 µg/L in five of the 23 samples, with exceeding concentrations between 0.19 µg/L and 0.64 µg/L. Detections of PFAS were broad across the site, including from the northern (up-gradient) well MW05 which recorded a PFOS concentration of 0.11 µg/L. JBS&G considered the 95% LOP to be suitable given the receiving water body of Botany Bay.
- It was noted that semi-volatile organic compounds analysed for in soil and groundwater samples, and formaldehyde, alcohols, glycols, and acrylates that were analysed for in groundwater samples recorded results below screening criteria or LRL. JBS&G did not identify these contaminants to be of concern on review of the results;
- Soil vapour results were generally low, however, it is noted that:
 - o Whilst not initially undertaken by JBS&G, subsequent analysis of soil vapour samples for TPH (F1 and F2) recorded high concentrations at SV13 and SV20 above the NEPC (2013) screening criteria, whilst detections at lower concentrations were also recorded at locations SV37, SV39 and SV43. In addition, and whilst not discussed by JBS&G (not clear to DP why) some impacts appear to also be present for trimethylbenzene around locations SV13 and SV20 when considered against the United States Environment Protection Agency (USEPA) regional screening levels (RSL) as an initial screen; and
 - o Based on the soil and groundwater results, JBS&G identified a soil vapour risk in the eastern section of the site (i.e. in the vicinity of BH37, BH66) should buildings be constructed in this area.
- Asbestos sheeting was identified in several buildings as part of a 2015 site hazard audit. It was noted in a subsequent 2021 audit that the asbestos sheeting had been removed from these buildings;
- In summary JBS&G concluded that:
 - o The site is suitable for ongoing commercial / industrial use in its current configuration subject to implementation of an environmental management plan to manage lead, OCP and asbestos impacts;
 - o To the west of the groundwater remediation area in the central / western section of the site, groundwater and soil vapour impacts indicate the presence of additional areas of petroleum impact hotspots expected to be associated with the site's sumps / pits, manufacturing plants and / or storage areas for chemicals used in the manufacturing processes;
 - o In the eastern section of the site natural attenuation of the groundwater is occurring in this area (i.e. in the area of JBMW07, JBMW12 and JBMW13); and

- o Remediation and / or management of identified impacts would be required for potential redevelopment of the site for commercial / industrial use.

As noted in Section 4.3, Allnex with support from JBS&G, has notified the NSW EPA of the contamination identified in the eastern section of the site under the undertaking outlined in the VMP. Accordingly, DP understands that addressing this contamination is being managed via the VMP.

The information presented in JBS&G (2023) was considered to be of sufficient quality to allow its consideration as part of, and to inform, this RAP.

6.2 BIP Orica Groundwater Information (2023)

As part previous works, DP requested from Orica any available information on the Orica groundwater wells located on the site and which are understood to be periodically sampled on a six-monthly basis as part of the BIP groundwater plume monitoring programme. Orica provided to DP in December 2023 borehole logs and groundwater monitoring data for the Orica wells. This information was included in DP (2024), and is also included in Appendix D2 for reference. The approximate well locations are shown on Drawing 5, Appendix A1.

The original wells installed *circa* 1996 and 2004 for well BP04 and BP53 respectively, were single screened wells with sampling undertaken at varying depth. Conversely, wells currently sampled and installed in 2007, wells WG229, WG230 and WG233, each had three screened sections installed at around 10 m, 20 m and 30 m depth. These reflected by the well identification prefix 'S', 'I' and 'D' respectively.

From discussions with Orica, DP understands that the monitoring program focuses on Orica's main contaminants of concern, namely VCH. The August 2023 monitoring data (being the most recent round of information provided) indicated detections of VCH above laboratory reporting limits (LRL) in wells WG229-S, WG229-D, WG230-S, WG233-S, WG233-I and WG233-D with the highest concentration for total VCH in WG233-D, and in particular for vinyl chloride. DP notes that the vinyl chloride concentration in WG233-D of 127 µg/L exceeds the ANZG (2018)⁷ 95% LOP for marine water.

Moreover, these results are generally consistent with earlier historical data, where well WG233-D typically recorded the highest concentrations. Increasing impacts with depth, particularly below about 20 m, was also conspicuous in the earlier progressive sampling from deeper depths in wells BP04 and BP53.

⁷ Australian and New Zealand Governments (ANZG), 'Australian and New Zealand Guidelines for Fresh and Marine Water Quality', 2018 (ANZG, 2018).

6.3 Groundwater Remediation in the Central / Western Area of the Site and AECOM (2024)

The following provides a summary of the groundwater remediation being undertaken in the central / western section of the site, including review of the monitoring report provided to DP (AECOM, 2024):

- Groundwater remediation, and associated monitoring events, are required under the site's VMP, Allnex (2020);
- Groundwater remediation has been, and continues to be, conducted on the site to address groundwater contamination in the central / western area in the vicinity of the Emulsions Plant and Beckamine Plant. The main contaminants of concern being addressed are TEX;
- Three horizontal injection wells were installed below the Emulsions Plant and Beckamine Plant, as shown on the AECOM drawings in Appendix D3 and on Drawing 3 in Appendix A1. These are understood to have been installed around 5-8 m bgl to target the impacted zone and are each about 90 m long, with the first 50 m comprising slotted screen;
- Previous groundwater remediation comprised *in situ* chemical oxidation (ISCO) which included injection and groundwater monitoring events. These works ceased in 2019 following the detection of light non-aqueous phase liquid (LNAPL) in groundwater monitoring wells. It was also hypothesised during the ISCO works that elevated contaminant concentrations in some monitoring wells may be due to new releases from sub-surface infrastructure at the site, although this was considered unlikely;
- The current remediation approach comprises EISB of the groundwater and commenced in April 2021. The EISB seeks to increase natural biodegradation rates by generating an aerobic environment. The method adopted involves injecting air under-pressure through the horizontal wells installed for the now abandoned ISCO treatment approach;
- The EISB remediation approach is supported by the BRS to mitigate against off-site migration of contaminants. The BRS comprises air sparging and soil vapour extraction along a 50 m section of the down-gradient (southern) site boundary (down-gradient of the Emulsions Plant and Beckamine Plant). It is understood the BRS commenced operation in 2012. The system's construction is unclear from the information reviewed by DP, however, from what DP could derive appears to comprise:
 - o 10 wells at approximately 5 m spacing (covering ~50 linear meters);
 - o Air sparging of the groundwater from around 5-8 m bgl to potentially 20 m depth through the sand profile (groundwater level generally around 5 m bgl); and
 - o Soil vapour extraction from above the groundwater table.
- With respect to AECOM (2024):
 - o LNAPL was detected in well IW02, located to the north of the Central AST Farm and was considered by AECOM to be within the same order of magnitude since it was first measured in October 2023. Moreover, AECOM noted that LNAPL was not measured in adjacent and nearby monitoring wells and there had been no notable increase in BTEX concentrations based on the December 2023 groundwater monitoring event;
 - o AECOM considered there was sufficient air flow in the subsurface. It was noted that the average air flow rate was higher compared to the previous biannual monitoring period due to the change in operating condition that involved running all three lines concurrently in December 2023 through to the completion of the monitoring period for

the report. Moreover, the dissolved oxygen results were noted to indicate that injected air may be reaching parts of the target area, although this varies;

- o AECOM indicated remediation is generally reducing TEX concentrations in the main impacted area suggesting source depletion and hence the associated TEX contaminant mass is also reducing. In this regard, AECOM also noted that when comparing the groundwater data to historical data, TEX and TRH concentrations were generally stable to decreasing at wells in the source area. This was also indicated by the presented historical mapping of the plume which suggests the plume to be decreasing in size. These figures extracted from AECOM (2024) are included in Appendix D3 for reference; and
- o An increase in TEX concentrations in compliance well MW40-S was recorded, with concentrations above the VMP objective of 1,000 µg/L. AECOM considered this well to have a stable TEX trend.

The information presented in AECOM (2024) was considered to be of sufficient quality to allow its consideration as part of, and to inform, this RAP.

6.4 **Supplementary Site (Contamination) Investigation – DP (2024)**

DP undertook a supplementary site (contamination) investigation (SSCI) to support ESR's development application for the proposed industrial warehouse development. The primary objectives of the investigation were to:

- Check the soil vapour concentrations in the eastern grassed area of the site and in the western section of the site where elevated TPH were previously recorded in the vicinity of the Alkyds Plant building;
- Supplement existing soil contamination data;
- Supplement groundwater information previously obtained on the site by others and provided by Allnex as part of its ongoing remediation and monitoring requirements;
- Consolidate information on contamination at the site to inform future remediation approaches such that the site can be made suitable for the proposed industrial warehouse development (i.e. to inform this RAP); and
- Check for the presence of ASS.

The investigation included a desktop component which involved a review of available information (primarily the information summarised above in the preceding sections of this report), and an intrusive component. The intrusive works comprised a regime of drilling and soil sampling from 60 boreholes, groundwater sampling from 32 wells and soil vapour sampling from 10 ports. This was supplemented by opportunistic sampling and testing from the geotechnical boreholes and cone penetration tests undertaken concurrently with the investigation. Samples were subject to laboratory analysis, with analysis focusing on contaminants of potential concern.

Based on the site walkover, it was noted that given the extensive (current and previous) site operations, age of the buildings and some infrastructure, and the general broad scale use of the site, operations would generally be considered high risk activity from a contamination perspective. This supported by contamination previously being identified at the site by others.

Field observations noted groundwater levels between ~5-6 m and identified a general subsurface profile consistent with that outlined in Section 3.

Elevated photoionisation detector (PID) reading and odours were observed, across the site, particularly in the eastern unpaved area of the site and in the north-western quadrant of the site in the vicinity of the Alkyd Plant, Emulsions Plant and Beckamine Plant buildings (refer to Drawings 7-7e, Appendix D4). With respect to PID readings, the high to very high results (i.e. above 100 ppm) above the water table (i.e. above ~4.5 m depth) were primarily located in the vicinity of the Nuodex Plant and the adjacent unpaved areas to its east along within the Emulsions Plant building. Higher results from near or below the water table (i.e. below ~4.5 m depth) were also recorded in the western section of the Alky building (borehole 304), along with down-gradient of the Emulsions Plant building in the Beckamine Plant building (borehole 314) and Drum Storage building (borehole 315). Odours were primarily associated with hydrocarbons or sulphur, consistent with the main TEX contaminants previously identified at the site and the potential for ASS to be present, respectively. Boreholes around the Northern UST Farm (i.e. boreholes 312, 316 and 317) noted what was colloquially described as a 'rotten cheese' (or 'urea' like) odour.

The main contaminants of concern identified previously at the site and during the course of this investigation are VOC, and in particular monocyclic aromatic hydrocarbons (MAH) such as TEX, and the associated shorter chain TRH / TPH. In summary, the majority of these impacts were identified at depth associated with the groundwater. The two main areas of groundwater impacts were those being addressed by the VMP, namely the central / western groundwater plume and the eastern impacted area to the south of the Nuodex Plant building (i.e. in the vicinity of wells JBMW06, JBMW07, JBMW12 and JBMW13). Soil impacts above the water table are associated with the eastern grassed area where boreholes 209, 329, 329D and 331 were located. Importantly, whilst the highest groundwater results were reported in well 331, these appeared to be localised and primarily associated with the upper groundwater table, as supported by the results in the nearby deeper well 209 and down-gradient wells towards the site boundary at wells 210 and 334. It was noted that addressing the impacts in the soils between ~2 m bgl and the top of the water table in eastern grass area will further assist with reducing the risk to groundwater in this area.

The other main chemical contaminants of concern were OCP, notably in soils to the south of the Nuodex Plant building, and lead which appeared to be present at elevated concentrations across large section of the eastern portion of the site primarily, but not limited to, the near surface soils. Lead impacts were most conspicuous in boreholes 210 and 333 located in the south-eastern corner of the site near the driveway off Coal Pier Road. Additionally, asbestos was recorded in fill across the site, including in non-friable (ACM) and friable form and above the asbestos fines / friable asbestos (AF / FA) site assessment criteria of 0.001%. Accordingly, fill at the site was considered to be impacted with asbestos.

The borehole (and well) locations referenced above are shown on Drawings 4, 4A and 5, Appendix A1.

Given the soil vapour results from the investigation, and the results presented in JBS&G's 2023 contamination investigation which only recorded exceedances of the site assessment criteria at SV13 and SV20, noting these elevated concentrations were not replicated by DP (2024), there was not considered to be a gross soil vapour risk.

It was concluded that the site currently presents contamination risks for the proposed development and these risks will need to be addressed as part of the development works. Summary of the anticipated works from a contamination perspective along with additional recommendations and comments provided in the report are outlined below:

- In addition to the broader impacts from asbestos and metals, six main areas of contamination concern were identified (as indicated on Drawing 9 in DP (2024), and also included herein as Drawing 7, Appendix A1);
- A RAP will need to be developed outlining an overarching strategy for the remedial works required to be undertaken during development to address the contamination identified (i.e. this report);
- Capping and associated long-term management of existing soils is required given lead and asbestos impacts;
- OCP impacted soils above the site assessment criteria (SAC), located south of the Nuodex Plant building, are to be placed in a low permeable containment cell. It was also recommended that consideration be given to the placement of lower impacted OCP soils and / or the soils with high lead concentrations (i.e. from the vicinity of boreholes 210 and 333) in the containment cell;
- Removal and validation of ASTs and USTs and associated infrastructure. This to include assessment of the soils from within and below the footprint of the AST farms and above the groundwater table, with the assessment to check if these soils warrant remediation;
- *Ex situ* treatment of soils for VOC and TRH / TPH contaminants will be required for soils excavated from the eastern grassed area and potentially for soils excavated from the tank farms as part of the removal and validation process associated with the preceding point (or other impacted soils that may be encountered during works);
- It is expected that the VMP will need to be completed and its implementation will no longer be applicable to the site;
- Commercially, to reduce longer term risks from retained contamination, consideration may be given to some *in situ* soil treatment (e.g. part immobilisation, etc.) in the upper section of the groundwater table in targeted areas;
- Consideration be given to the drilling of some additional boreholes to focus the area of treatment prior to commencing any due diligence remedial works (e.g. *in situ* soil treatment, excavations with the high lead around 210 and 331, etc.);
- The natural soils near or below the groundwater table should be assumed to require ASS management until demonstrated otherwise, noting that the ASS requiring management appears to be primarily below 8 m with the potential for some ASS in shallower soils below 4 m, such as in the vicinity of 203. It was noted that an acid sulphate soils management plan (ASSMP) would be required to be implemented when disturbing these soils with drafting of this plan best undertaken once the detailed design and construction approach are further developed;
- Development of the final remediation approach, particular for any *in situ* due diligence soil treatment works, will need to be undertaken in consultation with the geotechnical, civil and structural consultants and associated design disciplines. Moreover, for the structural pile design (and overall design more generally including other disciplines where applicable) this is to consider the presence of contaminants in the subsurface, the presence of ASS and generate low permeable seals with the surrounding soils where intersecting the Orica plume;

- An unexpected finds / additional finds protocol to be implemented during the works;
- Hazardous building material surveys are to be undertaken on the existing buildings / structures and subsequently appropriately removed; and
- On completion of the remedial works, development of a long term environmental management plan (LTEMP) will be required for the site. This is to address long term management of the site with respect to the retained contamination.

Based on the results of DP (2024) it was considered that the site can be made suitable for the proposed industrial warehouse development subject to implementation of the above recommendations (and others outlined in the report), and successful completion of the required remediation works outlined in the RAP (i.e. this report).

7. Conceptual Site Model

A conceptual site model (CSM) is a representation of site-related information regarding contamination sources, receptors and exposure pathways between those sources and receptors. The CSM provides the framework for identifying how the site became contaminated and how potential receptors may be exposed to contamination either in the present or the future. Figure 1, below, provides a diagrammatic representation of where risk is present from contamination based on source - pathway - receptor linkages. A risk is only present if a source, pathway and receptor are all present (i.e. a complete pathway). If one of these is removed, the corresponding risk to human health or the environment is also removed.

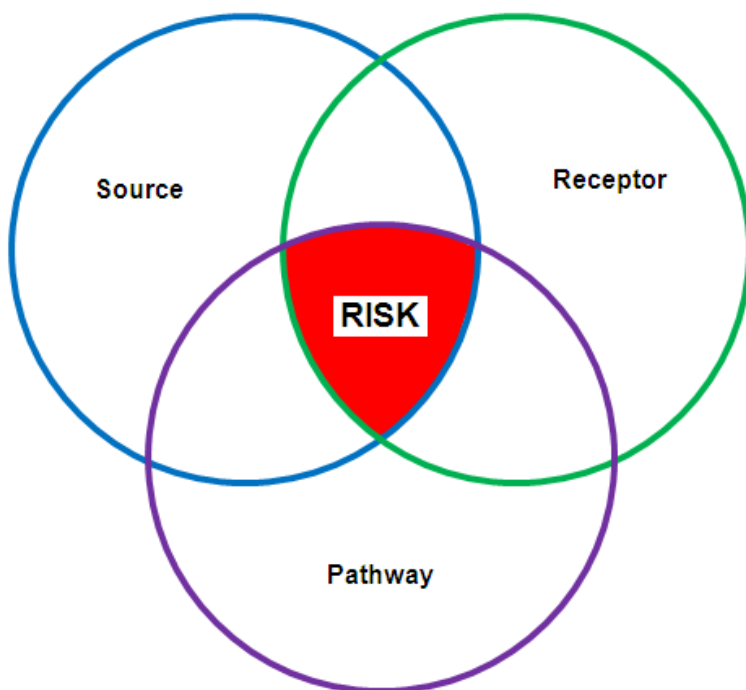


Figure 1: Presence of Risk with Respect to Source - Pathway - Receptor Linkages

Based on the previous investigations and other information as summarised in earlier sections of this report, the following potential sources of contamination and associated contaminants of potential concern (CoPC) have been identified and summarised in Table 1.

As this investigation is associated with the site's future development, and ongoing site management is the responsibility of Allnex, the CSM does not consider risks associated with current site users.

Table 1: Summary of Potential Sources and Associated CoPC

On-Site Sources
S1: Fill associated with site levelling to form current site levels: - Primary CoPC: Lead, TRH / TPH, OCP, asbestos. - Secondary CoPC: Chromium, VOC, PAH. S2: USTs, ASTs and associated pipework: - Primary CoPC: Lead, VOC (includes BTEX), TRH / TPH, PAH. - Secondary CoPC: Metals, PFAS. S3: Industrial use and chemical manufacturing operations, including the use and storage of chemicals (also associated with S2): - Primary CoPC: Lead, VOC (includes BTEX), TRH / TPH, PAH, OCP. - Secondary CoPC: Metals, phenols, PFAS. S4: Former and current buildings / structures. - Primary CoPC: Asbestos, SMF, lead (in paint and dust) and PCB.
Off-Site Sources
S5: Surrounding industrial land use (e.g. former Johnston & Johnston site to the north). - Primary CoPC: Metals, VOC (includes BTEX), TRH / TPH. - Secondary CoPC: PAH, PFAS.

The following potential human and environmental receptors, along with relevant potential pathways, have been identified and summarised in Table 2.

Table 2: Summary of Potential Receptors and Pathways

Potential human receptors
HR1: Construction and maintenance workers; HR2: Future users post redevelopment (commercial / industrial – warehouse users); and HR3: Adjacent property users (commercial / industrial and residential).
Potential Environmental Receptors
ER1: Surface water (open stormwater channel along Coal Pier Road and Botany Bay near the Port Botany container terminal); ER2: Groundwater; and ER3: Terrestrial ecology.
Potential Pathways to Human Receptors
HP1: Ingestion and dermal contact; and HP2: Inhalation of dust and / or vapours.

Potential Pathways to Environmental Receptors

- EP1:** Surface water run-off;
- EP2:** Leaching of contaminants and vertical migration into groundwater;
- EP3:** Lateral migration of groundwater providing base flow to water bodies; and
- EP4:** Inhalation, ingestion and absorption.

With respect to terrestrial ecology for the proposed development this is expected to be generally limited to the eastern and western sections of the site with minor strips of landscaping along the common property boundaries on the northern, north-eastern and southern sections of the site. As the remainder of the development involves limited new landscaping with the rest of the site covered by hardstand (i.e. building slabs and pavements), coupled with the site being raised as part of the development works, ecological receptors are considered primarily associated with the soils to be imported and placed in proposed landscape areas (e.g. those to raise the site, topsoil, etc.). Regarding soils in areas where existing trees are being retained, given these trees are in good health and in heavily vegetated areas, this would suggest that any contaminants in existing soils are not having a significant detrimental impact on ecological receptors, and hence management of existing soils around retained trees would be required more so from a human health risk perspective (e.g. potential for asbestos to be present). Terrestrial ecology receptors for this CSM are considered in the context of the above.

Regarding groundwater receptors, the site is located within a heavy industrialised and groundwater impacted area which includes restrictions on groundwater use and the presence of industrial properties between the site and Botany Bay. Accordingly, the environmental setting is considered to be consistent with a highly disturbed system with limited ecological value and in this context the groundwater receptor is considered for this CSM.

Surface water at the site post completion of the warehouse development will be managed day to day via the site's stormwater drains connected to the local stormwater network and hence surface run-off is not considered to be of significant concern. There is always the potential for surface water movement without appropriate site management or during excessive storm water events, and hence surface water as a pathway and receptor has been retained for this CSM although its overall risk from a contamination perspective over the long term are not considered to be of significant concern given this and the nature of the development.

Summary of Potentially Complete Exposure Pathways

A 'source-pathway-receptor' approach has been used to assess the potential risks of harm being caused to human or environmental receptors from contamination sources on or in the vicinity of the site, via exposure pathways (i.e. potential complete pathways). The possible pathways between the above sources (S1 to S5) and receptors are provided in below Table 3.

Table 3: Summary of Potentially Complete Exposure Pathways

Source	Exposure Pathway	Receptor	Risk Management Action*
S1: Fill. S2: USTs, ASTs and associated pipework. S3: Industrial use and chemical manufacturing operations. S5: Surrounding industrial land use.	HP1: Ingestion and dermal contact	HR1: Construction and maintenance workers.	- Placement of soils with concentrations of OCP above the RAC in low permeable containment cell below capping layer (part of Area 4, Drawing 7, Appendix A1). - Remediation of volatile contaminants in soils above the groundwater table in eastern grassed area (Area 5, Drawing 7, Appendix A1). - Removal and validation of UST and AST footprints, including (if required) any associated remediation of soils above the groundwater table for volatile contaminants. - Implementation of mitigation measures to construct barriers between any retained contaminated soils (e.g. asbestos, lead, etc.) and end site users and management of these mitigation measures through a LTEMP. - For commercial purpose and to assist long term management of the site consideration to <i>in situ</i> treatment of soils in the upper section of the groundwater table for volatile contaminants (e.g. partial immobilisation, etc.) in Areas 1, 3, 4 and 5 (Drawing 7, Appendix A1). - For commercial purposes and to assist long term management of the site consideration to placement of soils with elevated OCP concentrations (Drawings 8, 8a and 8b, Appendix A1) and / or high lead concentrations (i.e. in the vicinity of boreholes 210 and 333 in Area 6, Drawing 9, Appendix A1) in the low permeable cell with the other OCP impacted soils as noted above. - Management of impacted soils and groundwater through appropriate site management plans and procedures that are developed during final design and construction approach considerations and implemented during construction works.
	HP2: Inhalation of dust and / or vapours.	HR2: Future users.	
	HP2: Inhalation of dust and / or vapours.	HR3: Adjacent property users.	
	EP2: Leaching of contaminants and vertical migration into groundwater.	ER2: Groundwater.	
	EP1: Surface water run-off. EP3: Lateral migration of groundwater providing base flow to water bodies.	ER1: Surface water.	
	EP4: Inhalation, ingestion and absorption.	ER3: Terrestrial ecosystems.	

Source	Exposure Pathway	Receptor	Risk Management Action*
S4: Former and current buildings / structures.	HP1: Ingestion and dermal contact. HP2: Inhalation of dust and / or vapours.	HR1: Construction and maintenance workers. HR2: Future users.	A hazardous building materials (HBM) survey [^] on site buildings / structures to be undertaken prior to commencing works (and of inground infrastructure during works as appropriate). Hazardous materials to be removed in accordance with relevant legislation and guidelines prior to demolition
	HP2: Inhalation of dust and / or vapours.	HR3: Adjacent property users.	

Note:

* Above risk management actions focus on addressing the soil contamination above the groundwater table (i.e. above ~4 m depth), noting that other risk management actions to be addressed by Allnex via groundwater remediation and completion of the VMP.

[^] DP notes that an existing Allnex Hazard Audit report by Riskcon Engineering Pty Ltd (RE) was undertaken for the site as outlined in the report titled 'Hazard Audit 2021'. This is unlikely to be suitable for the purpose of demolition.

8. Party Responsibilities Post Sale

DP's current understanding with respect to responsibilities associated with remediation of the site is broadly that:

- Allnex will be responsible for *inter alia*:
 - o Groundwater remediation;
 - o Any remediation required prior to Allnex vacating the site;
 - o Removal of all production materials (including hazardous materials) when vacating the site;
 - o Any remediation required associated with the contamination identified in the eastern section of the site;
 - o Completion / removal / surrender of the VMP (including any updated, new or superseding VMP); and
 - o Surrender of Allnex's EPL for the site.
- ESR will be responsible for *inter alia*:
 - o Demolition of buildings;
 - o Removal of any inground infrastructure required to be removed as part of the development works (e.g. USTs);
 - o Remediation of soils above the groundwater table (i.e. to a depth of approximately 4 m) as part of the development works, including capping of the asbestos contaminated soils; and
 - o Obtaining a Section A2 Site Audit Statement for the proposed ESR development post remediation and prior to occupation.

9. Remediation Extent and Options

9.1 Areas of Contamination Concern

Areas of environmental concern can be broadly categorised as follows:

- **Broadscale impacts:** These being associated with asbestos and lead which have been encountered in soils across large sections of the site. Given the broadscale impacts determining the potential extent of contamination for different areas is likely to be impractical and/or not of significant benefit to the remediation process. Accordingly, remediation approaches for broadscale impacts would need to be applied across the site. Variations to the approach would require localised assessment and validation; and
- **Localised impacts:** Impacts associated with a source or general area, where its extent of impacts is generally understood from previous investigations. Indicative areas of these main areas of contamination concern are summarised on Drawing 7, Appendix A1. Localised impacts for elevated OCP and high lead are also summarised on Drawings 8, 8a, 8b and 9, Appendix A1.

Focus of these localised impacts and associated remediation of soils above the groundwater table is also informed by the VMP already requiring groundwater remediation to be undertaken. Furthermore, and as noted in DP (2024), soil impacts in other areas outside of those subject to groundwater remediation have indicated (in some areas where present) localised impacts on the groundwater (i.e. soils impacting groundwater in the subject area and not reflected in contaminant concentrations in down-gradient wells). This suggesting localised remediation of soils may provide some remedial benefit whilst broadscale remediation of soils would not provide significant benefit.

It is noted that ASS is also considered to be broadscale in nature with its presence at depth and across the footprint of the site. Management of ASS, where disturbed, will need to be implemented in accordance with the ASSMP.

Furthermore, with respect to the localised impacted areas, as summarised on the aforementioned drawings, these can generally be categorised into the following main impacts:

Impacts Requiring Soil Remediation

- OCP impacts soils with concentrations above the RAC (refer Section 12) – (part of) Area 4; and
- Soil impacted with volatile contaminants in the eastern grassed area - Area 5.

Note: Soils from footprints of UST and / or AST farms may require remediation from above the groundwater table that are impacted with volatile contaminants. To be assessed as part of the validation process for these features post-demolition (or for other finds that may occur during the works).

Soil Remediation of Impacts for Commercial Consideration for Reduce Longer Term Risks

- OCP impacted soils with elevated concentrations (above ~40 mg/kg) – eastern section of the site, refer to Drawings 8, 8a and 8b, Appendix A1;
- High lead concentrations (above 15,000 mg/kg) – (part of) Area 6 in the vicinity of boreholes 210 and 333, refer to Drawing 9, Appendix A1;

- *In situ* treatment of some soils (e.g. part immobilisation, etc.) in the upper section of the groundwater table (i.e. from around ~4.5-9 m) – potential for application in part of Areas 1, 3, 4 and 5; and
- Treatment of the ‘rotten cheese’ odours that may be excavated as part of the northern UST farm removal and validation process – (part of) Area 2.

9.2 Remediation Options

With reference to NEPC (2013) and CRC Care (2019), and in light of the potential exposure pathways, it is considered that the following remediation options have merit in terms of rendering the site suitable for the proposed development at the conclusion of the works:

A. Asbestos Contaminated Soils

1. Excavation of all asbestos contaminated soils and disposal off-site to a licensed waste facility;
2. Construction of a horizontal barrier between the retained asbestos contaminated soils with concentrations above the RAC and end site users;
3. Remediation of soils impacted with bonded asbestos via emu picking to concentrations for bonded asbestos below the RAC and application of one and / or both of the aforementioned approaches for soils unable to be remediated using this process (i.e. impacted with friable asbestos above the RAC or bonded soils which are unable to be remediated to concentrations below the RAC); and
4. Construction of a horizontal barrier between the retained soils (i.e. all fill and non-validated natural soils) and end site users, under the assumption that asbestos is present.

Note: Above approaches A1, A2 and A3 are with respect to soils with asbestos concentrations above the RAC. Extensive further investigation to identify soils above the RAC would be required for implementation of these three approaches.

B. OCP Contaminated Soils

1. Excavation of all OCP contaminated soils above the RAC and disposal off-site to a licensed waste facility;
2. Construction of a horizontal barrier (capping) between the retained OCP contaminated soils above the RAC and site users supplemented with stabilisation treatment to address potential leaching risk with soils placed above the groundwater table; and
3. Remediation of soils impacted by placement in a low permeable containment cell above the groundwater table and below the capping layer.

Note: Whilst that above approaches are with respect to soils with OCP concentrations above the RAC, commercial consideration may also wish to be given to applying these remediation options to address other soils where elevated OCP concentrations are present although less than RAC (i.e. sum of DDT, DDD and DDE above ~40 mg/kg).

C. Lead Contaminated Soils

1. Excavation of all lead contaminated soils above the RAC and disposal off-site to a licensed waste facility; and

2. Construction of a horizontal barrier between the retained lead contaminated soils with concentrations above the RAC and end site users and retention of soils above the groundwater table where this is already the case; and
3. Remediation of soils impacted by placement in a low permeable containment cell above the groundwater table.

Note: Extensive further investigation to identify soils above the RAC would be required for implementation of above approaches C1 and C3. Whilst the above approaches are with respect to soils with lead concentrations above the RAC, commercial consideration may also wish to be given to applying one or a mix of these options to address the very high concentrations as detected at borehole locations 210 and 33 in Area 6 (i.e. lead concentrations above ~15,000 mg/kg).

D. VOC and TRH /TPH Contaminated Soils (above groundwater table)

1. Targeted excavation of the more heavily impacted areas with volatile contaminants in soil and off-site disposal to a licensed waste facility;
2. *Ex situ* immobilisation treatment of soils and replacement above the groundwater table and below the capping layer;
3. *In situ* immobilisation treatment of soils;
4. *Ex situ* bioremediation treatment of soils and replacement above the groundwater table and below the capping layer;
5. *In situ* bioremediation treatment of soils; and
6. Capping of the area with low permeable capping layer to reduce potential for leaching and infiltration into the groundwater.

E. VOC and TRH / TPH Contaminated Soils (below groundwater table)

1. Targeted excavation of the more heavily impacted areas with volatile contaminants in soil and off-site disposal to a licensed waste facility;
2. Targeted excavation of the more heavily impacted areas with volatile contaminants in soil and *ex situ* bioremediation treatment of soils and replacement above the groundwater table and below the capping layer;
3. Targeted excavation of the more heavily impacted areas with volatile contaminants in soil and *ex situ* immobilisation treatment of soils and replacement above the groundwater table and below the capping layer;
4. Targeted *in situ* immobilisation treatment of soils; and
5. Targeted *in situ* part immobilisation treatment of soils.

With respect to existing soils that may exceed ecological screening criteria and management of exposure pathways to terrestrial ecology for where trees are to be retained (i.e. south-eastern section of the site and along western boundary) and the new landscaping areas within the site, this can be addressed through implementation of site management practices. These being prohibiting the reuse of existing soils in these landscaped areas and supported by the assessment of imported soils for their suitability for use in these areas. Given that the site is to be raised and hence a net import of fill is required, this is considered to be a straightforward management approach and the need for consideration of other alternative options (e.g. disposal of soils off-site) is not warranted.

9.3 Preferred Remediation Approach

In summary the preferred remediation approach is:

- Asbestos contaminated soils – Option A4;
- OCP contaminated soils – Option B3;
- Lead contaminated soils – Option C2; and
- VOC, TRH / TPH contaminated soils (above groundwater table) – Option D4.

For commercial long term risk management of the site, consideration may also be given to placement of soils with elevated OCP concentrations and high lead concentrations in containment cell, and for soils below the groundwater table contaminated with volatile contaminants (e.g. VOC, TRH / TPH) subjected to targeted *in situ* part immobilisation treatment of soils (Option E5).

The reasoning for the preferred remediation approach is as follows:

- With respect to remediation associated with the asbestos contaminated soils the preferred remediation approach is Option A4, given:
 - o The previous detections of asbestos (including above the RAC) and the potential for further asbestos to be encountered during future investigations (if they were undertaken) and earthworks;
 - o The remediation of friable asbestos contaminated soils is not a viable option (i.e. reducing friable asbestos concentrations through removal of friable asbestos in soils to below the RAC);
 - o The preference to maximise building works within clean fill or less impacted soils (e.g. excavations for service trenches) which is mitigated by minimising potential works within the existing fill following bulk earthworks;
 - o The prohibitive costs associated with off-site disposal given the potentially large quantities of asbestos impacted soils and such an approach maximising waste generation which is contrary to the NSW EPA policy of waste minimisation; and
 - o That the site is to be raised to meet design levels, thereby already generating a *quasi* barrier / capping layer across the site.
- With respect to OCP impacted soils the preferred remediation approach is Option B3 given:
 - o Consolidation of the soils in one area will assist with management of these soils during works and in the longer term;
 - o The potential for leaching of the contaminants from the soil matrix in areas currently covered by concrete slabs suggests additional measures than straight capping would be beneficial, such as placement in a low permeable cell;
 - o The costs associated with off-site disposal given the potentially elevated waste classification of the soils and such an approach maximising waste generation which is contrary to the NSW EPA policy of waste minimisation; and

- o Consideration being given to the placement of other OCP impacted soils with elevated concentrations (but below the RAC) in the containment cell for commercial long term risk management of the site. Option B3 allowing this to be incorporated into works if progressed with.
- With respect to remediation associated with the lead contaminated soils the preferred remediation approach is Option C2, given:
 - o The previous detections of lead above the RAC and the potential for further impacted soils to be encountered during future investigations (if they were undertaken) and earthworks;
 - o The preference to maximise building works within clean fill or less impacted soils (e.g. excavations for service trenches) which is mitigated by minimising potential works within the existing fill following bulk earthworks;
 - o The prohibitive costs associated with off-site disposal given the potentially large quantities of lead impacted soils above the RAC and the associated elevated waste classification for a larger portion of the soils. Such an approach would also maximise waste generation which is contrary to the NSW EPA policy of waste minimisation;
 - o That the site is to be raised to meet design levels, thereby already generating a *quasi* barrier / capping layer across the site;
 - o Placement of all soils exceeding the RAC in a containment cell unlikely to be practical given the volume of soils and nature of the proposed development works; and
 - o Consideration being given to the placement of soil with very high lead concentrations (i.e. greater than 15,000 mg/kg as recorded in boreholes 210 and 333) in the containment cell for commercial long term risk management of the site.
- With respect to remediation associated with the VOC and TRH / TPH contaminated soils above the groundwater table the preferred remediation approach is Option D4, given:
 - o *Ex situ* bioremediation is likely to provide a more effective and quicker treatment process than an *in situ* treatment approach;
 - o For Area 5 where majority of these soils will be sourced from:
 - Soils are anticipated to require disturbance as part of the redevelopment works to form final site levels;
 - Previous localised impacts on groundwater (e.g. well 331 in Area 5) and the proximity of the impacted soil to the groundwater table. Hence the potential for leaching of the contaminants from the soil matrix suggests additional measures to reduce contaminant load than relying on a straight capping would likely be beneficial; and
 - Will assist with *in situ* treatment if undertaken, given obstructions encountered in the fill during previous investigation works.
 - o Disturbance of soils in the footprints of AST and UST farms is also anticipated as part of demolition and validation works;
 - o The preference to maximise building works within clean fill or less impacted soils (e.g. excavations for service trenches) which is mitigated by minimising potential works within the existing fill following bulk earthworks;

- o The prohibitive costs associated with off-site disposal given the potentially large quantities of soils and the associated elevated waste classification for a portion of the soils. Such an approach also maximising waste generation which is contrary to the NSW EPA policy of waste minimisation; and
 - o Capping layer to be installed for other remediation requirements (e.g. asbestos and lead contamination mitigation - Options A4 and C2).
- With respect to potential remediation associated with the VOC and TRH / TPH contaminated soils below the groundwater table for commercial long term risk management of the site the preferred remediation approach is Option E5, given:
 - o The soils being at depth and, by definition below the groundwater table, thereby not considered practical for excavation without significant civil works (e.g. excavation stabilisation, dewatering, etc.). Given this and the nature of these works for due diligence commercial purposes, excavation and subsequent treatment or off-site disposal not considered practical or suitable;
 - o The anticipated limited timeframe between accessing an area of impacts post demolition and commencement of construction. Accordingly, project timeframes are unlikely to allow completion of an *in situ* bioremediation approach;
 - o That groundwater remediation will be undertaken and achieve acceptable levels regardless of these works being undertaken. Therefore, detailed and intensive remediation unlikely to be warranted for due diligence commercial purposes; and
 - o A partial immobilisation approach allows for flexibility in approach during works given its aim is not to immobilise or remediate all contamination, but rather immobilise part of the contaminant mass in the more highly impacted areas. In this regard, this flexibility allows for changes in the volume of soils treated with changes informed by the level of impacts in the subject soils and the risk profile ESR wishes to adopt.

Soils placed in the landscaped areas formed as part of the development are to be limited to imported soils which are to be determined to be suitable with respect to terrestrial ecology receptors prior to use in these areas.

10. Adopted Remediation Strategy

The remediation works must be conducted by experienced and appropriately licensed contractors. An experienced environmental consultant is to be engaged to inspect the progress of the works and to undertake assessments, provide ongoing advice and recommendations as required. The success of the remediation works is to be validated by the Environmental Consultant in consultation with other consultants (e.g. Occupational Hygienist, Remediation Contractor, Asbestos Contractor, Civil Engineer, etc.). Where appropriate, alternate materials may be used to those outlined below, but only with the Environmental Consultant's prior approval.

10.1 Pre-Remediation Works – Hazardous Building Materials Survey and Demolition

Prior to demolition of existing buildings / structures and infrastructure (e.g. service pipes, service pits, etc.), referred to collectively as “structure(s)” below, an intrusive / destructive pre-demolition HBM survey is to be conducted.⁸

Under the direction of a suitably qualified and experienced Occupational Hygienist, removal of HBM (e.g. lead paint, asbestos, etc.) from structures is to be undertaken prior to demolition. The Occupational Hygienist is to inspect the structure to confirm suitability of the HBM removal prior to demolition and provide written documentation (including photographs) of this inspection to ESR, the Principal Contractor and Environmental Consultant. Reference for these works is to be made to the intrusive / destructive pre-demolition HBM survey conducted for the subject structure being demolished.

Works are to be undertaken by an appropriately qualified and licenced contractor, with building materials to be disposed of to a receiving site that is suitably licenced to receive the material.

Following the demolition of structures (and pavements where appropriate), visual inspection using 3 m x 3 m cross grid approach (or smaller grid where appropriate) and clearance (including clearance certificate) of the ground surface by the Occupational Hygienist is required to confirm no HBM remain on the surface of the demolished structure's (or pavement's) footprint and curtilages within the demolition work area (including stockpiling areas and haulage route(s)). The works and findings of the inspection are to be provided in written documentation (including photographs) to ESR, the Principal Contractor and Environmental Consultant prior to remedial works commencing in the subject area.

On completion of the demolition works (and prior to remedial works commencing) the structure's (or pavement's) footprint, and demolition works area more generally, are to be inspected by the Environmental Consultant to confirm the absence of ACM (or other HBM) at the surface. Concurrently, assessment of the structure's footprints by the Environmental Consultant for contamination purposes is to be undertaken (also refer to following sub-sections). If signs of contamination concern are identified the inspection may be supplemented with a sampling and laboratory analysis regime at the Environmental Consultant's discretion to address this concern. Note: Should ACM (or other HBM) be observed at the surface by the Environmental Consultant during the site inspection, the need to remove this material is to be assessed by the Environmental Consultant in the context of the level and extent of impact, WHS requirements, the proposed works process for the area, and impacts the remedial works, etc.

Demolition works may be undertaken in a staged approach which will be informed by the final construction approach and associated staging of various works. It is noted that demolition works of the existing structures and pavements (concrete and asphalt) are not considered to form part of the remediation works and hence are referenced herein to assist with understanding how these works interact with the remediation approach.

⁸ DP understands that Allnex has previously undertaken some assessments of building materials and implemented a program of removing asbestos from buildings as part of its site management.

10.2 Remediation of OCP and High Lead Impacted Soils

Remediation of these soils is to comprise the following steps:

- Inspection of the subject area by the Environmental Consultant following demolition works and associated removal on building slabs and pavements.

Concentrations of OCP Above RAC (Required)

- Excavation of significantly contaminated OCP soils above the RAC from around JBS&G sample location BH67 under the direction of the Environmental Consultant. Indicative area in yellow hatching shown on Drawing 8A, Appendix A1. Excavated soils are to be stockpiled on a low permeable surface and covered with plastic. Based on previous results this is anticipated to cover an area of approximately 25 m² and extend to a depth of 0.5-2 m (likely ~ 1 m on average). Initial excavations are to extend to the depth of previously confirmed impacts. Reference should be made to DP (2024), in particular Section 13.1, and JBS&G (2023) to inform depths of impacts recorded in previous boreholes with and adjacent to the indicative excavation area. Excavations are to be extended at the direction of the Environmental Consultant if considered required;
- Validation of the excavation by the Environmental Consultant through validation sampling. Validation samples are to be collected from the excavation footprint as follows:
 - o Base of Excavation: One sample per 25 m² and a minimum of two samples; and
 - o Walls of Excavation: One sample per 5 linear meters and a minimum of one sample per wall. Where excavations have an exposed soil profile greater than 1 m depth, the wall sampling rate is to apply to each additional 1 m (or part thereof).
- Analysis of samples for OCP and comparison of validation results against the RAC (Section 12.2). If validation samples fail, extend the excavation of the relevant area (i.e. wall(s) or base) and repeat validation sampling and analysis approach outlined above until OCP concentrations are below the RAC.

Concentrations of OCP Above ~40 mg/kg (Commercial Consideration – Recommended)

- Excavate soils from other areas with elevated concentrations of OCP above ~40 mg/kg under the direction of the Environmental Consultant. Indicative areas shown in pink hatching on Drawings 8, 8a and 8b, Appendix A1). Excavated soils are to be stockpiled on a low permeable surface and covered with plastic. Initial excavations are to extend to the depth of previously confirmed impacts. Reference should be made to DP (2024), in particular Section 13.1, and JBS&G (2023) to inform depths of impacts recorded in previous boreholes with and adjacent to the indicative excavation area. Where soils are co-contaminated with other contaminants requiring remediation (e.g. soils from borehole 331 co-contaminated with volatile contaminants) these are to be stockpiled separately.

Note: Given impacts in borehole 331 were encountered at depth (i.e. from around 2 m bgl) compared to other locations where impacts appear to be in the upper soil and / or surface soil profile, excavation and stockpiling of OCP impacted soils from around 331 is likely to be more appropriately undertaken as part of the soil remediation works for this area as outlined in Section 10.5.

- Validation of the excavations by the Environmental Consultant through validation sampling. Validation samples are to be collected from each excavation footprint as follows (for each excavation):
 - o Base of Excavation: One sample per 50 m² and a minimum of two samples; and
 - o Walls of Excavation: One sample per 10 linear meters and a minimum of one sample per wall. Where excavations have an exposed soil profile greater than 1.5 m depth, the wall sampling rate is to apply to each additional 1.5 m (or part thereof).
- Analysis of samples for OCP and comparison of validation results against the 40 mg/kg screening threshold for sum of DDD, DDE and DDT screening threshold. If validation samples fail, extend the excavation of the relevant area (i.e. wall(s) or base) and repeat validation sampling until results below 40 mg/kg.

Note: Given these works are for due diligence purposes, if during works it is identified that the volume of excavated spoil generated will potentially be greater than 1,200 m³ (unbulked) consultation with the Remediation Contractor, Principal Contractor and ESR is to occur when this is identified and prior to extending the excavation(s) further.

High Lead Concentrations Above ~15,000 mg/kg (Commercial Consideration – Recommended)

- Under the direction of the Environmental Consultant, excavate soils from Area 6 (in the vicinity of boreholes 210 and 333) where concentrations for lead are above ~15,000 mg/kg, as indicated on Drawing 9, Appendix A1. As an initial excavation, a nominal 5 m x 5 m excavation around boreholes 210 and 333 with target depths between 4-6 m and 1.5-2.5 m respectively is suggested given previous results in these boreholes. Areas and depths are indicative only based on previous results. Excavated soils are to be stockpiled on a low permeable surface and covered with plastic. These soils should be stockpiled separately to the OCP impacted soils until placed in the containment cell.

Based on DP (2024), the results suggest that impacts in borehole 210 were near or below the groundwater table (i.e. from ~4-6 m). To assist with managing excavated material, it is recommended soils are placed in a holding vessel (e.g. skip) or bunded area to allow groundwater that may be inadvertently removed as part of the excavation process to drain from the saturated stockpiled soils and be appropriately captured and managed. The remaining soils then consolidated for stockpiling with other lead impacted soils excavated from above the groundwater table (e.g. from around borehole 333).

Note: As suggested in DP (2024), consideration may be given to undertaking some additional boreholes in Area 6 to better define the target excavation zone prior to commencing excavation works.

- Validation of the excavations by the Environmental Consultant through validation sampling. Validation samples are to be collected from the excavation footprint as follows (for each excavation):
 - o Base of Excavation: One sample per 50 m² and a minimum of two samples; and
 - o Walls of Excavation: One sample per 10 linear meters and a minimum of one sample per wall. Where excavations have an exposed soil profile greater than 1.5 m depth, the wall sampling rate is to apply to each additional 1 m (or part thereof).
- Analysis of samples for lead and comparison of validation results against the 15,000 mg/kg screening threshold. If validation samples fail, extend the excavation of the relevant area (i.e. wall(s) or base) and repeat validation sampling until it achieves target level.

Note: Given these works are for due diligence purposes, if during works it is identified that the volume of excavated spoil generated will potentially be greater than 300 m³ (unbulked) consultation with the Remediation Contractor, Principal Contractor and ESR is to occur when this is identified and prior to extending the excavation further.

For All Stockpiled Materials Outlined Above

- Survey the location (GPS co-ordinates to within 100 mm of its true position) and height (AHD to within 50 mm of its true level) of each excavation to allow a record of the location (vertical and horizontal) to be included in the site validation report. As a minimum, a survey point in the order of every 25 m² and every 5-10 m along the excavation boundary would be considered suitable. Survey locations and results are to be recorded on a site survey drawing;
- Confirmation of the stockpile volumes. DP recommends this is undertaken by a qualified surveyor;
- Review of the stockpile volumes and confirmation of next steps in the remediation approach (e.g. proposed locations where stockpiled soils are to be placed during remediation, location of containment cell, etc.) with relevant parties (e.g. ESR, Principal Contractor, Remediation Contractor, etc.).

Note: DP recommends that given the inherent potential to identify pockets of other materials through the remediation and earthworks, some capacity contingency should be allowed for in planning when reviewing the stockpiled volumes and confirming approach.

Construction of Containment Cell

- Confirm final design, dimensions and location of the containment cell. In this regard the cell is to have sufficient capacity for the stockpiled soils (as confirmed by survey) with some capacity contingency in design recommended.

Design to allow for the base of the cell is to be a minimum 2 m above the groundwater table (i.e. above about RL 7 m AHD). Refer to Section 11 for further information on cell design parameters and construction quality assurance (CQA).

Note: As the development's final design will inform the final location and dimensions (e.g. location and spacing of piles, etc.), location of the containment cell has not been outlined herein. DP recommends, where possible, the cell is located in an area where other impacts are not present (e.g. areas indicated on Drawing 7, Appendix A1, etc.) and towards the northern portion of the site.

- Excavation of the containment cell as per confirmed design. Excavated soils to be stockpiled and inspected by the Environmental Consultant to assess their suitability for potential reuse below the capping layer, or limitations on location of placement below the capping layer if displaying signs of contamination concern.

Note: As part of excavation works, input to be sought from other disciplines and consultants where appropriate (e.g. geotechnical engineer for batters, etc.).

- Inspection of the surface to confirm suitable for installation of the impermeable liner (e.g. free or sharp or angular materials that may impact the integrity of the liner);
- Installation of the liner (and protective geofabric) on the base and walls of the cell;

- Backfilling of the cell with stockpiled material impacted with elevated OCP and high lead concentrations (as per above). When backfilling, soils with lower potential to pierce the liner and impact its integrity (e.g. sands without inclusions of foreign materials and gravel) to be placed closer to the liner, and conversely those with higher potential to be placed away from the liner towards the centre of the cell.

Note: As part of the design / installation process and prior to placement, consideration on the need for soil compaction from a geotechnical perspective (if required) and liner integrity to be considered.

- Installation of liner over top of the cell that ties into the wall liners, thereby generating a continuous containment liner; and
- Placement of a protective layer above the liner and extending a minimum 500 mm past the footprint of the cell. It is recommended that this is a minimum 300 mm thick, comprise a sand matrix and is installed directly after liner completion to assist with its protection. This may either be formed by the capping layer above the marker layer from imported soils, or formed from site won excavated sands placed above the liner but below the marker layer (and the associated imported fill capping layer).

Note: When placing soils in the containment cell or above the liner for a protective layer, soils are to be placed in front of the excavator with tracking in a forward direction, thereby avoiding tracking over the liner.

10.3 AST Farm Validation (Required)

Post demolition of structures and pavements for the main AST farms, as indicated on Drawings 2 and 3, Appendix A1, the following validation works are to be undertaken:

- Inspection of the subject areas by the Environmental Consultant;
- Drilling of boreholes to a nominal depth of 8 m to gain an understanding of impacts at depth. Extend to greater depth if signs of contamination encountered at the base of the borehole. Boreholes to be supplemented with test pits (or additional boreholes if preferred) to a depth of 2 m to check impacts in the upper soil profile. Final borehole and test pit depths and number of pits to be undertaken at the direction of the Environmental Consultant.

As a guide the number of sample locations for the main AST areas are as follows (refer Drawing 2, Appendix A1:

- o Western AST Farm (area ~170 m²) – Two boreholes, five test pits;
- o Central AST Farm (area ~220 m²) – Four boreholes, five test pits;
- o North-Eastern AST Farm (area ~770 m²) - Four boreholes, five test pits; and
- o South-Eastern Nuodex AST Farm (adjacent areas):
 - North (area (~120 m²) - Two boreholes, five test pits; and
 - South (area ~100 m²) - One borehole, three test pits.

The above recommendation is based on a sampling rate of 1 per 25 m². This informed by the *Contamination Assessment of Service Station Sites, Minimum Sampling Requirements 2023* (EPA, 2023) for AST footprints and applied for this project for areas up to 250 m². Given the size of some farms, notably the North-Eastern AST Farm, for larger footprints reference should also be made *NSW EPA Sampling Design Part 1 – Application 2022* (EPA, 2022):

- Collection of soil samples at surface / underside of the concrete slab (i.e. top 0.2 m of the soil profile) then at regular intervals (i.e. 0.2-0.5 m intervals) and upon signs of contamination;
- Screening of all samples for VOC using a PID;
- Laboratory analysis of soil samples selected by the Environmental Consultant for VOC, TRH / TPH and PAH. Consideration should also be given to analysing some samples for other analytes (e.g. metals, OCP, phenols, asbestos, etc.) where appropriate if it assists with informing remediation options or site management processes (e.g. if material is to be subject to *ex situ* bioremediation treatment than asbestos impacts may be helpful to inform stockpile management requirements, etc.); and
- Review of results against the RAC (Section 12.2 in the first instance) and assessment if the soils are suitable to be retained on site without requiring remediation, or if remediation is required (as per approaches outlined in the sub-sections herein).

If upon review of the results it is determined by the Environmental Consultant that remediation of some of the above areas is required, the following process is to be implemented:

- Review of the required remediation measures, and assess if the remediation and validation processes already outlined in this RAP can be applied (e.g. UST, volatile contaminants, etc);
- Outline of proposed remediation / validation process to the relevant parties and obtain agreement from said parties (e.g. ESR, Principal Contractor, Remediation Contractor, Site Auditor, etc.);
- Assuming the agreed process will involve an excavation of impacted soils above the groundwater table as the first step in the remediation process, noting as per above this is to be confirmed, excavate and stockpile impacted material;
- Validation of excavation to confirm removal of material of concern has been achieved. Whilst the validation approach is to be confirmed in the above steps, as a general guide:
 - o Base of Excavation: One per 25 m² and a minimum of three samples;
 - o Wall of Excavation: One sample per 5-10 linear meters and a minimum of one sample per wall. Where excavations have an exposed soil profile greater than 1.5 m depth, the wall sampling rate is to apply to each additional 1.5 m (or part thereof); and
 - o Stockpiles (if required depending on remediation approach being implemented): One sample per 25 m³ and a minimum of three samples per stockpile (refer to Section 15.2). For larger stockpiles, or where stockpiles are already due to be subject to remediation (e.g. for volatile contaminants as per Section 10.5) a reduced sampling frequency may be appropriate.

Note that the actual number of samples may vary depending on the size of the excavation and the degree of contamination and the soil profile encountered. Sampling rate to be determined by the Environmental Consultant with reference to EPA (2022) and EPA (2023).

- Analysis of validation samples for contaminant(s) of concern, as identified by the investigation validation work outlined above that triggered the subject remediation;

- Review of the results against the RAC outlined in Section 12; and
- Repeat the above process extending the excavation (if applicable) and revalidation if initial validation results fail; and
- On completion of the excavation / remedial works, survey the location (GPS co-ordinates to within 100 mm of its true position) and height (AHD to within 50 mm of its true level) of each remediation excavation to allow a record of the location (vertical and horizontal) to be included in the site validation report. As a minimum, a survey point in the order of every 25 m² and every 5-10 m along the excavation boundary would be considered suitable. Survey locations and results are to be recorded on a site survey drawing.

The above validation works, and remedial works (if required), are to be reported in the final validation report. DP recommends that these works are initially reported (e.g. letter report or memorandum) when works are completed so these and associated results and outcomes can be reviewed and agreed by the Site Auditor.

10.4 UST Farm Validation (Required)

Information from previous investigations indicates that there are two main UST farms (Northern UST Farm – 375 m², Central UST Farm – 200 m²) containing 12 USTs between 50,000-55,000 L in size with a further three smaller redundant tanks located near the Northern UST Farm Pump Room building. Locations of these USTs are indicated on Drawings 2 and 3, Appendix A1. Removal of the UST(s) is required as part of the remedial works.

DP notes that on a site like this, given its age and use, encountering additional USTs during works would not be unexpected. Removal and validation of any addition UST(s), if encountered during works, would also be required.

Where an UST(s) is identified the following process is to be implemented:

- All works to be undertaken in accordance with the *Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation 2019* (UPSS Regulation) under the *Protection of the Environment Operations Act 1997* (POEO Act);
- Prior to the removal of the UST, any residual product (liquid / vapour) is to be removed from the tank and disposed of appropriately in accordance with Australian Standard (AS 4976 - 2008 *The Removal and Disposal of Petroleum Underground Storage Tanks*) by an appropriately licenced contractor. Records of disposal are to be provided to ESR and the Environmental Consultant for inclusion in the validation report;
- Removal of the UST and all associated infrastructure (e.g. supply and dispensing lines, vent pipes, etc.) and subsequent appropriate disposal by a qualified contractor in accordance with AS 4976 - 2008. Disposal records are to be provided to ESR and the Environmental Consultant for inclusion in the validation report. During removal the UST is to be examined for potential leaks and general condition by the Remediation Contractor in conjunction with the Environmental Consultant;
- Excavation and stockpiling of impacted materials, including materials backfilled around the tank(s), supply and dispensing lines and pipes for classification. Materials which meet the RAC (excluding asbestos) can be retained on site below the capping layer and above the groundwater table. Where material is identified to exceed the RAC or not considered to be suitable by the Environmental Consultant, these are to be remediated for the contaminant

of concern as outlined in the sub-sections herein, or as directed by the Environmental Consultant if the identified contaminant(s) is different to that identified in this RAP for remediation.

If excavated soils exhibit signs of contamination during excavation (such as hydrocarbon odours or staining) then the soil should be segregated into a separate stockpile(s) from soils that are not (or less) impacted.

- Collection of validation samples from the tank pit and below the associated infrastructure (e.g. pipe / supply and dispensing lines, bowser, fill point) by the Environmental Consultant for laboratory analysis at the following rate:
 - o Base of Tank Pit Excavation: A minimum of two samples (one at each end) and a minimum sampling rate of 1 sample per 25-50 m²;
 - o Side of Tank Pit Excavation:
 - Pit length less than 4 m: A minimum of one sample per wall;
 - Pit length 4-10 m: A minimum of two samples per wall; and
 - Pit length greater than 10 m: A minimum of three samples per wall.

Wall sampling rates per 1.5 m depth interval with additional samples as required to target each observed depth of concern.

- o Pipe / Supply and Dispensing Lines: One sample per five linear metres (minimum one sample) collected from below the pipe / line. This density assumes that there is no 'chase out' excavation (i.e. excavation only comprises removal of pipes and backfill sands);
- o Bowser / Dispensing Point: One sample from the footprint each bowser / dispensing point. Where multiple points are located adjacent to each other (e.g. in the Northern UST Farm Pump Room building) this sampling rate may be reduced at the discretion of the Environmental Consultant where appropriate (e.g. 1 sample per 3 points may be appropriate if no signs of significant concern identified during inspection of the area);
- o Fill Point: One sample from the footprint of each fill point. Where multiple points are located adjacent to each other (e.g. in the Northern UST Farm) this sampling rate may be reduced at the discretion of the Environmental Consultant where appropriate (e.g. 1 sample per 3 points may be appropriate if no signs of significant concern identified during inspection of the area); and
- o Stockpiles: One sample per 25 m³ and a minimum of three samples per stockpile. For larger stockpiles, or where stockpiles are already due to be subject to remediation (e.g. for volatile contaminants as per Section 10.5) a reduced sampling frequency may be appropriate.

Note that the actual number of samples may vary depending on the size of the excavation and the degree of contamination and the soil profile encountered. Sampling rate to be determined by the Environmental Consultant with reference to EPA (2022) and EPA (2023);

- Laboratory analysis of soil samples for VOC, TRH / TPH and PAH. Consideration should also be given to analysing some samples for other analytes (e.g. metals, OCP, phenols, asbestos, etc.) where appropriate if it assists with informing remediation options or site management processes (e.g. if material is to be subject to *ex situ* bioremediation treatment than asbestos impacts may be helpful to inform stockpile management requirements, etc.);

- Review of the validation results with respect to the RAC (Section 12) and hence assessment on the adequacy of the remedial works (or if additional remediation is required) and the suitability of the stockpiled materials to be reused on-site, or whether these materials need to be remediated prior to reuse;
- Survey the location (GPS co-ordinates to within 100 mm of its true position) and height (AHD to within 50 mm of its true level) of each tank pit excavation, and associated infrastructure, to allow a record of the location (vertical and horizontal) to be included in the site validation report. As a minimum, a survey point in the order of every 25 m² and every 5-10 m along the tank pit excavation boundary would be considered suitable. Survey locations and results are to be recorded on a site survey drawing;
- Preparation of a validation letter report the Environmental Consultant with reference to the UPSS Regulation and other relevant guidance; and
- All results (including the letter report) included in the site's final validation report.

Further discussion on the remediation of other soils impacted with volatile contaminants, as outlined in Section 10.5, also applies to similar soils that may be removed as part of the UST remediation and validation works.

Moreover, as recommended in DP (2024), where the odorous ('rotten cheese') soils are encountered and excavated as part of the UST removal and validation works for the Northern UST Farm, consideration should be given to these materials being opportunistically stockpiled and subject to *ex situ* treatment as outlined in Section 10.5. DP notes that 'chase-out' of such odorous soils is not anticipated to be warranted.

10.5 *Ex Situ* Remediation of VOC and TRH /TPH Contaminated Soils from Above the Groundwater Table (Required)

Soils with volatile contaminants to be excavated for *ex situ* treatment are anticipated to be from soils above the groundwater table in Area 5 (Drawing 7, Appendix A1) and other soils that may be encountered during other remedial works (e.g. UST and AST farms remediation and validation) or from other site works encountered during works deemed by the Environmental Consultant to require remediation.

The general process to address the volatile contamination of concern in soil is as follows:

- Confirmation of location(s) where excavated soils are to be stockpiled; and
- Preparation of area(s) where stockpiles are to be located. In this regard, to assist with leachate management / water run-off stockpiles are to be placed on a low permeable pad with infiltration rate of 10⁻⁸ m/s (e.g. plastic, geocomposites, compacted clay pad, sealed concrete, etc.) and within a bunded area. Water is to be directed towards a sump / collection point and collected for application to the stockpile, use on the site or off-site disposal. Prior to off-site disposal, or if consideration is given to reusing on other sections of the site (e.g. as dust suppressant), the water is to be first assessed for its suitability prior to this being undertaken.

- Excavation of impacted soils requiring *ex situ* treatment and stockpile:

Excavations of impacted soils in Area 5 are to occur across the area indicated on Drawing 7, Appendix A1, from approximately 2 – 5 m depth (about 1 m above groundwater). The objective of the excavation is to remove material to depth as far as practical. Once the base of excavation is about 1 m above the groundwater table, consultation with the Remediation Contractor and Geotechnical Consultant is to occur to establish how further material can be removed, in the context of the development works for the area, and what process is to be followed when undertaking such works. It is noted that soils not removed may require *in situ* remediation (see Section 10.10) and hence preference to removal for *ex situ* treatment is to be given preference where feasible given this would be more effective from a remediation perspective.

The upper 2 m of the soil profile (i.e. 0-2 m) has not indicated significant impacts from volatile contaminants. Accordingly, this material is not anticipated to require remediation, and hence subject to inspection and confirmation by the Environmental Consultant, may be segregated and stockpiled separately.

Soils around borehole 331 with elevated OCP concentrations should be excavated first and the excavation validated for OCP (see Section 10.2 for OCP sampling and validation requirements).

During previous investigations, obstructions were encountered in the fill in this area. It is suggested, where feasible and appropriate, that large inclusions are removed from the soil matrix during excavation works. DP notes that this and other geotechnical considerations (e.g. separation of surface soils with high organic material) should be considered and discussed with the Geotechnical Consultant prior to commencing excavation works.

Moreover, reference should also be made to Section 10.8 regarding the chase out of any inground services that may be within and extending past the extent of the final excavation for the impacted soils.

- To assist with site management of stockpiles, consideration could be given to initially stockpiling different types of materials separately, as directed by the Environmental Consultant. Different types of materials and stockpiles may comprise for example:
 - o General soils requiring treatment;
 - o Soils impacted with other non- or semi-volatile chemical co-contaminants (e.g. elevated OCP around borehole 331 in Area 5);
 - o Natural soils if not impacted with asbestos (e.g. not mixed with fill); and
 - o Natural soils that may be ASS.

Note: Once stockpiled, some of these stockpiles may be combined, or segregated with geofabric within an overall larger stockpile that is subject to bioremediation. Consolidation of stockpiles is only to be undertaken following consultation and agreement between the Environmental Consultant and Remediation Contractor (and other parties as relevant).

- Confirmation of the stockpile volumes. DP recommends this is undertaken by a qualified surveyor;
- Soil sampling of the stockpiles at a rate of 1 sample per 150-250 m³ and a minimum of three samples per stockpile. Undertake laboratory analysis for VOC and TRH / TPH. This to provide a baseline of soil contaminant concentrations in the soils to be treated. DP notes that depending on how the excavated soils are managed and stockpiled, *in situ* results from

previous investigations may also be able to be used to inform the baseline. In this circumstance reducing sampling frequency of the stockpiles for the baseline soil data may be appropriate (e.g. if material for each excavation stockpiled separately);

- Stockpiles are to be covered with plastic where appropriate (e.g. to mitigate excessive soil vapour release where monitored concentrations are too high, mitigate uncontrolled release of excessive odours, for dust mitigation during high winds, asbestos mitigation, during rain events, maintenance of moisture levels, etc.);
- Implementation of air quality, odour and dust management and monitoring measures (along with other management measure as appropriate, e.g. asbestos management);
- Inspection of excavation by the Environmental Consultant for signs of gross contamination (e.g. notable odours) on the walls of the excavation, noting that contaminated soils are anticipated to extend below the groundwater table in Area 5. Moreover, at the discretion of the Environmental Consultant consideration is to be given to collecting soil samples from the walls of the excavation, placed in zip lock bags and screened for VOC using a PID (50 ppm screening criteria);
- Sampling of excavation for Area 5 by soil sampling of the excavation at a rate of:
 - o Excavation Base: Samples to be collected with respect to EPA (2022). Based on an area <2,000 m² this would comprise eight sample locations. These samples collected for the purpose of informing soil contamination that remains above the water table, not as a final validation sample; and
 - o Excavation Walls: One sample per 10-15 linear meters and a minimum of one sample per wall. Where excavations are greater than 2 m deep, the wall sampling rate is to apply to each additional 2 m (or part thereof).

Note: If other areas are subject to excavation of soils validation sampling rates for excavations are likely to differ and these are to be confirmed by the Environmental Consultant (e.g. validation sampling for UST and AST farms are indicated in relevant sub-sections above).

- Laboratory analysis of soil validation samples for VOC and TRH / TPH;
- Review of soil results from the wall samples against the RAC for volatile contaminant validation (refer to Section 12). Where validation samples exceed the RAC and are considered to be of concern based on a wholistic review of the data by the Environmental Consultant (see Section 20), extend the excavation and repeat the above process;
- Survey of the location (GPS co-ordinates to within 100 mm of its true position) and height (AHD to within 50 mm of its true level) of each excavation to allow a record of the location (vertical and horizontal) to be included in the site validation report of where the more significant chemical contamination soils have been removed from and the validated excavation. As a minimum, a survey point in the order of every 25 m² and every 5-10 m along the zone boundary would be considered suitable. Survey locations and results are to be recorded on a site survey drawing;
- Review of the stockpile volumes and confirmation of approach (e.g. proposed locations where stockpiled soils are to be placed during and post remediation) with relevant parties (e.g. ESR, Principal Contractor, Remediation Contractor, etc.).

Note: DP recommends that given the inherent potential to identify pockets of other materials through the bulk earthworks, some capacity contingency should be allowed for in planning when reviewing the stockpiled volumes and confirming approach.

- Undertake soil bioremediation of stockpiled soils using biopiles which promote the breakdown of contaminants via biodegradation and by the nature of the process can also on occasion induce physical / air stripping as a by-product of the process. Biopiles comprise covering the stockpiles with plastic with air intake and extraction piping imbedded within the stockpiled material connected to an extraction fan. Given the fan is likely to concentrate the contaminants, the fan is to be connected to a soil vapour extraction unit (including carbon / charcoal drums) incorporating a high efficiency particulate air (HEPA) filter attachment to the extraction outlet (for asbestos or assumed asbestos impacted stockpiles).

Bioremediation additives (e.g. urea, etc.) may be added to promote microbial populations and hence biodegradation, with the nature and benefit of these best assessed by the Remediation Contractor and Environmental Consultant at the time of the works and during the monitoring program on the progress of the remedial works.

Other factors which may also be considered, and monitored where appropriate, during the bioremediation process to inform progress include (but not limited to) temperature, moisture and oxygen levels.

Note: To assist with soil remediation (prior to bioremediation) it may be worth considering placement of the soils through a mechanical treatment machine (or pugmill) to facilitate mechanical aeration and stockpiling of the treated material in small stockpiles. This would comprise placing the soils through a confined soil treatment machine (e.g. Hitachi) with trommel and / or shaker like features with a view to aerating and allowing release of a significant portion of the volatile chemicals from the soil matrix in the machine which is subsequently captured at the exhaust outlet. Soils placed in the machine should generally be dry to maximise potential release of volatiles during treatment and hence covering of stockpiles with plastic prior to treatment is likely to be required to avoid being impacted by rain events. Moreover, as with the biopiles, the air extraction point / fan outlet for the machine is to be connected to a soil vapour extraction unit (including carbon / charcoal drums) incorporating a HEPA filter attachment (for asbestos impacted stockpiles).

When undertaking the above remediation measures, implementation of air quality, odour and dust management and monitoring measures, as mentioned above, is to continue for the duration of these works. In this regard fugitive dust and odours (including volatile contaminants) leaving the confines of the site is to be mitigated and management measures reviewed and updated through the process as appropriate to achieve this objective. As noted in Section 16, this plan (and other plans) is to be developed and implemented prior to commencing works. Section 16 also provides some additional commentary on air quality that could be considered when developing said plan.

- Periodic soil vapour field screening (e.g. PID reading from soil samples and air extraction points, etc.) is suggested to check progress of the treatment and be undertaken by the Environmental Consultant in consultation with the Remediation Contractor. In this regard DP would suggest an appropriate approach may comprise a field screening frequency of 1-2 times a week in the first two weeks and then reducing this to every week for the next month and then fortnightly to monthly thereafter. Consideration should be given to taking some samples for laboratory analysis to calibrate these with the field screening results and hence better inform remediation progress and assist with remediation process refinement (where appropriate). These samples comprising a combination of soil samples and soil vapour samples from the air extraction point (prior to entering the soil vapour extraction unit) and analysing these for VOC and TRH / TPH.

- When screening results are indicating soils have been sufficiently treated to not pose an unacceptable risk to future site users or the environment, soils are to be subject to validation sampling to confirm this as follows:
 - o For the initial 500 m³ to assess consistency in results and effectiveness of the soil treatment process:
 - One soil sample per 100 m³ for laboratory analysis; and
 - Two soil vapour samples from the air extraction point (prior to entering the soil vapour extraction unit) per stockpile being treated that the material is being source from. Each sample for each stockpile collected 3-5 days apart.
 - o For every subsequent 250 m³:
 - One soil sample per 250 m³ for laboratory analysis; and
 - Two soil vapour samples from the air extraction point (prior to entering the soil vapour extraction unit) per stockpile being treated that the material is being source from. Each sample for each stockpile collected 3-5 days apart (if not covered by the initial 500 m³ validation sampling).
- Comparison of the soil and soil vapour results against the against the RAC (refer to Section 12) to assess if soils have been adequately remediated or further remediation is required. The soil results compared against the baseline testing results as per earlier dot point to determine level of decrease. Where RAC secondary targets (Table 5, Section 12.3) are not achieved consultation on how to address the subject soils is to be undertaken between ESR, Principal Contractor, Remediation Contractor, Environmental Consultant and the Site Auditor (e.g. subject to further remediation, placed in certain areas of site such as outside building footprints at depth and away from service trenches, etc.); and
- At the direction of the Environmental Consultant, placement of remediated soils considered suitable by the Environmental Consultant. Considerations for placement to include being a minimum 1.5 m above the groundwater table, and preferably (where possible), located deeper within the soil profile where filling is to occur, outside building footprints and away from the site's southern boundary. When considering these (and / or other) parameters, the risk profile of different stockpiles should be considered, viz. consideration of more parameters would likely be suitable for higher risk soils (e.g. higher residual contamination) and may be less important for soils with low risks (e.g. lower residual contamination).

Other placement considerations, such as geotechnical and civil requirements (e.g. compaction, etc.), are also to be taken into consideration when identifying locations to place materials.
- Survey the location (GPS co-ordinates to within 100 mm of its true position) and height (AHD to within 50 mm of its true level) of where treated soils are placed (as outlined above) to allow a record of the location (vertical and horizontal) to be included in the site validation report. Survey is to include the base and top of the placed treated soils and hence provide base levels for the imported clean materials to be placed above the treated soils. As a minimum, a survey point in the order of every 25 m² and every 5-10 m along the zone boundary would be considered suitable. Survey locations and results are to be recorded on a site survey drawing.

Where placement of these impacted soils does not extend to the underside of the capping layer, the survey is pick up both the levels at the top of the placed treated soils and then subsequently the base of the capping layer (i.e. the marker layer level).

- Placement of a minimum 1 m thick capping layer of clean imported soils above where the subject soils outlined above are placed. This capping layer also required for asbestos and lead management and discussed further in Section 10.6. For areas outside the proposed building footprint and pavements consideration should be given to using a lower permeable imported material to form the capping layer, or part thereof (e.g. use of compacted clay, sandstone, etc.).

As part of the detailed design works, indicative proposed locations of where materials are to be stockpiled (during remediation) and placed post remediation is to be confirmed by relevant parties (e.g. ESR, Principal Contractor, Remediation Contractor, Environmental Consultant, Site Auditor, etc.). DP would suggest the Environmental Consultant give consideration to incorporating the likely, final and updated locations, and associated updated designs, into the remediation works plan (RWP), and any subsequent updates of the RWP.

With respect to the potential presence of asbestos in soils and its associated management through the treatment process, this is to be considered by the relevant parties (e.g. Principal Contractor, Remediation Contractor, Asbestos Contractor, Occupation Hygienist, Environmental Consultant, etc.) when developing the preferred bioremediation approach, with the proposed works controls to be implemented as part of the works to be developed concurrently. This may require variable management and monitoring practices to be adopted based on the nature of the works and nature of the asbestos contamination for the different stockpiles (e.g. if natural soils not impacted with asbestos are stockpiled separately, etc.). The asbestos management requirements are to be incorporated into the site's asbestos management plan (AMP) prior to commencing works.

10.6 Remediation of Asbestos and Lead Contaminated Soils (Required)

The capping approach for addressing the broadscale asbestos and lead contaminated soils (i.e. all fill and non-validated natural soils) is outlined below. The general approach is also indicated on Drawing 10, Appendix A1:

- Undertake works prior to commencing capping as per those outlined in other sub-section herein and for the development more generally (e.g. demolition, remediation, excavation / filling and compaction for bulk earthworks) to achieve bulk earthworks levels for base of capping layer;
- Removal of any asbestos on the surface by the Asbestos Contractor;
- Visual inspection using 3 m x 3 m cross grid approach (or smaller grid where appropriate) by the Occupational Hygienist to confirm the absence of any visible asbestos at the surface. The works and findings of the inspection are to be provided in written documentation (which includes photographs and drawings of the area inspected) to ESR, Principal Contractor, Remediation Contractor and Environmental Consultant;
- Placement of a geotextile marker layer over the existing soils with a minimum 300 mm overlap at the edges with the adjacent geotextile roll. Layer is to cover the footprint of the site extending to the site boundary. Jaybro TerraStop HVL / MastaTEX orange are examples of suitable marker materials (refer to Appendix F);
- Survey the location (GPS co-ordinates to within 100 mm of its true position) and height (AHD to within 50 mm of its true level) of the capped soils / marker layer to allow a record of the location (vertical and horizontal) to be included in the LTEMP for the site and provide base levels for the capping material. As a minimum, a survey point in the order of every 25-50 m²

and every 5-10 m along the zone boundary would be considered suitable. Survey locations and results are to be recorded on a site survey drawing;

- There is to be no movement of machinery across the geotextile layer, so as to minimise the potential for damage to the layer. Furthermore, no existing fill from the site is to be placed above the geotextile layer. Consequently, it may be practical to lay the marker layer progressively moving from one side of the site to the other. This may be undertaken progressively and concurrently with the earthworks to minimise the exposure time period of the asbestos contaminated soils;
- Once the geotextile has been laid, the material is to be weighed down (e.g. with sand bags). If the marker is being laid progressively across the site, a layer of imported clean material which is suitable for use in the cap may be laid to hold to the geotextile layer in place; and
- Undertake second phase of the bulk earthworks comprising placing a minimum 1 m thick layer of imported soils to allow construction of a capping layer. This also to allow installation of inground services within the capping layer and assist with site development works (i.e. minimising the need to disturb soils below the marker layer as part of the build works at a later time). From a contamination perspective, placement of a minimum 0.5 m thick capping layer would generally be sufficient, although the thicker 1 m layer provides greater contingency in the remediation approach and is therefore supported by DP. In this regard, DP notes that the capping layer is likely to be generally around 1.5-2 m thick to allow earthworks design levels to be achieved.

As noted in Section 10.5, for areas outside the proposed building footprint and pavements consideration should be given to using a lower permeable imported material to form the capping layer, or part thereof (e.g. use of compacted clay, sandstone, etc.).

- Survey the location (GPS co-ordinates to within 100 mm of its true position) and height (AHD to within 50 mm of its true level) at approximately the same locations undertaken for the survey post placement of the geotextile. Survey locations and results are to be recorded on a site survey drawing and compared to the initial results to confirm (or otherwise) the cap thickness outlined above has been achieved. The survey data from both surveys is also to be overlayed on a recent aerial image of the site; and
- Construction of building slab, pavements and landscaping.

Note: The suitability of any soils placed would also need to be considered from a geotechnical and landscaping perspective, as appropriate. Therefore, reference is to be made to geotechnical, civil and landscaping requirements for the development (e.g. compaction, etc.).

10.6.1 Landscape Areas – Retained Existing Trees (Required)

For the few areas where existing trees within the site are to be retained, namely the south-eastern corner of the site and along the western boundary adjacent to Stephen Road, the capping approach will need to be augmented for tree health (i.e. placing a 1 m thick cap around the base of the tree's trunk would not be suitable). Given the small area and the benefit to tree health by minimising disturbance of the root zone, this is not considered to compromise the integrity of the overall capping approach.

For capping works around the existing trees to be retained within the tree protection zones (TPZ), the general approach is indicated on Drawing 11, Appendix A1. In summary, the above process outlined for capping of the site would apply for the existing trees with the following amendments and / or requirements:

- Excavation of soils to a depth of 100-150 mm using hand tools within 1 m of the trunk;
- Inspection of the surface by the Environmental Consultant to confirm the absence of signs of gross contamination of concern and observable asbestos;
- Placement of a geotextile marker layer at the surface with the marker layer with a minimum 300 mm overlap between rolls. It is to extend 500 mm past the edge of the TPZ, or further, if necessary, to allow it to be overlapped with the marker layer for the rest of the site. To assist with long term durability and site management placement of a double marker layer of the Jaybro TerraStop HVL / MastaTEX (or a higher grade geofabric) in TPZ area is to be undertaken;
- Survey the location (GPS co-ordinates to within 100 mm of its true position) and height (AHD to within 50 mm of its true level) of the capper soils / marker layer area and boundary of the to allow a record of the location (vertical and horizontal) to be included in the LTEMP for the site and provide base levels for the capping material in the TPZ. As a minimum, a survey point in the order of every 5-10 m² and every 2-5 m along the capping / TPZ edge would generally be considered suitable. Additional survey points would be required for smaller areas. Survey locations and results are to be recorded on a site survey drawing;
- Place a minimum 200 mm thick capping layer comprising natural soils over the marker layer;
- To minimise potential ponding of water at the base of the tree, as can occur when fill is placed in very close proximity to the trunk, fill (natural / topsoil) is not to be placed within 300 mm of the truck and graded up to final level at a grade of 3(H):1(V);
- Soil used in the TPZ is to be free draining;
- Where the minimum 200 mm imported soil layer is placed, 100 mm of a mulch mixture (comprising of woodchip and / or leaf mulch) is also to be placed above to make an overall capping thickness of 300 mm;
- Leaf mulch / woodchip (or similar) to be placed in the 300 mm area around base of trunk, but not mounded against the tree trunk, to cover the marker layer;
- At the interface between mulch (only) areas and adjacent areas where capping is present an identifiable marker (such as a plastic edging, for example a 90 mm x 40 mm Integrated Recycling CON920 plastic edge with a rectangular profile) is to be installed to delineate the two areas and assist with retention of mulch within the designated area; and
- Survey the location (GPS co-ordinates to within 100 mm of its true position) and height (AHD to within 50 mm of its true level) at approximately the same locations undertaken for the survey post placement of the geotextile. Survey locations and results are to be recorded on a site survey drawing and compared to the initial results to confirm (or otherwise) the cap thickness outlined above has been achieved. The survey data from both surveys is also to be overlayed on a recent aerial image of the site.

10.7 General: Management of Existing Site Soils (Required)

Whilst impacts on groundwater have been identified, these are expected to be reduced by the remediation works being undertaken by Allnex and supported by other remedial works (as outlined above) and the proposed development (e.g. placement of clean imported soils to facilitate raising the site and new building and pavements covering the majority of the site's footprint). Associated management of existing soils during works is also likely to further assist. For the latter this would involve, in addition to any requirements outlined herein, as a general principle not placing any existing soils impacted with chemical contaminants within 1.5 m of the groundwater table without further consideration by the Environmental Consultant.

It is noted that where deeper excavations have been generated from the works (e.g. UST tank farms, excavation of volatile contaminated soils for Area 5, etc.) it may be appropriate to backfill the base of these generated excavations using lower risk existing soils such as clean fill and / or natural soils (excluding ASS) sourced from less impacted areas of the site. As per the comments above, this is to be considered by the Environmental Consultant prior to works being undertaken.

Use of existing soils for backfilling of service trenches is not permitted.

10.8 General: Inground Infrastructure - Pits, Sumps, Drains and Services (Required)

Given the age and use of the site it is expected that there will be unidentified pits, sumps, drains and services encountered during the civil works. In this regard pits, sumps, drains and services can act as contamination point sources and / or potential migration pathways, although this tends to be less significant in a sand profile, as is present at the site. Notwithstanding, DP recommends the following general principles and approach be implemented during the works. It should be noted that the given the likely variability in these features (e.g. dimensions, materials, location, previous use, etc.) the assessment / validation approach to be implemented will be variable and hence more appropriately addressed on a case-by-case basis as determined at the discretion of the Environmental Consultant.

Initially, consideration of the risk of the infrastructure (to inform the requirement of assessment) should be undertaken. For example:

- Where is the subject infrastructure located?
 - o Is it located in a lower risk area such as outside those areas where more significant contamination has been identified, as indicated on Drawing 7, Appendix A1;
 - o Is it located in a higher risk area such as within those areas where more significant contamination has been identified, as indicated on Drawing 7, Appendix A1 or near AST / UST farms; and
 - o Is it located in the base or walls where volatile contaminants have been excavated from? If so, the infrastructure is to be excavated and removed. For services and drains these are to be chased out for a minimum of 5 m past the excavation (or until the drain / service stops if shorter distance), with chase out excavations extended further if material of concern is identified.
- Does the subject infrastructure and / or surrounding soils display signs of contamination concern that requires further assessment (e.g. odours, staining, etc.)?;

- What was the infrastructure used for? If comprising higher risk uses, such as the storage of chemicals, then further assessment is more likely to be warranted; and
- How will further assessment inform the remediation process being implemented and the remediation outcomes? For example, if the area is already to be excavated to address contamination (e.g. Area 5, UST farms, etc.) additional assessment may be of limited or negligible value.

When assessing and addressing the infrastructure DP would suggest the following process:

- Environmental Consultant notified of the encountered inground infrastructure;
- Inspection of the subject infrastructure by the Environmental Consultant;
- Determination of the level of assessment by the Environmental Consultant;
- For the relevant considered risk, the following is to be implemented:
 - o Low Risk: Inspection and possibly supplemented with screening of soil samples for VOC using a PID may be sufficient;
 - o Moderate Risk: Inspection, screening of soil samples for VOC using a PID (screening criteria of 25 ppm), excavation to determine extent of impacts (e.g. is it minor and surficial or extending to greater depths). Collection of soil samples for potential laboratory analysis with analysis subsequently undertaken if risk sufficient enough to warrant it, as determined by the Environmental Consultant; and
 - o High Risk: Inspection, screening of soil samples for VOC using a PID (screening criteria of 50 ppm), excavation to determine extent of impacts. Collection of soil samples for laboratory analysis. If excavation and remediation required, sample collection may be undertaken following these works.
- Excavation of material of concern, stockpiling and application of the remedial measures outlined herein (e.g. Section 10.5 for addressing volatile contaminants).

As noted above, for high risk areas any services and drains (i.e. potential migration pathways) are to be chased out for a minimum of 5 m past the edge of the excavation / footprint of the area (or until the drain / service stops if shorter distance), with chase out excavations extended further if material of concern is identified during the chase out works;

- Reinspection of the area by the Environmental Consultant post any required excavation and remedial works;
- Collection of validation samples where required (see notes above) from the footprint of the infrastructure and from associated remediation excavations. The following provides a suggested rate of sampling:
 - o Footprint of Infrastructure: A minimum of one sample per 25 m²;
 - o Base of Excavation: A minimum one sample per 25 m² and a minimum of two samples per excavation;
 - o Wall of Excavation: One sample per 10 linear meters and a minimum of one sample per wall. Where excavations have an exposed soil profile greater than 1.5 m depth, the wall sampling rate is to apply to each additional 1.5 m (or part thereof);
 - o Stockpiles (if required depending on remediation approach being implemented): One sample per 25 m³ and a minimum of three samples per stockpile (refer to Section 15.2). For larger stockpiles, or where stockpiles are already due to be subject to remediation

(e.g. for volatile contaminants as per Section 10.5) a reduced sampling frequency may be appropriate; and

- o Soil samples to be collected at surface / underside of the concrete slab (i.e. top 0-0.2 m of the soil profile) then at regular intervals (i.e. 0.2-0.5 m intervals) and upon signs of contamination if deeper sampling is required (e.g. if contamination of concern at depth is identified to be of concern).

Note that the actual number of samples may vary depending on the size of the infrastructure / excavation and the degree of contamination, the soil profile encountered and the presence of groundwater. Sampling rate to be determined by the Environmental Consultant. Reference should be made to EPA (2022) and EPA (2023).

- Laboratory analysis of the validation samples for the contaminants of concern as determined by the Environmental Consultant; and
- Review of results by the Environmental Consultant. If validation results exceed the RAC (Section 12), assessment on the next steps to be undertaken by the Environmental Consultant. This may comprise for example remediation of the material of concern via excavation, stockpiling and treatment, etc.

Where remedial measures are proposed, these are to be, where appropriate, discussed and agreed with the relevant parties (e.g. ESR, Principal Contractor, Remediation Contractor, Site Auditor, etc.).

Note that where additional remedial works are undertaken revalidation of the subject area, as per the validation process outlined above would be expected to be required.

- Survey the location (GPS co-ordinates to within 100 mm of its true position) and height (AHD to within 50 mm of its true level) of each inground infrastructure assessed and considered to be moderate to high risk by the Environmental Consultant. This to include associated remediation excavations and / or chase outs. Survey to allow a record of the location (vertical and horizontal) to be included in the site validation report. As a minimum, a survey point in the order of every 25 m² and every 5-10 m along the excavation boundary (or drain / service alignment) would be considered suitable. Survey locations and results are to be recorded on a site survey drawing; and
- Reporting of the above works in the final validation works, along with any associated remedial and subsequent validation works (if undertaken).

As part developing the site management plans prior to commencing works, such as the RWP, the process of identification, notification and communication between the Environmental Consultant and the Remediation Contractor is to be established. Where appropriate, this process should be reviewed and updated as works progress to address and improve the process.

If the Environmental Consultant is in any doubt regarding the suitability of the process being implemented in general, or applied for a specific piece of infrastructure encountered, this is to be discussed and the process agreed with the Site Auditor.

The above is not intended to capture other inground inclusions that might also be encountered but not of contamination concern such as footings from current and former structures. Moreover, unless identified to be of a contamination concern, the above process does not propose to chase out and remove inground infrastructure that is not encountered by the civil bulk earthworks.

It is noted that the above comments do not consider other project disciplines that may also require consideration when addressing these inground features (e.g. geotechnical, civil, etc.).

10.9 Building Slabs Sealing (Recommended)

Sealing of ground level building slabs is good practice and is recommended as part of the development works. This is to be applied to all occupiable buildings constructed on grade (i.e. ground floor levels). The concrete slab is to be sealed using polyurethane sealants such as paint-on sealants, mastics, and /or expansion bands (as appropriate) with these applied to the supplier / manufacturer's specifications. Sealants are to be applied to all joints (e.g. movement joint, pour joint) and each service conduit that penetrates the ground floor building slabs. Examples of sealants are provided in Appendix G and whilst examples of the application approach are shown on Drawing 15, Appendix A1.

It is also noted that open service conduits are not permitted, thereby avoiding the generation of an open connection between the sub-surface and the buildings, viz. all conduits are to be connected and sealed.

Whilst not considered required, consideration may be given to application of sealants to services and service pits (i.e. at the interface of the pit conduit entering the pit). If implemented, such an approach is likely to be more beneficial in proximity to soils with residual chemical contamination (e.g. in proximity of Area 3, Drawing 7, Appendix A1, etc.).

10.10 *In Situ* Remediation of VOC and TRH /TPH Contaminated Soils from Below the Groundwater Table (For Commercial Consideration – Recommended)

To reduce contaminant mass in soils at depth (near and) below the groundwater level that are to be retained on site and hence reduce longer term risk profile of the site, ESR may wish to consider a part immobilisation of the remaining contamination in the soil media. A full immobilisation approach is not considered to be warranted given the due diligence nature of the works and the other remedial works that are already to be undertaken. Ultimately the final approach adopted will be informed by the outcomes of other remedial works, the conservatism in approach ESR wish to implement and other development design considerations (e.g. pile type, spacing and depth, geotechnical, location and depth of inground services, etc.). It is noted that these works, if undertaken, are intended to further supplement the groundwater remediation undertaken by Allnex, not to replace or supersede the groundwater remediation requirements that are to be met under the VMP.

As outlined in DP (2024) the areas that *in situ* remediation could look to be applied are Areas 1, 3, 4 and 5 (Drawing 7, Appendix A1). The works seek to target the main zone where contaminants has been observed during investigations, namely the upper section of the groundwater table. As noted in DP (2024) these main impact zones are anticipated to be:

- Areas 1 and 3: ~4.5-8.5 m bgl;
- Area 3: ~4.5-8.5 m bgl;
- Area 4: ~4-7 m bgl; and
- Area 5: ~5-9 m bgl. Note: Top of treatment would commence where base of excavation for *ex situ* treatment in this area ceases (as per Section 10.5).

As mentioned in DP (2024), consideration may be given to undertaking some additional boreholes in the aforementioned areas to better define the preferred target areas and depths for treatment and hence achieve a more optimum outcome.

Determining the size and spacing of bores and stabilisation matrix to be adopted is to be informed by the final approach. A full immobilisation would involve interconnecting boreholes covering the whole area to be treated. For a part immobilisation approach, DP would typically suggest adopting in the order of 25-50% coverage of a target area, although a greater coverage would be expected to commensurately reduce the contaminant mass mobility. An offset borehole approach is preferred as it can assist with the potential halo effect by picking up contaminants in soils / groundwater nearby (outside the direct target zone for the individual bore). The borehole alignment should be perpendicular to groundwater flow. Example approaches of borehole set out for 600 mm and 900 mm diameter boreholes are shown on Drawings 13 and 14, Appendix A1.

Given the availability of similar contaminated soils in Area 5 above the groundwater table, these soils would provide an opportunity to run trial(s) on the effectiveness of the VOC and TRH / TPH immobilisation on the soils to determine the preferred additive mix (e.g. concrete, bentonite, other additive such as Organoclay, etc.). Whilst granular activated carbon can have some benefits when added to a mix, its inclusion in a final mixture may not necessarily be appropriate, especially if an aerobic environment is seeking to be maintained (e.g. in Area 3 where this is the current groundwater approach). As part of the trial process, samples are to be collected and subjected to leachability analysis for VOC and TRH / TPH (e.g. ASLP, using uncontaminated groundwater taken from monitoring wells at the site, etc.). In conjunction with the *ex situ* trial, it is also suggested an *in situ* trial on the drilling process be adopted so this can be optimised prior to broad scale implementation.

The following provides a general approach for these works:

- Remediation Contractor and Environmental Consultant in consultation with relevant parties and project disciplines (e.g. ESR, Principal Contractor, Structural Engineer, Geotechnical Engineer, etc.) to determine final design (bore spacing, size, depths, etc.);
- Survey set-out of boreholes, each marked with an individual identifying number; and
- Drill boreholes as per design. When borehole is within 0.5 m of the top of the target depth, injection / mixing of the stabilising matrix (e.g. grout, bentonite, additive, etc.). This to continue 0.5 m below the depth of the target zone. Volumes of injected matrix versus expected volumes to be monitored to check performance of process.

Note: The drilling process and injection / mixing of the stabilising matrix should be regularly reviewed, particularly in the first few days so the process can be refined and optimised.

- A record of borehole drilling information is to be maintained (e.g. bore identification number, drilling date, bore depth, estimated volume of stabilising matrix added, etc.);
- For any returns brought to the surface, these are to be stockpiled in the bunded areas. Where there is an observable difference in impacts materials should be segregated and stockpiled separately as appropriate (e.g. odorous returns stockpiled together, stockpiles with negligible odours stockpiled together, etc.); and
- Assessment of returns by the Environmental Consultant for their contamination risk. Stockpiles to be assessed for VOC, TRH / TPH and PAH concentrations and sampled at a rate of one sample per 25-50 m³ and a minimum of three samples per stockpile. For larger

stockpiles, or where stockpiles are already assessed to require remediation (e.g. for volatile contaminants as per Section 10.5) a reduced sampling frequency may be appropriate.

Assessment and management of returns also to consider ASS. Reference is to be made to the ASSMP in this regard. It is noted that the stabilising matrix may provide some neutralising capacity for the ASS.

- Appropriate management and placement of returns in suitable areas as per processes outlined above in the preceding sub-sections.

11. Construction Quality Assurance

11.1 Geotextile

For the separation (marker layer) geotextile to address the containment zone for the asbestos and lead contaminated soils, DP considers the use of a coloured geotextile to be preferred such as the Jaybro TerraStop HVL or MastaTEX Orange geotextile. For geotextile used as a protective layer for the high density polyethylene (HDPE) liner, a Geofabrics Bidim A44 non-woven geotextile (or equivalent) is likely to be suitable, subject to confirmation during final design and appropriate management measures implemented during works (e.g. inspections to confirm no sharp or angular materials directly underlying or placed directly onto the liner, installation of the protective sand layer, etc.). Geotextiles shall be 100-percent polyester or polypropylene non-woven and needle-punched materials and are to be mildew and needle free.

It is recommended that delivery of the geotextile to the site not be undertaken until all material specifications and certificates are approved by the Environmental Consultant. It is the responsibility of the relevant contractor (i.e. Principal Contractor, Remediation Contractor, Asbestos Contractor) to ensure that all required documentation and / or certifications for the materials are approved prior to delivery.

All geotextiles shall be unloaded, stored, and installed in accordance with the Manufacturer's Installation Manuals (or equivalent). Upon delivery at the site, the relevant contractor / installer shall complete a surface observation of all rolls for defects and damage. Geotextile shall be suitable and durable for the intended application as satisfactorily demonstrated by similar and prior applications.

The method of installation of the geotextile shall include the following:

- Prior to and during deployment the surface is to be inspected to confirm that the surface material has been removed of objects that will damage the geotextile;
- Panels are placed one at a time with a minimum 300 mm overlap between rolls; and
- The perimeter of each geofabric roll is to be secured in place with weights (e.g. sandbags) prior to placement of the overlying fill. Anchor trenches are not anticipated to be required, but may be implemented where deemed necessary by the relevant contractor or Environmental Consultant.

Defects or faults shall be cut back to be free from imperfections. They shall then be covered with an appropriately shaped patch of the same material to give a minimum 300 mm overlap in all directions which shall then be secured using an acceptable method. An alternate and generally preferred approach is to cover the defected area with a new layer of geofabric, also ensuring a minimum 500 mm overlap in all directions.

CQA is the responsibility of the relevant contractor (e.g. Remediation Contractor, Asbestos Contractor, etc.). The relevant contractor shall provide a record of the rolls imported (including supplier and delivery date) and the location of any repairs to the materials during works to ESR and the Environmental Consultant for inclusion in the validation report.

11.2 Containment Cell Liner

The containment cell design, in addition to being designed to allow for sufficient capacity (and contingency) and the base being a minimum 2 m above the groundwater table, is to be lined with a lower permeable liner. The liner is to have hydraulic permeability of less than 1×10^{-9} m/s and line the base, walls and top of the pit / cell. DP considers a textured 1.5 mm thick welded HDPE liner with protective geofabric (e.g. Bidim A44) to minimise potential for damage would be suitable.

Other liners may also be suitable including geosynthetic clay liner (GCL) and geosynthetic cementitious composite mats (GCCM) and could be considered for use where appropriate.

The Environmental Consultant in consultation with the Remediation Contractor is to develop a final design and associated CQA report for the liner's installation. Alternatively, the Remediation Contractor / Liner Installer may generate a CQA report for the Environmental Consultant's approval. The final design and CQA report is to be provided to the Site Auditor and other relevant parties as appropriate (e.g. ESR, Principal Contractor, etc.) for approval prior to commencing works.

Whilst the CQA report will be informed by the final design and liner selected, for a HDPE liner the CQA should include the following requirements *inter alia*:

- Material data sheets and batch testing;
- Manufacturers' quality control documentation;
- Proposed welding methods (e.g. wedge / fusion welding, extrusion welding, etc.);
- Equipment inspection, testing and calibration (e.g. welding equipment temperature checks);
- Material and weld destructive and non-destructive testing (e.g. thickness measurements, vacuum testing, etc.);
- Inspections (e.g. materials, subgrade, geotechnical for batters, etc.);
- Documentation (e.g. testing records, delivery and roll placement records, daily welding records, etc.); and
- Installation methodology.

The above is not intended to be a comprehensive list but rather an indicative list.

12. Remediation Acceptance Criteria

12.1 Approach to Applying the Remediation Acceptance Criteria

When considering the application of the RAC the following notes are provided to assist:

- For non-volatile or semi-volatile contaminants (i.e. not including VOC and TRH / TPH): Refer to Table 4, Section 12.2;
- For soils being treated for volatile contaminants as per Section 10.5: Refer to Tables 5 and 6, Section 12.3;
- For validation assessment of excavations impacted with volatile contaminants: Refer to Tables 5, Section 12.3;
- For assessment of soils to be used in new landscaped areas formed as part of the development: Refer to both health investigation level (HIL) / health screening level (HSL) and ecological investigation level (EIL) / ecological screening level (ESL) in Table 4, Section 12.2; and
- For assessment of the overarching application of the remediation works: Refer to Table 7, Section 12.4.

Note: For additional information on assessment of imported soils this is included in Section 15.3. Moreover, additional comments on air quality and odours with respect to soil vapour is included in Section 17.

12.2 Soil

For any areas requiring further validation (e.g. unexpected finds), laboratory results are to be compared to the RAC outlined in Table 4 in the first instance.

The RAC in Table 4 is primarily based on NEPC (2013) HIL and HSL for a commercial land use setting. EIL and ESL have also been included to assist with assessing soils to be located in new landscaped areas for the development. In this regard outside of the new landscape areas, EIL / ESL do not need to be considered for the rest of the site. Importantly, it is noted that the EILs presented have used default parameters to generate the criteria, hence analysis of parameters of soils to be used in these landscape area (e.g. pH, CEC, TOC, clay content) may be appropriate to allow a more representative and less conservative criteria to be applied for these contaminants.

In addition, management limits have been included to provide an initial RAC to be considered for TRH / TPH, in particular for medium to longer chain TRH (i.e. $>C_{16}-C_{40}$), noting that soil vapour criteria for $C_6 - C_{10}$ (less BTEX) [F1] and $>C_{10}-C_{16}$ (less Naphthalene) [F2] are at a lower RAC concentration and is anticipated to be applicable for most of the site. Use of management limits only may be appropriate in very limited circumstances based on assessment of the source-pathway-receptor linkage. If the management limit is proposed to be adopted as the primary RAC the approach is to be justified by the Environmental Consultant and approved by the Site Auditor.

It is noted that the RAC outlined in Table 4 is based on the SAC generated as part of DP (2024). Reference should be made to DP (2024) for further information in this regard.

Table 4: Soil Remediation Acceptance Criteria (Use to Confirm Risks) – all in mg/kg

Contaminant		Direct Contact HIL (Management Limit – ML in brackets)	Soil Vapour Intrusion HSL	EIL ⁵ / ESL
Metals	Arsenic	3,000	-	160
	Cadmium	900	-	-
	Chromium (III+VI)	3600	-	320
	Copper	240,000	-	140
	Lead	1,500	-	1,800
	Mercury (inorganic)	730	-	-
	Nickel	6,000	-	40
	Zinc	400,000	-	300
PAH	Benzo(a)pyrene	40 (TEQ) ¹	-	172
	Naphthalene	30 ²	NL	370
	Total PAH	4,000	-	172
TRH / TPH	C6 - C10 (less BTEX) [F1]	111 ² (700 – ML)	370	215
	>C10-C16 (less Naphthalene) [F2]	300 ² (1,000 - ML)	NL	170
	>C16-C34 [F3]	(3,500 – ML)	-	1,700
	>C34-C40 [F4]	(10,000 – ML)	-	3,300
BTEX	Benzene	30 ²	3	75
	Toluene	30 ²	NL	135
	Ethylbenzene	30 ²	NL	165
	Xylenes	30 ²	NL	180
VOC	Various (used as an initial screen for each analyte)	<5 ³	<5 ³	-
Phenol	Pentachlorophenol (used as an initial screen)	660	-	-

Contaminant		Direct Contact HIL (Management Limit – ML in brackets)	Soil Vapour Intrusion HSL	EIL ⁵ / ESL
OCP	Aldrin + Dieldrin	45	-	-
	Chlordane	530	-	-
	DDD+DDE+DDT	3,600	-	640 ⁶
	Endosulfan	2,000	-	-
	Endrin	100	-	-
	Heptachlor	50	-	-
	HCB	80	-	-
	Methoxychlor	2,500	-	-
Total PCB ⁴		7	-	-
PFAS	PFOS and PFHxS	20	-	1 (direct) 0.01 (indirect)
	PFOA	50	-	10 (direct)
Asbestos		- Bonded <0.05 % (w/w) - Friable <0.001% (w/w) - No visual asbestos at final ground surface level (upper 0.1 m)	-	-
Visual		- No odours or stained soil at the final ground surface level (upper 0.1 m).	-	-

Notes:

1 – Sum of carcinogenic PAH.

2 – Screening concentrations amended from NEPC (2013) to take account of site remediation target levels (outlined in Table 5, Section 12.3) previous site investigations results when taking the data set (soil, groundwater, soil vapour) as a whole.

3 – Where results exceed the screening criteria, RAC for the respective individual VOC analyte maybe generated by the Environmental Consultant which supersedes the indicated screening criteria.

4 – non dioxin-like PCBs only.

5 – Default parameters used to generate EIL screening criteria. These being, pH – 5 pH units, cation exchange capacity – 4 meq/100 g, clay content 1%, total organic carbon – 1%.

6 - EIL based on DDT only.

NL – not limiting.

12.3 Soil and Soil Vapour for Volatile Contaminants

For validation of volatile contaminants where soils are subject to *ex situ* remediation (biopiling) and replacement, such as for the works outlined in Section 10.5, validation sampling includes both soil and soil vapour analysis. Reference is to be made to Tables 5 and 6 in lieu of Table 4 for these works.

The soil RAC outlined in Table 5 has been developed based on a general comparison of the previous soil results with respect to groundwater and BTEX leachability (ASLP) results of soil samples reported in the same areas. For instance, in DP (2024) no soil samples with a concentration below 30 mg/kg recorded a TEX concentration in the corresponding ASLP analysis (where undertaken) above 1 mg/L (this being the target concentration for TEX in groundwater outlined in the VMP).

Initial targets outlined in Section 5 are to be met whilst the secondary target should form the objective of the remediation outcomes. As noted in Section 10.5, where the secondary targets are not achieved consultation on how to address the subject soils is to be undertaken between ESR, Principal Contractor, Remediation Contractor, Environmental Consultant and Site Auditor is required (e.g. further validation testing such as leachability testing to further inform the data set, subject soils to further remediation, place soils in certain areas of site such as outside building footprints at depth and away from service trenches, etc.).

Caution should be used where soil concentrations are low and soil vapour results are high given the inherent limitations with potential loss of volatiles in the soil sampling process, or analysis not including the actual impacted soils (e.g. sample may be from soils adjacent to the impacted soils generating the soil vapour). Hence the requirement for applying these soil RAC in conjunction with the soil vapour RAC (Table 6).

With a view to reducing the contaminant mass and associated long term risks, for *ex situ* remediated soils associated with volatile contaminants, post-treatment RAC validation (in addition to the below initial target levels) is to also apply a 50% reduction in the contaminant concentrations in soils. This reduction component not applying where the concentrations in the soils are below the secondary target level.

Table 5: Soil Remediation Acceptance Criteria Validation for Volatile Contaminants (Use to Confirm Risks) – all in mg/kg

Contaminant	Initial Target	Secondary Target
VOC (for each individual analyte)	100	30
C6 – C10 (less BTEX) [F1]	370	111
>C10-C16 (less Naphthalene) [F2]	1,000	300

Note: Only to be applied when undertaken in conjunction with soil vapour validation sampling (see Table 6 for soil vapour RAC).

Table 6 summarises the soil vapour RAC for the main volatile contaminants previously recorded in soil vapour testing as part of DP (2024). Additional monitoring for other volatile contaminants may be required during the works and this is to be assessed (including development of RAC) by the Environmental Consultant in consultation with other relevant parties (e.g. Principal Contractor, Remediation Contractor, Site Auditor, etc.) when required.

Table 6: Soil Vapour Remediation Acceptance Criteria Validation Concentrations for Volatile Contaminants (Use to Confirm Risks) – all in µg/m³

Contaminant	Site Suitability Screening Criteria
TRH / TPH (F1)* [^]	0-1 m depth: 680,000 (NEPC) 1-2 m depth: 2,800,000 (NEPC)
TRH / TPH (F2)* [^]	0-1 m depth: 500,000 (NEPC) 1-2 m depth: 2,400,000 (NEPC)
Benzene*	0-1 m depth: 4,000 (NEPC) 1-2 m depth: 10,000 (NEPC)
Toluene*	0-1 m depth: 4,800,000 (NEPC) 1-2 m depth: 16,000,000 (NEPC)
Ethylbenzene*	0-1 m depth: 1,300,000 (NEPC) 1-2 m depth: 4,600,000 (NEPC)
Xylene (total – m, p and o)*	0-1 m depth: 840,000 (NEPC) 1-2 m depth: 3,200,000 (NEPC)
Naphthalene*	0-1 m depth: 3,000 (NEPC) 1-2 m depth: 15,000 (NEPC)
1,2,4-trimethylbenzene	2,630 (RSL)
1,3,5-trimethylbenzene	2,630 (RSL)
Styrene	43,800 (RSL)
Cyclohexane	263,000 (RSL)
Hexane	30,700 (RSL)
Heptane	17,500 (RSL)
Tetrachloroethene (PCE)	8,000 (NEPC)
1,2-dichloroethene (DCE)	300 (NEPC)
Trichloroethene (TCE)	80 (NEPC)
Vinyl chloride	100 (NEPC)

Notes:

- NEPC (2013) and USEPA RSL used to generate screening criteria. Where appropriate, site specific screening criteria that supersede those outlined above may be generated by the Environmental Consultant in consultation with the Site Auditor, Remediation Contractor and ESR.

- * Depth of soils relative to final surface level. Based on the application of a 1-2 m capping layer across the site comprising imported soils, the relevant depth criteria is likely to generally be greater than 1 m although this is to be confirmed by the Environmental Consultant when applying the relevant screening criteria. In this regard, under some circumstance's application of screening criteria for depths below 2 m may be appropriate. DP recommends that targets for up to 2 m are sought to be achieved through the remediation process in the first instance and hence screening criteria for deeper depths have not been included in this table.

- [^]Where individual contaminants are identified that can be contributed to the F1/F2 TPH result (e.g., detection of elevated 1,2,4-TMB concentration contributing to F1 result) the F1/F2 TPH result, if exceeding the screening criteria, may be able to be set aside by the Environmental Consultant in some circumstances.

It is noted that where there is an exceedance of the RAC the result will need to be considered by the Environmental Consultant in the context of the overall remediation works and site development to determine if the exceedance is of concern and/or if further remediation / management of the subject material / area is required. Further comments on this are included in Section 20.3.

12.4 Overarching Remediation Acceptance Criteria

The overarching RAC to be adopted for the project is for 'no unacceptable risks posed by the relevant media (i.e. soils, groundwater or soil vapour) to human health or the environment'.

The remediation works are to be validated as meeting the RAC by the Environmental Consultant by means of visual inspection, field screening, recovery and analysis of samples and review of any available plans as set out in this report. It is noted that assessment and validation of ASS, including adopted criteria (which was previously outlined in DP (2024), to be addressed separately in the ASSMP.

The following table provides a summary guide of the RAC.

Table 7: Summary of Overarching Remediation Acceptance Criteria

Item	Remediation Acceptance Criteria
Soils (general)	Tier 1 RAC as informed by SAC in DP (2024) and as per Table 4 above. No aesthetic impacts for surficial soils, e.g. odours, staining or gross anthropogenic materials. EIL / ESL outlined in Table 4 above to also apply to new landscaped areas formed as part of the development.
Removal and validation of potential contaminating infrastructure	Removal and validation of AST and UST farms (and other inground infrastructure of contamination concern if identified during works) as per Section 10. Treatment of impacted soils if required (associated with following row).
Soils impacted with volatile contaminants	Treatment of impacted soils as per Section 10. Assessment with reference to Tables 5 and 6 above. Placement of <i>ex situ</i> treated soils (post- treatment) below the capping layer and above the groundwater table.
OCP and high lead impacted soils	Consolidation and placement in containment cell, as per Sections 10 and 11. Tier 1 RAC as informed by SAC in DP (2024) and as per Table 4 above for validation of excavation for soils with high OCP (above the RAC). Adopted screening threshold for elevated OCP (~40 mg/kg) and high lead (~15,000 mg/kg) if works for these also undertaken for commercial long term management purposes.
Asbestos and lead contaminated soils	Placement of marker layer across the site with minimum capping thickness and suitable materials used in cap as per Section 10.
Imported Soils	Tier 1 RAC as informed by SAC in DP (2024) and Table 8, Section 15.3. Testing / inspection as per relevant resource recovery order(s) (RRO) / exemption(s) (RRE).

Item	Remediation Acceptance Criteria
	All non VENM / quarried materials to include testing for asbestos (AF / FA) in addition to RRO / RRE requirements (refer Section 15.3 for further detail).

Note: Overarching RAC outlined does not address separate remediation works being completed by Allnex under the VMP.

13. Regulatory Requirements

All works must be conducted in accordance with the development consent conditions.

All works must also be undertaken in accordance with the relevant regulatory criteria, including *inter alia*:

- NSW Work Health and Safety Act 2011 (WHS Act);
- NSW Work Health and Safety Regulation 2017 (WHS Regulation);
- NSW Environment Protection Legislation Amendment (Stronger Regulation and Penalties) Act 2024;
- NSW Contaminated Land Management Act 1997 (CLM Act);
- NSW Protection of the Environment Operations Act 1997 (POEO Act);
- NSW Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation 2019 (UPSS Regulation);
- National Environment Protection Council, *National Environment Protection Measures 1999 (amended 2013)* (NEPC, 2013); and
- WA Department of Health (DoH), *Guidelines for the Assessment, Remediation and Management of Asbestos Contaminated Sites in Western Australia* (WA DoH, 2021).

Reference to relevant Codes of Practice, Australian Standards and industry standards should also be made in determining appropriate safe work practices. These include, *inter alia*:

- SafeWork NSW: *Code of Practice How to Manage and Control Asbestos in the Workplace*, December 2022;
- SafeWork NSW: *Code of Practice How to Safely Remove Asbestos*, December 2022;
- NOHSC *Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres 2nd Edition* [NOHSC:3003 (2005)];
- NOHSC *Guidance Note on the Interpretation of Exposure Standards for Atmospheric Contaminants in the Occupational Environment 3rd Edition* [NOHSC:3008 (1995)] 3rd edition;
- AS/NZS 1715:2009 *Selection, Use and Maintenance of Respiratory Protective Devices*;
- AS/NZS 1716:2012 *Respiratory Protective Devices*;
- AS 4976 - 2008 *The Removal and Disposal of Petroleum Underground Storage Tanks*; and
- WorkCover NSW (now SafeWork NSW) *Managing Asbestos in or on Soil*, March 2014.

14. Roles and Responsibilities

14.1 Principal

ESR, the site owner retains the overall responsibility for ensuring that this RAP is appropriately implemented. ESR is to nominate a representative (the Principal's Representative (PR)), who is responsible for overseeing the implementation of this RAP. The actual implementation of the RAP may be conducted by the Principal Contractor on behalf of ESR.

ESR is also responsible for liaising with Allnex on the progress of the VMP, and obtaining appropriate documentation confirming completion of the groundwater remediation and VMP and the surrender of Allnex's EPL.

14.2 Principal Contractor

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

In addition to the implementation of the RAP it will be the Principal Contractor's responsibility *inter alia*:

- To obtain specific related approvals as necessary to implement the works, including for example, permits for removal of asbestos, SafeWork NSW notification, NSW EPA consents, etc.;
- To develop or request and review plans to manage site works;
- That all site works, and other related activities are undertaken in accordance with the RAP;
- To maintain all site records related to the implementation of the RAP;
- That sufficient information has been provided to engage or direct all required parties, including sub-contractors, to implement the requirements of the RAP other than those that are the direct responsibility of the Principal Contractor;
- To manage the implementation of recommendations made by those parties in relation to work undertaken in accordance with the RAP;
- To inform, if appropriate, the relevant regulatory authorities, of any non-conformances with the procedures and requirements of the RAP in accordance with the procedures outlined in this document;
- To retain records of any contingency or unexpected and additional finds protocol (UAFP) actions;
- On completion of the project, to review the RAP records for completeness and update as necessary; and
- To recommend any modification to general documentation which would further improve the environmental outcomes of this RAP.

14.3 Remediation Contractor

The Remediation Contractor is foreseen to be the party responsible for the general remediation works (not associated with the asbestos works). This would include the remediation of the UST and AST farms (where required), soil remediation and treatment works, the containment cell construction and the capping works. It is noted that the Remediation Contractor may appoint appropriately qualified sub-contractors or sub-consultants to assist in fulfilling the requirements of the remediation works.

In addition to the implementation of the RAP it will be the Remediation Contractor's responsibility *inter alia*:

- To obtain specific related approvals as necessary to implement the works that are the direct responsibility of the Remediation Contractor;
- To ensure WHS site monitoring and mitigation practices are being undertaken as required by the Occupation Hygienist (and Environmental Consultant where appropriate), e.g. site's odour and soil vapour management;
- To develop the RWP in consultation with the Environmental Consultant and Principal Contractor (and other relevant parties as necessary);
- To develop final containment cell design and CQA in consultation with Environmental Consultant and Liner Installer (and other relevant parties as necessary);
- That all site works, and other related activities are undertaken in accordance with this RAP;
- To maintain all site records related to the implementation of remedial works as outlined herein;
- To develop or request and review plans to manage remediation works;
- To undertake testing of imported materials (e.g. soils, aggregates, etc.);
- To keep records of materials being imported and removed from site;
- To keep records, testing results and surveys for placed cap;
- To keep records of soil treatment works including excavations, *ex situ* treatment (and *in situ* treatment if undertaken) testing and placement;
- To keep construction records and surveys of the containment cell;
- To keep records, testing results and surveys for validated UST and AST farms;
- To keep records, testing results and surveys for any soils treated for ASS (if applicable);
- To undertake surveys and provide these to the Principal Contractor;
- Review and approve all CQA documentation (e.g. geotextile records, liner, welding reports, testing reports, etc.) prior to providing to the Principal Contractor and Environmental Consultant;
- Providing documentation to the Principal Contractor and Environmental Consultant for review and approval (e.g., products specifications, CQA, etc.);
- That sufficient information has been provided to engage or direct all required parties, including sub-contractors, to implement the requirements of the remedial works required under the RAP that are the direct responsibility of the Remediation Contractor;

- To inform the Principal Contractor of any non-conformances with the procedures and requirements of the RAP;
- To retain records of any contingency and UAFP actions;
- On completion of the remedial works, to review the RAP records for completeness and update as necessary that are the responsibility of the Remediation Contractor; and
- To recommend any modification to general documentation which would further improve the environmental outcomes of this RAP.

The Remediation Contractor may be the same entity as the Principal and /or the Asbestos Contractor.

14.4 **Asbestos Contractor**

The Asbestos Contractor is responsible for undertaking all asbestos works involving any asbestos impacted soils and building materials for the removal of asbestos (issued by SafeWork NSW). Given friable asbestos has been encountered in some soils, the Asbestos Contractor is to hold a minimum of Class A licence from SafeWork NSW.

The Asbestos Contractor can be the same as the Principal Contractor and / or Remediation Contractor.

14.5 **Sub-Contractors**

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

14.6 **Environmental Consultant**

The Environmental Consultant is to provide advice on implementing this RAP.

The Environmental Consultant will be responsible for *inter alia*:

- Developing the RWP in consultation with the Remediation Contractor and Principal Contractor (and other relevant parties as necessary);
- Developing the final containment cell design and CQA in consultation with Remediation Contractor and Liner Installer (and other relevant parties as necessary);
- Developing and / or reviewing the CQA plan for the containment cell liner;
- Developing the ASSMP in consultation with the Remediation Contractor and Principal Contractor (and other relevant parties as necessary);
- Reviewing final results and outcomes of the VMP provided by Allnex / ESR in the context of this RAP and the site's development;
- Undertaking any required assessments where applicable (e.g. waste classification, validation sampling, assessments of soil treatment, ASS assessments and validation, etc.);

- Undertaking inspections as part of the validation process;
- Providing advice and recommendations arising from inspections;
- Undertaking any post works monitoring of the remediation measures (if required);
- Reviewing documentation and results provided by the relevant contractor (e.g. information on material import, surveys, proposed materials to be imported, pipework installation, etc.);
- Notifying their client with the results of any assessments and any observed non-conformances in a timely manner;
- Preparation of a final validation report confirming (if appropriate) the suitability of the site of the site post completion of the development works; and
- Preparation of the LTEMP.

14.7 Occupational Hygienist

The Occupational Hygienist is to provide advice on WHS issues related to soil contamination (e.g. asbestos), soil vapour and odour release related works. The Occupational Hygienist is to hold a SafeWork NSW Asbestos Assessor Licence, in accordance with the WHS Regulations.

The Occupational Hygienist will be responsible for *inter alia*:

- Developing the AMP and air quality and odour management / monitoring plan (AQOMP) and where appropriate any WHS plans and advice requested by the aforementioned contractor(s);
- Undertaking airborne asbestos monitoring;
- Undertaking air quality and other monitoring of the works area and works / site boundary to assess suitability of implemented practices with respect to the release of volatile contaminants;
- Undertaking clearance inspections;
- Asbestos sampling for WHS purposes;
- Providing advice and recommendations arising from monitoring and / or inspections; and
- Notifying their client with the results of any assessments and any observed non-conformances in a timely manner.

The Environmental Consultant and Occupational Hygienist can be the same entity.

14.8 Site Workers

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

- Being inducted on site and advised of the general nature of the remediation / environmental issues at the site;
- Being aware of the requirements of this plan;
- Wearing appropriate personal protective equipment (PPE);
- Only entering restricted areas when permitted; and

- Requesting clarification when unclear of requirements of this or any other plans (e.g., safety work method statement (SWMS)).

15. General Site Management of Soils

This section provides general information which is to be considered during the remedial works associate with the site soils.

15.1 Stockpiling of Contaminated Soils

Temporary stockpiles formed during works are to be managed to minimise the risk of dust generation and erosion, and release of volatile contaminants at elevated concentrations which may pose a risk to on-site and / or off-site users. The measures required to achieve this should include:

- Restrict the height of stockpiles to reduce dust generation to less than 4 m. It is noted that reduced heights may be required for other considerations (e.g. soil remediation and biopiling, etc.);
- Construct erosion and sediment control measures (such as outlined in the 'blue book');
- Implement odour suppressants around stockpiled / work areas and / or at site boundaries;
- Cover stockpiles of contaminated soils at the end of each day or when not in use with plastic (geotextile may be suitable in some circumstances); and
- Keep temporary stockpiles moist, by using water spray where required.

Imported materials are to be placed as separate stockpiles and demarcated to maintain clear and distinct segregation between these and other stockpiles (e.g. soil treatment stockpiles, asbestos / lead / asbestos contaminated stockpiles, ASS stockpiles, etc.). This segregation would also apply to excavated (and validated) natural soils (if generated although considered unlikely).

15.2 Waste Disposal

All off-site disposal of soils is to be undertaken in accordance with the POEO Act and the NSW EPA *Waste Classification Guidelines*, 2014 (EPA, 2014). It is noted that given the detection of ASS at the site this includes Part 4 of the guidelines. Copies of all necessary approvals from the receiving site shall be given to the PR, and approval sought from the PR, prior to any contaminated material being removed from the site.

The sampling rate for waste classification of stockpiled soils is (note that actual frequency is to be determined by the Environmental Consultant based on volume, previous results, contamination risk, homogeneity of the material and objective of the assessment):

- Stockpiles $\leq 250 \text{ m}^3$: One sample per 25 m^3 and a minimum of three samples; and
- Stockpiles $> 250 \text{ m}^3$: One sample per $100\text{-}250 \text{ m}^3$ and a minimum of 10 samples.

For all ASS (confirmed or potential), ASS sampling and analysis to be implemented as per the ASSMP.

If contaminated soils are stockpiled in clean or previously validated area, the footprint of the stockpile is to be validated for the contaminants of concern following removal of the contaminated soils. A minimum of three samples per stockpile footprints up to 200 m². Additional samples for larger areas are required as is to be determined by the Environmental Consultant with reference to EPA (2022).

During excavation or stockpiling, but prior to loading out, where appropriate the waste material is to be periodically inspected (and sampled if required) by the Environmental Consultant to confirm the waste classification of the material.

No spoil is to leave the site without a formal waste classification report. Transport of spoil shall be via a clearly delineated, pre-defined haul route. Copies of all consignment notes for the transport, receipt and disposal of all materials are to be maintained as part of the site log and made available to the Environmental Consultant for inspection and reporting purposes upon request. All relevant analysis results, as part of waste classification reports, shall be made available to the relevant contractor(s) and proposed receiving waste facility to enable selection of a suitable disposal facility

Any asbestos waste / asbestos impacted soil transported in NSW weighing more than 100 kg or consisting of more than 10 m² of asbestos sheeting in one load is required to be recorded utilising the NSW EPA asbestos tracking tool. Additionally, it is noted that given the detection of elevated chemical concentrations at the site other orders, approvals and management requirements may apply. For instance, soils with DDD, DDE and / or DDT exceeding 2 mg/kg would trigger applying the NSW EPA '*Environmentally Hazardous Chemicals Act 1985, Chemical Control Order in Relation to Scheduled Chemical Wastes*' dated 11 June 2004.

15.3 Importation of Soil

Any soils (including topsoil, garden soils, mulch and aggregate) imported are to be classified as VENM, or must be compliant with an appropriate RRO (and associated RRE). All imported material classifications are to be supported by the relevant chemical and physical testing results and at a minimum include analysis for heavy metals, TRH, BTEX, PAH, PCB⁹ and asbestos. In this regard, materials imported under an RRO are, in addition to the preceding, also to be compliant with the relevant resource recovery criteria (RRC). Moreover, for mulch material, testing is to also include phenols and foreign materials (10 L bulk sample spread on contrasting surface to identify inclusions).

Furthermore, results are also to be compared against the import assessment criteria (IAC) outlined below in Table 8. Note, where there is a difference between the IAC and the RRC, the more conservative criteria is to be adopted.

VENM is to be sampled for each source site at a minimum rate of three samples for the first 1,000 m³ and then one sample per 1,000 m³ thereafter. If more than 8,000 m³ of VENM is sourced from one site and the initial validation check sampling and inspections are indicating a consistency in the material and low contamination risk, consideration may be given to reducing

⁹ Minimum PCB analysis requirement not necessarily applicable to VENM.

the subsequent sampling frequency at the discretion of the Environmental Consultant and with the approval of the Site Auditor.

VENM (and excavated natural material) reports should include information on the source site's location, history and the potential for contamination (e.g. review of aerial photographs, previous contamination reports and EPA online database), a list of contaminants of potential concern¹⁰, reasoning for the sampling and analysis approach undertaken, description and photographs of the material assessed (and associated drawing where required) and a determination of the soil's classification.

Table 8 below, also provides screening criteria for imported VENM that is to be adopted.

For other materials imported under an RRO / RRE, sampling is to meet the minimum requirements of the RRO / RRE. It is noted that based on the sampling frequency, results and other supporting documentation provided additional sampling at the source site, or check sampling of the subject material on delivery at the site may be appropriate. This is to be confirmed by the Environmental Consultant when reviewing the information provided and inspection of the material.

Whilst the EIL / ESL outlined in Table 8 would only be applicable for the soils to be used in landscaped areas, DP would recommend that this is applied as a general criteria for all imported soils to assist with managing and placing soils once imported (i.e. removing any restrictions on where imported soils may be used). Importantly, it is noted that the EIL presented have used default parameters to generate the criteria, hence analysis of parameters of soils to be used in these landscape area (e.g. pH, CEC, TOC, clay content) may be appropriate to allow a more representative and less conservative criteria to be applied for these contaminants.

Prior to importation appropriate documentation confirming the classification of the material is to be provided to, and approved by, the Environmental Consultant. If necessary, the material is to be inspected at the source site (and sampled if required) to confirm the classification given and that there are no signs of contamination.

The material must be inspected during importation by the Principal Contractor and Remediation Contractor (as appropriate), and any materials not meeting the description given in the provided documentation or displaying signs of contamination are to be rejected. The Environmental Consultant is to conduct periodic inspections during and / or following importation to check the same. Additional testing of the imported material may be required, as recommended by the Environmental Consultant, commensurate with the documentation and the material type / classification.

DP notes that generally materials imported under a RRO present a higher contamination risk, hence, extra caution should be used if proposing to use a recycled product.

¹⁰Contaminants of potential concern to be addressed by the supporting testing / analysis information.

In summary any soil, aggregate, landscaping materials (e.g. mulch, turf underlay, planting blends, etc.) imported for the remediation works and / or until the site is signed-off by the Environmental Consultant and Site Auditor must have contaminant concentrations that meet the relevant criteria. DP recommends even following sign-off, if this occurs prior to the completion of all import, that the above check process is still implemented.

Table 8: Import Assessment Criteria – all in mg/kg

Contaminant		Direct Contact and Soil Vapour Intrusion	EIL ⁶ / ESL	VENM - ANZECC 1992 / LRL
Metals	Arsenic	3,000	160	0.2-30
	Cadmium	900	-	0.04-2
	Chromium (III+VI)	3600	320	0.5-110
	Copper	240,000	140	1-190
	Lead	1,500	1,800	2-200
	Mercury (inorganic)	730	-	0.001-0.1
	Nickel	6,000	40	2-400
	Zinc	400,000	300	2-180
PAH	Benzo(a)pyrene	40 (TEQ) ¹	172	-
	Naphthalene	5 ²	370	-
	Total PAH	4,000	172	0.95-5
TRH/ TPH	C6 - C10 (less BTEX) [F1]	111 ³	215	<25 (LRL)
	>C10-C16 (less Naphthalene) [F2]	300 ³	170	<50 (LRL)
	>C16-C34 [F3]	3,500 ⁴	1,700	<100 (LRL)
	>C34-C40 [F4]	10,000 ⁴	3,300	<100 (LRL)
BTEX	Benzene	3	75	0.05-1
	Toluene	5 ²	135	0.1-1
	Ethylbenzene	5 ²	165	<1 (LRL)
	Xylenes	5 ²	180	<1 (LRL)
VOC	Various (used as an initial screen for each analyte)	<5 ²	-	<1 (LRL)
Phenol	Pentachlorophenol (used as an initial screen)	660	-	0.03-0.5 / LRL

Contaminant		Direct Contact and Soil Vapour Intrusion	EIL ⁶ / ESL	VENM - ANZECC 1992 / LRL
OCP	Aldrin + Dieldrin	45	-	<0.2 (LRL)
	Chlordane	530	-	<0.1 (LRL)
	DDT+DDE+DDD	3,600	640 ⁷	<0.1 (LRL)
	Endosulfan	2,000	-	<0.1 (LRL)
	Endrin	100	-	<0.1 (LRL)
	Heptachlor	50	-	<0.1 (LRL)
	HCB	80	-	<0.1 (LRL)
	Methoxychlor	2,500	-	<0.1 (LRL)
Total PCB ⁵		7	-	<5 (LRL)
PFAS	PFOS and PFHxS	20	1 (direct) 0.01 (indirect)	
	PFOA	50	10	
Asbestos		- Bonded <0.05 % (w/w) - Friable <0.001% (w/w) - No asbestos detected or observed.	-	- No asbestos detected or observed.
Visual		- No odours or stained soil at the final ground surface level (upper 0.1 m).	-	- Free of odours, unnatural staining and cross contamination with other soils/materials.

Notes:

1 - Sum of carcinogenic PAH.

2 - Initial screening concentration for VOC (including naphthalene) adopted. Where appropriate updated criteria may be generated for individual VOC analytes and applied by the Environmental Consultant following approval provided by the Site Auditor.

3 - Screening concentrations amended from NEPC (2013) to take account of site remediation target levels (outlined in Table 5).

4 - Based on management limit from NEPC (2013) used as a screening criteria.

5 - non dioxin-like PCBs only.

6 - Default parameters used to generate EIL screening criteria. These being, pH – 5 pH units, cation exchange capacity – 4 meq/100 g, clay content 1%, total organic carbon – 1%.

7 - EIL based on DDT only.

For the purpose of providing screening criteria to compare laboratory results against for assessing VENM, the published background concentrations in ANZECC/NHMRC (1992) *Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites, Environmental Soil Quality Guidelines Background A* [ANZECC A] have been adopted in Table 8. In the case of organics, where no reference values exist the LRL has been adopted as the screening level. The direct contact and soil vapour screening criteria is based on the RAC outlined in Table 4, Section 12.2.

16. Sample Collection and Analysis Requirements

16.1 Field Methods

Soil Sampling

When required, the following general methodology is to be implemented for all soil sampling:

- Preparing records of samples, including sample date, location, description, signs of concern, and any field results;
- Sampling from surface or from the utilised plant using disposable sampling equipment (where appropriate) and where required hand tools;
- Decontaminating all re-useable sampling equipment prior to collecting each sample using a solution of phosphate free detergent (e.g. Liquinox) and distilled water;
- Transferring samples into a sealable plastic bag. For asbestos analysis, placement in a second plastic bag / sealed container, such as an esky (i.e. double bagging);
- Transferring samples into laboratory-prepared glass jars with Teflon-lined lid and plastic containers (for PFAS samples) and capping immediately (for chemical analytes);
- Labelling sample containers with individual and unique identification, including project number and sample number;
- Placing samples for chemical analysis into a cooled, insulated and sealed container for transport to the laboratory (cooling not required for asbestos samples); and
- Using 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.

Soil Vapour Sampling

Soil vapour sampling is anticipated to be primarily associated with sampling from the air extraction points associated with the biopiling works. Notwithstanding, the following general approach could also be adopted for *in situ* testing (e.g. soil vapour ports) if required.

The following general soil vapour sampling is to be implemented:

- Connect the sample tubing directly to the air extraction soil vapour sampling point;
- Collect the soil vapour sample with a Summa canister and / or sample on carbon tubes. The Summa canisters to be attached directly to the sample point with disposable tubing;
- Collect the carbon tube sample using an air sampling pump, with the flow rate monitored using a rotameter and vacuum gauge;

- Perform a shut in test (minimum 30 seconds) following assembly of the sampling apparatus at each location comprising:
 - o Summa canister: Assembling the sample apparatus to the extent practical (i.e. connecting the Summa canister to the regulator), then opening the canister valve to apply the vacuum (of between -28 Hg" to -30 mm Hg") to the sampling train whilst the regulator is still capped; and / or
 - o Carbon tube: Assembling the sample train (fittings to attach to vapour pint / port, carbon tube, vacuum gauge, rotameter and pump plus the associated tubing connecting the sample train) then clamping the sampling tube between the vapour port and carbon tube, activating the pump until a vacuum of -15 Hg" is achieved and then clamping the sampling train at the pump.
- If feasible (dependent on system set-up) cover the soil vapour sampling point with a sampling shroud and introduce IPA into the sampling shroud to act as a tracer gas for leaks in the soil vapour port or the sampling train;
- If applicable, take PID readings from the soil vapour sampling point prior to and following application of the IPA tracer gas. PID reading were also taken inside the shroud to provide a field indication of potential leaks;
- Collect samples directly from the soil vapour sampling point:
 - o Into 1 L Summa canisters with a flow regulator set by the analytical laboratory (approximately 100 ml/min). The regulators to be supplied by the analytical laboratory and decontaminated by the laboratory prior to shipment; and / or
 - o Onto carbon tubes using an SKC constant flow air-sampling pump, low flow adapter and rotameter to confirm the flow rate.
- Collect a replicate Summa Canister sample for intra-laboratory QC analysis;
- If applicable, collect a daily shroud sample on a carbon tube to conduct analysis for IPA and determine the concentration of the tracer compound in the shroud;
- Collect samples from the sampling points directly into the canister / onto the carbon tube so as not to pass through the pump, rotameter or tubing which has the potential to contaminate the samples (rotameter not required for canisters); and
- Labelling of the sample canisters and tubes and use of chain of custody documentation. Completed field sampling sheets and samples were transported to the laboratory in appropriately sealed containers.

16.2 Laboratory Analysis

Laboratory analysis of validation samples is to be undertaken by laboratories with NATA accreditation for the analyte being tested and with appropriate quality assurance / quality control (QA / QC) assessment. It is noted that AF / FA as per NEPC (2013) is not a NATA accredited laboratory tests and hence is exempt from this requirement along with field screening testing.

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

Samples are to be analysed for the contaminants of concern identified for the sampling purpose. These contaminants are to be identified by the Environmental Consultant based on available laboratory results from previous testing, field observations and the objective of the analysis (e.g. samples from imported soils analysed as per Section 15.3).

In circumstances where a mobile gas chromatograph is utilised to analyse soil vapour samples on site, this testing does not need to be NATA accredited. However, results are still to be subject to 10% replicate sample analysis a NATA accredited laboratory as a check on the testing in the field.

17. Environmental Management During Remediation

Appropriate plans (e.g. construction environment management plan, AMP, AQOMP, RWP, ASSMP, etc.) are to be developed by the Principal Contractor (with the assistance of relevant sub-contractors and consultants where required) prior to commencing works to address the general site environmental management requirements. In this regard, the remediation and construction works shall be undertaken with all due regard to the minimisation of environmental effects and to meet all statutory requirements. The development and implementation of these work plans are to take into account the works outlined in this RAP.

It is noted that the CEMP (and other site and environmental management plans as appropriate) are to include, but not limited to, the following:

- The remediation schedule;
- Hours of site operations;
- Contingency plans to respond to site incidents (also see Section 19);
- Licence and approvals required for the remedial works;
- Site / project contact information of appropriate personnel and other relevant parties (e.g. emergency services, utilities, etc.);
- Community relations plans / engagement process (e.g. process for community feedback, complainants and / or issues to be addressed that may be raised by the local community);
- Requirement for waste management and materials tracking; and
- Requirement for the information in the plans to be updated as and when appropriate (e.g. new personnel, etc.).

Moreover, the Principal Contractor shall also be responsible to ensure that the site works comply with the following *inter alia*:

- Fugitive dust (including asbestos fibres given the detection of friable asbestos) and odours (including volatile contaminants) leaving the confines of the site is mitigated;
- No water containing any suspended matter or contaminants leaves the site in a manner which could pollute the environment;
- Vehicles be cleaned and secured so that no mud, soil or water are deposited on any public roadways or adjacent areas;
- Noise and vibration levels at the site boundaries comply with the legislative requirements; and

- Whilst dewatering is not proposed, should isolated groundwater / surface water require removal during works (e.g. following rain events, seepage into temporary excavations, etc.), this water is to be appropriately treated and assessed prior to disposal to stormwater and / or sewer in accordance with the utility owner's requirements or disposed off-site to an appropriately licenced waste water treatment facility. Authority from the relevant utility owner or licenced facility is to be obtained prior to disposing of the water.

The appointed Principal Contractor, Remediation Contractor, Asbestos Contractor, Environmental Consultant and Occupational Hygienist are to be provided with a copy of this RAP so that they are aware of the contamination status of the soils and the remediation approach to be adopted.

With respect to odour and air quality management, Table 9 provides information on contaminant and odour concentrations that may assist as a guide when developing the AQOMP. These may be used as a guide in conjunction with site observations and other field screening results to assess odour release at site / works boundaries. In this regard, field monitoring for individual contaminants using field detection tubes is often limited with higher detection limits (e.g. TMB detection limits generally 5-10 ppm) and hence reliance solely on the odour thresholds should be avoided.

Table 9: Soil Vapour and Odour Management Screening Criteria During Works

Contaminant	Workplace Exposure Standard – TWA ($\mu\text{g}/\text{m}^3$) ~	Approximate Odour Threshold (ppm) ~
TRH / TPH (F1)*	-	15 [^]
TRH/TPH (F2)*	-	15 [^]
Benzene	3,200	1.5
Toluene	191,000	8
Ethylbenzene	434,000	2
Xylene	350,000	1
1,2,4-trimethylbenzene	123,000	0.4
1,3,5-trimethylbenzene	123,000	0.4
Styrene	213,000	1
Cyclohexane	350,000	25 [^]
Hexane	72,000	65 [^]
Heptane	1,640,000	40 [^]
Tetrachloroethene (PCE)	340,000	1
1,2-dichloroethene (DCE)	793,000	17
Trichloroethene (TCE)	54,000	50

Contaminant	Workplace Exposure Standard – TWA ($\mu\text{g}/\text{m}^3$) ~	Approximate Odour Threshold (ppm) ~
Vinyl chloride	13,000	3000

Notes:

- * Where individual contaminants are identified that can be contributed to the F1/F2 TPH result (e.g., detection of elevated 1,2,4-TMB concentration contributing to F1 result) the F1/F2 TPH result, if exceeding the screening criteria, may be able to be set aside by the Environmental Consultant in some circumstances.

- ~ TWA and odour screening criteria to be used for assessing risk to on-site and off-site users during works. TWA and odour information based on information presented in Appendix 2 of NSW EPA 'Assessment and Management of Hazardous Ground Gases, Contaminated Land Guidelines', 2019 (amended 2020).

- ^ Odour threshold adopted for initial general screen. May be updated by Occupational Hygienist based on further assessment and taking into account proposed approach to site works. Final levels to be outlined in the site's air quality and odour management plan(s).

18. Worker Health and Safety

A site specific WHS Plan is to be prepared by the appointed Principal Contractor in consultation with other contractors and submitted for approval by the Principal prior to commencing works. Further information on the WHS requirements for addressing works associated with the remediation (asbestos related works, soil vapour / volatile contaminant related works, etc.) is to be outlined in the relevant plans (e.g. AMP, AQOMP, etc.) and other inputs from the Occupation Hygienist prior to commencing work and subsequently during works where required.

18.1 Personal Protective Equipment

As a minimum, all site personnel (within the designated remediation works areas, as advised by the Remediation Contractor, Asbestos Contractor and Occupational Hygienist) are anticipated to be required to wear the following PPE during the majority of the remedial works:

- Steel-capped boots (preferably lace-less);
- Hard hat;
- High visibility clothing;
- Half-face piece respirator fitted with appropriate cartridge (respirator type to be confirmed by the Occupational Hygienist following risk assessment noting friable asbestos and volatile contaminants have been previously encountered at the site);
- Full-body disposable coveralls (EN Type 5). Ongoing requirement for all works to be confirmed by the Occupational Hygienist following risk assessment); and
- Gloves.

The Principal Contractor, Remediation Contractor and Asbestos Contractor are to ensure that PPE (e.g. respirators, coveralls, gloves, etc.) is available at the entry / exit point to the remediation work area(s). The Asbestos Contractor must ensure that PPE used during the works with asbestos materials is disposed of as asbestos waste or decontaminated in accordance with the WHS Regulations and the SafeWork NSW *Code of Practice: How to Safely Remove Asbestos* December 2022.

With respect to the site and other tasks more generally, the following PPE shall be used where considered necessary and where required by a task-based SWMS:

- Steel-capped boots (preferably lace-less);
- Hard hat;
- High visibility clothing;
- Safety glasses or safety goggles;
- Hearing protection;
- Sunscreen;
- Sunvisor / brim;
- Long sleeve shirts and pants; and
- Any other site-specific PPE as required by the relevant contractor and / or the Occupational Hygienist.

18.2 Specific Requirements for Chemical Contaminants

As with all potentially contaminated soils, measures should be undertaken to minimise the potential exposure of workers to contamination. These include:

- Minimising dermal contact with contaminated soil / water;
- Minimising ingestion with contaminated soil / water, including of dust;
- Minimising inhalation of volatile contaminants in soil vapour phase; and
- Appropriate air monitoring when entering a confined space.

The above can be achieved by the use of appropriate PPE and good hygiene.

WHS practices, procedures and requirements should be regularly reviewed, and updated if required, as works progress (e.g. due to change in approach to works, results of works monitoring, identification of contamination of concern, etc.).

19. Unexpected and Additional Finds Protocol

A general UAFP and associated contingency plan has been established to deal with unexpected / additional finds and / or unplanned situations as outlined in the following sections.

19.1 Unexpected and Additional Finds Protocol

All site personnel are to be inducted into their responsibilities under this UAFP, which is to be included in the Principal Contractor's Site Management Plan.

All site personnel are required to report unexpected signs of environmental concerns to the Site Manager if observed during the course of their works (e.g. unnatural staining, potential contamination sources (such as buried drums or tanks), chemical spills, etc.).

Should signs of concern be observed, the Principal Contractor is to, as soon as practical:

- Place barricades around the affected area and cease work in that area;
- Notify authorities needed to obtain emergency response for any health or environmental concerns (e.g. fire brigade);
- Notify the PR of the occurrence;
- Notify any of the authorities that the Principal Contractor is legally required to notify (e.g. NSW EPA, Council);
- Notify the Environmental Consultant and / or Occupational hygienist, as appropriate (and Site Auditor if required); and
- The PR is to notify any of the authorities which the Principal is legally required to notify (e.g. NSW EPA, Council).

Following the immediate response to the UAFP a contingency plan is to be implemented (as outlined in the following sub-section).

19.2 Contingency Plan

The contingency plan for the site is as follows:

- The Environmental Consultant and / or Occupational Hygienist, as appropriate, to inspect the issue of concern and determine the nature of the issue and the appropriate approach to assessing or (if appropriate) managing the issue;
- The Environmental Consultant and / or Occupational Hygienist, as appropriate, to undertake an assessment considered necessary to determine the management strategy for the area;
- If contamination is found and remediation action (not specified herein) is considered necessary, a remediation strategy for the area is to be prepared by the Environmental Consultant and provided to ESR, the Principal Contractor, Remediation Contractor and the Site Auditor for approval; and
- If the area or proposed remediation strategy is significantly different than that detailed in this RAP, the Consent Authority and / or Private Certifier (as appropriate) is to be provided notification of the proposed works.

20. Validation Plan

20.1 Data Quality Objectives and Indicators

The validation assessment is to be conducted in accordance with Data Quality Objectives (DQO) and QA / QC procedures to ensure the repeatability and reliability of the results.

The validation assessment will be planned in accordance with the following DQOs:

- 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) in accordance with NEPC (2013) Schedule B2 is to be completed as part of the validation assessment. The DQIs are:

- Documentation completeness;
- Data completeness;
- Data comparability and representativeness; and
- Data precision and accuracy.

Based on a fulfilment of the DQOs and DQIs an assessment of the overall data quality is to be presented in the validation assessment report.

Further information on DQO and DQI are included in Appendix H.

20.2 Validation Plans

Prior to commencing works a RWP and CQA are to be developed by the Environmental Consultant and Remediation Contractor and provided to the Site Auditor for review and approval.

The RWP is to outline *inter alia* the process proposed to be implemented for the remedial works (i.e. what and how tasks will be implemented), when tasks and associated validation works will be undertaken (e.g. proposed staging of tasks for different areas) and the feedback and approvals process between relevant parties, in particular (but not limited to) the Remediation Contractor, Environmental Consultant and the Site Auditor. In essence, the RWP is to be framed in a more practical application guise for the remedial works than an overarching planning document that this RAP represents.

The CQA is to outline the testing, validation and other quality control to be implemented for installation of the liner selected to be used for the containment cell.

To assist the validation process, the Environmental Consultant may wish to generate a validation sampling and analysis quality plan (VSAQP) prior to commencing works. If undertaken, the VSAQP is to outline the validation approach proposed to be implemented by the Environmental Consultant to validate the suitability of the remedial works and hence allow confirmation of the site's suitability from a contamination perspective.

20.3 Assessment and Validation Approach

The assessment and validation approach is to consider site information in a wholistic approach thereby not relying on an individual result or piece of information, such as validation data, previous *in situ* investigation data, historical and desktop information, etc.

In this regard, where results exceed the RAC (as outlined in Section 12) the remediation may, in certain circumstances, still be acceptable based on a review of other information. For instance, an exceedance of a soil validation result for volatile contaminants may not be of significant concern if the associated soil vapour results are well below its respective RAC, the material is not showing signs of significant leaching risk, the material is not displaying signs of gross contamination such as significant odours, the material can be located in a suitable low risk area, etc.

It is important that if the Environmental Consultant proposes to justify an exceedance of the RAC by considering other factors and lines of evidence, the information and justification is to be presented to the Site Auditor, and other relevant parties (e.g. ESR, Principal Contractor, Remediation Contractor, etc.), for review and approval at the time of the validation (i.e. not left to the end of the validation process and final validation report).

Similarly, following application of the validation approach outlined in this RAP where relevant (or the VSAQP if undertaken), and subsequent review, and in the context of other site information and lines of evidence, it may be appropriate in certain circumstances to amend the validation approach to optimise the process being implemented. If the validation approach is proposed to be amended it is to be presented to the Site Auditor, and other relevant parties (e.g. ESR, Principal Contractor, Remediation Contractor, etc.), for review and approval prior to its implementation.

20.4 Validation Inspection and Sampling

Remediation of the site is considered complete when the remediation approach, outlined in the Section 10, is completed (i.e. capping of retained soils, placement of relevant impacted soils in containment cell, treatment of soils, removal of the USTs, etc.).

The Environmental Consultant is to conduct periodic site inspections during each phase of the remediation works (and when an issue of concern is identified). It is foreseen, these periodic inspections would be undertaken at the following times:

- During excavation, remediation and validation of contaminated soils (e.g. OCP impacted soils);
- During containment cell construction, liner installation, placement of contaminated soils in cell;
- During investigation, removal and validation of the AST and UST farms;
- During excavation, treatment, validation and placement of soils impacted with volatile contaminants;
- During installation of the separation marker over the asbestos impacted soils;
- During preparation and capping works in TPZ areas for retained trees;
- During import and placement of soils for the capping layer;
- During import and export of site materials; and
- Post completion of the works.

It is noted that there are some tasks which are more likely to require greater than a periodic presence (i.e. closer to a daily inspection or full-time attendance) whilst others do not. The level of attendance at any one point will be influenced by several factors, including the nature of the works being undertaken, the staging of works, observations during works and how well the process of feedback on site observations (and any identified issues) is being implemented between the Environmental Consultant and the Remediation Contractor. It is important that the Environmental Consultant is confident that the level of site inspections (and associated validation works) being implemented is sufficient to determine the suitability of the validation works undertaken and hence the suitability of the site for its future industrial warehouse use. Given this, it is suggested that a general outline of the proposed inspection approach by the Environmental Consultant is included in the RWP once the Remediation Contractor's approach to the remedial works, staging, etc. is confirmed.

A record of the inspections and observations is to be provided as part of the final validation assessment report. This is to include a photographic record.

When visually inspecting areas for the presence of asbestos, this is to be undertaken on a 3 m x 3 m cross grid pattern to confirm the absence of any visible asbestos at the surface. A smaller grid may be appropriate for some areas and is to be applied where appropriate by the Environmental Consultant (and Occupation Hygienist).

Where validation sampling is undertaken due to unexpected or additional finds then the sampling rate adopted by the Environmental Consultant is to be reflective of the works being assessed. In this regard, reference is to be made to the EPA (2022) for general validation of areas.

Reference should be made to the relevant section of this report for other validation sampling requirements, such as imported soils and aggregates, remediated soils, waste classification, AST and UST farm validation, etc.

Results of the validation sampling are to be initially compared to the RAC. It is noted that where exceedances of the screening or target concentrations occur, the result will need to be considered by the Environmental Consultant in the context of the overall remediation works and site development to determine if the exceedance is of concern and/or if further remediation / management of the subject material / area is required (also see Section 20.3 in this regard).

20.5 Documentation Requirements

The following documents will need to be reviewed, in conjunction with those that may be required by other relevant plans (e.g. AMP), as part of the validation assessment by the Environmental Consultant. These are to include the following and be provided to the Environmental Consultant by the relevant parties:

- Any licences and approvals required for the remediation works;
- Waste classification reports;
- Transportation Record: comprising a record of all truck-loads of soil (including aggregate) entering the site, including truck identification (e.g. registration number), date, time, source site, load characteristics (i.e. type of material (e.g. VENM - clay, VENM - sandstone, quarried aggregate, etc.), approximate volume, use (e.g. general site raising, service trenches, etc.);

- Disposal dockets for any soil disposed off-site. The contractor is to supply records of: transportation records, spoil source, spoil disposal location, receipt provided by the receiving waste facility, a record of receipt from the receiving site will be supplied (i.e. the receiving sites transportation records). Note: A record of the building materials disposed off-site is also be kept and provided to the Principal Contractor on request;
- Imported materials records: records for any soil imported onto the site, including source site, classification reports, approximate volume / weight of each load, inspection records of soil upon receipt at site and transportation records;
- Records relating to any unexpected finds and contingency plans implemented;
- Incident Reports: any environmental incidents which occur during the works which is to be documented and the PR and appropriate regulatory authority informed in accordance with regulatory requirements;
- Any relevant earthworks compaction testing results (including testing report which incorporates certificates, drawings and documents the works undertaken);
- Laboratory certificates and chain-of-custody documentation;
- Product data sheets and delivery records (e.g. geotextile, liner, sealants, etc.);
- Installation and associated CQA records for the installed liner (e.g. welding records, weld testing, etc.);
- Records of the soil remediation works (e.g. stockpile tracking and numbering, periods of treatment, etc.) and associated validation results;
- Letters / memos as required which provide instruction or information to the relevant contractor;
- Inspections records from the Environmental Consultant and Occupational Hygienist;
- Photographic records by all contractors and consultants of the works undertaken within their purview of responsibilities;
- Surveys (overlayed on a recent aerial image of the site):
 - o Areas subject to excavation and / or validation (e.g. eastern grass areas, UST and AST farm footprints, etc.);
 - o Pre- and post-capping construction showing areas where retained soils are located and capped;
 - o Pre- and post-capping construction showing areas where threatened soils have been placed;
 - o Pre- and post-capping construction showing areas where *in situ* soil treatment has occurred (if undertaken); and
 - o Location of any other remediation or monitoring features (e.g. Orica wells if retained).
- Airborne asbestos and VOC monitoring records (including drawings showing monitoring locations);
- Interim visual and sampling clearances for asbestos related works; and
- A written final asbestos clearance certificate.

Note: For all interim and final asbestos clearance reports, these are to also include a drawing(s) and photographs of the areas inspected / cleared.

20.6 Reporting

A validation assessment report is to be prepared for the site by the Environmental Consultant consistent with EPA (2020) and other appropriate guidance documentation (e.g. NSW EPA 2023).

The validation report shall describe the remediation approach adopted, methodology, results and conclusion of the assessment and make a clear statement regarding the suitability of the site for the proposed land use (i.e. industrial warehouses). It is also to provide details of any ongoing environmental management (i.e. an LTEMP) which is required in order to maintain the remediation mitigation measures.

21. Conclusions

In summary, it is considered that the site can be rendered suitable from a contamination perspective for its use as industrial warehouses subject to appropriate remediation, management and site validation in accordance with this RAP. Relevant plans will need to be prepared, reviewed and agreed by the Site Auditor prior to commencing remediation works (e.g. RWP, CQA, etc.).

The above is subject to requirements of the remediation (e.g. groundwater remediation) under the VMP being addressed by Allnex. In this regard, DP notes that the groundwater remediation is not considered to be required to address risks to site users from a contamination perspective and hence allow occupation of the proposed development.

The successful completion of the remediation as outlined herein is to be validated and reported.

DP recommends that this RAP is reviewed following completion of the detailed design for the proposed development and prior to commencing remedial works. Moreover, the Environmental Consultant and Site Auditor is to be informed if there are any proposed changes to the remediation approach, and if so, this RAP must be updated in consultation with the relevant parties.

22. Long Term Environmental Management Plan (Post Remediation Works)

On completion of the development (or remediation works if completed earlier and if appropriate), a LTEMP is to be generated. This is focus on the ongoing management measures to allow the site to continue to be suitable from a contamination perspective for its proposed industrial warehouse use. As outlined herein, the primary ongoing management measure that is anticipated to be implemented is the construction and maintenance of a capping layer, thereby generating a barrier between site users and retained contamination on the site. DP notes that this is a widely adopted and common remediation approach and hence arguably the most common type of LTEMP.

The LTEMP is anticipated to outline *inter alia*:

- Background on the contamination present at the site, including areas of greater impact identified by previous investigations and / or during works;

- The depth of the capping layer and location of the containment cell (e.g. via surveys taken during remediation works);
- The management practices to be implemented to prevent damage or degradation of the capping layer implemented for the retained contaminated soils (e.g. periodic inspections by ESR's facility manager / representative); and
- Processes to repair and make good the capping layer in the event of planned (e.g. maintenance of inground service, etc.) or inadvertent breaches such that related risks are mitigated and that any potential exposure of the contaminated soils to site users is minimised.

The final LTEMP can only be prepared on completion of the works so it takes into account of, and reflects, actual remedial works undertaken and final actual site features. Accordingly, DP notes that the above measures, outline and requirements for the LTEMP may be updated to reflect final works and features.

The LTEMP is required to be developed by a suitably qualified Environmental Consultant, be legally enforceable and subject to public notification. The LTEMP is to be reviewed and agreed by ESR, the Site Auditor and Council. On agreement by all parties, appropriate public notification of the plan for the site is to be undertaken, typically this involves Council notifying the presence of the LTEMP on the site's Section 10.7 Planning Certificate. As part of this process, ESR is to confirm how they intend to make the LTEMP legally enforceable.

23. Limitations

Douglas Partners Pty Ltd (DP) has prepared this report for this at 49-61 Stephen Road, Banksmeadow 49-61 Stephen Road, Banksmeadow in general accordance with DP proposal 219609.01.P.001.Rev0 dated 3 June 2023 and acceptance received from ESR Australia. The work was carried out under DP's Conditions of Engagement. This report is provided for the exclusive use of ESR Australia 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. DP cannot be held liable for these interpretations and conclusions where the information provided is not accurate.

This RAP has been prepared based on the results of previous investigations at the site, that groundwater remediation will be completed by Allnex Resins Australia Pty Ltd (Allnex), Allnex will address the requirements for completion / removal / surrender of the VMP and EPL associated with the site, and the proposed development works. Should site conditions encountered during works differ from those currently understood and as outlined in this report, or works not completed by others (e.g. Allnex) as expected, the proposed works be altered and / or the remedial approach amended without DP's knowledge and agreement, this RAP would no longer be valid for remediation of the site.

The results provided in the report are indicative of the sub-surface conditions on the site only at the specific testing locations in the cited reports, and then only to the depths investigated and at the time the work was carried out. Sub-surface conditions can change abruptly due to variable geological processes and also as a result of human influences (e.g. remedial works, etc.). Such changes may occur after field testing has been completed.

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

This report must be read in conjunction with all of the attached notes and referenced reports 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.

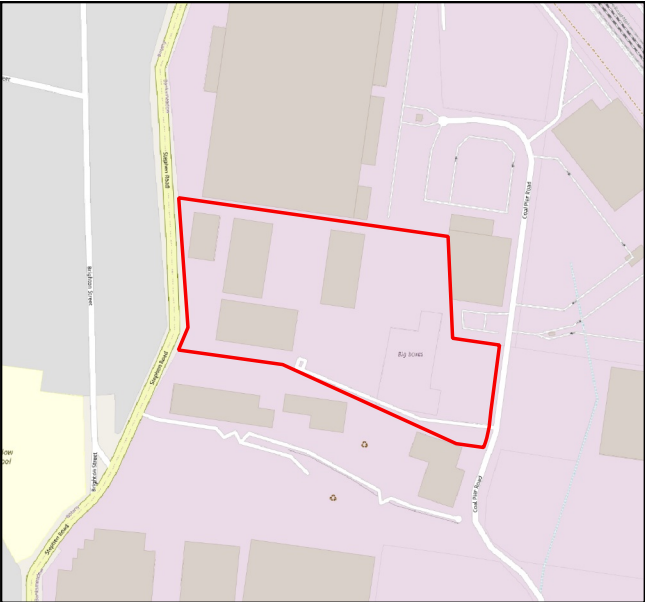
The contents of this report do not constitute formal design components such as are required, by the Health and Safety Legislation and Regulations, to be included in a Safety Report specifying the hazards likely to be encountered during construction and the controls required to mitigate risk.

Appendix A

Drawings

Appendix A1

Investigation Drawings

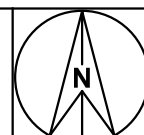


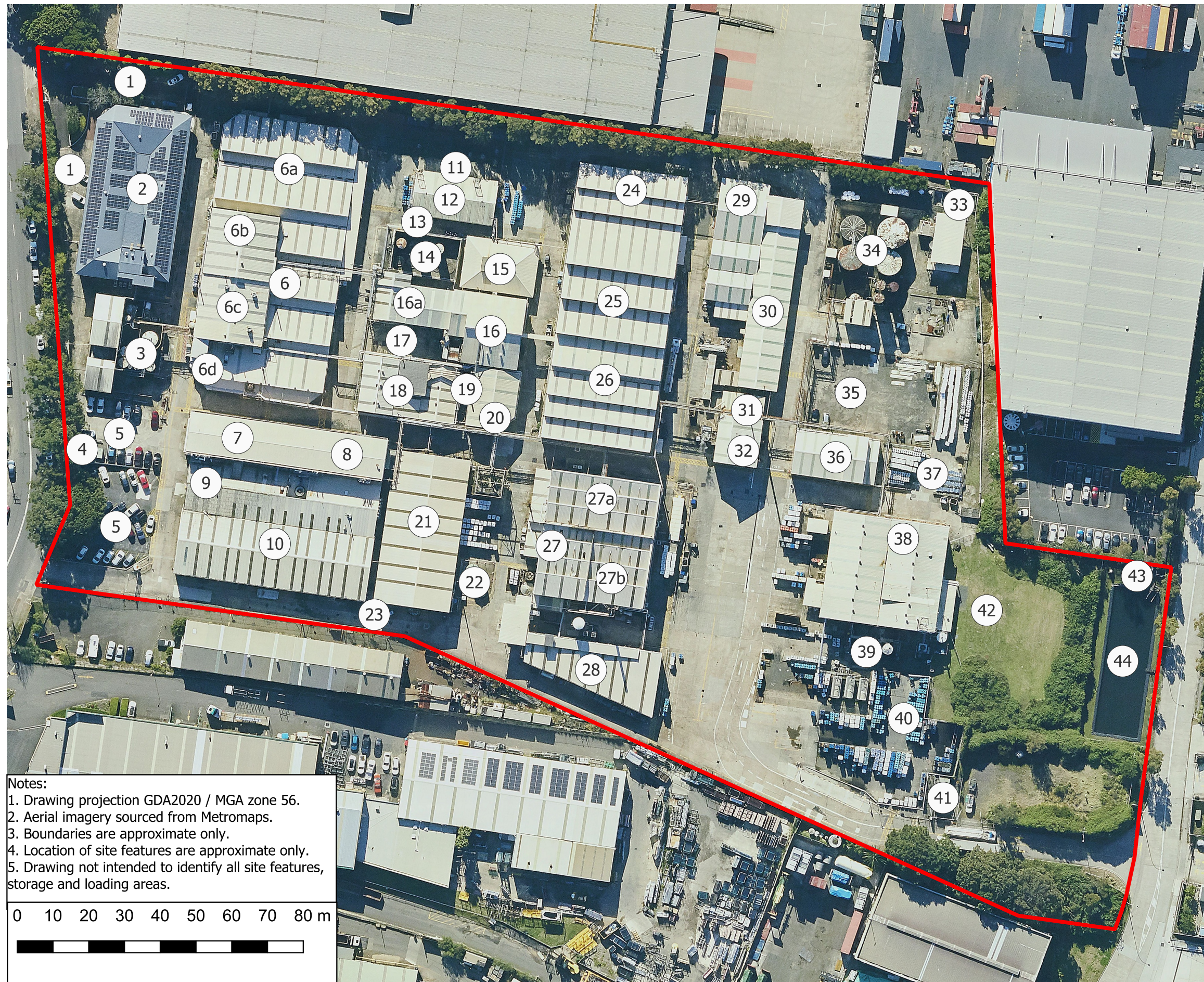
LOCALITY MAP

- Notes:
- 1. Drawing projection GDA2020 / MGA zone 56.
 - 2. Aerial imagery sourced from Metromaps.
 - 3. Boundaries are approximate only.

Legend

 Site Boundary





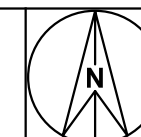
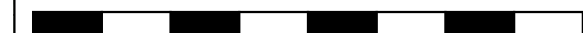
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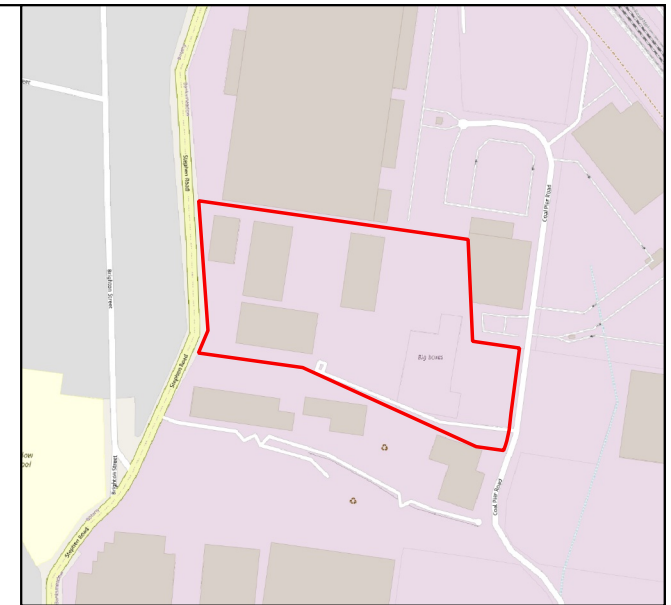
-  Site Boundary
- 1. Office and Visitor Car Park
- 2. Administration Building
- 3. Western AST Farm
- 4. Substation
- 5. Western Staff Car Park
- 6. Alkyd Resin Plant Building
- 6a. Storage Area
- 6b. Thinning Room
- 6c. Kettle Room
- 6d. Electrical Room
- 7. Laboratories
- 8. Production / Site Offices
- 9. Loading Dock
- 10. Raw Materials Storage
- 11. Northern UST Farm
- 12. Northern UST Farm Pump Room
- 13. Redundant USTs
- 14. Central AST Farm
- 15. Emulsions Plant Control Room
- 16. Emulsions Plant Building
- 16a. Storage Area
- 17. Central UST Farm
- 18. Beckamine Plant Building
- 19. Beckamine Plant Inground Holding Tanks
- 20. Brick Building - Storage and Water Plant Room
- 21. Drum Storage Building
- 22. Groundwater Remediation System
- 23. Boundary Remediation System
- 24. Poisons and Corrosive Storage
- 25. Emulsions Plant Storage
- 26. Emulsions Plant AST
- 27. Hard Resin Plant Building
- 27a. Blending Plant
- 27b. Storage Area
- 28. Corrosives Storage
- 29. Fire Sprinkler and Hydrant Pump Room and Inground Water Tank
- 30. Engineering Workshop
- 31. Forklift Maintenance Area
- 32. Boiler House
- 33. Emulsions Plant Wastewater Treatment / Separation Pit
- 34. North-Eastern AST Farm
- 35. Eastern Staff Car Park
- 36. Storage Area
- 37. Storage Area
- 38. Nuodex Plant
- 39. South-Eastern (Nuodex Plant) AST Farm
- 40. Main External Bunded Storage Area
- 41. Gate House
- 42. Nuodex Plant Spill Areas
- 43. Stormwater Interception Pit and Disposal Point
- 44. Stormwater First Flush Pit

Notes:

1. Drawing projection GDA2020 / MGA zone 56.
2. Aerial imagery sourced from Metromaps.
3. Boundaries are approximate only.
4. Location of site features are approximate only.
5. Drawing not intended to identify all site features, storage and loading areas.

0 10 20 30 40 50 60 70 80 m





LOCALITY MAP

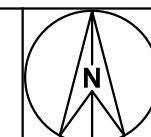
Notes:

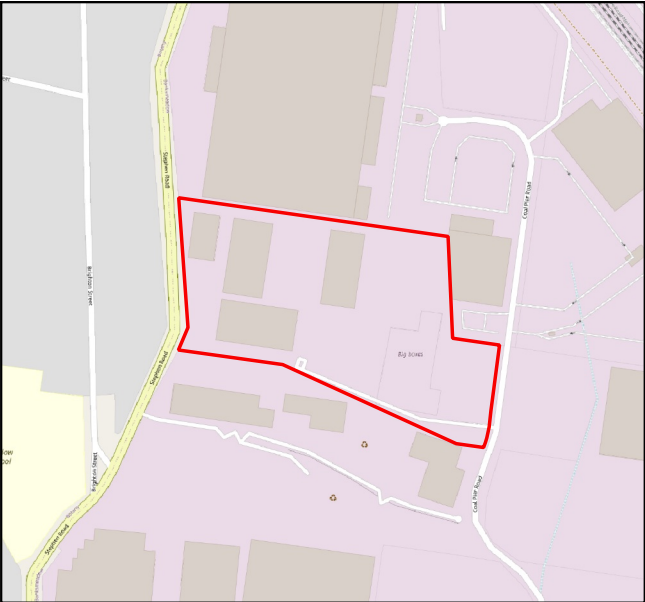
1. Drawing projection GDA2020 / MGA zone 56.
2. Aerial imagery sourced from Metromaps.
3. Boundaries and land features are approximate only.
4. Groundwater remediation infrastructure for the eastern area (south of the Nuodex plant building near wells JBMW06, JBMW07, JBMW12 and JBMW13) still to be designed and installed.

Legend

- Site Boundary
- Above ground Storage Tank
- Underground Storage Tank
- Internal Storage Area
- External Storage Area
- Production Area
- Current Remediation Infrastructure
 - Horizontal Well - Screened Section
 - Horizontal Well - Solid Casing
 - Boundary Remediation System Wells

0 10 20 30 40 50 60 70 80 m



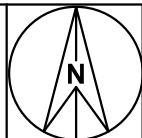
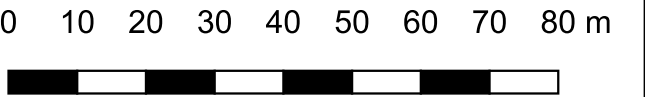


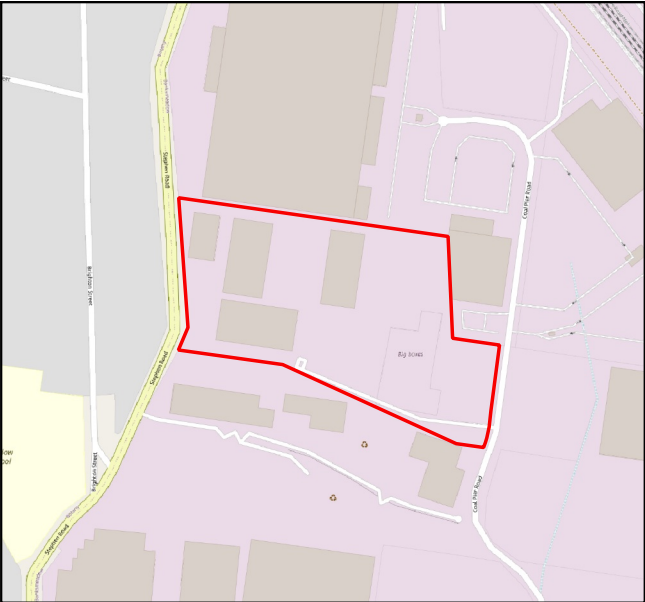
LOCALITY MAP

- Notes:
1. Drawing projection GDA2020 / MGA zone 56.
 2. Aerial imagery sourced from Metromaps.
 3. Boundaries are approximate only.
 4. Sample locations within buildings are approximate only.
 5. JBS&G test locations extracted from JBS&G drawing 'Sampling Locations' Figure 5, JBS&G report dated 19/01/2023.
 6. Soil samples not collected at CPT locations 121, 121A, 122, 123, 124 and JBS&G wells JBMW12 and JBMW13.

Legend

-  Site Boundary
- Soil Test Locations - Previous Investigations
-  DP Environmental Borehole
 -  DP Geotechnical Borehole
 -  DP Groundwater Well
 -  DP Soil Vapour Port
 -  DP Geotechnical CPT
 -  JBS&G Environmental Borehole
 -  JBS&G Groundwater Well
 -  JBS&G Hand Auger





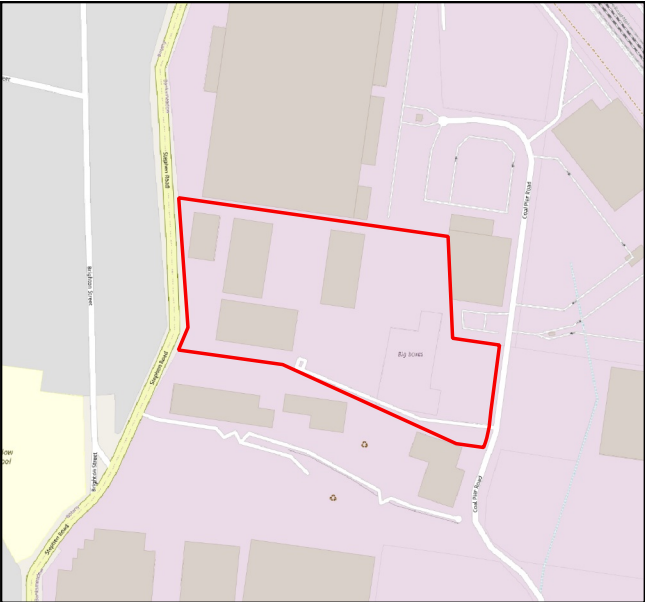
LOCALITY MAP

- Notes:
1. Drawing projection GDA2020 / MGA zone 56.
 2. Aerial imagery sourced from Metromaps.
 3. Boundaries are approximate only.
 4. Sample locations within buildings are approximate only.
 5. JBS&G test locations extracted from JBS&G drawing 'Sampling Locations' Figure 5, JBS&G report dated 19/01/2023.
 6. Soil samples not collected at CPT locations 121, 121A, 122, 123, 124 and JBS&G wells JBMW12 and JBMW13.

Legend

- Site Boundary
- Soil Test Locations - Previous Investigations
 - DP Environmental Borehole
 - DP Geotechnical Borehole
 - DP Groundwater Well
 - DP Soil Vapour Port
 - DP Geotechnical CPT
 - JBS&G Environmental Borehole
 - JBS&G Groundwater Well
 - JBS&G Hand Auger



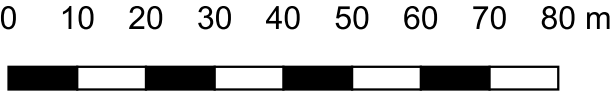


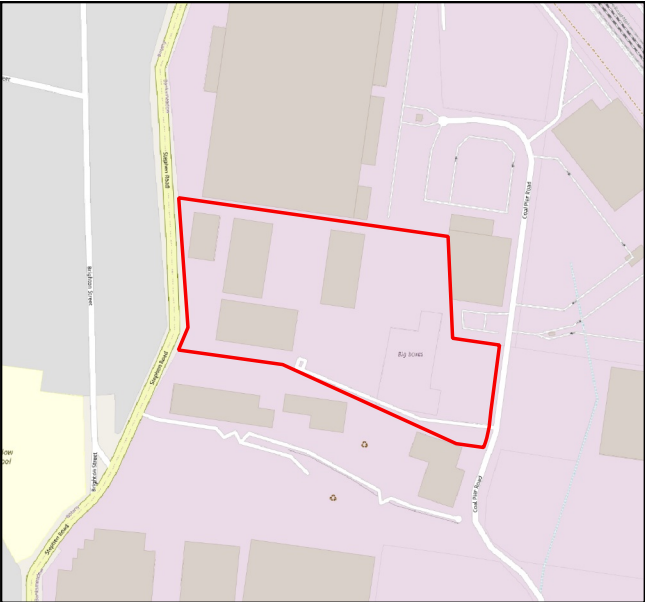
LOCALITY MAP

- Notes:
- 1. Drawing projection GDA2020 / MGA zone 56.
 - 2. Aerial imagery sourced from Metromaps.
 - 3. Boundaries are approximate only.
 - 4. Sample locations within buildings are approximate only.
 - 5. AECOM also includes wells previously identified as URS.
 - 6. JBS&G test locations extracted from JBS&G drawing 'Sampling Locations' Figure 5, JBS&G report dated 19/01/2023.
 - 7. AECOM test locations extracted from AECOM drawing 'Site Layout' Figure 1, AECOM report dated 22/12/2023.

Legend

- Site Boundary
- Groundwater Well Locations
 - DP Groundwater Well
 - AECOM Groundwater Well
 - Orica Groundwater Well
 - JBS&G Groundwater Well



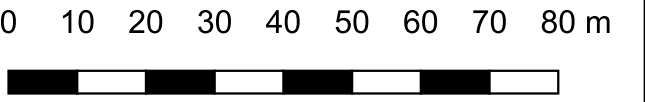


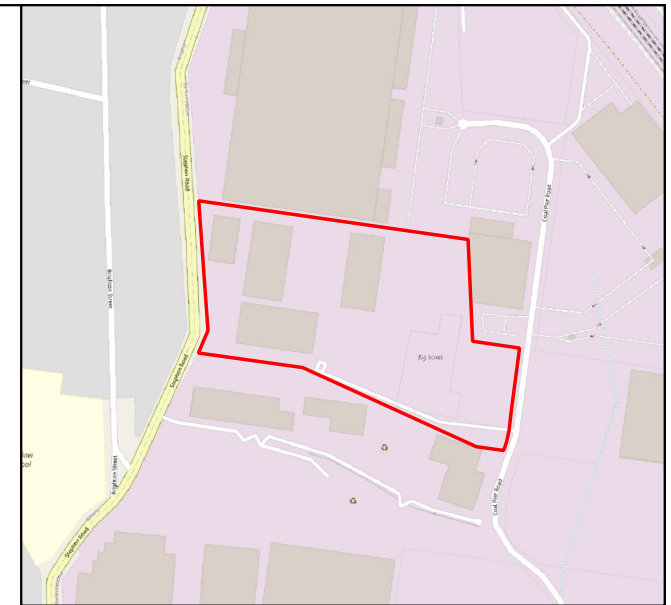
LOCALITY MAP

- Notes:
- 1. Drawing projection GDA2020 / MGA zone 56.
 - 2. Aerial imagery sourced from Metromaps.
 - 3. Boundaries are approximate only.
 - 4. Locations within buildings are approximate only.
 - 5. JBS&G test locations extracted from JBS&G drawing 'Sampling Locations' Figure 5, JBS&G report dated 19/01/2023.

Legend

-  Site Boundary
- Soil Vapour Locations - Previous Investigations
 -  DP Soil Vapour Ports
 -  JBS&G Soil Vapour Pins





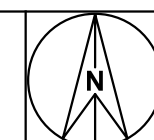
LOCALITY MAP

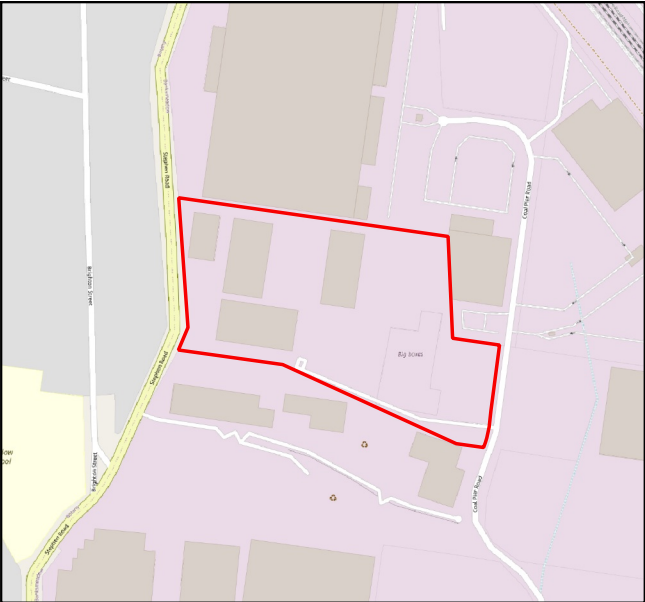
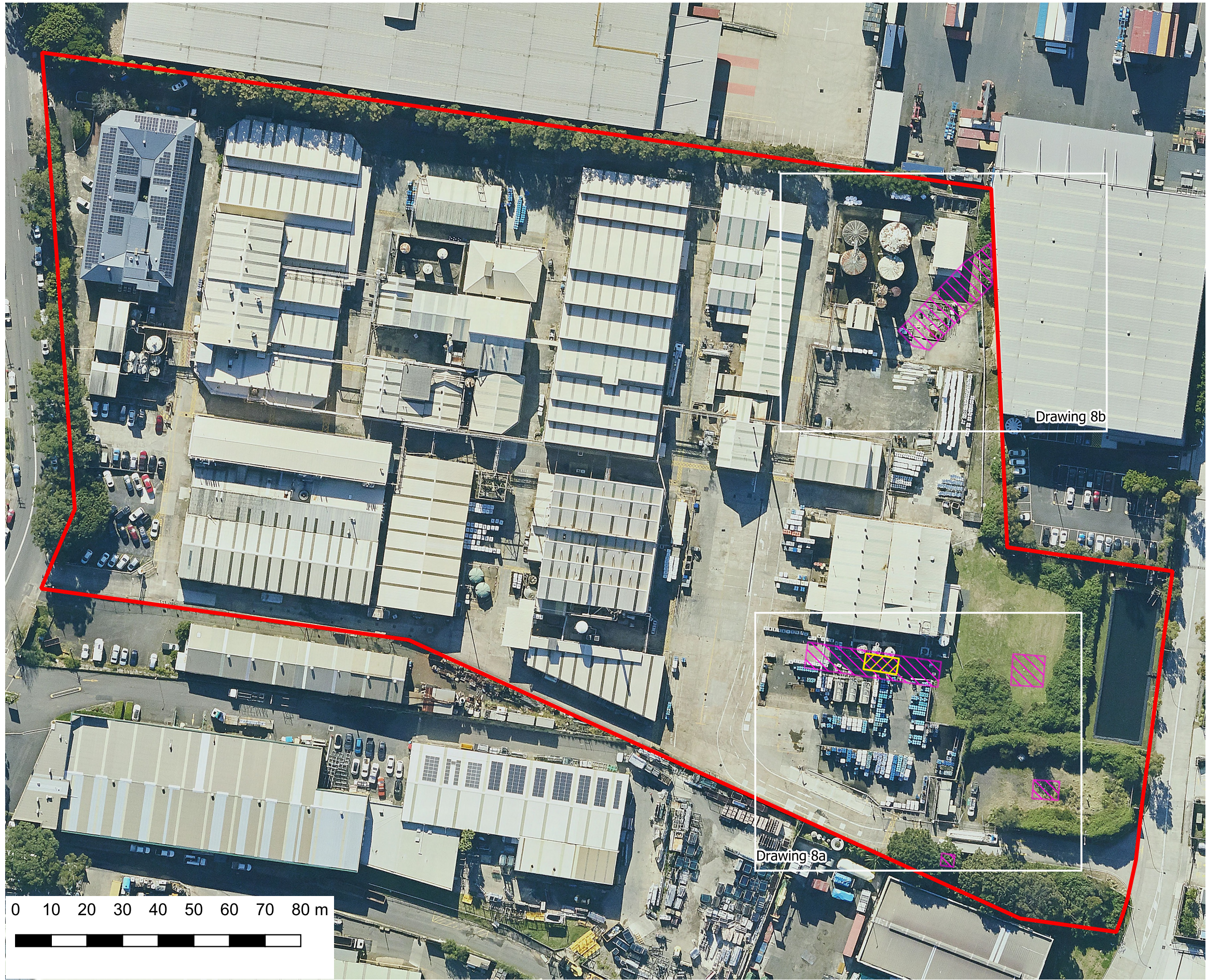
- Notes:
1. Drawing projection GDA2020 / MGA zone 56.
 2. Aerial imagery sourced from Metromaps.
 3. Boundaries are approximate only.
 4. Main areas of concern are indicative only. Areas may change or other areas may be identified during works.
 5. Lighted shaded areas for Area 1, Area 2, Area 3 and Area 4 are indicative contingency areas for consideration.
 6. AST = Above ground Storage Tank
 7. Broadscale contamination impacts (e.g. asbestos, lead, etc.) not indicated by shaded areas.

Legend

- Site Boundary
- Area 1
- Area 2
- Area 3
- Area 4
- Area 5
- Area 6
- AST Farm - Footprint to be checked post demolition

0 10 20 30 40 50 60 70 80 m





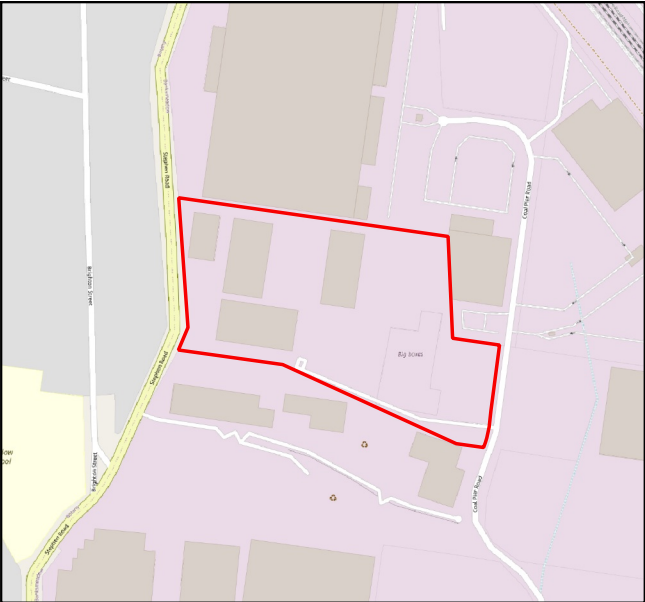
LOCALITY MAP

- Notes:
- 1. Drawing projection GDA2020 / MGA zone 56.
 - 2. Aerial imagery sourced from Metromaps.
 - 3. Boundaries are approximate only.
 - 4. Sample locations within buildings are approximate only.
 - 5. JBS&G test locations extracted from JBS&G drawing 'Sampling Locations' Figure 5, JBS&G report dated 19/01/2023.
 - 6. OCP remediation areas are indicative only. Areas may change or other areas may be identified during works.
 - 7. RAC = Remediation Assessment Criteria
 - 8. Elevated OCP concentrations considered to be concentrations of DDT+DDE+DDD above approximately 40mg/kg.

Legend

- Site Boundary
- High OCP Concentrations Exceeding RAC
- Elevated OCP Concentrations





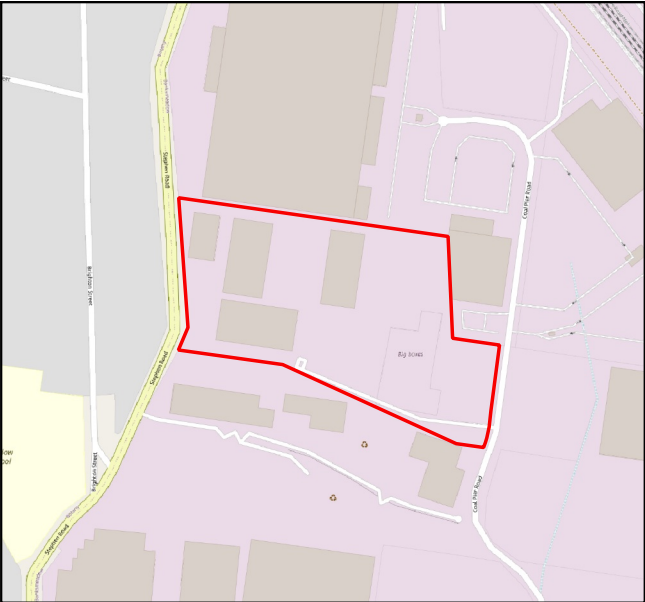
LOCALITY MAP

- Notes:
1. Drawing projection GDA2020 / MGA zone 56.
 2. Aerial imagery sourced from Metromaps.
 3. Boundaries are approximate only.
 4. Sample locations within buildings are approximate only.
 5. JBS&G test locations extracted from JBS&G drawing 'Sampling Locations' Figure 5, JBS&G report dated 19/01/2023.
 6. OCP remediation areas are indicative only. Areas may change or other areas may be identified during works.
 7. RAC = Remediation Assessment Criteria
 8. Elevated OCP concentrations considered to be concentrations of DDT+DDE+DDD above approximately 40mg/kg.

Legend

- Site Boundary
 - High OCP Concentrations Exceeding RAC
 - Elevated OCP Concentrations
- Soil Test Locations - Previous Investigations
- DP Environmental Borehole
 - DP Geotechnical Borehole
 - DP Groundwater Well
 - DP Soil Vapour Port
 - DP Geotechnical CPT
 - JBS&G Environmental Borehole
 - JBS&G Groundwater Well
 - JBS&G Hand Auger





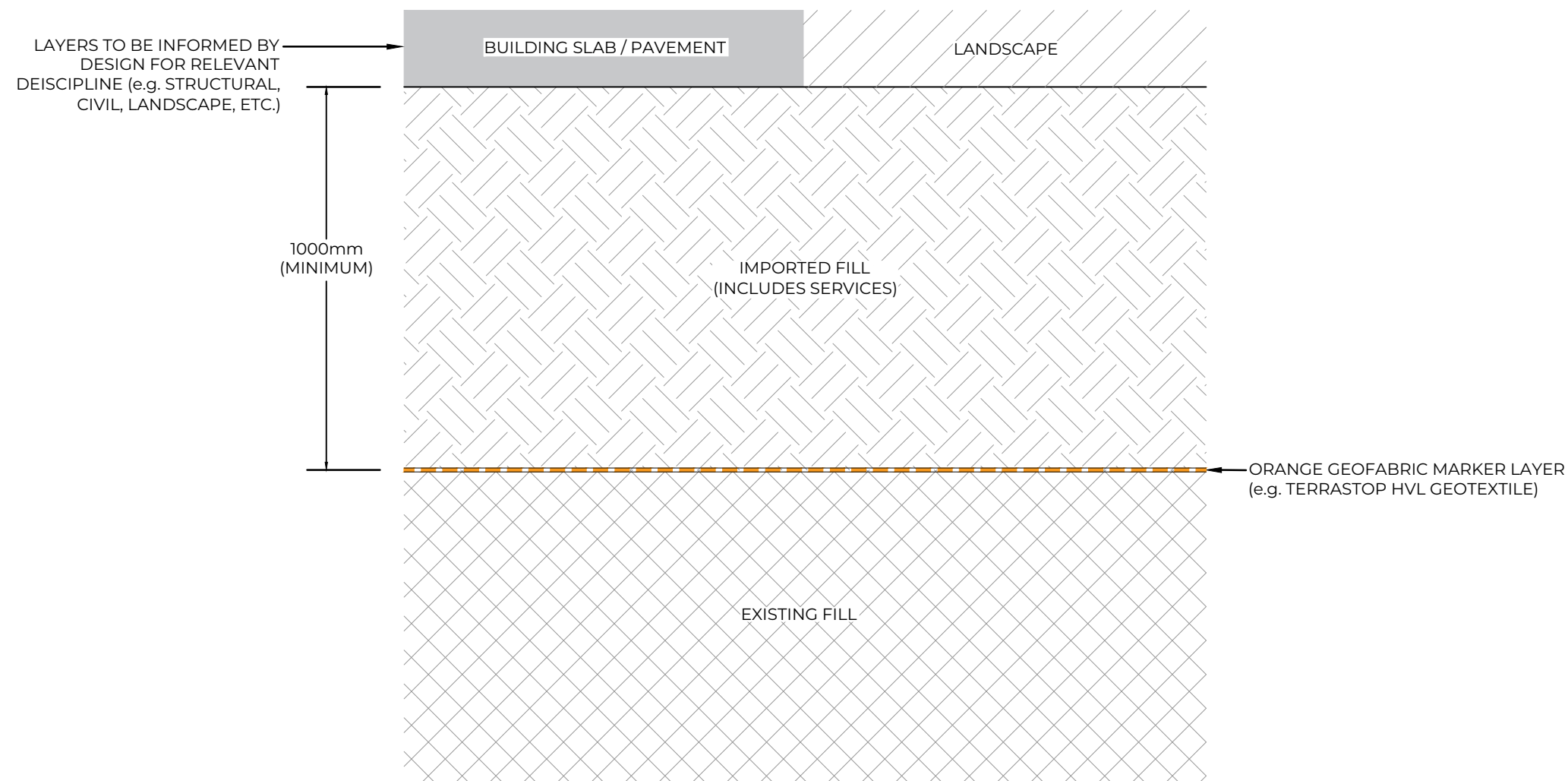
LOCALITY MAP

- Notes:
1. Drawing projection GDA2020 / MGA zone 56.
 2. Aerial imagery sourced from Metromaps.
 3. Boundaries are approximate only.
 4. Sample locations within buildings are approximate only.
 5. JBS&G test locations extracted from JBS&G drawing 'Sampling Locations' Figure 5, JBS&G report dated 19/01/2023.
 6. OCP remediation areas are indicative only. Areas may change or other areas may be identified during works.
 7. RAC = Remediation Assessment Criteria
 8. Elevated OCP concentrations considered to be concentrations of DDT+DDE+DDD above approximately 40mg/kg.

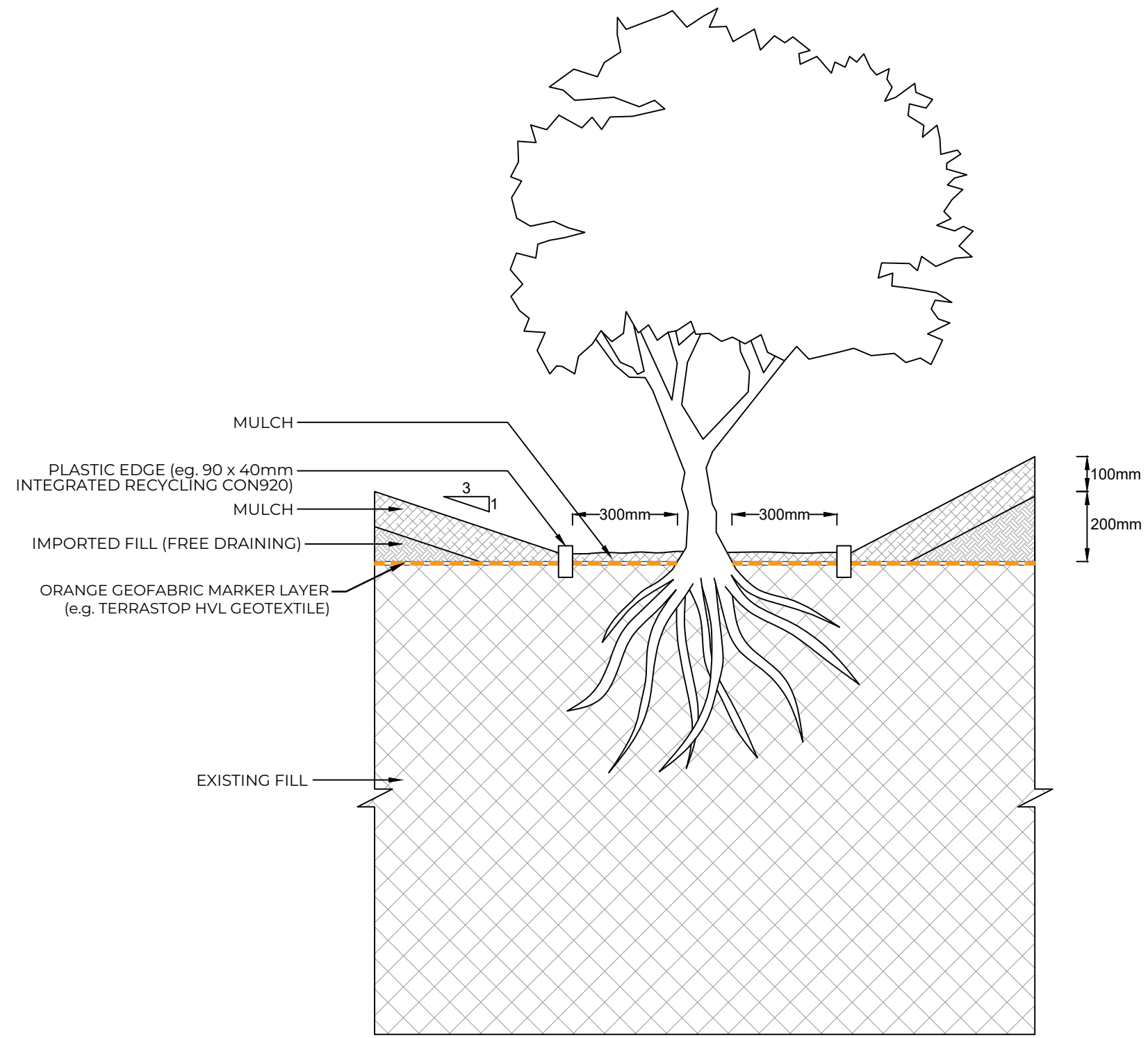
Legend

- Site Boundary
 - High OCP Concentrations Exceeding RAC
 - Elevated OCP Concentrations
- Soil Test Locations - Previous Investigations
- DP Environmental Borehole
 - DP Geotechnical Borehole
 - DP Groundwater Well
 - DP Soil Vapour Port
 - DP Geotechnical CPT
 - JBS&G Environmental Borehole
 - JBS&G Groundwater Well
 - JBS&G Hand Auger

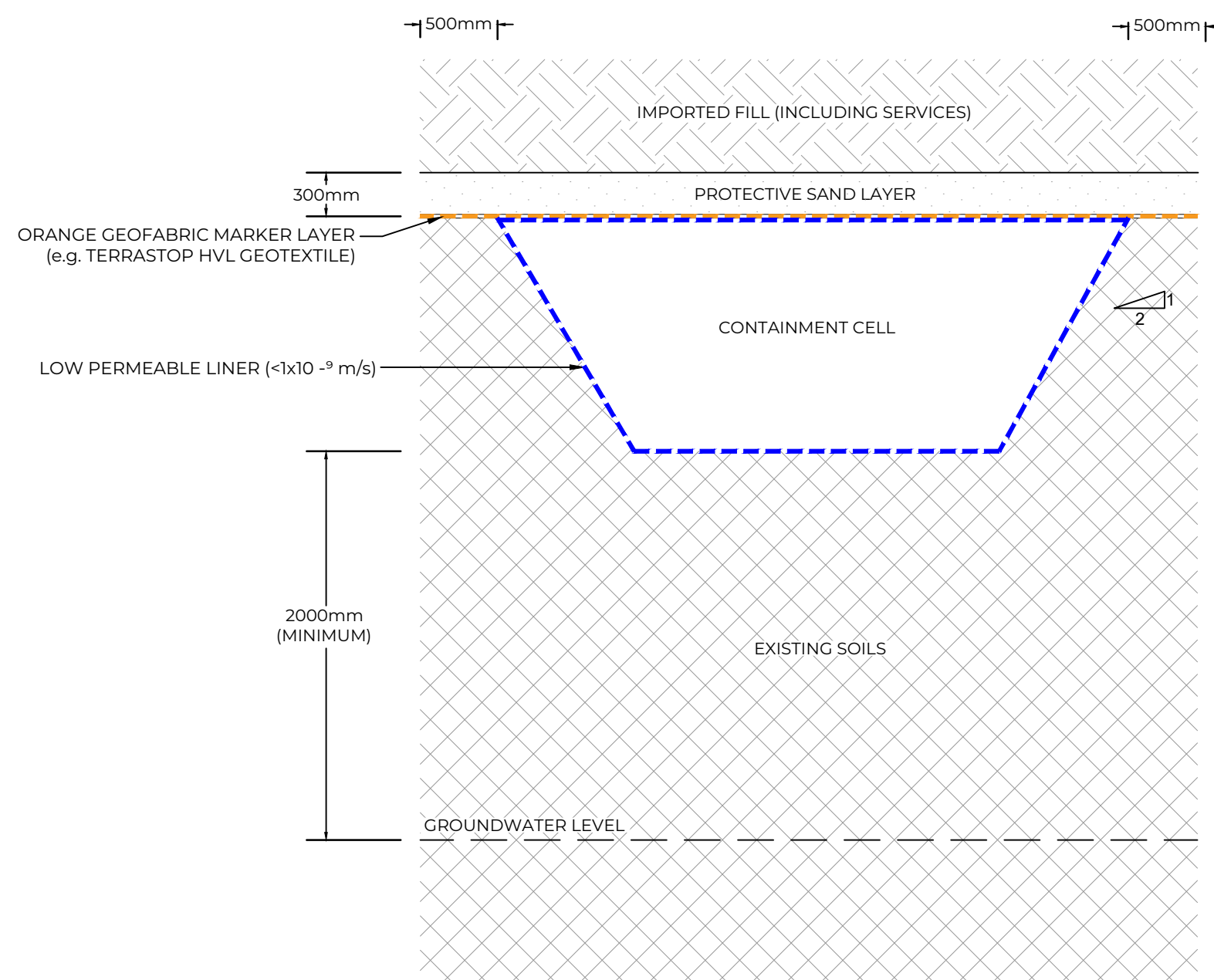




- NOTES:
1. Drawings are not for construction purposes.
 2. Designs are indicative only and may be updated and amended based on the final design works.
 3. Alternate products may be used to those examples indicated in the final design if confirmed to be suitable by the Environmental Consultant.
 4. Import fill (capping) layer may be reduced (minimum 500 mm thick) in some circumstances. Such an approach is to be reviewed and approved by the Environmental Consultant prior to implementation.
 5. Specific requirements from other disciplines (e.g. structural, civil, geotechnical, services, landscape, arborist, etc.) should be considered when developing final design.

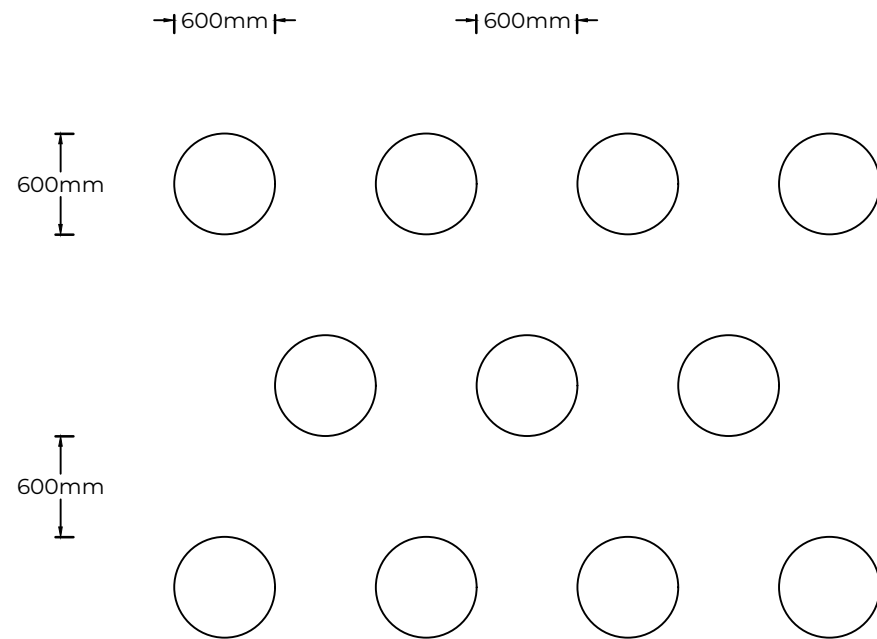


- NOTES:
- 1. Drawings are not for construction purposes.
 - 2. Designs are indicative only and may be updated and amended based on the final design works.
 - 3. Alternate products may be used to those examples indicated in the final design if confirmed to be suitable by the Environmental Consultant.
 - 4. Maximising the thickness of the capping layer should be considered where possible to allow flexibility in design and during works.
 - 5. Specific requirements from other disciplines (e.g. structural, civil, geotechnical, services, landscape, arborist, etc.) should be considered when developing final design.
 - 6. This design can be considered an option when working around existing tree to be retained on site.

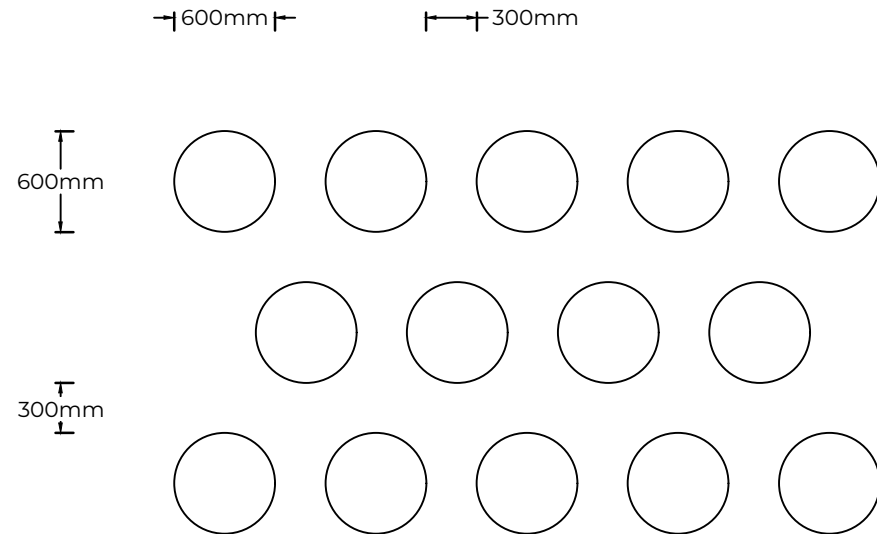


- NOTES:
- 1. Drawings are not for construction purposes.
 - 2. Dimensions and location of containment cell to be confirmed during detailed design.
 - 3. Liner material to be approved by the Environmental Consultant prior to use.
 - 4. Liner may require protective geotextile. To be confirmed during design and liner CQA.
 - 5. Protective sand layer can comprise imported soils above marker layer or site won soils placed below the marker layer, and is to extend 500mm past the edge of the contaminated cell.
 - 6. Battering and other geotechnical requirements to be confirmed with Geotechnical Consultant during design and prior to commencing works.

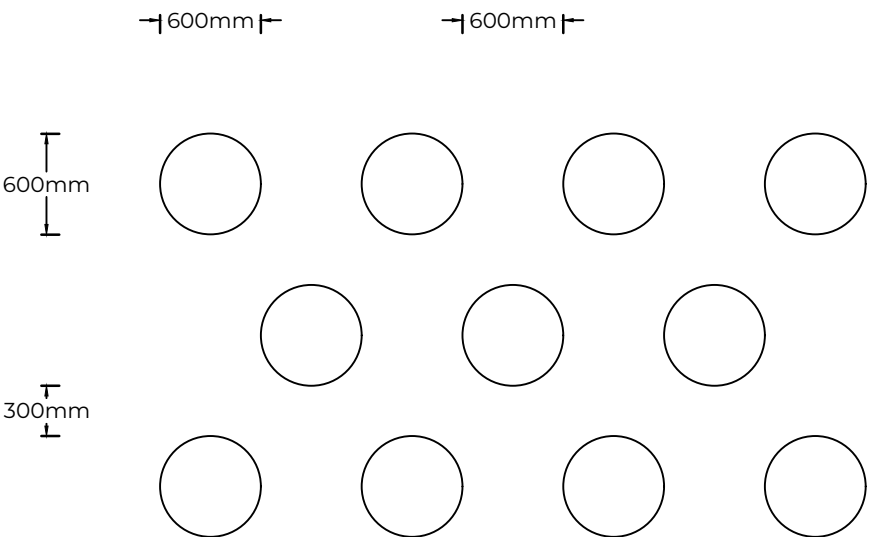
 Douglas Partners <i>Geotechnics Environment Groundwater</i>	CLIENT: ESR Australia		TITLE: Sketch - Containment Cell Approach Proposed Industrial Development 49-61 Stephen Road, Banksmeadow	PROJECT No: 219609.01.R.002	
	OFFICE: Sydney	DRAWN BY: EC		DRAWING No:	12
	SCALE: NTS	DATE: 08.10.2024		REVISION:	0



EXAMPLE 1 - COVERAGE APPROXIMATELY 23%



EXAMPLE 3 - COVERAGE APPROXIMATELY 34%

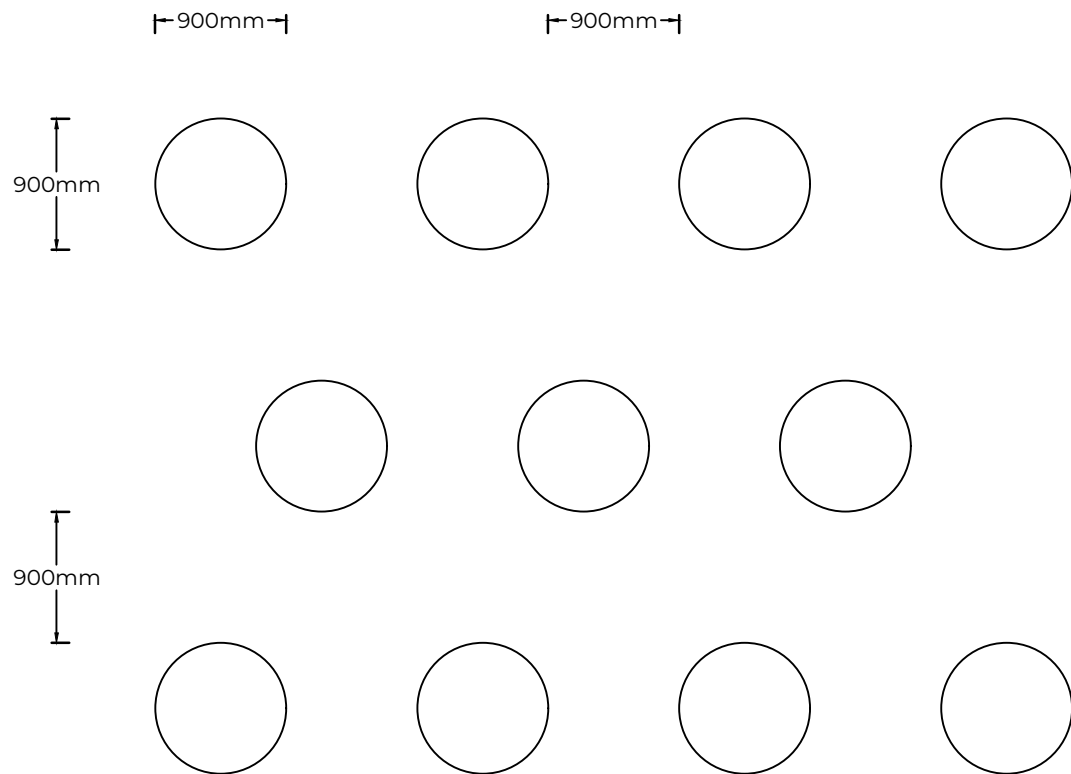


EXAMPLE 2 - COVERAGE APPROXIMATELY 28%

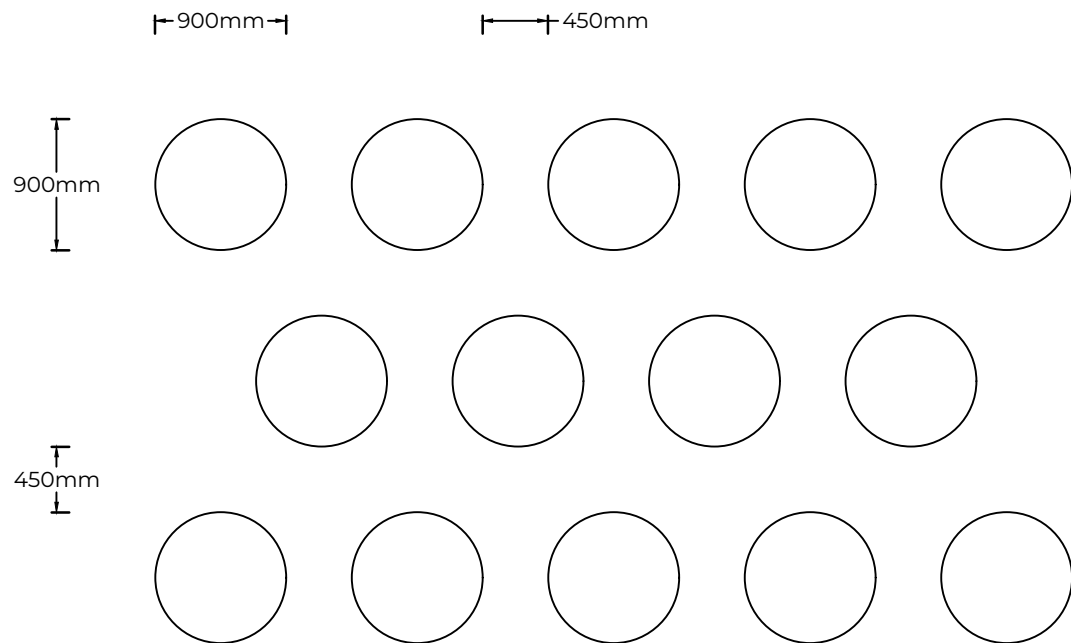
- NOTES:
- 1. Example indicative approaches only. Final approach to be informed by ESR Australia's preferred approach and objectives.
 - 2. Spacing and bore size may be altered for final design.
 - 3. Bores to target upper sections of groundwater table (i.e. between ~4.5-9m depth).

LEGEND

○ In Situ Soil Treatment Bore

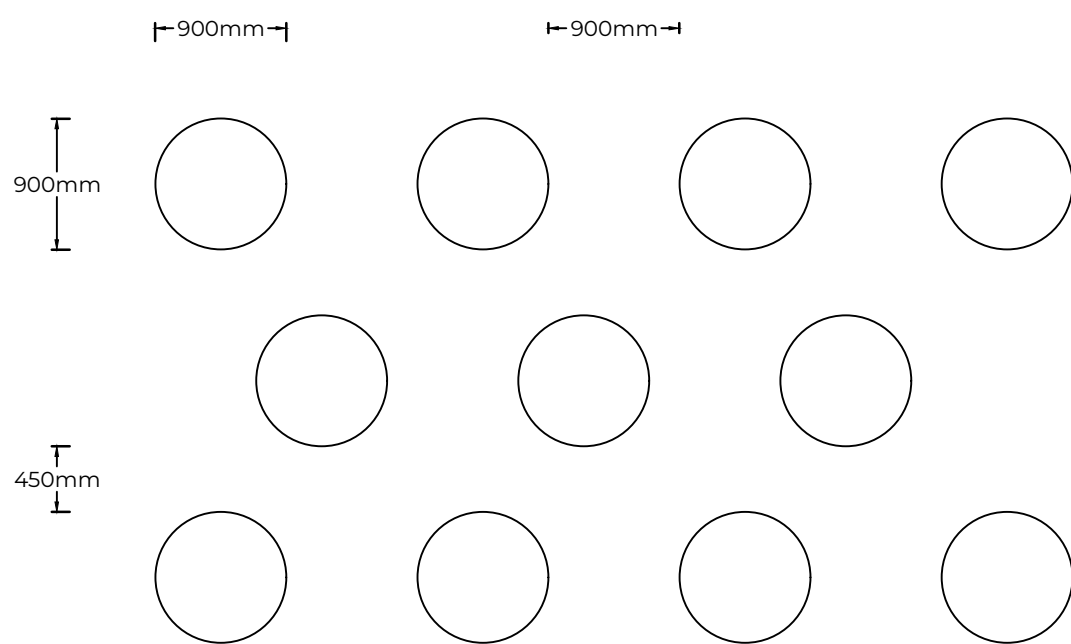


EXAMPLE 1 - COVERAGE APPROXIMATELY 23%



EXAMPLE 3 - COVERAGE APPROXIMATELY 40%

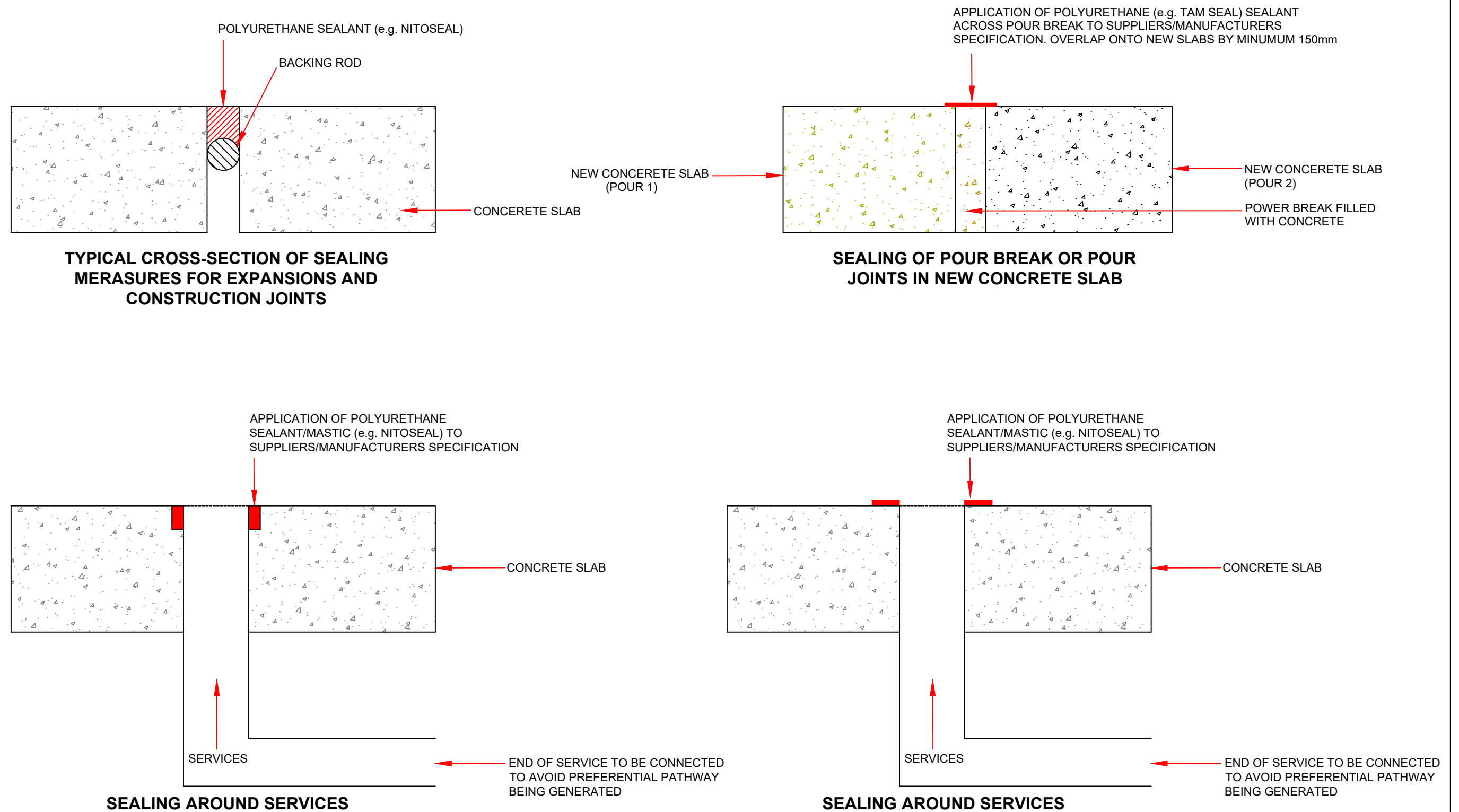
- NOTES:
- 1. Example indicative approaches only. Final approach to be informed by ESR Australia's preferred approach and objectives.
 - 2. Spacing and bore size may be altered for final design.
 - 3. Bores to target upper sections of groundwater table (i.e. between ~4.5-9m depth).



EXAMPLE 2 - COVERAGE APPROXIMATELY 30%

LEGEND

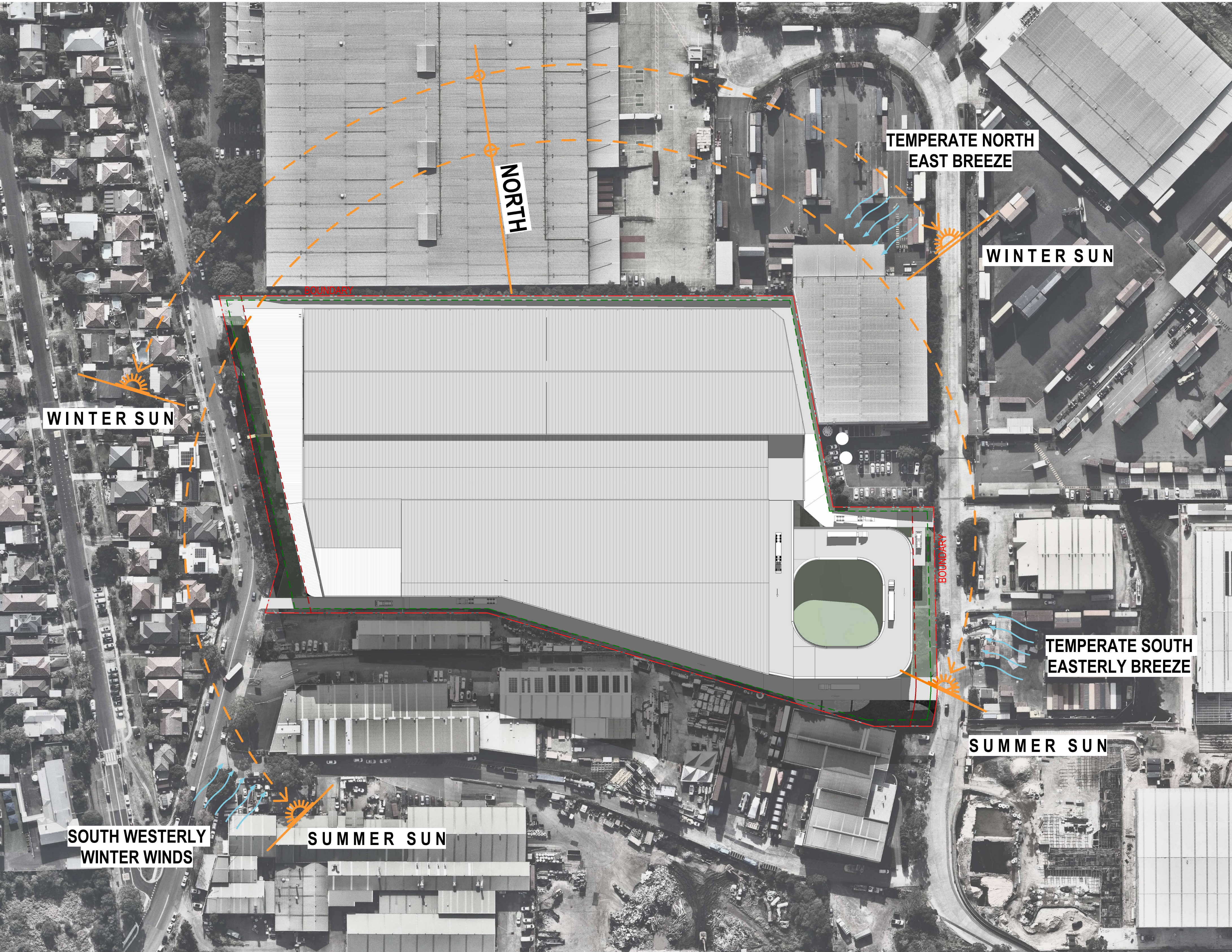
○ In Situ Soil Treatment Bore



NOTE: Where construction joints cannot be filled with sealant, an alternative approach to addressing the joint may be required. Where slab construction methods have generated appropriate seal additional sealant may not be required. To be confirmed between contractor and Environmental Consultant.

Appendix A2

Proposed Development Drawings



LEGEND	
	Site Boundary
	Lot Boundary
	Building Setback
	Landscape Setback

DEVELOPMENT SUMMARY

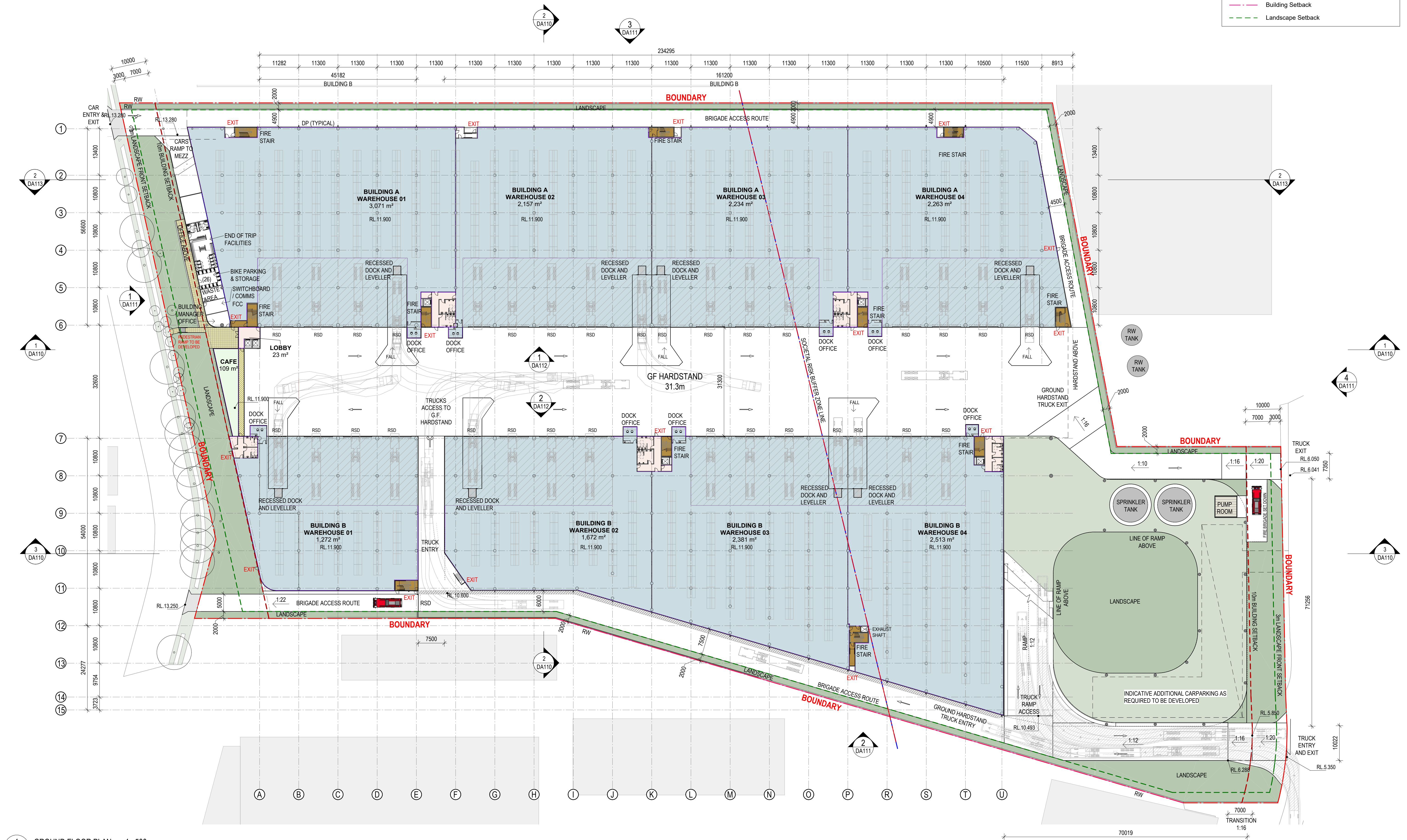
DEVELOPABLE SITE AREA	48,186 m²
TOTAL GFA	54,730 m²
PROPOSED FSR	1.14 : 1
MINIMUM LANDSCAPED AREA REQUIRED BAYSIDE DCP 3.7 C12	10%
LANDSCAPE AREA PROVIDED	5,002 m² (tbd)
LANDSCAPE PERCENTAGE PROVIDED	10.39% (tbd)
BICYCLE PARKING 1 BICYCLE SPACE PER 600sqm OF GFA (25% WAREHOUSE, 100% OFFICE)	29 21 (Warehouse) 8 (Office)
PARKING REQUIREMENT 1 space / 300m² GFA 1 space / 40m² GFA of ancillary office & cafe	284 162 (Warehouse) 119 (Office) 3 (Cafe)
PARKING PROVIDED	243
MOTORBIKE PARKING REQUIRED 1 MOTORCYCLE SPACE PER 15 CAR SPACES	19
MOTORBIKE PARKING PROVIDED	19
END OF TRIP FACILITIES: SHOWERS: 4 PER 200 OCCUPANTS & 1 ADDITIONAL PER 200 OCCUPANTS (OCCUPANCY CALCULATED 25% OF WAREHOUSE GFA & 100% OF OFFICE)	7 (tbd)
LOCKERS ONE LOCKER PER 8 OCCUPANTS	102 (tbd) 2 Tier

DEVELOPMENT SUMMARY - GFA

WAREHOUSE	OFFICE	LOBBY	SHARED CORRIDOR	END OF TRIP	CAFE	TOTAL AREA
48632 m²	4760 m²	1229 m²	0 m²	0 m²	109 m²	54,730 m²
48632 m²	4760 m²	1229 m²	0 m²	0 m²	109 m²	54,730 m²

LEGEND

- Site Boundary
- Lot Boundary
- Building Setback
- Landscape Setback

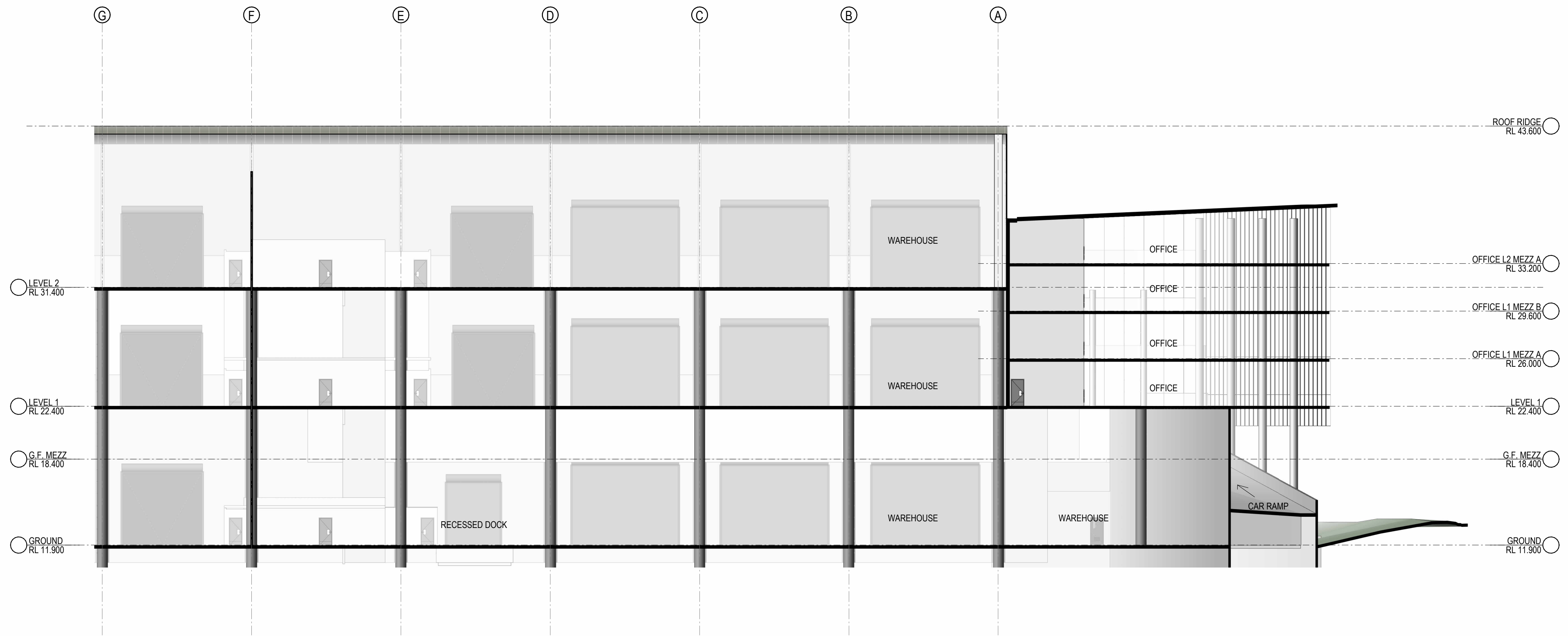


1 GROUND FLOOR PLAN 1:500

PRELIMINARY

PROPOSED MULTI-LEVEL INDUSTRIAL DEVELOPMENT

49 STEPHEN RD, BANKSMEADOW. NSW 2019

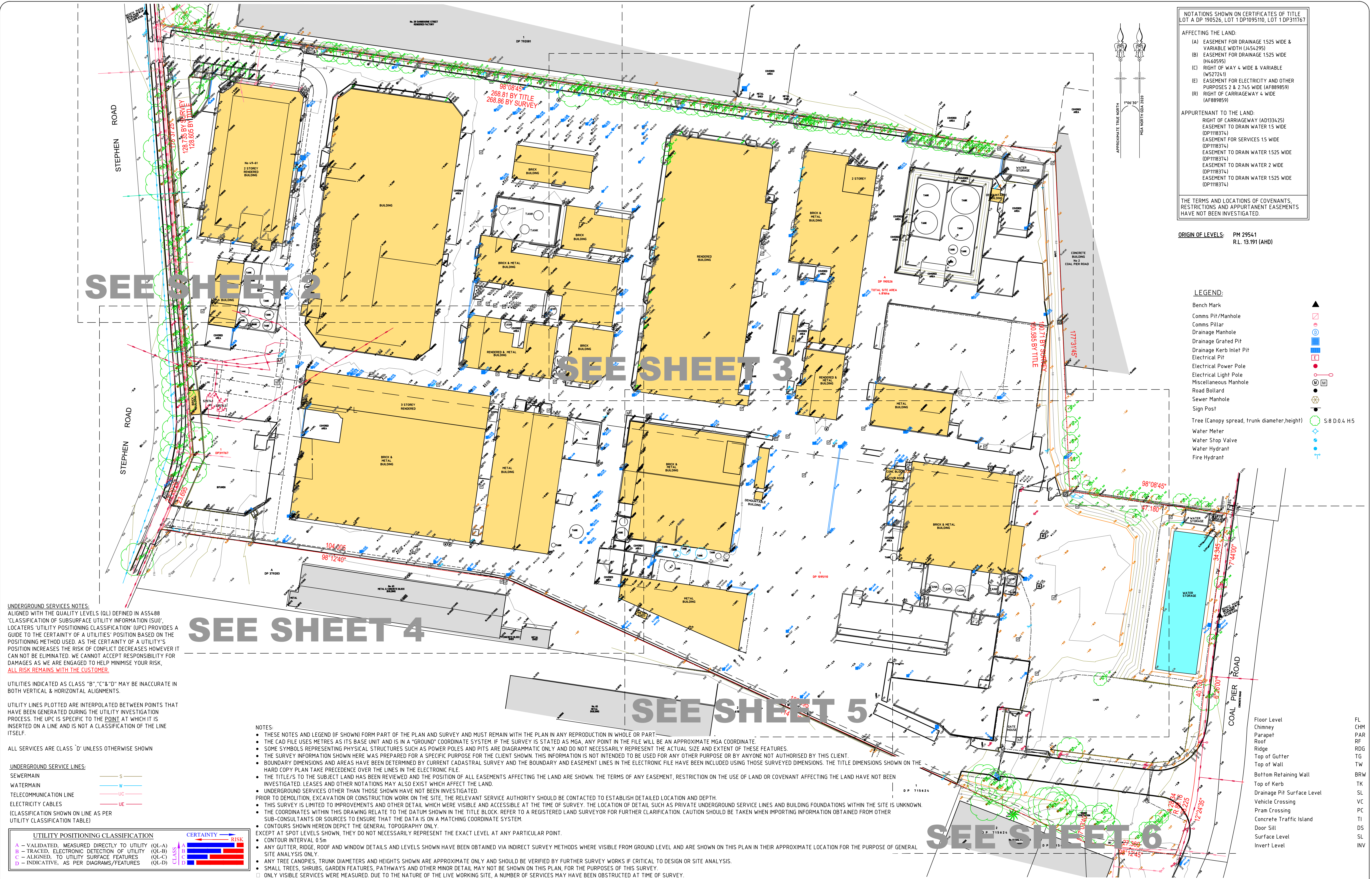


2 WAREHOUSE & OFFICE BUILDING SECTION 1 : 200

PRELIMINARY

Appendix A3

Site Survey



NOTATIONS SHOWN ON CERTIFICATES OF TITLE
LOT A DP 190526, LOT 1 DP1095110, LOT 1 DP311767

AFFECTING THE LAND:

(A) EASEMENT FOR DRAINAGE 1525 WIDE & VARIABLE WIDTH (H454295)
(B) EASEMENT FOR DRAINAGE 1525 WIDE (H460595)
(C) RIGHT OF WAY 4 WIDE & VARIABLE (W527241)
(E) EASEMENT FOR ELECTRICITY AND OTHER PURPOSES 2 & 2.745 WIDE (AF889859)
(R) RIGHT OF CARRIAGEWAY 4 WIDE (AF889859)

APPURTENANT TO THE LAND:

RIGHT OF CARRIAGEWAY (AD133425)
EASEMENT TO DRAIN WATER 15 WIDE (DP118374)
EASEMENT FOR SERVICES 15 WIDE (DP118374)
EASEMENT TO DRAIN WATER 1525 WIDE (DP118374)
EASEMENT TO DRAIN WATER 2 WIDE (DP118374)
EASEMENT TO DRAIN WATER 1525 WIDE (DP118374)

THE TERMS AND LOCATIONS OF COVENANTS, RESTRICTIONS AND APPURTENANT EASEMENTS HAVE NOT BEEN INVESTIGATED.

ORIGIN OF LEVELS: PM 29541
R.L. 13.191 (AHD)

LEGEND:

- Bench Mark
- Comms Pit/Manhole
- Comms Pillar
- Drainage Manhole
- Drainage Grafted Pit
- Drainage Kerb Inlet Pit
- Electrical Pit
- Electrical Power Pole
- Electrical Light Pole
- Miscellaneous Manhole
- Road Bollard
- Sewer Manhole
- Sign Post
- Tree (Canopy spread, trunk diameter,height)
- Water Meter
- Water Stop Valve
- Water Hydrant
- Fire Hydrant

UNDERGROUND SERVICES NOTES:
ALIGNED WITH THE QUALITY LEVELS (QL) DEFINED IN AS5488
'CLASSIFICATION OF SUBSURFACE UTILITY INFORMATION (SU)',
LOCATORS 'UTILITY POSITIONING CLASSIFICATION' (UPC) PROVIDES A
GUIDE TO THE CERTAINTY OF A UTILITIES' POSITION BASED ON THE
POSITIONING METHOD USED. AS THE CERTAINTY OF A UTILITY'S
POSITION INCREASES THE RISK OF CONFLICT DECREASES HOWEVER IT
CAN NOT BE ELIMINATED. WE CANNOT ACCEPT RESPONSIBILITY FOR
DAMAGES AS WE ARE ENGAGED TO HELP MINIMISE YOUR RISK,
ALL RISK REMAINS WITH THE CUSTOMER.

UTILITIES INDICATED AS CLASS "B", "C" & "D" MAY BE INACCURATE IN
BOTH VERTICAL & HORIZONTAL ALIGNMENTS.

UTILITY LINES PLOTTED ARE INTERPOLATED BETWEEN POINTS THAT
HAVE BEEN GENERATED DURING THE UTILITY INVESTIGATION
PROCESS. THE UPC IS SPECIFIC TO THE POINT AT WHICH IT IS
INSERTED ON A LINE AND IS NOT A CLASSIFICATION OF THE LINE
ITSELF.

ALL SERVICES ARE CLASS "D" UNLESS OTHERWISE SHOWN

UNDERGROUND SERVICE LINES:

SEWERMAIN — S —
WATERMAIN — W —
TELECOMMUNICATION LINE — UC —
ELECTRICITY CABLES — UE —

(CLASSIFICATION SHOWN ON LINE AS PER UTILITY CLASSIFICATION TABLE)

UTILITY POSITIONING CLASSIFICATION

CLASS	CERTAINTY	RISK
A	VALIDATED, MEASURED DIRECTLY TO UTILITY (QL-A)	LOW
B	TRACED, ELECTRONIC DETECTION OF UTILITY (QL-B)	LOW
C	ALIGNED, TO UTILITY SURFACE FEATURES (QL-C)	MEDIUM
D	INDICATIVE, AS PER DIAGRAMS/FEATURES (QL-D)	HIGH

NOTES:

- THESE NOTES AND LEGEND (IF SHOWN) FORM PART OF THE PLAN AND SURVEY AND MUST REMAIN WITH THE PLAN IN ANY REPRODUCTION IN WHOLE OR PART.
- THE CAD FILE USES METRES AS ITS BASE UNIT AND IS IN A 'GROUND' COORDINATE SYSTEM. IF THE SURVEY IS STATED AS MGA, ANY POINT IN THE FILE WILL BE AN APPROXIMATE MGA COORDINATE.
- SOME SYMBOLS REPRESENTING PHYSICAL STRUCTURES SUCH AS POWER POLES AND PITS ARE DIAGRAMMATIC ONLY AND DO NOT NECESSARILY REPRESENT THE ACTUAL SIZE AND EXTENT OF THESE FEATURES.
- THE SURVEY INFORMATION SHOWN HERE WAS PREPARED FOR A SPECIFIC PURPOSE FOR THE CLIENT SHOWN. THIS INFORMATION IS NOT INTENDED TO BE USED FOR ANY OTHER PURPOSE OR BY ANYONE NOT AUTHORISED BY THIS CLIENT.
- BOUNDARY DIMENSIONS AND AREAS HAVE BEEN DETERMINED BY CURRENT CADASTRAL SURVEY AND THE BOUNDARY AND EASEMENT LINES IN THE ELECTRONIC FILE HAVE BEEN INCLUDED USING THOSE SURVEYED DIMENSIONS. THE TITLE DIMENSIONS SHOWN ON THE HARD COPY PLAN TAKE PRECEDENCE OVER THE LINES IN THE ELECTRONIC FILE.
- THE TITLE/S TO THE SUBJECT LAND HAS BEEN REVIEWED AND THE POSITION OF ALL EASEMENTS AFFECTING THE LAND ARE SHOWN. THE TERMS OF ANY EASEMENT, RESTRICTION ON THE USE OF LAND OR COVENANT AFFECTING THE LAND HAVE NOT BEEN INVESTIGATED. LEASES AND OTHER NOTATIONS MAY ALSO EXIST WHICH AFFECT THE LAND.
- UNDERGROUND SERVICES OTHER THAN THOSE SHOWN HAVE NOT BEEN INVESTIGATED.
- THIS SURVEY IS LIMITED TO IMPROVEMENTS AND OTHER DETAIL WHICH WERE VISIBLE AND ACCESSIBLE AT THE TIME OF SURVEY. THE LOCATION OF DETAIL SUCH AS PRIVATE UNDERGROUND SERVICE LINES AND BUILDING FOUNDATIONS WITHIN THE SITE IS UNKNOWN.
- THE COORDINATES WITHIN THIS DRAWING RELATE TO THE DATUM SHOWN IN THE TITLE BLOCK. REFER TO A REGISTERED LAND SURVEYOR FOR FURTHER CLARIFICATION. CAUTION SHOULD BE TAKEN WHEN IMPORTING INFORMATION OBTAINED FROM OTHER SUB-CONSULTANTS OR SOURCES TO ENSURE THAT THE DATA IS ON A MATCHING COORDINATE SYSTEM.
- CONTOURS SHOWN HEREON DEPICT THE GENERAL TOPOGRAPHY ONLY.
- EXCEPT AT SPOT LEVELS SHOWN, THEY DO NOT NECESSARILY REPRESENT THE EXACT LEVEL AT ANY PARTICULAR POINT.
- CONTOUR INTERVAL 0.5m
- ANY GUTTER, RIDGE, ROOF AND WINDOW DETAILS AND LEVELS SHOWN HAVE BEEN OBTAINED VIA INDIRECT SURVEY METHODS WHERE VISIBLE FROM GROUND LEVEL AND ARE SHOWN ON THIS PLAN IN THEIR APPROXIMATE LOCATION FOR THE PURPOSE OF GENERAL SITE ANALYSIS ONLY.
- ANY TREE CANOPIES, TRUNK DIAMETERS AND HEIGHTS SHOWN ARE APPROXIMATE ONLY AND SHOULD BE VERIFIED BY FURTHER SURVEY WORKS IF CRITICAL TO DESIGN OR SITE ANALYSIS.
- SMALL TREES, SHRUBS, GARDEN FEATURES, PATHWAYS AND OTHER MINOR DETAIL MAY NOT BE SHOWN ON THIS PLAN, FOR THE PURPOSES OF THIS SURVEY.
- ONLY VISIBLE SERVICES WERE MEASURED. DUE TO THE NATURE OF THE LIVE WORKING SITE, A NUMBER OF SERVICES MAY HAVE BEEN OBSTRUCTED AT TIME OF SURVEY.

VER	BY	AMENDMENTS	DATE
A	V.K.M.	INITIAL ISSUE	23.12.22
B			
C			
D			
E			
F			
G			

THE POSITION OF SERVICES SHOWN ON THIS DRAWING ARE INDICATIVE ONLY AND HAVE BEEN PLOTTED FROM PLANS AND DRAWINGS SUPPLIED BY RELEVANT AUTHORITIES.

SERVICE AUTHORITY PITS, MANHOLES, POLES, MARKER POSTS, ETC., WHERE SIGHTED AT TIME OF SURVEY, HAVE BEEN LOCATED. THE SURVEY DOES NOT INCLUDE INVESTIGATION OR LOCATION OF UNDERGROUND INFRASTRUCTURE.

SERVICES INFORMATION SHOWN ON THIS DRAWING HAS BEEN OBTAINED THROUGH A DIAL BEFORE YOU DIG SEARCH AND IS VALID FOR THE PERIOD OF TIME FROM THE DATE OF ISSUE NOMINATED BY THE AUTHORITY.

PRIOR TO ANY DEMOLITION, EXCAVATION OR CONSTRUCTION ON OR ADJACENT TO THE SITE IT IS THE RESPONSIBILITY OF THE DEVELOPER AND CONTRACTORS TO APPLY FOR AND OBTAIN UP TO DATE PLANS THROUGH A NEW DIAL BEFORE YOU DIG SEARCH AND TO CONTACT ALL THE RELEVANT AUTHORITIES TO ESTABLISH AND CONFIRM THE DETAILED LOCATION AND DEPTH OF ALL UNDERGROUND SERVICES.

www.dialbeforeyoudig.com.au

DIAL 1100 BEFORE YOU DIG

CLIENT:

ESR DEVELOPMENTS (AUSTRALIA) PTY LTD

BW Beveridge Williams
Land Development Consultants
Registered Surveyors

Sydney (02) 9283 6677 www.beveridgewilliams.com.au

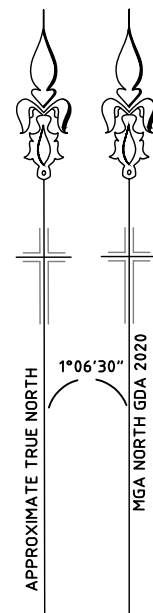
DETAILS:

DETAIL SURVEY PLAN
AT 49-61 STEPHEN ROAD,
BANKSMEADOW
LOTS A/DP190526, 1/DP1095110, 1/DP311767

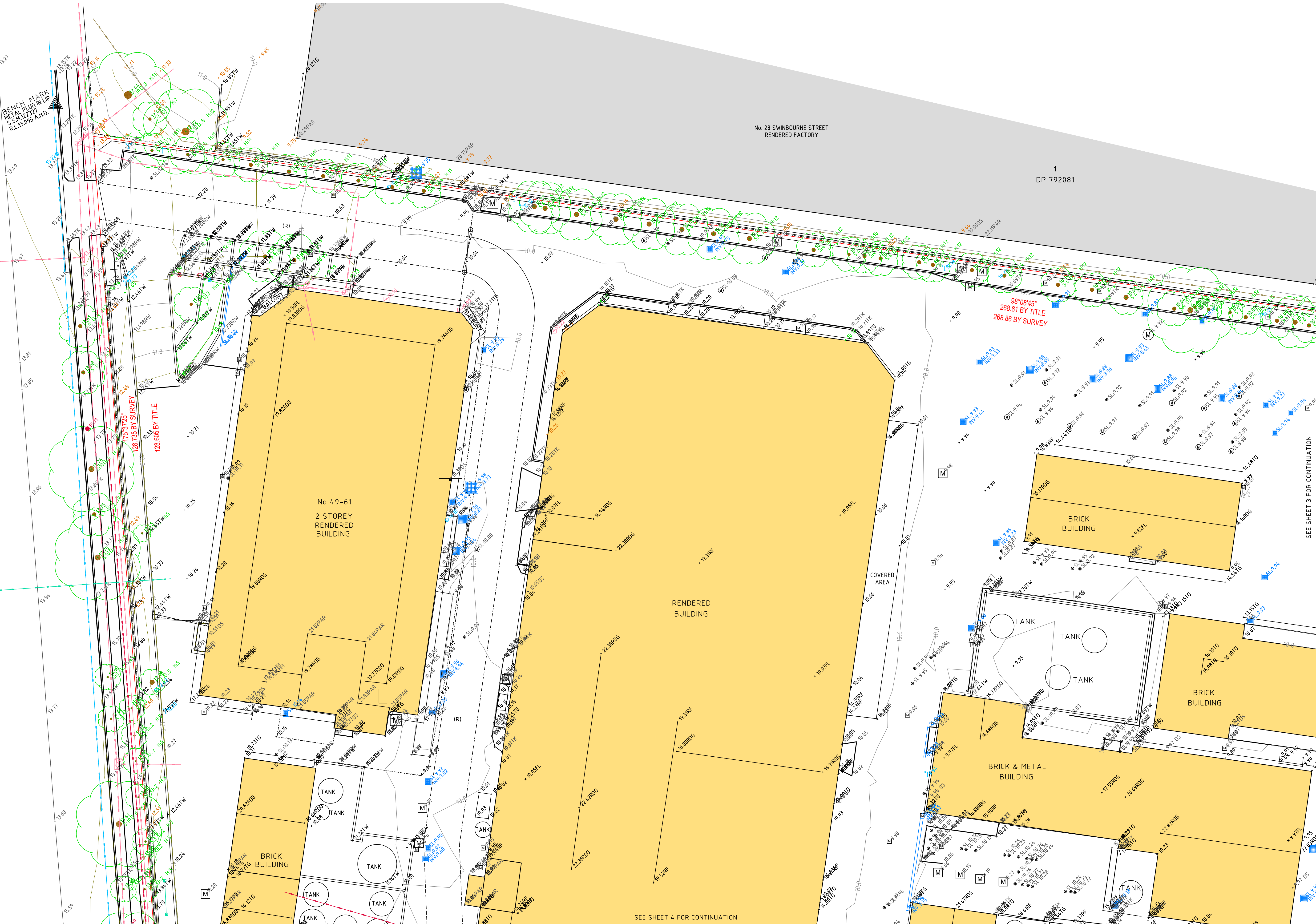
ORIGINAL SHEET SIZE A1
SCALE 1:500
CAD REFERENCE: 2201113_DET_REV A
SCALE ON ORIGINAL DRAWING AT 1:500

SURVEYOR: V.K.M.
DRAWN: J.G.
CHECKED: J.G.
SURVEY DATE: 14.12.2022
VERTICAL DATUM: AHD
HORIZONTAL DATUM: MGA

PROJECT No. 2201113
DRAWING REF. DET-001
VERSION A
SHEET 1 OF 6



STEPHEN ROAD



VER	BY	AMENDMENTS	DATE
A	V.K.M.	INITIAL ISSUE	23.12.22
B			
C			
D			
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CLIENT:
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Beveridge Williams
Land Development Consultants
Registered Surveyors

Sydney (02) 9283 6677

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DETAILS:
DETAIL SURVEY PLAN
AT 49-61 STEPHEN ROAD,
BANKSMEDAW
LOTS A/DP190526, 1/DP1095110, 1/DP311767

ORIGINAL SHEET SIZE
SCALE 1:200
A1
CAD REFERENCE: 2201113_DET_REV A
SCALE ON ORIGINAL DRAWING AT 1:200

SURVEYOR: V.K.M.
DRAWN: J.G.
CHECKED: J.G.
SURVEY DATE: 14.12.2022
VERTICAL DATUM: AHD
HORIZONTAL DATUM: MGA

PROJECT No.
2201113
DRAWING REF.
DET-001
VERSION A
SHEET 2 OF 6

SEE SHEET 3 FOR CONTINUATION

SEE SHEET 4 FOR CONTINUATION



VER	BY	AMENDMENTS	DATE
A	V.K.M.	INITIAL ISSUE	23.12.22
B			
C			
D			
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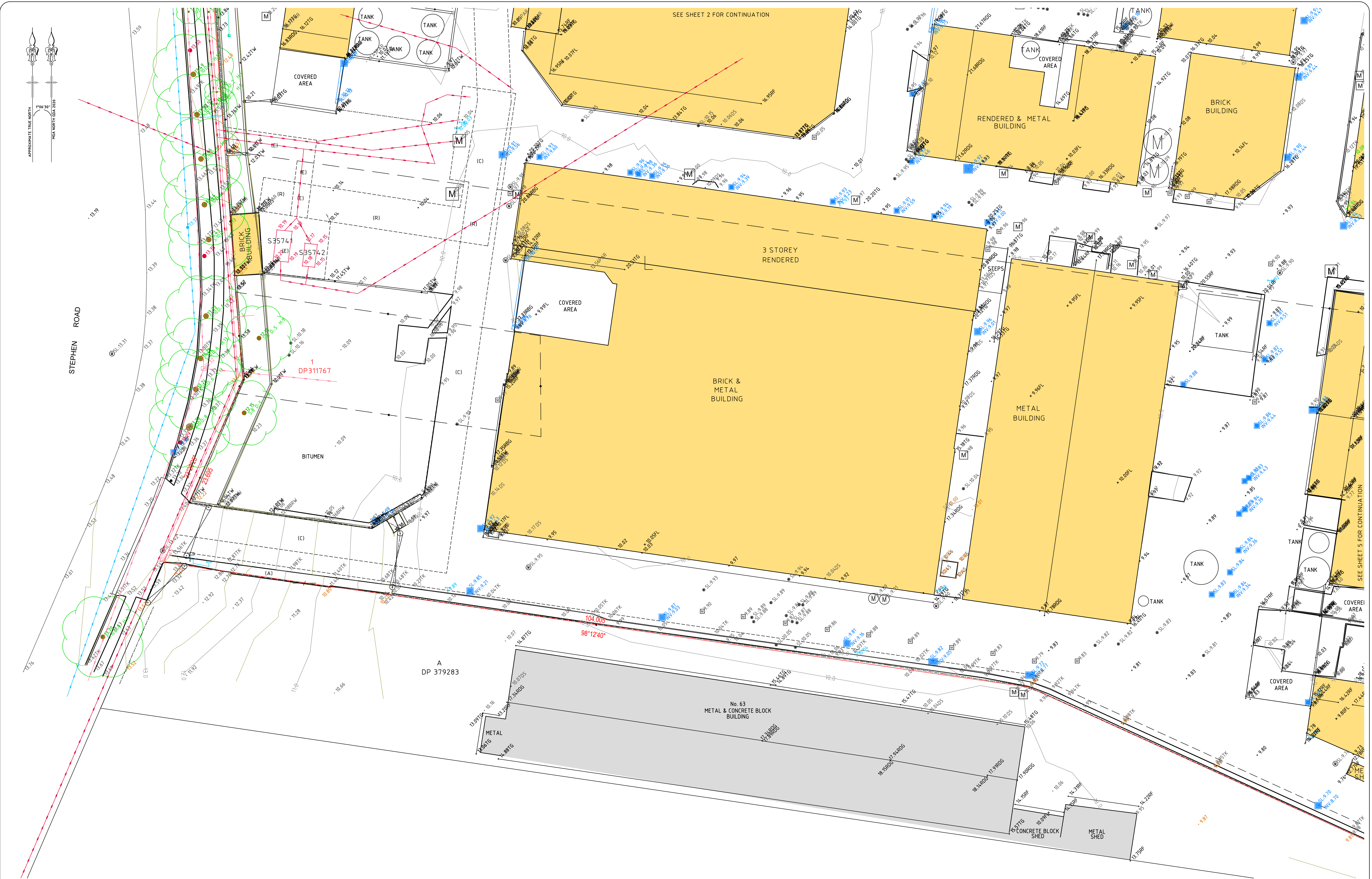
DETAILS:
DETAIL SURVEY PLAN
AT 49-61 STEPHEN ROAD,
BANKSMEADOW
LOTS A/DP190526, 1/DP1095110, 1/DP311767

ORIGINAL SCALE
1:200
SHEET SIZE
A1
CAD REFERENCE: 2201113_DET_REV A
0 4 8 12
SCALE ON ORIGINAL DRAWING AT 1:200

SURVEYOR:
DRAWN:
CHECKED:
SURVEY DATE:
VERTICAL DATUM:
HORIZONTAL DATUM:

V.K.M.
J.G.
J.G.
14.12.2022
AHD
MGA

PROJECT No.
2201113
DRAWING REF.
DET-001
VERSION
A
SHEET 3 OF 6



VER	BY	AMENDMENTS	DATE
A	V.K.M.	INITIAL ISSUE	23.12.22
B			
C			
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DETAILS:
DETAIL SURVEY PLAN
AT 49-61 STEPHEN ROAD,
BANKSMEADOW
LOTS A/DP190526, 1/DP1095110, 1/DP311767

ORIGINAL SHEET SIZE
SCALE 1:200
A1
CAD REFERENCE: 2201113_DET_REV A
SCALE ON ORIGINAL DRAWING AT 1:200

SURVEYOR:
DRAWN:
CHECKED:
SURVEY DATE:
VERTICAL DATUM:
HORIZONTAL DATUM:

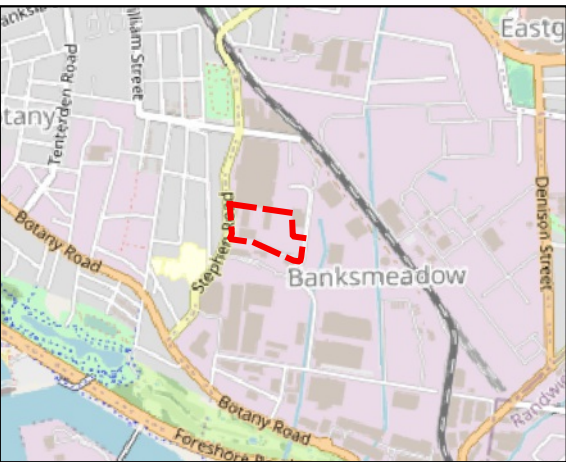
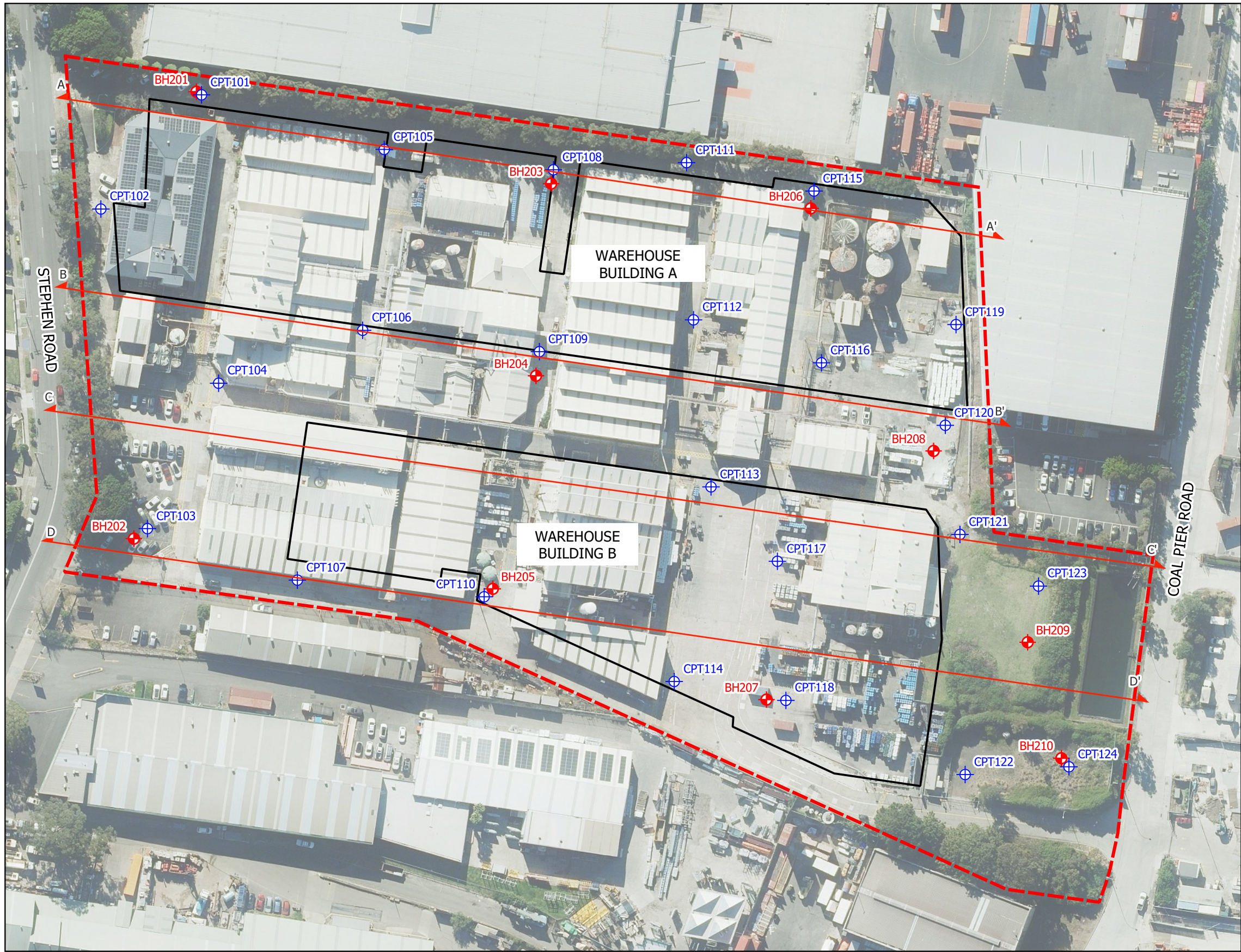
V.K.M.
J.G.
J.G.
14.12.2022
AHD
MGA

PROJECT No.
2201113
DRAWING REF.
DET-001
VERSION
A
SHEET 4 OF 6



Appendix A4

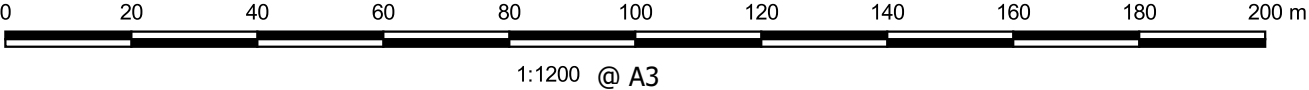
DP (2023) Geotechnical Investigation - Extracted Drawings



Locality Plan

- LEGEND
- Borehole Location
 - CPT Location
 - Approximate Site Boundary
 - Proposed Building Outline
 - Cross Sections

NOTE:
1: Basemap from Metromap (Dated 26.07.2023)

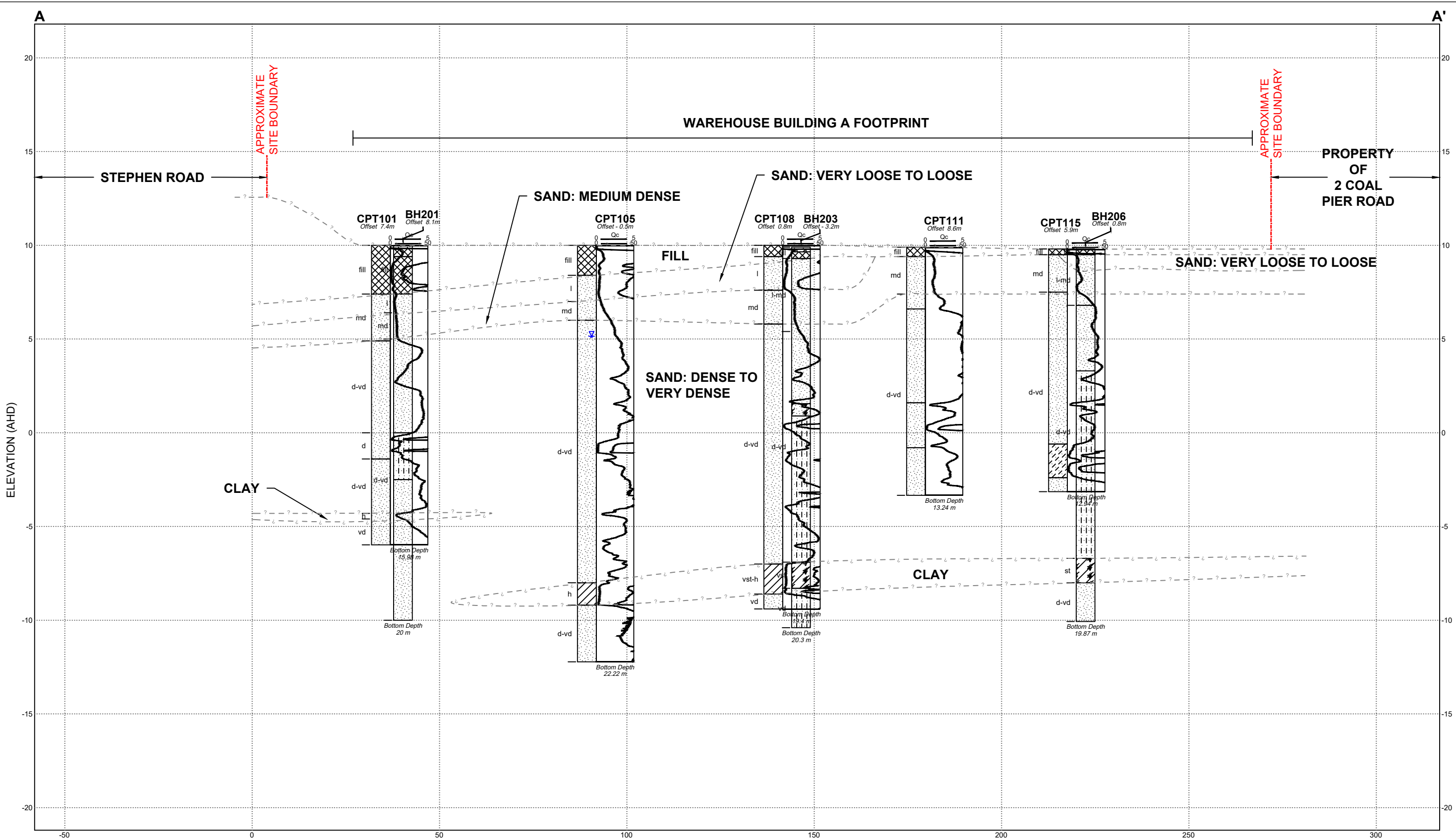


CLIENT: ESR Australia	
OFFICE: Sydney	DRAWN MN/EC
SCALE: 1:1200 @ A3	DATE: 14.11.2023

TITLE: Test Location Plan
Proposed Industrial Development
49 Stephen Road, Banksmeadow



PROJECT No: 219609.02	
DRAWING	1
REVISION:	0



LEGEND

	Concrete		Sand
	Filling		Peaty Clay
	Sand		Clay
	Silty Sand		Clayey Sand

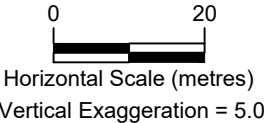
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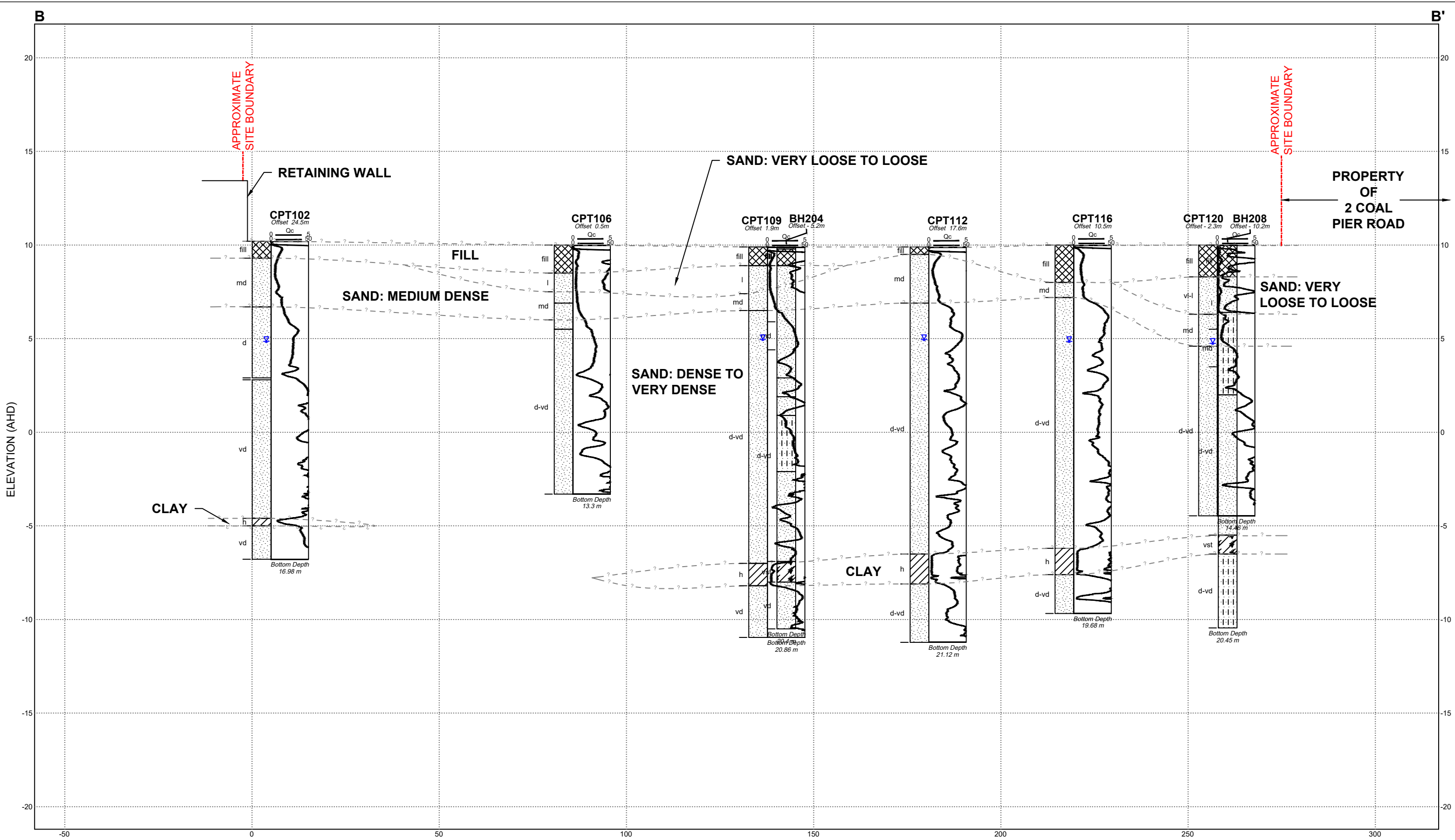
1. Subsurface conditions are accurate at the borehole locations only.
Variations in subsurface conditions may occur between borehole locations.
Interpreted strata boundaries are approximate and should be used as a guide only.

2. Summary logs only and should be read in conjunction with detailed logs.

3. Horizontal and vertical scales are not equal.

SOIL DENSITY	ROCK STRENGTH	SOIL CONSISTENCY	TESTS / OTHER
vl - Very Loose	EL - Extremely Low	vs - Very Soft	N - Standard penetration test value
l - Loose	VL - Very Low	s - Soft	- - - - - Interpreted geotechnical boundary
md - Medium Dense	L - Low	f - Firm	▼ - Water level
d - Dense	M - Medium	st - Stiff	
vd - Very Dense	H - High	vst - Very Stiff	
		h - Hard	





LEGEND

- Concrete
- Filling
- Sand
- Silty Sand

- Peaty Clay
- Clay

NOTES:

- Subsurface conditions are accurate at the borehole locations only. Variations in subsurface conditions may occur between borehole locations. Interpreted strata boundaries are approximate and should be used as a guide only.
- Summary logs only and should be read in conjunction with detailed logs.
- Horizontal and vertical scales are not equal.

SOIL DENSITY

- vl - Very Loose
- l - Loose
- md - Medium Dense
- d - Dense
- vd - Very Dense

ROCK STRENGTH

- EL - Extremely Low
- VL - Very Low
- L - Low
- M - Medium
- H - High

SOIL CONSISTENCY

- vs - Very Soft
- s - Soft
- f - Firm
- st - Stiff
- vst - Very Stiff
- h - Hard

TESTS / OTHER

- N - Standard penetration test value
- - - - - Interpreted geotechnical boundary
- W - Water level



Horizontal Scale (metres)
Vertical Exaggeration = 5.0



CLIENT: ESR Australia

OFFICE: Sydney

DRAWN BY: EC

SCALE: 1:1000 (H)
1:200 (V) @ A3

DATE: 14.11.2023

TITLE: **Interpreted Geotechnical Cross-Section B-B'**

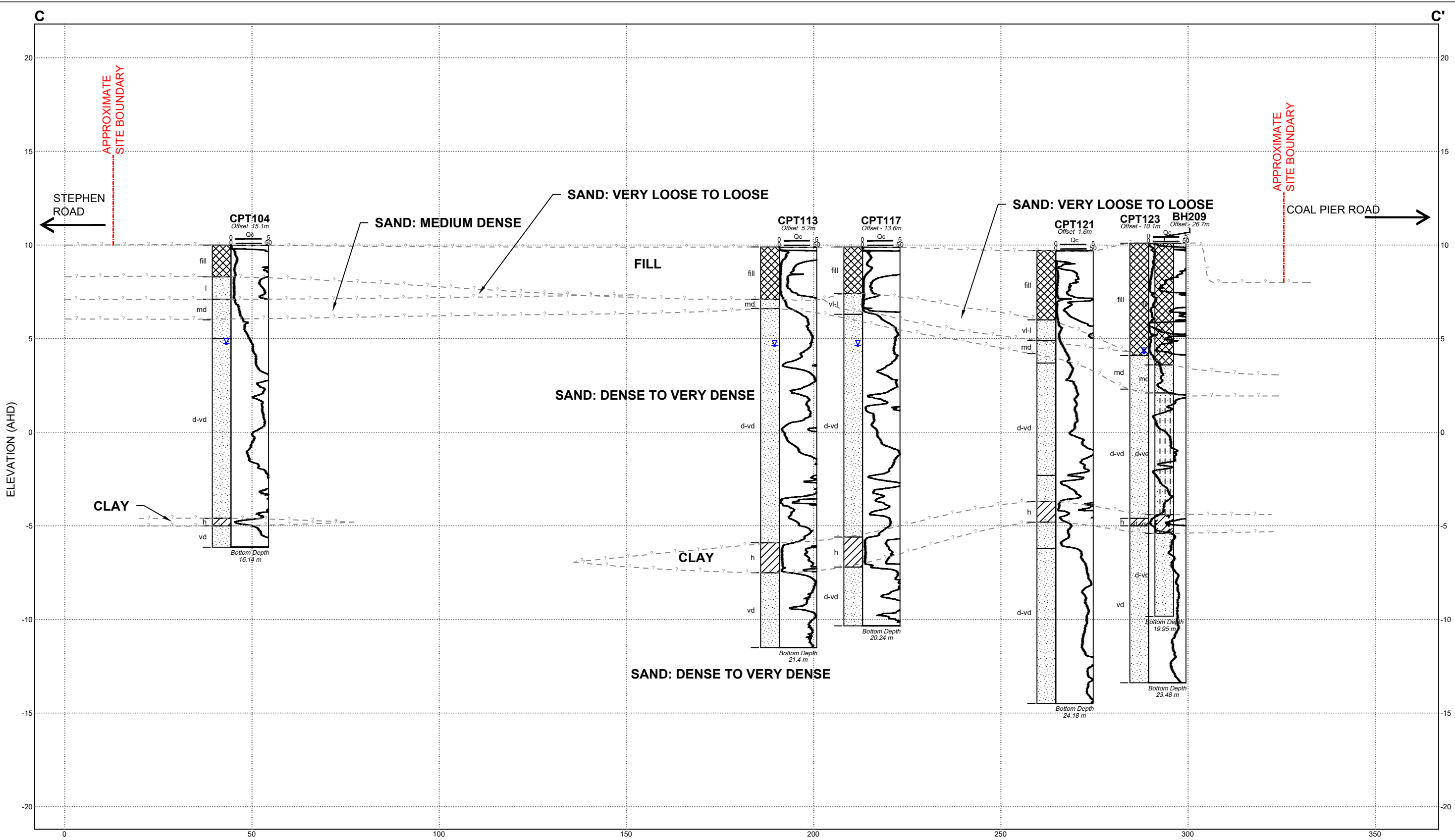
Proposed Industrial Development

49 Stephen Road, Banksmeadow

PROJECT No: 219609.02

DRAWING No: 3

REVISION: 1



- LEGEND
- Filling
 - Sand
 - Silty Sand
 - Peaty Clay



NOTES:

- Subsurface conditions are accurate at the borehole locations only. Variations in subsurface conditions may occur between borehole locations. Interpreted strata boundaries are approximate and should be used as a guide only.
- Summary logs only and should be read in conjunction with detailed logs.
- Horizontal and vertical scales are not equal.

SOIL DENSITY

- vl - Very Loose
- l - Loose
- md - Medium Dense
- d - Dense
- vd - Very Dense

ROCK STRENGTH

- EL - Extremely Low
- VL - Very Low
- L - Low
- M - Medium
- H - High

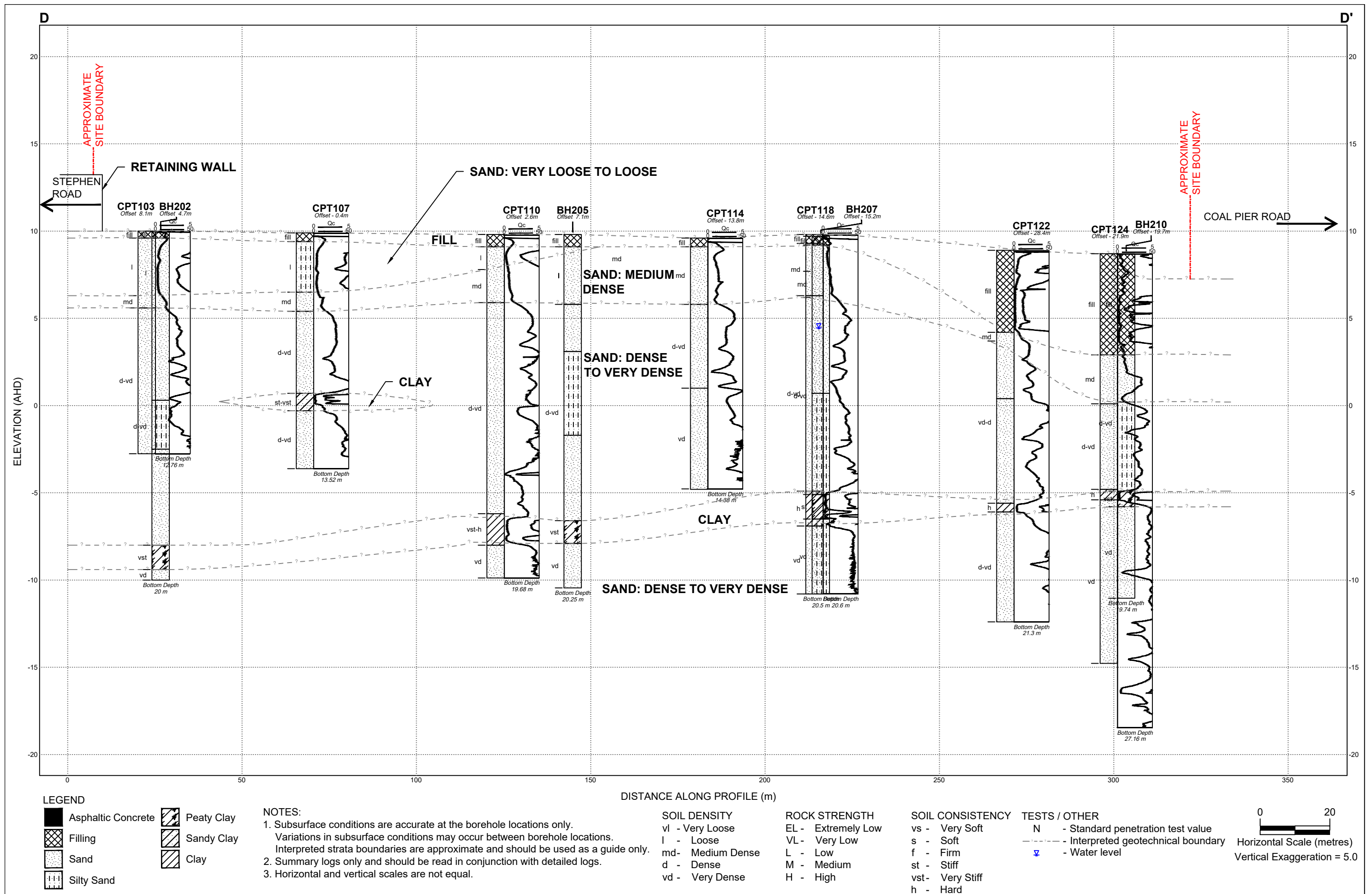
SOIL CONSISTENCY

- vs - Very Soft
- s - Soft
- f - Firm
- st - Stiff
- vst - Very Stiff
- h - Hard

TESTS / OTHER

- N - Standard penetration test value
- - - - - Interpreted geotechnical boundary
- ▼ - Water level

0 20
Horizontal Scale (metres)
Vertical Exaggeration = 5.0



Appendix B

About this Report

Introduction

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

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

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

Borehole and Test Pit Logs

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

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

Groundwater

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

- In low permeability soils groundwater may enter the hole very slowly or perhaps not at all during the time the hole is left open;
- A localised, perched water table may lead to an erroneous indication of the true water table;
- Water table levels will vary from time to time with seasons or recent weather changes. They may not be the same at

the time of construction as are indicated in the report; and

- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must first be washed out of the hole if water measurements are to be made.

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

Reports

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

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

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

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

continued next page

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.

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