Douglas PARTNERS

GROUNDED EXPERTISE

Volume 1 of 4
Report, Appendix A (A1)

Report on Supplementary Site (Contamination) Investigation

Proposed Industrial Development

49-61 Stephen Road, Banksmeadow

Prepared for ESR Australia

Project 219609.01

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

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Executive Summary

This report presents the results of a supplementary site (contamination) investigation (SSCI) undertaken by Douglas Partners Pty Ltd (DP) for the proposed industrial warehouse development at 49-61 Stephen Road, Banksmeadow (herein referred to as the 'site'). The site boundary is shown on Drawing 1, Appendix A1.

Historical and recent investigations have identified hydrocarbon based contaminants, in particular toluene, ethylbenzene and xylene (TEX) associated with the former owner's, now tenant (Allnex Resins Australia Pty Ltd (Allnex)), site operations. Other elevated concentrations for potential contaminants of concern have also been identified by previous investigations, more conspicuous being lead, organochlorine pesticides (OCP) and asbestos. Hydrocarbon based contaminants have been primarily identified in soil and groundwater whilst other contaminants were more notably in soil media. Although some soil vapour phase impacts have previously been identified, these did not appear to be widespread or grossly elevated based on previous results.

Allnex agreed with the NSW Environment Protection Authority (EPA) to the current voluntary management proposal (VMP) that applies to the site. The current VMP is associated with groundwater impacts in the central / western section of the site and addresses groundwater remediation, monitoring and validation of these remedial works. Notwithstanding, contamination was subsequently identified by JBS&G Australia Pty Ltd (JBS&G) in the eastern section of the site, as reported in their 2023 contamination investigation. The impacts in the eastern area primarily comprised total recoverable hydrocarbons (TRH) and TEX in groundwater wells JBMW07, JBMW12 and JBMW13. Consequently, and with regard to Undertaking 12 of the VMP, the contamination in the eastern area was reported by Allnex to the NSW EPA on 9 December 2022. DP understands the ongoing remediation and management of the contamination in the central / western section of the site, and the more recently identified eastern contamination area, is being managed under the VMP.

The primary objectives of this 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 total petroleum hydrocarbons (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; and
- Check for the presence of acid sulphate soils (ASS).

The 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.

Field observations noted groundwater levels between ~5-6 m and identified a general subsurface profile comprising:

- 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 fragments 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 8-15 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.

The main contaminants of concern identified previously at the site and during the course of this investigation are volatile organic compounds (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 are at depth associated with the groundwater. The two main areas of groundwater impacts are associated with 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 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 appear 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 210 and 334. Addressing the impacts in the soils between ~2 m and the top of the water table in this 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 appears 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 conspicuously in boreholes 210 and 333 located the south-eastern corner of the site near the driveway off Coal Pier Road. The lead contamination across the eastern section of the site will need to be addressed via capping to remove the complete exposure pathway. It is also recommended that given the detections in groundwater, OCP impacted soils are placed in a low permeable containment cell.

Asbestos has been recorded in fill across the site, including in non-friable (ACM) and friable form and above the asbestos fines / friable asbestos site assessment criteria of 0.001 %. Accordingly, fill at the site is to be considered impacted with asbestos and will need to be capped to remove the complete exposure pathway, consistent with the capping required for the lead contamination and the development approach of raising the site.

Given the soil vapour results from this 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 this investigation, there is not considered to be a gross soil vapour risk.

Based on the results from this SSCI and previous investigations, the site currently presents contamination risks for the proposed development and these risks will need to be addressed as part of the development works. In this regard, anticipated works from a contamination perspective along with additional recommendations and comments are provided below:

- A remediation action plan (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;
- Capping and associated long-term management of soils is required given lead and asbestos impacts;
- Placement of the OCP impacted soils in a low permeable containment cell. Consideration should also be given the placement of lower impacted OCP soils and /or the soils with high lead concentrations from the vicinity of boreholes 210 and 333 in the containment cell;
- Removal and validation of aboveground and underground storage tanks and associated infrastructure;
- *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 (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;
- The natural soils near or below the water 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. Accordingly, an acid sulphate soils management plan 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;
- Implementation of an unexpected finds / additional finds protocol 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 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 this SSCI it is 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 body of this report, and successful completion of the required remediation works as to be outlined in the RAP.

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:
    - Approximately 57,034 m^2 of total GFA comprising:
        - 51,195 m^2 of warehouse area;
        - 4,775 m^2 of office area;
        - 964 m^2 of lobby space; and
        - 100 m^2 café.
    - 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 m^2 (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. - Assessment of the extent and nature of any contamination of the soil, groundwater and soil vapour, including the potential risks to human health and the environment receptors near 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 extent and nature of contamination at the site and information on the VMP in the context of the site and the proposed development.

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 DSI.
NSW Environment Protection Authority (Contamination & Remediation / Rehabilitation)	Appendix A, Section B: - Information on groundwater quality. Appendix A, Section C: 5. Soil Contamination Issues -Site history. Appendix A, Section E: 5. Water - Description of existing groundwater quality. 6. Soils and Contamination: -Description of soils types, soil contamination and acid sulphate soils (ASS).	Report in full addresses requested documentation, namely contamination present at the site and assessment of ASS. Note: The RAP provides information on remediation approach for the site.

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.

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Appendix D: Information Extracted from Provided Information and Reports

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

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D3: Orica Groundwater Data (December 2023) – Logs and Summary Results Tables

D4: Allnex Spill Information (2023).

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Report on Supplementary Site (Contamination) Investigation
Proposed Industrial Development
49-61 Stephen Road, Banksmeadow

1. Introduction

This report presents the results of a supplementary site (contamination) investigation (SSCI) undertaken by Douglas Partners Pty Ltd (DP) for the proposed industrial warehouse development at 49-61 Stephen Road, Banksmeadow (herein referred to as the 'site'). The site boundary is shown on Drawing 1, Appendix A1. The investigation was commissioned by ESR Australia (ESR) and was undertaken in general accordance with DP's proposal 219609.01.P.001.Rev0 dated 3 June 2023.

Given the contamination at the site DP is aware of numerous previous contamination investigations and reports (including groundwater monitoring events) that have previously been undertaken at the site dating back to *circa* 2009, with groundwater remediation and monitoring events ongoing. Notwithstanding, the more relevant investigations were considered to be those which are representative of current site conditions, *viz.* those investigations[1] undertaken since 2022 when property ownership changed from the current tenant, Allnex Resins Australia Pty Ltd (Allnex), to ESR. These have been the focus of the background review component of this investigation.

Historical and recent investigations have identified hydrocarbon based contaminants, in particular toluene, ethylbenzene and xylene (TEX) associated with the Allnex's site operations. Other elevated concentrations for potential contaminants of concern have also been identified by previous investigations, more conspicuous being metals (namely lead), organochlorine pesticides (OCP) and asbestos. Hydrocarbon based contaminants have been primarily identified in soil and groundwater whilst other contaminants were more notably in soil media. Although some impacts in soil vapour phase have previously been identified, these did not appear to be widespread or grossly elevated based on previous results.

This investigation seeks to supplement results from previous investigations and ongoing groundwater monitoring assessments, in particular with respect to potential soil and groundwater (and to a lesser extent soil vapour) impacts encountered as part of the due diligence contamination investigation works undertaken by others, namely JBS&G Australia Pty Ltd (JSB&G) and AECOM Services Pty Ltd (AECOM). Hence, when this and previous investigations are considered in total, this is considered to exceed the requirements for a detailed site (contamination) investigation.

[1] Including groundwater monitoring events and groundwater remediation performance monitoring events.

The primary objectives of this investigation were to:

- Check the soil vapour concentrations in the eastern grassed area of the site where previous soil vapour testing was not undertaken and in the western section of the site where elevated total petroleum hydrocarbons (TPH) were previously recorded in the vicinity of the Alkyds Plant building;
- Supplement soil contamination data with a view to:
  - Understand further the nature of the lead and OCP contamination identified during the due diligence investigations (i.e. are these isolated or more widespread);
  - Better understand the potential extent of asbestos contamination at the site; and
  - Gain addition understanding of soil impacts in the vicinity of the underground storage tanks (USTs) and the area subject to current groundwater remediation in the central section of the site.
- Supplement groundwater information previously obtained on the site by others;
- Review groundwater contamination information 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; and
- Check for the presence of acid sulphate soils (ASS).

The investigation 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:

- National Environment Protection Council (NEPC), *'National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013)'*, dated 2013 (NEPC, 2013);
- NSW Acid Sulfate Soils Management Advisory Committee (ASSMAC), *'Acid Sulfate Soils Assessment Guidelines'*, dated 1998 (ASSMAC, 1998); and
- NSW EPA, *'Contaminated Land Guidelines - Consultants Reporting on Contaminated Land'*, dated 2020 (NSW EPA, 2020).

It is noted that the investigation was undertaken concurrently with DP's geotechnical investigation, which has been reported separately in DP (2023)[2].

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

[2] DP, *'Report on Geotechnical Investigation, Proposed Industrial Development, 49-61 Stephen Road, Banksmeadow'*, DP ref: 219609.02.R.001.Rev0 dated 21 December 2023 (DP, 2023).

2. Scope of Work

DP undertook the following scope of works for this SSCI:

- Reviewed desktop information including:
  - Pertinent previous reports and information provided to DP by ESR, Allnex and Orica Limited (Orica);
  - Topographical, soil, geological and ASS risk mapping;
  - NSW EPA online database for the site and nearby properties with respect to notifications under the *Contaminated Lands Management Act 1997* (CLM Act) and *Protection of the Environment Operations Act 1997* (POEO Act);
  - *Temporary Water Restrictions Order for the Botany Sands Groundwater Source 2024* (TWR Order); and
  - NSW Government online database of nearby groundwater bores.
- Conducted a site walkover to observe site features, set-out proposed sample locations and assess the serviceability of previously installed groundwater wells;
- Undertook a Before-You-Dig Australia search for the site and services scan at the proposed sample locations. As part of the test location set out and service scanning, a ground penetrating radar (GPR) screen was undertaken in the vicinity of the test locations and the area of potential USTs in the central northern section of the site as indicated from DP's site observations and discussions with Allnex;
- Undertook opportunistic works in association with the geotechnical investigation works, DP (2023), including:
  - As part of the cone penetration tests (CPTs) electrical conductivity (EC) testing of the soil profile at 14 of the CPT locations to gain a qualitative indication for the potential for gross contamination at depth;
  - Installation of groundwater wells at depth in boreholes 209 and 210;
  - Opportunistic soil sampling comprising:
    - Soil samples for asbestos analysis collected from under the concrete slab at CPT locations 101-120 given these locations required concrete coring. Locations 121-124 located in unsealed areas at the eastern end of the site were not sampled; and
    - Soil sampling for contamination and ASS purposes from boreholes 201-210.
- Drilled 41 sample locations, and a total of 60 boreholes for contamination purposes. This included grouped boreholes around 320 (including 320A-320D), 322 (including 322A-322D), 328 (including 328A-328D) and 329 (including 329A-329D) where elevated soil contamination results were identified by JBS&G (2023)[3]. This work included:
  - Dilling primarily undertaken using a geoprobe drill rig, with hand tools used at two locations (320A and 336) where drill rig access was restricted;

[3] JBS&G, *'Detailed Site Investigation, 49 to 61 Stephen Road, Botany NSW'*, JBS&G ref: 63638/148593 (Rev2) dated 19 January 2023 (JBS&G, 2023).

  - Installation of soil vapour ports in 10 of the boreholes (301, 303, 304, 306, 328C, 329B, 329C, 330, 332, 333); and
  - Installation of groundwater wells in nine boreholes (302, 305, 307, 311, 331, 334).
- Each borehole was logged by a DP engineer or scientist;
- Collected soil samples at all test locations generally at near surface, regular depth intervals, changes in strata or upon signs of contamination (e.g. odours, staining);
- Collected ASS samples from the geotechnical boreholes (201-210) and 15 of the contamination boreholes (302, 305, 308, 311, 312, 316-319, 327, 328C, 329C, 331, 333, 334);
- Field screened soil samples, groundwater wells and soil vapour ports for volatile organic compounds (VOC) using a photoionisation detector (PID). Also screened groundwater wells (Round 2 wells) and soil vapour ports for bulk ground gases using a GA5000;
- Developed each well which comprised removing a minimum of three well volumes or until the well was dry;
- Sampled new and existing wells using a low flow technique. Field parameters were recorded and allowed to stabilise prior to sampling. Sampling was undertaken across two rounds which comprised:
  - Round 1 - September 2023:
    - New DP Wells: 209, 210, 302, 305, 307, 331, 334, 338;
    - Existing AECOM Wells: MW11, MW40-S, MW41-S, MW41-D;
    - Existing JBS&G Wells: JBMW01, JBMW03, JBMW04, JBMW05, JBMW06, JBMW7, JBMW10, JBMW12, JBMW13; and
    - Existing Orica Wells: WG229-S, WG229-D, WG230-S, WG233-I, WG233-D.
  - Round 2 – November 2023:
    - New DP Wells: 209, 210, 307, 331, 334, 338;
    - Existing AECOM Wells: MW09, MW18, MW32-S, MW40-S; and
    - Existing JBS&G Wells: JBMW05, JBMW06, JBMW07, JBMW11, JBMW12, JBMW13,

  It is noted samples collected during Round 2 (November 2023) from 10 locations (307, 331, 334, 334, JBMW05, JBMW06, JBMW07, JBMW12, JBMW13 and MW40-S) included an additional shallow sample collected from the upper groundwater profile as indicated by a '(T)' prefix on the sample in addition to mid water column sample.
- Purged each soil vapour port (301, 303, 304, 306, 328C, 329B, 329C, 330, 332, 333) and subsequently sampled using laboratory prepared Summa canister with attached regulator;
- Analysed selected soil, groundwater and soil vapour samples (plus quality assurance / quality control samples (QA / QC)) at National Association of Testing Authorities (NATA) accredited laboratories for a range of potential contaminants and properties including:
  - Soils: Metals; total recoverable hydrocarbons (TRH); TPH; VOC (including benzene and TEX - BTEX); polycyclic aromatic hydrocarbons (PAH); OCP; organophosphorus pesticides (OPP); polychlorinated biphenyls (PCB); phenols; per- and poly-fluoroalkyl substances (PFAS); asbestos; toxicity characteristic leaching procedure (TCLP); Australia Standard leaching procedure (ASLP); anions; and cations;

  - Groundwater: Metals; TRH; TPH; VOC (including BTEX); PAH; OCP; OPP; phenols; PFAS; pseudomonas aeruginosa; cations; anions; total suspended solids (TSS); and total dissolved solids (TDS); and
  - Soil Vapour: Air phase TPH; VOC (TO-15); and isopropyl alcohol (IPA).
- Selected material samples collected from test locations were subject to analysis at a NATA accredited laboratory for asbestos identification;
- Screened soil samples for the potential presence of ASS at a NATA accredited laboratory. Following review of screening results selected samples were subject to chromium reducible sulphur suite (SCr) analysis; and
- Compiled this SSCI report which outlines the works undertaken and comments on the findings of the investigation.

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 m^2 and 3300 m^2. Between each storey of the two warehouse blocks, hardstand areas will be suspended, and a mezzanine carpark level is also positioned between the ground floor and level 1 warehouses. This, in essence, forming a single structure occupying the majority of the site footprint.

Gound 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). 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 USTs 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 and around the access ramp, sprinkler tanks and pump room with minor strips of landscaping along the common property boundaries on the northern, north-eastern and southern sections of the site. This includes retention of some existing trees within the site boundary 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.

4. Site Identification

Site Address	49-61 Stephen Road, Banksmeadow[4]. 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.
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).

[4] 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.

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.

5. 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. This current and previous intrusive testing identified a general subsurface profile at the site 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; • Natural soils – typically the upper section of the natural profile comprising sands fine to medium and moist with some weakly cemented bands occasional bands of peaty clay and clay; 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 would indicate 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 boundary with Stephen Road) was outside the mapped zone, with the mapping indicating no data available for this area. It is noted that given the mapping, ASS was required to be investigated, as has occurred as part of this investigation, with ASS identified at the site (see Section 13).
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	Groundwater has been typically recorded between 4-6 m below ground level (bgl) in previous investigations undertaken by others and in this investigation.

Previous investigations by others have 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. This is consistent with DP's observations as part of this investigation.

Groundwater is impacted by the volatile chlorinated hydrocarbon (VCH) plume associated with the BIP. This and associated restrictions on its use are discussed in the following sections.

A search of the NSW Government online database of nearby groundwater bores 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.

6. Planning, Regulatory Records and Orders

6.1 Section 10.7 Planning Certificate

Section 10.7 (2) and (5) Planning Certificates are included in Appendix F of JBS&G (2023)[5] for the three lots that form the site. The certificates indicated the following key points:

- The size is zoned IN1 – General Industrial;
- The land is not an area of outstanding biodiversity;
- The land is significantly contaminated within the meaning of the 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 voluntary management proposal (VMP) with respect the CLM Act are not applicable. DP notes that, as indicated in the following sections, the site is subject to a VMP.

6.2 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[6] agreed between Allnex and NSW EPA (discussed further in Section 6.3).

[5] JBS&G, *'Detailed Site Investigation, 49 to 61 Stephen Road, Botany NSW'*, JBS&G ref: 63638/148593 (Rev2) dated 19 January 2023 (JBS&G, 2023).

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

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 notified with eight of these being regulated / regulation being finalised under the CLM Act or POEO Act) and Botany (six 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.

6.3 **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 TPH and TEX. Intrusive investigations and a remediation action plan (RAP) were developed and subsequently a VMP was agreed between the then site owner Nuplex Industries (Aust) Pty Ltd (now Allnex) and NSW EPA dated 14 January 2010 (approved 19 February 2010). An updated VMP was subsequently developed dated 16 May 2012 (approved 24 August 2012). These previous VMPs were replaced with the current VMP with a Notice of Cessation of Approved Management Proposals under Section 17(7) of the CLM Act issued for the previous VMPs by the NSW EPA on 28 October 2020. It is noted that implementation of the requirements for the aforementioned VMPs was also listed on Allnex's Environment Protection Licence (EPL) for the site, which has been subsequently removed as per the EPL variation dated 26 July 2021.

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 Drawings in Appendix D2 and Drawings 3 and 4 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:
  - Confirm that no signs of rebound are observed after completion of the EISB remediation works; and
  - 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 for Allnex's surrender of their 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 Emulsion Plant and Beckamine Plant) with the primary contaminants of concern being TEX, JBS&G (2023) identified contamination, in particular 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 is included in Appendix D1 for reference. Groundwater well locations shown in this information are also included on Drawings 5 and 5a in 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 end of the site, as per the groundwater results from the aforementioned wells, and reported this to the EPA on 9 December 2022[7]. A copy of this notification is included in Appendix C1 for reference.

[7] Allnex, *'Notification to EPA, Approved Voluntary Management Proposal No 20201720, Allnex Chemical Manufacturing Facility, 49-61 Stephen Road Botany NSW'*, dated 9 December 2022.

DP understands, from conversations with Allnex, that Allnex has discussed with NSW EPA about remediation of this area, which may include *inter alia* BRS system. DP 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.

6.4 Environment Protection Licence

Allnex currently has an EPL[8] 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 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 2010 and 2012 VMPs, is included in Appendix C2 for reference.

6.5 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.

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.

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

7. Previous Reports and Additional Desktop Information

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

- JBS&G, *'Detailed Site Investigation, 49 to 61 Stephen Road, Botany NSW'*, JBS&G ref: 63638/148593 (Rev2) dated 19 January 2023 (JBS&G, 2023);
- AECOM, *'EISB Performance Report No.6, Allnex Botany Source Remediation Program: November 2023 to April 2024'*, AECOM ref: 60539398 dated 1 July 2024 (AECOM, 2022);
- Information provided by Orica on groundwater monitoring of wells on the site associated with the BIP groundwater monitoring program; and
- Information provided by Allnex on the spill in the eastern section of the site during investigation works.

Additional information on site history, previous reports and background are included in the referenced JBS&G and AECOM reports and hence for brevity are not delved into detail below. For reference, Drawings 3-5 (including sub-numbered drawings) in Appendix A1 show site features and sample locations mentioned below.

7.1 Detailed Site Investigation - JBS&G (2023)

The following provides a summary of the site setting and findings outline in the detailed site investigation undertaken by JBS&G for due diligence purposes to support the site's sale, JBS&G (2023). 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 6.4);
- 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, 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 7.2);

- 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 6.2 and 6.3);
- Multiple storage areas, aboveground storage tanks (ASTs), USTs of varying sizes and containing various products (the majority of which were 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 USTs[9] were identified to be present on the site ranging in size between around 50,000 L and 55,000 L. Of these, eight 55,000L 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 6.5;
- 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:
    - 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;
    - TRH in samples BH22/0.5-0.6 (C_{10}-C_{40}: 9,700 mg/kg), BH37/3.5-3.6 (C_6-C_{10}: 6,300; C_{10}-C_{40}: 5,730 mg/kg), BH57/4-4.1 (C_6-C_{10}: 4,200; C_{10}-C_{40}: 9,400 mg/kg), BH60/0.2-0.3 (5,250 mg/kg), BH65/6-6.1 (C_6-C_{10}: 710 mg/kg), BH66/2.9-3.0 (C_6-C_{10}: 6,200; C_{10}-C_{40}: 4,800 mg/kg). With respect to TRH C_{10}-C_{40} exceedances, at least one of the sub-fractions exceeded their respective NEPC (2013) management limit criteria whilst C_6-C_{10} exceedances were with respect to the management limit criteria of 700 mg/kg;

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

- TRH F1 (C_6-C_{10} 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;
- 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;
- 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; and
- 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.
- 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 asbestos containing material (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 have 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:
  - Petroleum hydrocarbon odours were observed in 11 wells, two of these also noting the potential additional presence of a solvent odour;
  - Elevated TRH F1 (C_6-C_{10} 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);
  - 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;
  - 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
  - PFAS was detected in all groundwater samples. Per-fluoroctane 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 (SVOC) 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 of potential concern (CoPC) to be of concern on review of the results;
- Soil vapour results were generally low, however, it is noted that:
    - 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
    - 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 that a subsequent 2021 audit identified that the asbestos sheeting had been removed from these buildings;
- In summary JBS&G concluded that:
    - 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;
    - 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;
    - 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
    - Remediation and / or management of identified impacts would be required for potential redevelopment of the site for commercial / industrial use.

As noted in Section 6.3, Allnex with support from JBS&G, have 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 investigation.

7.2 Groundwater Remediation in the Central 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 Emulsion Plant and Beckamine Plant. The main contaminants of concern being addressed are TEX;
- Three horizontal injection wells were installed below the Emulsion Plant and Beckamine Plant, as shown on the AECOM drawings in Appendix D2 and on Drawing 4 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 oxidisation (ISCO) which included injection and groundwater monitoring events. These works ceased in 2019 following the detection of light non-aqueous phase liquid (LNAPL) in 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 enhanced *in situ* bioremediation (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:
    - 10 wells at approximately 5 m spacing (covering ~50 linear meters);
    - 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
    - Soil vapour extraction from above the groundwater table.
- With respect to AECOM (2024):
    - 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;

- 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;
- 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 D2 for reference; and
- 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 investigation.

7.3 BIP Orica – Groundwater Information (2023)

As part of this SSCI 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 is included in Appendix D3 for reference. The approximate well locations are shown on Drawing 5, Appendix A1.

The original wells installed in *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 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 volatile chlorinated hydrocarbons. 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)[10] 95% level of protection (LOP) for marine water.

[10] Australian and New Zealand Governments (ANZG), *'Australian and New Zealand Guidelines for Fresh and Marine Water Quality'*, 2018 (ANZG, 2018).

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

7.4 **Allnex Spill Information (2023)**

During the course of DP's investigation works, Allnex became aware of a spill that occurred on 13 September 2024 associated with operations in the Nuodex Plant. The spill was notified to the NSW EPA in accordance with the requirements with Allnex's EPL. Accordingly, Allnex in consultation with the NSW EPA have managed these works under its EPL.

Information provided by Allnex on the spill is provided in Appendix D4. General location of the Nuodex Plant and spill area is also indicated on Drawing 3 (locations 38 and 42), Appendix A1 for reference.

In brief it was estimated that 800 L of a xylene based solvent was released from the upper roof of the Nuodex Plant to the lower roof and then onto the grassed area adjacent to the eastern side of the building Drawing 3, location 42).

Works comprised initial excavations between 14 and 18 September to remove the main impacted materials with approximately 18 m^3 excavated thereby generating an excavation 4.2 m long, 1.9 m wide and 2 m deep. Validation samples indicated significant xylene impacts on the western wall near the base of the building, *viz.* xylene recorded at 19,000 mg/kg and 17,000 mg/kg in soil samples taken at 1 m and 2 m depths respectively on the western wall. Additional materials were excavated as far as practical, given the inherent limitation presented by the building. This resulted in an additional 12 m^3 being excavated and subsequent validation sampling recorded notably lower concentrations (e.g. 480 mg/kg on the western wall). Additional investigation boreholes were drilled to 5-6 m depth and sampled within the building to the west of the excavation with xylene results indicated to be between <0.3 mg/kg and 230 mg/kg. No groundwater investigation was undertaken as part of these works.

The excavation is understood to have been backfilled with clean imported sand, then a plastic sheet placed to reduce infiltration associated with the potential for stormwater overflow from the adjacent building roof and subsequently covered in gravel.

Allnex advised that 36.34 tonnes of waste materials were disposed of to a Hi Quality Waste Treatment Services Pty Ltd facility. Three waste classifications of the material stockpiled in intermediate bulk containers (IBCs) and bulk bags were undertaken by JBS&G. These include classifications of:

- Restricted Solid Waste – Special Waste (Asbestos). JBS&G Report L01[11] for 16 m^3 (16 IBCs);
- General Solid Waste (Non-Putrescible). JBS&G Report L02[12] for 8 m^3 (8 IBCs); and

[11] JBS&G, *'L01: Waste Classification Xylene – First Excavation – Intermediate Bulk Containers, Allnex Botany, NSW'*, JBS&G reference: 65834/155,761 dated 15 November 2023.

[12] JBS&G, *'L02: Waste Classification Xylene – Second Excavation – Intermediate Bulk Containers, Allnex Botany, NSW'*, JBS&G reference: 65834/155, 818 dated 15 November 2023.

- Hazardous Solid Waste. JBS&G Report L03[13] for 2 m^3 (two pallets of bags).

DP understands that the Allnex report dated 27 November 2023[14], included in Appendix D4, was provided to the NSW EPA. DP is not aware of any subsequent correspondence from the EPA on this report and the associated works.

It should be noted that DP does not provide any comment or endorsement of the works, waste classification or disposal undertaken.

7.5 **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*:
  - Groundwater remediation;
  - Any remediation required prior to Allnex vacating the site;
  - Removal of all production materials (including hazardous materials) when vacating the site;
  - Any remediation required associated with the contamination identified in the eastern section of the site;
  - Completion / removal / surrender of the VMP (including any updated, new or superseding VMP); and
  - Surrender of Allnex's EPL for the site.
- ESR will be responsible for *inter alia*:
  - Demolition of buildings;
  - Removal of any inground infrastructure required to be removed as part of the development works (e.g. USTs);
  - Remediation of soils above the water table (i.e. to a depth of approximately 4 m) as part of the development works, including capping of the asbestos contaminated soils; and
  - Obtaining a Section A2 Site Audit Statement for the proposed ESR development post remediation and prior to occupation.

[13] JBS&G, *'L03: Waste Classification Xylene – First Excavation – Bags, Allnex Botany, NSW'*, JBS&G reference: 65834/155, 815 dated 15 November 2023.

[14] Allnex, *'REF-NO-23959 Report to NSW EPA, Report made to the NSW EPA Environment Line 174/09/2023 09:41 AM, Initial written report to NSW EPA 19/09/2023'*, Allnex ref: -, dated 27 November 2023.

8. Site Walkover

A site walkover was conducted over the course of DP's fieldwork in August and September 2023 by a DP environmental scientist. Photographs of main site features and general site uses taken during the walkover are included in Appendix E. Main site features and general site uses are also shown on Drawings 3 and 4, Appendix A1. The drawings and photographs more effective illustrate the nature of the site's use. The following general comments are also provided for context:

- The site topography was generally consistent with that outlined in Section 5 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 m^3 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 were located in the central and northern sections of the site, consistent with the notes in JBS&G (2023). The northern UST farm was supported by the adjacent pump room building;
    - The main external AST farms comprised:
        - A sunken bunded AST farm in the north-eastern corner of the site which contains seven ASTs of varying sizes. It is understood from discussions with the Allnex that the sunken bund acts as additional *quasi* capacity for the first flush pit when capacity is limited during high rainfall events;
        - The south-eastern AST farm 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 to the north of the Emulsion 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 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 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 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)) were evident in the south-western quadrant of the site near the western staff car park.

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. Moreover, given the preceding and the extensive range of potential contamination point sources, the usefulness of identifying every storage and potential contamination point source was considered to be of limited value and hence has not been outlined above. On a site such as this, identifying targeted point sources in the context of reviewing results from intrusive investigations or site observations of concern it considered a more appropriate approach.

9. 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, i.e. it enables an assessment of the potential source – pathway – receptor linkages (complete pathways).

Based on the desktop review summarised in Sections 6 and 7 above, the following potential sources of contamination and associated 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: Metals, VOC (includes BTEX), TRH / TPH, PAH, OCP, asbestos. • Secondary CoPC: PCB, OPP, phenols, PFAS. **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: Metals, VOC (includes BTEX), TRH / TPH, PAH, OCP. • Secondary COPC: 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 in a limited scope and context with respect to the CSM for this investigation. *Viz.* terrestrial ecology has limited considerations for this investigation, although would be applicable for soils used in these areas as part of the future development works and hence require further consideration associated with the site's remediation.

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.

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 (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.	HP1: Ingestion and dermal contact HP2: Inhalation of dust and / or vapours.	HR1: Construction and maintenance workers. HR2: Future users.	A supplementary intrusive investigation is recommended to further assess the presence and significance of the CoPC in the soils and groundwater at the site, and to a lesser extent associated soil vapour media. This recommended investigation is
	HP2: Inhalation of dust and / or vapours.	HR3: Adjacent property users.	
	EP2: Leaching of contaminants and vertical migration into groundwater.	ER2: Groundwater.	
S5: Surrounding industrial land use.	EP1: Surface water run-off.	ER1: Surface water.	

Source	Exposure Pathway	Receptor	Risk Management Action
	EP3: Lateral migration of groundwater providing base flow to water bodies.		documented in the following sections of this report (and associated appendices). It outlines and discusses the results of the intrusive investigation to inform future remediation of the site.
	EP4: Inhalation, ingestion and absorption.	ER3: Terrestrial ecosystems.	
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.	An intrusive / destructive hazardous building materials survey^ is recommended to identify HAZMAT in the buildings for general site management and prior to any demolition works.
	HP2: Inhalation of dust and / or vapours.	HR3: Adjacent property users.	

Note: DP notes that an existing Allnex Hazard Audit report by Riskcon Engineering Pty Ltd 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.

10. Sampling Plan

10.1 Data Quality Objectives

This SSCI was devised with reference to the seven-step data quality objectives (DQO) process which is provided in Appendix B Schedule B2, NEPC (2013). The data quality objective process is outlined in Appendix F.

10.2 Soil Sampling Rationale and Analysis

Based on the CSM and DQOs the following sampling rationale was adopted.

Table 2 of EPA *Sampling design part 1 – application* (EPA, 2022) recommends a minimum of 55 sampling points to characterise a 4.8 ha site based on circular hot spots using a systematic grid sampling pattern, with additional locations for areas of particular concern (e.g. USTs, etc.). JBS&G (2023) comprised 70 boreholes (BH1-BH8 and BH10-BH71) as part of the assessment which provided broad site coverage. It is noted that an additional 20 hand augers (HA101-HA120) were also undertaken to gain a better understanding of OCP impacts in the eastern area of the site. Whilst the majority of these boreholes were limited to around 2 m in depth and had somewhat limited analysis, they were considered to provide a broad understanding of contamination at the site when considered in the context of other investigations and monitoring programs already being undertaken at the site by AECOM.

Given that the site was operational at the time of the investigation, and the findings of previous investigations, the test locations were positioned across the accessible areas of site. Locations were selected based primarily on information and results from previous investigations along with observations during the course of DP's fieldwork.

Borehole locations from previous investigations and this investigation are shown on Drawings 5 and 6 (including sub-numbered drawings), Appendix A1. The following presents DP's rationale for the sampling locations adopted.

301	Primarily to allow installation of soil vapour port in targeted area and hence also provides general site coverage for soil sampling.
302	Primarily to allow installation of groundwater well in targeted area and hence also provides general site coverage for soil sampling.
303, 304, 306	Provide additional coverage in the area of the Alkyd Plant building and to allow installation of soil vapour ports.
307, 338	Provide additional site coverage in the area of the Alkyd Plant building and to allow installation of groundwater well up- and across-gradient of 304 given observations of odours and elevated PID results during fieldwork at 304.
305	Primarily to allow installation of a groundwater well up-gradient of well JBMW03 which recorded elevated impacts in groundwater in JBS&G (2003) and hence also provides general site coverage for soil sampling.
308	Provide additional site coverage up-gradient of the existing central / western groundwater plume area and west of the northern UST farm.
309-315, 318, 319 335, 336	To gain an understanding of soil impacts within the central / western groundwater plume area and around the central AST and UST farms.
311	Provide a check on soil impacts to the west of the central / western groundwater plume subject to remediation, and to allow installation of groundwater well down-gradient of well JBMW03 which recorded elevated impacts in groundwater in JBS&G (2023).
308, 316, 317	To gain an understanding of soil impacts around the northern UST farm.
312, 337, 339	Around the redundant tanks and the northern UST farm pump room building.
320-320D	Gain an understanding on the extent of elevated contamination identified at BH22 in JBS&G (2023), in particular lead.
321	Gain an understanding on the potential for contamination in soil, in particular PFAS given the PFAS concentration in groundwater was highest in adjacent well JBMW04 as reported in JBS&G (2023).
322-322D	Gain an understanding on the extent of elevated contamination identified at BH38 in JBS&G (2023), in particular lead.
323-326, 328-328D	Gain a further understanding on the extent of elevated contamination identified at BH67 and well JBMW07 in JBS&G (2023), in particular OCP, VOC and TRH.
328-328D	Gain an understanding on the extent of elevated contamination identified at BH66 and well JBMW06 in JBS&G (2023), in particular lead, VOC and TRH. Also to allow installation of soil vapour port.

327	To gain an understanding on the potential for contamination in soil, in particular for PFAS given the PFAS concentration in groundwater was elevated in adjacent well WG233-S (although three times lower than JBMW04), along with VOC, TRH and OCP given detections in wells and boreholes to the east / north-east, as reported in JBS&G (2023).
328-328D	Gain an understanding on the extent of elevated contamination identified at BH66 and well JBMW06 in JBS&G (2023), in particular lead, VOC and TRH.
329-329D	Gain an understanding on the extent of elevated contamination identified at BH66 and well JBMW05 in JBS&G (2023), in particular lead, VOC and TRH. Also to allow installation of soil vapour ports.
330	Additional site coverage of the eastern area where contamination had been identified and to allow installation of soil vapour port.
331	Additional site coverage of the eastern area where contamination had been identified and to allow installation of groundwater well given observations of odours and elevated PID results during drilling of boreholes in this general area.
332, 333	Primarily to allow installation of soil vapour port in targeted area and hence also provides general site coverage for soil sampling.
334	Additional site coverage and gain a further understanding of the elevated contamination identified at BH57 in JBS&G (2023), in particular VOC and TRH. Also to allow installation of groundwater towards the down-gradient site boundary.
340, 341	Additional site coverage to focus on the existing ramps which will likely require disturbance as part of the future development works.
201-210	Geotechnical boreholes opportunistically sampled to provide additional site coverage.
101-120	Soils underlying the concrete slab at CPT locations 101-120 opportunistically sampled for asbestos purposes given these locations already required concrete coring for CPT testing. Note: Locations 121-124 located in unsealed areas at the eastern end of the site were not sampled given asbestos sampling already undertaken by other boreholes in this area.

Soil samples were generally collected from each borehole at the near surface (or directly below the pavement or concrete slab) and then at regular intervals and where signs of contamination were observed.

Additionally with respect to ASS, and reference to ASSMAC (1998) and Australian Government Department of Agriculture and Water Resources (AWR), *'National Acid Sulfate Soils Guidance, National Acid Sulfate Soils Sampling and Identification Methods Manual'*, dated June 2018 (AWR, 2018), these guidelines recommend 10 and 12 boreholes for sampling respectively. Given this, and taking advantage of the depeer boreholes that were drilled for the geotechnical investigation, DP (2023), ASS samples were collected from the 10 geotechnical boreholes (201-210) and 15 of the contamination boreholes (302, 305, 308, 311, 312, 316-319, 327, 328C, 329C, 331, 333, 334).

Taking into account the locations where the envionmental and geotechnical borehole sampling supplemented each other (i.e. six locations – 201/302, 204/318, 205/319, 207/327, 209/331, 210/334), in total 19 locations were subject to testing which provided broad site coverage.

The general sampling methods are described in the field work methodology, included in Appendix G.

10.3 Groundwater Sampling Rationale and Analysis

In order to supplement existing groundwater well network and results from previous investigations and to inform this investigation, additional groundwater wells were installed for sampling. The locations were selected based on the following rationale:

209	Opportunistically installed to depth with screened section near the top of a peaty clay layer at 14.5 m bgl to check for potential groundwater impacts at depth given the observations of contamination impacts observed during drilling in the nearby boreholes (e.g. 331). Well also installed with a view to supplement the well installed nearby in 331 which focused on the upper groundwater profile.
210	Opportunistically installed to depth with screened section near the top of a peaty clay layer at 13.6 m bgl to check for potential groundwater impacts at depth given the observations of contamination impacts observed during drilling in the nearby boreholes and particularly up-gradient in the eastern grassed area where wells 209 and 331 were installed. Well also installed with a view to supplement the well installed nearby in 334 which focused on the upper groundwater profile.
302	Additional background well located adjacent to the up-gradient northern site boundary whilst also providing general site coverage of the north-western corner of the site where limited sampling previously has been undertaken.
305	Located down-gradient of the administration building, given the limitations of sampling within the footprint of the administration building, and up-gradient of JBMW03 which recorded elevated contamination, in particular for VOC, in JBS&G (2023).
307	Installed within the Alkyd Plant building and to the west (cross-gradient) of 304 given observations of odours and elevated PID results during fieldwork at 304.
311	Down-gradient of the Alkyd Plant building and JBMW03 which indicated potential impacts along with providing a well to the west of the central / western groundwater plume subject to remediation as a check on the potential groundwater impacts from that plume extending to the west.
331	Installed following observations during drilling which indicated odours and elevated PID results suggesting the potential for significant impacts in this borehole and nearby boreholes (e.g. 329).
334	Installed in borehole drilled closest to the down-gradient site boundary and down-gradient of the eastern grassed area where observations during drilling suggested the potential for significant impacts.

338	Located nearby and up-gradient of 304 given observations of odours and elevated PID results during fieldwork at 304.

In addition, with respect to sampling groundwater, the majority of JBS&G (2023) wells were resampled to supplement the existing data set and following site observations during drilling. In this regard, JBMW02 was not resampled given the low initial results, whilst JBMW11 was sampled during the second groundwater sampling round following review of the results from JBMW03 obtained during the first round of groundwater sampling.

With respect to the AECOM wells sampled:

- MW40S/D and MW41S/D (along with JBMW10 and WG230) were sampled following observations during drilling at nearby borehole 315 which noted the hydrocarbon odours and elevated PID results;
- Wells MW09, MW18 and MW32-S were sampled during the second round of groundwater sampling to gain an understanding of impacts on the western side of the central / western groundwater plume given the results at 307; and
- MW11 was resampled given observations during the works of impacts to the east of the well and elevated PFAS results relative to most other sampled wells reported as part of JBSG (2023).

At the time of sampling it was unclear if information, or what information, would be provided by Orica. Accordingly, opportunistic sampling of those wells that were able to be sampled at the time of DP's fieldwork was undertaken. In this regard, it is noted that sample recovery from WG229-I, WG230-I, WG230-D and WG233-S was unable to be achieved.

During the second round of groundwater sampling additional samples were collected from the top of the water column from selected wells being sampled that had higher TEX concentrations and where the water column was large enough to allow collection of the additional sample (i.e. water column generally greater than 1.3 m). Wells that this additional sample was collected from were 307, 331, 334, 338, JBMW05, JBMW06, JBMW07, JBMW12, JBMW13, MW40-S. These samples were identified with a 'T' prefix. The objective of this additional sampling and associated analysis was to gain a better indication if the impacts were limited to, or more significant at, the very upper section of the water column (i.e. the surface of the water table), or if the significant impacts were generally deeper than this within the water column (i.e. the upper few meters of the water column as suggested by previous investigation results when not considering the regional BIP groundwater plume).

Moreover, review of the initial results from the first round of sampling indicated higher concentrations in JBMW06 compared to nearby JBMW07, in particular for VOC (including BTEX) and TRH. This being the inverse to the JBS&G (2023) results where JBMW07 generally had higher concentrations than JBMW06. Whilst a review of DP's fieldwork and inquiries at the laboratory could not definitively establish an error in the reporting, given the results these two wells were resampled as part of the second round of groundwater sampling. It is noted that the second round of analysis indicated results generally with higher concentrations in JBMW07 compared to JBMW06 and hence that the first round of results from JBMW06 and JBMW07 sampled on 20 September 2023 should possibly be inverted. Given the proximity of the two wells and other results of this investigation, as outlined in the subsequent sections, this discrepancy was not considered to be of significant concern.

Sample analysis was informed by the CoPC outlined in the CSM, previous results and field observations. For instance, most samples were analysed for the more common contaminants which have been broadly detected across the site (e.g. VOC, TRH, metals and PFAS), whilst pesticide analysis (e.g. OCP) tended to be focused on the eastern end of the site where soil analysis had previously recorded elevated results.

The general sampling methods are described in the field work methodology, included in Appendix G.

10.4 Soil Vapour Sampling Rationale and Analysis

In order to assess the soil vapour concentrations at the site by supplementing previous results presented in JBS&G (2023) which involved sampling from 45 soil vapour pins, the sampling for this investigation was undertaken from ten soil vapour ports installed by DP. Soil vapour sampling locations are shown on Drawing 6c, Appendix A1.

The locations were selected based on the following rationale:

301	To provide additional coverage in the north-western area of the site given the limitations of sampling within the footprint of the administration building.
303, 304, 306	In the vicinity of JBS&G soil vapour sample locations SV13 and SV20 where elevated TPH was reported by JBS&G and given observations of odours and elevated PID results during fieldwork at 304.
328C, 329B, 329C, 330, 332, 332	Area not previously assessed for soil vapour by JBS&G (2023), although the report did indicate potential for soil vapour impacts based on soil and groundwater results from this area. Locations selected to provide general site coverage of this area and with reference to well locations which recorded VOC impacts (e.g. 328C located near JBMW06 and 332 located near well JBMW12).

Sample analysis focused on the main CoPC, namely VOC and TPH.

The general sampling methods are described in the field work methodology, included in Appendix G.

11. Site Assessment Criteria

The SAC applied for this investigation are informed by the CSM (Section 9) which identified primarily human receptors, although environmental receptors are also noted, to potential contamination on the site. Analytical results are assessed (as a Tier 1 assessment) against the SAC comprising primarily the investigation and screening levels of Schedule B1 of NEPC (2013).

The investigation and screening levels applied in the current investigation comprise levels adopted for a generic commercial / industrial land use scenario. The derivation of the SAC is included in Appendix H and the adopted SAC are listed on the summary analytical results tables in Appendix J.

With respect to the SAC for groundwater, this has been developed with reference to the VMP remediation levels, Allnex (2020), NEPC (2013) and ANZG (2018), noting the off-site highly disturbed marine water receptor and industrial land uses at and down-gradient of the site. These were also considered in the context of groundwater extraction and beneficial reuse being restricted at, but not limited to, the site and hydraulically down-gradient of the site, as outlined in Section 6.5.

For assessment of ASS this was based on the criteria derived from ASSMAC (1998) assuming a sand matrix.

12. Results

12.1 Field Work

12.1.1 Soil

The borehole logs for this investigation are included in Appendix I1. In addition, the CPT interpretation results are included in Appendix I2. The general sequence of subsurface materials identified in the current test locations comprised:

- Pavements: Present at the majority of sample locations and generally comprising concrete between 0.15-0.2 m thick (range 0.1-0.35 m). Pavements were not present in the eastern area of the site (i.e. east of the Nuodex Plant building);
- Fill: Variable in colour although primarily grey and brown and of a sand matrix. Typically 1-2 m thick across the majority of the site, although this thickness does vary. For instance, fill observed to a depth of 3.3 m at borehole 311 located in the raw materials building, tended to be 2-3 m towards the north-western section of the site and the access driveways / ramps from Stephen Road were observed to have fill to a depth of about 3-3.5 m. In and around the Nuodex Plant building the fill depth appeared more variable, typically 1-4 m, whilst the filled area to east of this building ranged between about 3-7 m (increasing further east and closer to the retaining walls).

  Whilst sands were the main matrix, there were other soil materials logged, including gravelly sand, gravelly clay, clayey sand and clay. These were considered minor in the overall composition of the profile.

  Inclusions of sandstone, igneous and concrete gravel were recorded to varying quantities whilst ash, slag, clinker, asphalt, brick, glass wire, fabric, plastic and rootlets were generally minor in nature across the majority of the site (although appeared to be more prevalent in the eastern unpaved areas). It is noted that buried obstructions including (but not limited to) concrete and sandstone boulders were encountered when drilling, particularly in the eastern unpaved areas. Also in this eastern area a metal plate (or similar) caused refusal for borehole 332 at a depth of 1.2 m.

  Fragments of ACM were observed at boreholes 208, 209, 312, 319, 329 and 329C.
- Natural Soils: Typically grey and brown and primarily comprising sands. Occasional lenses or bands of hard peaty clay and clay were typically encountered between 8-15 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.

It is noted that based on the logs provided by Orica and included in Appendix D3, bedrock is likely to be at depths in the order of 30 m or greater.

Elevated 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. The elevated PID readings and observations of hydrocarbon odours tended to generally correlate. A summary of these observations is present on Drawings 7-7e in Appendix A1.

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 (304), along with down-gradient of the Emulsions Plant building in the Beckamine Plant building (314) and Drumn Storage building (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, 312, 316, 317 noted what was colloquially described as an 'rotten cheese' (or 'urea' like) odour. Laboratory analysis of samples with this odour are discussed further results in Section 13.1. Other odours such as sweet or chemical odours were not as prevalent. It is noted that the general chemical odour description was applied when an odour was present, however was less distinctive.

12.1.2 **CPT Results**

The results of the CPT testing and the associated EC results opportunistically measured are presented in Appendix I2. In summary, EC readings were low. Where elevated results (relative to other low results) were recorded these were typically to depths of 4.5 m with measurements of 1-3 mS/cm (general range 0.5-4.5 mS/cm).

High EC results can be an indicator for the potential presence of gross contamination. Accordingly, the results at the locations tested did not suggest gross contamination issues deeper in the soil profile associated with the site's use, such as indications of DNAPL on top of clay lenses and layers. This confirmed the appropriateness of focusing the contamination boreholes for this investigation on the upper soil profile (i.e. generally to depths of around 4-11 m bgl).

12.1.3 **Groundwater**

Groundwater well locations sampled are summarised on Drawing 6b, Appendix A1. These along with other wells gauged for water levels between 8-10 November 2023 are shown on Drawing 8, Appendix A1.

Groundwater depths observed prior to development and sampling are summarised in Table I3-1, Appendix I3. Levels were generally between 5-6 m bgl (~RL 4-5 m AHD), consistent with previous investigations. As indicated by the groundwater level contours on Drawing 8, Appendix A1, groundwater tended to be migrating in a more southerly direction on the western side of the site and more in a south-easterly direction on the eastern side of the site.

Groundwater parameters obtained prior to sampling are summarised in Table I3-2, Appendix I3. These generally indicated neutral to slightly acidic pH conditions (i.e. 5-7 pH units) with neutral redox potential. Dissolved oxygen generally tended towards low levels and hence anaerobic / anoxic conditions, although results did vary as noted by elevated dissolved oxygen readings in wells 302, JBMW04 and WG230-S. EC was broadly consistent across the site, typically between 200-650 µS/cm. More elevated EC readings were recorded in wells 307 (629 and 919 µS/cm), 334 (1422 and 1084 µS/cm), MW41-D (1214 µS/cm), JBMW03 (5,243 µS/cm) and JBMW05 (664 and 780 µS/cm).

Odours were noted in all wells except WG229-D. These were primarily sulphuric odours which were present in 26 of the wells, and which can be an indicator for the potential presence of ASS. Hydrocarbon odours were noted during sampling of wells 331, 338 and JBMW03 whilst possible slight solvent odours were noted in wells JBMW05 and MW09. It is also noted that a possible 'off-cheese' odour was noted in well 210, although this observation was less conclusive / distinct than other odour observations.

PID screening results from the head space of the groundwater wells were generally low, with most PID readings less than the 50 ppm. Higher reading were more prevalent in wells in the eastern area of the site, of particular note well 331 which recorded PID readings of 1868 ppm and 640 ppm during the course of the two sampling events. The next highest readings in the eastern area were 59 ppm in well JBMW05 and 35 ppm in well 334. It is noted that readings of 73 ppm and 32 ppm were recorded in well 338 located in the western section of the site.

Similarly, bulk ground gas screening results from the head space of the groundwater wells were generally low. Of note was the slightly elevated methane concentration recorded in well 331 at 7.6 % w/w. Other wells that were screened in the eastern area, and in the vicinity of 331, recorded low results with the maximum concentration for methane in these wells at 334 with a concentration of 1.7 % w/w. It is noted that 334 recorded the highest carbon dioxide concentration of 6.2 % w/w.

The PID and bulk ground gas screening results are summarised in Table I3-3, Appendix I3.

No phase separated hydrocarbons were observed by interface meter or during visual inspection (bailer). As noted in Section 7.2, LNAPL was detected in well IW02 by AECOM in 2023, with the fieldwork by AECOM undertaken during a similar period to DP's fieldwork.

12.1.4 **Soil Vapour**

Soil vapour test locations are summarised on Drawing 6c, Appendix A1.

Field readings taken during and prior to sampling indicated bulk gas concentrations that were typically oxic (~7-21 % oxygen). Generally, the PID screening results from the soil vapour ports indicated a low potential for gross concentrations of VOC to be present, although indicated the potential for some VOC to be present. In this regard, all PID readings were below 26 ppm, and eight of the 10 ports recording PID readings below 2 ppm. The highest PID readings and methane concentration was recorded in soil vapour port 333, located in the east of the site, which recorded a result of 25.7 ppm and 2.3 % w/w respectively.

The PID and bulk ground gas screening results taken prior to sampling are summarised in Table I3-3, Appendix I3.

12.2 Laboratory Results

Laboratory results are summarised in Appendix J as follows:

- Table J1: Summary of Soil Laboratory Results;
- Table J2: Summary of Groundwater Laboratory Results;
- Table J3: Summary of Soil vapour Laboratory Results; and
- Table J4: Acid Sulphate Soil Results.

Laboratory certificates of analysis, chain of custody and sample receipt documentation are included in Appendix K.

13. Discussion

13.1 Soil and Groundwater

VOC (including BTEX) and TRH / TPH

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 BTEX, and the associated shorter chain TRH / TPH.

Exceedances of TRH and BTEX SAC for soil samples analysed as part of this investigation are summarised in Table 4 below. To assist with informing risks, ASLP for TEX was also undertaken, with results compared against the VMP criteria of 1 mg/L for each (TEX) analyte.

Table 4: Summary of Soil SAC Exceedances for TRH and BTEX

Borehole Locations	Exceeds F1 Soil Vapour Risk (Depth Range)	Exceeds Benzene Soil Vapour Risk (Depth Range)	ASLP TEX Result Exceeds 1 mg/L (Depth Range)	Exceeds TRH Management Limits (Depth Range)	Area ID^
209	3.7-5.5	-	3.7-5	-	5
304	4.5-5.3	-	-	4.8-5	1
313	4-7.8	-	4.5-6.8	4-7.8	3
316	4-5.8	-	-	4-5.8	2
317	-	-	-	4-10*	2
326	4-6.8	-	4.5-5.8	4-6.3	4
329	4.8-6	-	4.8-5.5	4.8-5.5	5
329D	2.6-6	-	2.6-6	2.6-6	5
331	1.2-9*	5-5.7	2.7-9*	1.2-9*	5
338	7-8* #	-	-	7-8* #	1

Notes:
- Depth range indicated in m bgl and based on results from samples above and below and judgemental interpretation.
* = borehole termination depth.
# = retest and replicate result below SAC.
^ = see Section 14 and Drawing 9, Appendix A1 for area references.

Other VOC exceedances in soil included:

- 1,2-dibromo-3-chloropropane (SAC - USEPA RSL of 0.64 mg/kg) in samples:
  - 316/4.8-5 (2 mg/kg) with results from samples analysed below this depth recorded at less than LRL;

    326/4.3-4.5 (3 mg/kg), 326/4.8-5 (3 mg/kg), 326/5.3-5.5 (7 mg/kg) and 326/5.8-6 (2 mg/kg), with results recorded in the underlying samples from 6.3 m recording results less than LRL; and

    331/3-3.2 (9 mg/kg) and 331/4.8-5 (2 mg/kg) with results recorded in the intervening (samples 331/3.9-4.1 and 331/4.8-5) underlying samples (from 5.7 m) recording results less than LRL.
- 1,2,3-trichloropropane in sample 331/3-3.2 which recorded a concentration of 21 mg/kg (SAC - USEPA RSL of 1.1 mg/kg) with results in samples above and below this depth recording results below the LRL; and
- 1,2,4-trimethylbenzene in sample 326/5.3-5.5 which recorded a concentration of 2,200 mg/kg (SAC - USEPA RSL of 1,800 mg/kg) with results in samples above and below this depth recording results well below the SAC.

With respect to 1,2-dibromo-3-chloropropane and 1,2,3-trichloropropane, these were recorded below LRL in all groundwater samples whilst trimethylbenzenes, propylbenzene and others MAH, including TEX, appear to be co-contaminants in groundwater. *Viz.* where TEX concentrations are above the VMP screening criteria, elevated results for other MAH are also present.

Samples collected from the soils noted to have a strong 'rotten cheese' odour in boreholes 316 and 317 (present below 4.3 m) recorded elevated medium to longer chain TRH. Results in particular for F3, and to a lesser extent F2, were notably higher than other shallower samples in the same boreholes and in other boreholes across the site (with the exception of 331 discussed below). Most conspicuous in this regard was nearby borehole 203 to the east of 317 which did not record similar observations or TRH results.

A review of the results in consultation with the laboratory suggested the 'rotten cheese' odours may be associated with chemicals l-(+)-ascorbic acid 2,6-dihexadecanoate and E,E,Z-1,3,12-nonadecatriene-5,14-diol. Following discussion with Allnex, it is noted that Allnex did not recognise these chemicals as those that would be used as part of their operations. It was speculated, given the proximity to the northern boundary (particularly 316), that these chemicals may have been associated with the former Johnston & Johnston manufacturing site.

Regardless, when samples were subject to silica gel clean up analysis, the TPH results were notably lower. For example >C_{16}-C_{34} in sample 316/4.8-5 went from 20,000 mg/kg (F2 - TRH) to <1,000 mg/kg (TPH), whilst >C_{16}-C_{34} in sample went 317/4.8-5 went from 25,000 mg/kg (F2 - TRH) to 2,100 mg/kg (TPH).

Outside of 316 and 317, the borehole 331 (and to a lesser extent nearby borehole 209) was the other location which recorded elevated F2 and F3 TRH results. These impacts were in the deeper fill generally between about 2.5-6.2 m. It is noted that when subjected to silica gel clean up analysis, >C_{16}-C_{34} in sample 331/2.5-2.7 went from 41,000 mg/kg (F2 - TRH) to 16,000 mg/kg (TPH), whilst sample 331/6.3-6.5 went from 490 mg/kg (F2 - TRH) to 190 mg/kg (TPH).

With the respect to medium to longer chain TRH, samples from other boreholes commonly recorded a notable, although less significant, reduction in corresponding results when subject to silica gel clean up analysis compared to 316 ,317 and 331. Moreover, groundwater also recorded low >C_{16}-C_{34} TPH results when subject to silica gel clean up analysis with a maximum result (for results above LRL) of 180 µg/L. These lower TPH concentrations (post silica gel clean up analysis) are considered to be common where peat lenses and layers are present within the soil profile given these can often contribute to naturally occurring organic TRH results.

It is noted that consistent with information provided by Orica, high VCH results were recorded in well WG233-D sampled at a depth of approximately 29 m bgl. VCH was not considered to be of significant concern in the upper groundwater table or soil table based on the results from this investigation and JBS&G (2023).

In summary, most impacts are at depth associated with the groundwater. The two main areas of groundwater impacts are associated with 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 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 appear 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 210 and 334. Addressing the impacts in the soils between ~2 m bgl and the top of the water table in this area will further assist with reducing the risk to groundwater.

The areas of TEX and TRH impacts in soil and groundwater are presented in Drawings 10a-10e and 11a-11j, Appendix A1. These are provided as a guide with the objective of summarising in visual form the main impacted areas. These areas are consistent with the above discussion.

It is also noted that from a commercial perspective, 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 (i.e. from around 4.5-9 m).

PAH

PAH concentrations were generally low in soil samples with all results below the SAC in the current investigation and in JBS&G (2023).

The main PAH recorded was naphthalene with results generally (but not always) recorded at higher results when analysed and reported as part of the VOC analysis. Naphthalene was recorded at elevated concentrations during the current and previous investigations as outlined below:

- Boreholes 313 and 314 were located in the Emulsions Plant and Beckamine Plant buildings respectively, down-gradient of the central AST farm and in the general area where current groundwater remediation works are being undertaken associated with the VMP. 313 recorded soil results above LRL at concentrations between 0.2-13 mg/kg in samples collected between 3.8-9 m (9 m base of borehole), whilst ASLP results of 230 µg/L (sample 313/4.8-5), 87 µg/L (sample 313/6.3-6.5 µg/L) and 22 µg/L (sample 313/8.8-9) were also recorded. 314 recorded results above LRL in soil samples between 5.3-8 m (8 m base of borehole) and at concentrations between 19-140 mg/kg. ASLP results were between 200-730 µg/L. Samples

collected and analysed for naphthalene in the overlying soils at these two boreholes recorded results below LRL.

Groundwater results in MW40-S, located down-gradient of the central AST farm and the aforementioned buildings, was recorded at 150 µg/L (first round of sampling) and <100 µg/L (second round of sampling). The latter being close to the groundwater screening criteria of 70 µg/L (95% LOP) and 90 µg/L (90% LOP). Results from this well were consistent with the results presented in AECOM (2024), namely the result from December 2023 at 111 µg/L. Previous results for this well between July 2022 and April 2023, as presented in AECOM (2024), have been recorded at concentrations between 41-66 µg/L. Groundwater results for naphthalene in this area, as indicated in AECOM (2024), were highest around the Emulsions Plant and Beckamine Plant buildings with a maximum concentration of 344 µg/L during the December 2023 sampling event recorded in well IW04D located in the Emulsions Plant building.

- Highest concentrations in groundwater were recorded in well JBMW03, with results between 71 µg/L and 250 µg/L. Results from wells up-gradient (305 and 308) and down-gradient (311 and JBMW11) were low, with maximum naphthalene concentrations (where above the LRL) of 31 µg/L in the aforementioned up-gradient wells and below LRL in the aforementioned down-gradient wells. This suggests elevated naphthalene impacts may be localised around JBMW03; and
- The highest naphthalene concentration recorded in soil samples analysed and reported in JBS&G (2023), and considerably higher than other results reported in JBS&G (2023), was in sample BH66 (JBMW06)/2.9-3 with a result of 61-72 mg/kg. This was reflected in the elevated results in groundwater at JBMW06 and nearby groundwater well JBMW07, with concentrations in these wells generally between 100-170 µg/L. It is noted that down-gradient wells JBMW12 and JBMW13 generally recorded lower results, with concentrations (where above the LRL) of 54-87 µg/L reported.

  Soil results from this area as part of the current investigation have generally recorded results below LRL or below 2 mg/kg. Some slightly higher results were recorded in samples collected from 326 between 4.3-6 m where concentrations were recorded between 3-10 mg/kg; and
- In the eastern area of the site, soil samples collected from borehole 331 between 3 – 9 m were subject to ASLP analysis. The analysis recorded results below LRL (0.1 µg/L) for all samples with the exception of the sample collected from 4.8-5 m which recorded a naphthalene ASLP result of 48 µg/L. These low ASLP results were consistent with groundwater results from well 331, and the adjacent deeper well 209, which recorded naphthalene results (where above the LRL) between 29-36 µg/L and 2.3-11 µg/L respectively.

In summary, results are generally low with higher impacts, where present, appearing to be generally more localised. Whilst soil treatment is not considered to be warranted in isolation, given the main impacted areas overlap with areas subject to remediation for other volatile contaminants, addressing PAH as a co-contaminant in the soil remediation process (if soil remediation undertaken from commercial longer term risk management perspective) may warrant further consideration for the more impacted areas, such as around 313 and 314 (i.e. the Emulsions Plant and Beckamine Plant buildings, the central AST farm and central UST farm) and to a lesser extent around JBMW06/JBMW07.

OCP

The main OCP analytes detected were DDT, DDE and DDD. Other OCP analytes, where present, were less prevalent, at low concentrations and as co-contaminants of samples containing DDT/DDE/DDD. Hence addressing the DDT/DDE/DDD contamination, where required, would also by default capture these other OCP, albeit them being of less concern.

As identified in JBSG (2023), DDT/DDE/DDD combined exceeded the SAC of 3,600 mg/kg at BH67(JBMW07) and HA106 with concentrations 11,580 mg/kg and 5,410 mg/kg respectively. Elevated concentrations for DDT/DDE/DDD combined (i.e. above 50 mg/kg) in the area of these boreholes are summarised below:

- BH67 to 1 m with concentrations of 223-11,580 mg/kg;
- HA104 to 1.5 m with concentrations of 1,086-1,428 mg/kg;
- HA105 to 1 m with concentrations of 193.6-1,306 mg/kg;
- HA106 to 1.6+ m (deepest sample collected at 1.6 m still with elevated concentrations) with concentrations of 113.6-5,410 mg/kg;
- HA111 to 0.5 m with a concentration of 50.2 mg/kg;
- 326 to 1 m with concentrations of 70-82 mg/kg; and
- 328D to 0.5 m with concentration of 71 mg/kg.

Elevated concentrations for DDT/DDE/DDD combined were also recorded in borehole 331 (samples 331/4.8-5 (46 mg/kg) and 331/5.2-5.4 (85 mg/kg)) and 333 (sample 333/1-1.2 (79 mg/kg) further east of BH67. BH59 also recorded a result of ~49 mg/kg in sample BH59/0.2-0.3.

As indicated by the results in JBS&G (2023), elevated concentrations of OCP's were detected in the surface samples in the north-eastern corner of the site at BH06 (147.5-350 mg/kg in sample from 0.2-0.3 m and its replicate) and HA108 (39.3 mg/kg in sample from 0-0.1 m). Other samples from nearby boreholes BH07, HA102 and HA107 all recorded notably lower concentrations. Groundwater results from wells JBMW01 and JBMW05, located nearby and down-gradient of BH06, recorded OCP concentrations below LRL.

The areas with elevated OCP in soil reflected locations where elevated concentrations in groundwater were also recorded. In this regard, the highest OCP concentrations in groundwater were in wells JBMW06, JBMW07 and 331. It is noted that wells nearby generally detected OCP at lower concentrations, and wells down-gradient of the soil impacted areas were notably lower (e.g. JBMW12 at 0.0332 µg/L -0.04 µg/L, JBMW13 at <LRL µg/L, 210 at 0.004 µg/L -<LRL and 334 at 0.004 µg/L -<LRL).

In summary, the OCP results around BH67 and HA106 will need remediation. Given the detections in groundwater it is recommended that these be placed in a low permeable containment cell. Whilst not exceeding the HIL, it is also suggested that other OCP impacted soils nearby also form part of this remediation, whilst consideration to a reducing degree also be given to including soils from other areas where elevated concentrations were also recorded (e.g. 331, surface soils (~0.3-0.5 m deep) near BH06 and HA108 in the north-eastern corner of the site and BH59 near the driveway off Coal Pier Road).

Phenols

All soil samples subject to phenols analysis for the current investigation recorded results below LRL whilst JBS&G (2023) only recorded two samples with results above the LRL. These being BH37/3.5-3.6 with a concentration of 1.4 mg/kg and QA20221019-03 (replicate of BH57/4-4.1) with a concentration of 0.7 mg/kg.

All groundwater results for total phenols were well below the SAC (95% LOP - 400 µg/L, 90% LOP - 520 µg/L) with the exception of JBMW03 which recorded a result of 4,800 µg/L. The next highest concentration was 200 µg/L. It is noted that results from wells up-gradient (305 and 308) and down-gradient (311 and JBMW11) of JBMW03 all recorded results for phenols below LRL.

Cresol (o-, m- and p-) were recorded in several wells, generally at low concentrations.

There were detections of 2,4-dimethylphenol in samples analysed for speciated phenols in wells 307 (16 µg/L), JBMW12 (4 µg/L), JBMW13 (53 µg/L), MW32-S (33 µg/L) and MW40-D (57 µg/L). Whilst these results were above the screening criteria of 2 µg/L, it should be noted that this screening criteria is for freshwater of low reliability and with no LOP identified.

In this regard, the following is noted in ANZG (2018) for 2,4-dimethylphenol with respect to the 2 µg/L screening criteria:

'2,4-dimethylphenol (2,3-xylenol) (CAS 105-67-9) is a naturally occurring substituted phenol derived from fractions of petroleum and coal tar distillation (USEPA 1980p). The available data for freshwater aquatic life indicate that acute toxicity occurs at concentrations as low as 2120 µg/L (USEPA 1986). No data were available concerning the chronic toxicity of 2,4-dimethylphenol to sensitive freshwater animals...

A low reliability freshwater trigger value of 2 µg/L was derived for 2,4-dimethylphenol using an assessment factor (AF) of 1000. In the absence of marine data a marine low reliability trigger value of 2 µg/L was adopted from the freshwater figure. Both figures should be used as indicative interim working levels only.'

Whilst acknowledging that tap water does not directly relate to the same receptors as ANZG (2018), and the limitations on exposure with restriction on use of the groundwater below the site and surrounding areas (associated with TWRO), notwithstanding, for context to human exposure it is noted that USEPA RSL for tap water for cresols (o-, m- and p-) are between 370-930 µg/L and for 2,4-dimethylphenol is 360 µg/L.

Accordingly, taking into account the soil results and the overall groundwater results, the phenol detections in groundwater were not considered to be of significant concern with the exception of those at JBMW03. Given the results from other up-gradient and down-gradient wells, the impact at JBMW03 appears to be localised in nature.

OPP and PCB

All OPP in soils and all OPP and PCB results in groundwater recorded concentrations below LRL.

Detections of PCB above the LRL were recorded in soil samples 313/0.4-0.5 (0.7 mg/kg), 336/0.2-0.3 (1.7 mg/kg), 336/0.4-0.5 (0.1 mg/kg), 341/0.2-0.4 (0.2 mg/kg) and 341/1.7-1.9 (7 mg/kg). It is noted that the underlying samples analysed, sample 313/0.4-0.5, 336/1.4-1.5 and 341/3.2-3.4 recorded results below LRL. No results exceeded the SAC of 7 mg/kg for total PCB.

In summary, OPP and PCB contaminants were not considered to be of significant concern at the site.

Metals

Metals have been recorded in soils across the site, the majority of which have been below the SAC.

The main metal of concern was lead, with exceedances of the heath investigation level of 1,500 mg/kg at multiple locations. Sampling in areas where lead was previously identified in JBS&G (2023), such as around JBS&G boreholes BH22, BH38, BH66 and BH65 did not identify the extent of the impacts in these areas with some step-out sample locations still exceeding the SAC. Accordingly, on review of results from the step-out boreholes, and other results across the site, the approach of potentially consolidating the lead impacted soils previously identified by JBS&G (2023) was not considered practical.

Moreover, whilst elevated lead (and other metal) impacts were typically associated with the near surface soils (or soils directly below the concrete slab), *viz.* the upper ~0.5 m of the soil profile and to a lesser extent the upper 1 m with lead concentrations where elevated generally between 1,000-6,000 mg/kg, impacts within the fill were identified as part of the current investigation at deeper depths in the eastern area of the site where fill was deeper. Most conspicuous was lead results in borehole 210 between approximately 4-5.8 m which recorded results of 9,900 mg/kg in sample 210/4-4.2 (12,000 mg/kg in the replicate sample BD4/20230912) and 100,000 mg/kg in sample 210/5.5-5.8. This sample also recording the highest chromium concentration of 19,000 mg/kg and the only sample exceeding the chromium SAC of 3,600 mg/kg. It is noted that the underlying samples recorded lead concentrations notably lower at 11 mg/kg (sample 210/5.8-5.95) and 1,700 mg/kg (sample 210/7-7.45).

Similar conspicuous lead results were recorded in nearby borehole 333 which recorded similar elevated lead results in sample 333/2-2.2 with results ranging between 53,000-140,000 mg/kg. Samples above and below this recorded lead concentrations of 350 mg/kg (sample 333/1.5-1.7) and 1,000 mg/kg (sample 333/2.4-2.6) respectively.

Leaching analysis (ASLP) was undertaken on samples for metals to better understand the leaching characteristics between samples. In this regard, whilst ASLP results tend to overestimate the impact that is actually found in groundwater, and hence should be considered in this context, ASLP results for lead from samples 210/5.8-5.95 and 333/2-2.2 are generally about 1-2 orders of magnitude higher than other samples. These elevated results were reflected in the groundwater lead results in nearby well 334 during the first sampling event with a concentration of 33 µg/L recorded compared to the next highest result of 5 µg/L. Resampling and analysis of this well as part of the second round of groundwater sampling recorded a low results of 3 µg/L suggesting even the initial groundwater results may have over-estimated lead impacts on the groundwater.

A notably higher concentration of 290 µg/L was recorded in MW09 for zinc, although this level of impact was not reflected in nearby or down-gradient wells. JBS&G (2023) recorded similar results.

Overall, whilst metals in groundwater were recorded in some samples to exceed the screening criteria for arsenic, cadmium, chromium copper, lead and zinc, these were considered to be generally consistent with what is encountered in urban heavy industrialised areas. These were also consistent with the JBS&G (2023) conclusions that metal detections in groundwater at the site were representative of background levels for the area.

In summary, the lead exceedances in soils would need to be remediated / managed to remove a complete source – pathway – receptor, such as via capping. Consideration may be given to assist with management of the very high concentrations at 333 (between ~1.7-2.4 m) and 210 (between ~4-5.8 m) during and post construction by placing these soils in the containment cell with the impacted OCP soils, as mentioned above.

PFAS

All PFAS soils results, including ASLP results, were low. Of note, this was reflected in samples collected from boreholes 321 and 327 which were located in close proximity to JBMW04 and WG233-S where higher results in these groundwater wells were recorded in JBS&G (2023), and in particular JBMW04. Similar to the JBS&G (2023) results, JBMW04 recorded the highest concentration with a result of 0.36 µg/L, this being slightly above the 95% LOP of 0.13 µg/L and well below the 90% LOP of 2 µg/L. Other exceedances of the 95% LOP at 209, 331, JBMW10, JBMW11 and WG233-I were all considered minor with results between 0.136 µg/L and 0.2 µg/L. It is noted that replicate or resampling of wells did not record exceedances of the SAC at 209, 331 and JBMW11.

Overall, based on the soil (including soil leaching ASLP) and groundwater results, whilst PFAS was ubiquitously above LRL, given the low concentrations and site setting it was not considered to be of significant concern.

Asbestos

Asbestos has been recorded in fill across the site, including in non-friable (ACM) and friable form and above the asbestos fines / friable asbestos SAC of 0.001 %. A summary of the detections is shown on Drawing 12 and 12A, Appendix A1. As indicated on Drawing 12A, asbestos has been recorded in samples directly below the concrete building slabs and pavements. This will need to be considered when developing the approach and management procedures for removal of the slab and subsequent use of the materials (e.g. reuse on site, disposal off-site, etc.).

In summary, fill at the site is to be considered impacted with asbestos and will need to be capped to remove the complete source – pathway – receptor, consistent with the development approach of raising the site.

13.2 Soil Vapour

The results of the soil vapour analysis recorded low concentrations for most contaminants, with all results well below the adopted SAC.

Results from ports 303, 304 and 306 in the vicinity of the Alkyd Plant building, where JBS&G soil vapour pins SV13 and SV20 were located, did not replicate the elevated TRH (or other VOC) recorded in this area as reported in in JBS&G (2023). The maximum TRH F1 (C_6-C_{10} minus BTEX) in this area was recorded in 304 (located near SV13) at 820 µg/m^3 whilst the maximum TRH F2 (>C_{10}-C_{12} minus naphthalene) in this area was recorded in 306 (located near SV20) at 840 µg/m^3.

The highest TRH F1 and TRH F2 results were recorded in the eastern section of the site at 333, with results of 150,000 µg/m^3 (SAC of 680,000 µg/m^3) and 6,900 µg/m^3 (SAC of 500,000 µg/m^3), respectively. BTEX concentrations were also highest at 333, and similarly were well below their respective SAC.

Based on the soil vapour results from this investigation, and the results presented in JBS&G (2023) which only recorded exceedances of the SAC at SV13 and SV20, noting these elevated concentrations were not replicated by this investigation, there is not considered to be a gross soil vapour risk. Whilst DP notes that the groundwater results from some wells would suggest a theoretical soil vapour risk when applying groundwater screening criteria for vapour intrusion risk, DP considers the actual soil vapour risk is best understood from the data presented by sampling of the soil vapour media.

Accordingly, in the context of the proposed development which includes raising the site levels, DP does not consider that the contamination at the site presents significant soil vapour risk to end users. Notwithstanding, implementation of practical measures should be undertaken as part of the site's management during and post development. For example, avoiding where practical the placement of impacted soils above current site levels, placement of soils remediated for volatile contaminants in suitable areas, implementation of precautionary air quality monitoring measures for any post development intrusive works undertaken by maintenance workers and outlining this requirement in the site's long-term environmental management plan (LTEMP), etc.

13.3 **Acid Sulphate Soils**

Laboratory analysis results confirmed the presence of ASS in the natural soils. This was consistent with the field observations of sulphuric odours noted in numerous boreholes and groundwater wells.

Results were generally low in the upper soil profile and below the screening criteria triggering the need for management and treatment. In this regard, the sample from the shallowest depth that exceeded the criteria was sample 203/4-4.45 m. Apart from this sample, all other results that exceeded the screening criteria were from samples collected below 8 m bgl. This suggests that sample 203/4-4.45 m may be an outlier and not representative of soils at this depth across the broader site. This is also supported by results of the pale grey sands at similar depths in nearby boreholes 312 (312/4.8-5 m) and 316 (316/4.8-5 m) which recorded SCr results of 0.006 %S and 0.008 %S respectively.

Sample 203/8.35-8.45 m recorded the highest SCr and net acidity (without considering the soils acid neutralising capacity) results at 0.15 % S and 1.7 % S respectively.

The laboratory analysis also suggests a required liming rate for most samples was between <0.75-15 $CaCo_3$ kg / tonne, with the highest liming rate associated with sample 203/8.35-8.45 m at 81 $CaCo_3$ kg / tonne. It should be noted that the laboratory analysis does not consider the actual $CaCo_3$ (and associated purity) to be used, or treatment techniques. Accordingly, these liming rates should be considered indicative only.

In summary, the natural soils near or below the water table should be assumed to require ASS management until demonstrated otherwise, noting that the ASS requiring management appears to be primarily below 8 m bgl with the potential for some ASS in shallower soils below 4 m bgl, such as in the vicinity of 203. Accordingly, an acid sulphate soils management plan (ASSMP) would be required to be implemented when disturbing these soils (e.g. when bringing to surface). Drafting the ASSMP would be best undertaken once the detailed design is further progressed and the and the construction approach more developed.

13.4 Data Quality Assurance and Quality Control

The QA / QC results are included in Appendix L. Based on the results of the field QA and field and laboratory QC, and evaluation against the data quality indicators, it is concluded that the field and laboratory test data obtained are reliable and useable for this assessment.

14. Areas of Concern and Anticipated Remediation Works

Based on the results of this and previous investigations, contamination impacts have been summarised into five main areas. These areas are shown on Drawing 9 in Appendix A1.

Area 1:

Area 1 focuses on the Alkyd Plant building in the north-western section of the site. Whilst specific remediation works are not considered to be required, given the results in groundwater wells 307, 338 and JBMW03 the following comments are provided:

- Appropriate site management practices are to be incorporated into the works so as to not allow movement of soils from this area without appropriate tracking and / or assessment. This is particularly the case around JBMW03 where localised impacts, as reflected in the groundwater results, appear to be present;
- 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 (i.e. from around ~4.5-8.5 m); and
- If *in situ* soil treatment is proposed, it is suggested additional boreholes are drilled in this area to better focus the area of treatment prior to commencing remedial works.

Area 2

Area 2 focuses on the northern UST farm, associated pump room and adjacent areas. Remediation works in this area are likely to comprise:

- Removal and validation of the USTs from the northern UST farm, including removal of the inground infrastructure (e.g. pipe work that extends into the adjacent pump room building, etc.);

- Removal and validation of the redundant USTs, including removal of the inground infrastructure (e.g. pipe work, etc.). Currently there is anticipated to be three smaller redundant USTs to the west and south-west of the pump room building;
- For soils excavated from the UST farms requiring remediation, *ex situ* treatment (e.g. biopiling, etc.) is to be undertaken until soils are suitable for placement below the capping layer; and
- As part of the UST removal and validation works, it is recommended that where the odorous ('rotten cheese') soils are encountered and excavated as part of the general UST removal and validation works, consideration be given to these materials being opportunistically stockpiled and subject to *ex situ* treatment (e.g. biopiling, etc.) This should not be read so as to imply that 'chase-out' of such odorous soils is required.

Area 3

Area 3 generally encompasses the area subject to the central / western groundwater remediation being undertaken via the VMP. Remediation works in this area are likely to comprise:

- Groundwater remediation and validation as per the requirements of the VMP, as is being undertaken by Allnex;
- Removal and validation of the USTs from the central UST farm, including removal of the inground infrastructure (e.g. pipe work, etc.);
- Removal and validation of the ASTs from the central AST farm, including removal of the inground infrastructure (e.g. pipe work, etc.). As part of the validation work, assessment of the soils from within and below the footprint of the AST farm and above the water table will be required. This assessment to check if these soils warrant remediation;
- For soils excavated from the AST and UST farms requiring remediation, *ex situ* treatment (e.g. biopiling, etc.) is to be undertaken until soils are suitable for placement below the capping layer;
- 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 (i.e. from around ~4.5-8.5 m) in the vicinity of the central AST farm, Emulsions Plant building, central UST farm and the Beckamine Plant building; and
- If *in situ* soil treatment (e.g. part immobilisation, etc.) below the water table is proposed, it is suggested additional boreholes are drilled in this area to better focus the area of treatment prior to commencing remedial works. These should particularly focus down-gradient of the Beckamine Plant building.

Area 4

Area 4 generally encompasses the area to the south of the Nuodex Plant building where groundwater impacts are being addressed via the VMP. Remediation works in this area are likely to comprise:

- Groundwater remediation and validation as to be undertaken by Allnex via the VMP;
- Removal and validation of the ASTs from the south-eastern (Nuodex Plant) AST farm, including removal of the inground infrastructure (e.g. pipe work, etc.). As part of this validation work, assessment of the soils from within and below the footprint of the AST farm

and above the water table will be required. This assessment to check if these soils warrant remediation;

- For soils excavated from the AST farm requiring remediation, *ex situ* treatment (e.g. biopiling, etc.) is to be undertaken until soils are suitable for placement below the capping layer;
- Excavation and validation of OCP impacted soils around BH67 and HA106. It is recommended that this also incorporates sample locations HA104, HA105, HA111, 326 and 328D. Excavations in this area are anticipated to extend to about 1 m on average (likely range ~0.5-2 m);
- 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 (i.e. from around ~4-7 m) in the vicinity of the AST farm; and
- If *in situ* soil treatment (e.g. part immobilisation, etc.) below the water table is proposed, it is suggested additional boreholes in this area are drilled to better focus the area of treatment prior to commencing remedial works.

Area 5

Area 5 generally encompasses the grassed area to the east of the Nuodex Plant building. Remediation works in this area are likely to comprise:

- Excavation of the soils in this area for *ex situ* treatment (e.g. biopiling, etc.) to address VOC and TRH impacts in the soils below 2 m above the water table below (i.e. between ~2-5 m). Treatment of soils to be undertaken until soils are suitable for placement below the capping layer.

  The upper 2 m is not anticipated to require significant remediation (apart from asbestos) and will likely be suitable without treatment, subject to inspection during excavation. Moreover, to assist with soil management during and post construction it is suggested that the OCP impacted soils around 331 with elevated results are stockpiled separately; and
- 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 (i.e. from around ~5-9 m).

Area 6

Area 6 generally comprises the unsealed filled area in the south-eastern section of the site, located to the north of the driveway off Coal Pier Road and the south of the first flush pit. Whilst specific remediation works are not considered to be required, given the very high lead results in boreholes 210 and 333 the following comments are provided:

- Appropriate site management practices are to be incorporated into the works so as to not allow movement of soils from this area without appropriate tracking and / or assessment;
- Commercially, to reduce longer term risks from retained contamination, consideration may be given to assist with management of the very high lead concentrations at 333 (between ~1.7-2.4 m) and 210 (between~4-5.8 m) during and post construction by addressing these soils. For instance excavation and validation of the highly impacts soils and placement of these in the containment cell with the impacted OCP soils;

- To assist with soil management during and post construction, it is suggested that the OCP impacted soils around 333, as reported in sample 333/1-1.2 at 79 mg/kg forms part of the above mentioned excavation works; and
- Given the variability in depths from the results to date, it is suggested additional boreholes are drilled in this area to better focus the area (and depths) of excavation prior to commencing remedial works.

Other Works

Other remedial works that are anticipated to be required or worth further consideration from a contamination perspective include:

- Removal and validation of the ASTs from the north-eastern AST farm and the western AST farm, including removal of the inground infrastructure (e.g. pipe work). As part of this validation work, assessment of the soils from below the AST farm and above the water table will be required to check if these soils warrant remediation. For any subsequent soils excavated from the AST farm(s) requiring remediation, *ex situ* treatment (e.g. biopiling, etc.) will need to be undertaken until soils are suitable for placement below the capping layer;
- Removal and validation of other inground tanks / infrastructure such as, but not limited to, the Beckamine Plant inground holding tanks (number 19 on Drawing 3, Appendix A1) and the Emulsions Plant waste water treatment / separation pit in the north-eastern corner of the site (number 33 on Drawing 3, Appendix A1); and
- Given the detections of OCP in the near surface soils in the north-eastern corner of the site around BH06, HA108, and at BH59 near the driveway off Coal Pier Road, it is suggested consideration be given to a surface scrape to ~0.3-0.5 m depth in these areas to consolidate these soils with the other OCP impacted soils from Area 4.

15. Conclusions

Based on the results from this SSCI and previous investigations by others, the site currently presents contamination risks for the proposed development and these risks will need to be addressed as part of the development works. Accordingly, a RAP will need to be developed to outline an overarching strategy for the remedial works required to be undertaken during development to address the contamination identified.

Anticipated works from a contamination perspective for the main impacted areas are summarised in Section 14. In addition, the following recommendations and comments are provided:

- Asbestos is present in the fill (in bonded and friable form) and will need to be capped to remove the complete exposure pathway (i.e. source – pathway – receptor). A capping approach is consistent with the development approach of raising the site. Works with asbestos impacted materials should be considered friable in nature, unless demonstrated and endorsed otherwise by the Occupational Hygienist. Moreover, it is noted that asbestos has been recorded in samples directly below the concrete building slabs and pavements, and this will need to be considered when developing the approach and management procedures for removal of the slab and subsequent use of the materials (e.g. reuse on site, disposal off-site, etc.);

- Capping of asbestos impacted soils will also address the risk associated with a direct exposure pathway for metals, in particular for lead;
- It is expected that the VMP will need to be completed and its implementation will no longer be applicable to the site. This applying to current central / western groundwater remediation area and the eastern area which was subsequently notified under the VMP. For example, a Notice of Cessation of Approved Management Proposals from the NSW EPA under Section 17(7) of the CLM Act, or similar, is likely to be required with respect to the VMP being completed;
- The natural soils near or below the water table should be assumed to require ASS management until demonstrated otherwise, noting that the ASS requiring management appears to be primarily below 8 m bgl with the potential for some ASS in shallower soils below 4 m bgl, such as in the vicinity of 203. Accordingly, an ASSMP would be required to be implemented when disturbing these soils (i.e. bringing to the surface). Drafting the ASSMP would be best undertaken once the detailed design is further progressed and the construction approach developed;
- Development of the final remediation approach, particular for any *in situ* due diligence treatment works for commercial risk management purposes, 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;
- Whilst off-site disposal of soils is anticipated to be minimised, a waste classification will be required prior to disposal of any soils to appropriate receiving licensed facilities;
- Implementation of an unexpected finds / additional finds protocol is to occur during the works. It is noted that on a site of this nature (i.e. age, industrial use, etc.) it would not be uncommon to find additional USTs, other inground infrastructure or additional finds during works that require remediation;
- Hazardous building material surveys are to be undertaken on the existing buildings / structures and subsequent appropriate removal of any identified hazardous building materials be undertaken by a suitability qualified contractor prior to demolition; and
- On completion of the remedial works, development of a 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 this SSCI it is considered that the site can be made suitable for the proposed industrial warehouse development subject to implementation of the above recommendations, the works outlined in Section 14, and successful completion of the required remediation works as to be outlined in the RAP.

16. Limitations

Douglas Partners Pty Ltd (DP) has prepared this report for this project at 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 and reports provided by ESR Australia and / or their agents.

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

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

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

This report must be read in conjunction with all of the attached and should be kept in its entirety without separation of individual pages or sections. Douglas 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 Douglas. This is because this report has been written as advice and opinion rather than instructions for construction.

Asbestos has been detected by observation and laboratory analysis, on the surface of the site and in fill materials at the test locations sampled and analysed. Building demolition materials, such as brick, plastic, metal, wire, concrete, etc. were also observed in fill, and these are considered as indicative of the possible presence of hazardous building materials (HBM), including asbestos.

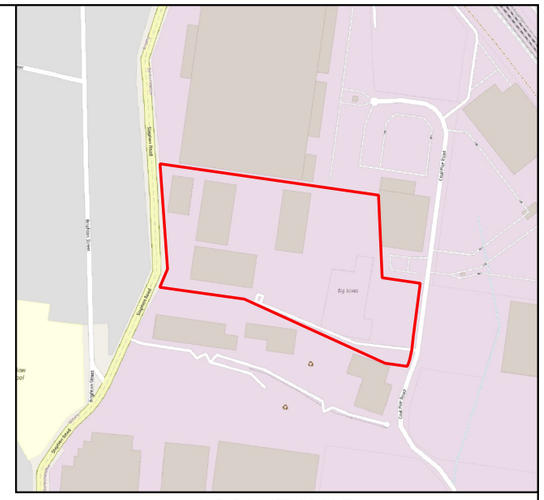
Although the sampling plan adopted for this investigation is considered appropriate to achieve the stated project objectives, there are necessarily parts of the site that have not been sampled and analysed. This is either due to undetected variations in ground conditions, or to parts of the site being inaccessible and not available for inspection / sampling, or to vegetation preventing visual inspection and reasonable access. It is therefore considered possible that HBM, including asbestos, may be present in unobserved or untested parts of the site, between and beyond sampling locations, and hence no warranty can be given that asbestos is not present.

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

0 100 200 300 400 m

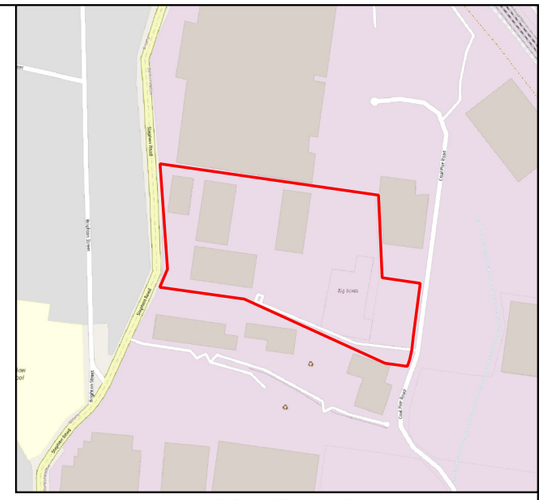
Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT:	ESR Australia		
OFFICE:	Sydney	DRAWN BY:	PJ
SCALE:	1:6000 @ A3	DATE:	19.09.2024

TITLE: **Site Location Plan**
Proposed Industrial Development
49-61 Stephen Road, Banksmeadow

N

PROJECT No:	219609.01
DRAWING No:	1
REVISION:	0



LOCALITY MAP

Notes:
1. Drawing projection GDA2020 / MGA zone 56.
2. Aerial imagery sourced from Metromaps.
3. Boundaries and property locations are approximate only.
4. Properties (and associated co-ordinates) are based on information provided on the NSW EPA online database accessed on 20 August 2024.
5. Site (Allnex) also a notified property.

Legend

- Site Boundary
- Contamination regulated under the POEO Act
- Contamination regulated under the CLM Act
- Regulation under the CLM Act not required
- Contamination being managed via the planning process (EP&A Act)
- Regulation being finalised

0 250 500 750 1,000 m

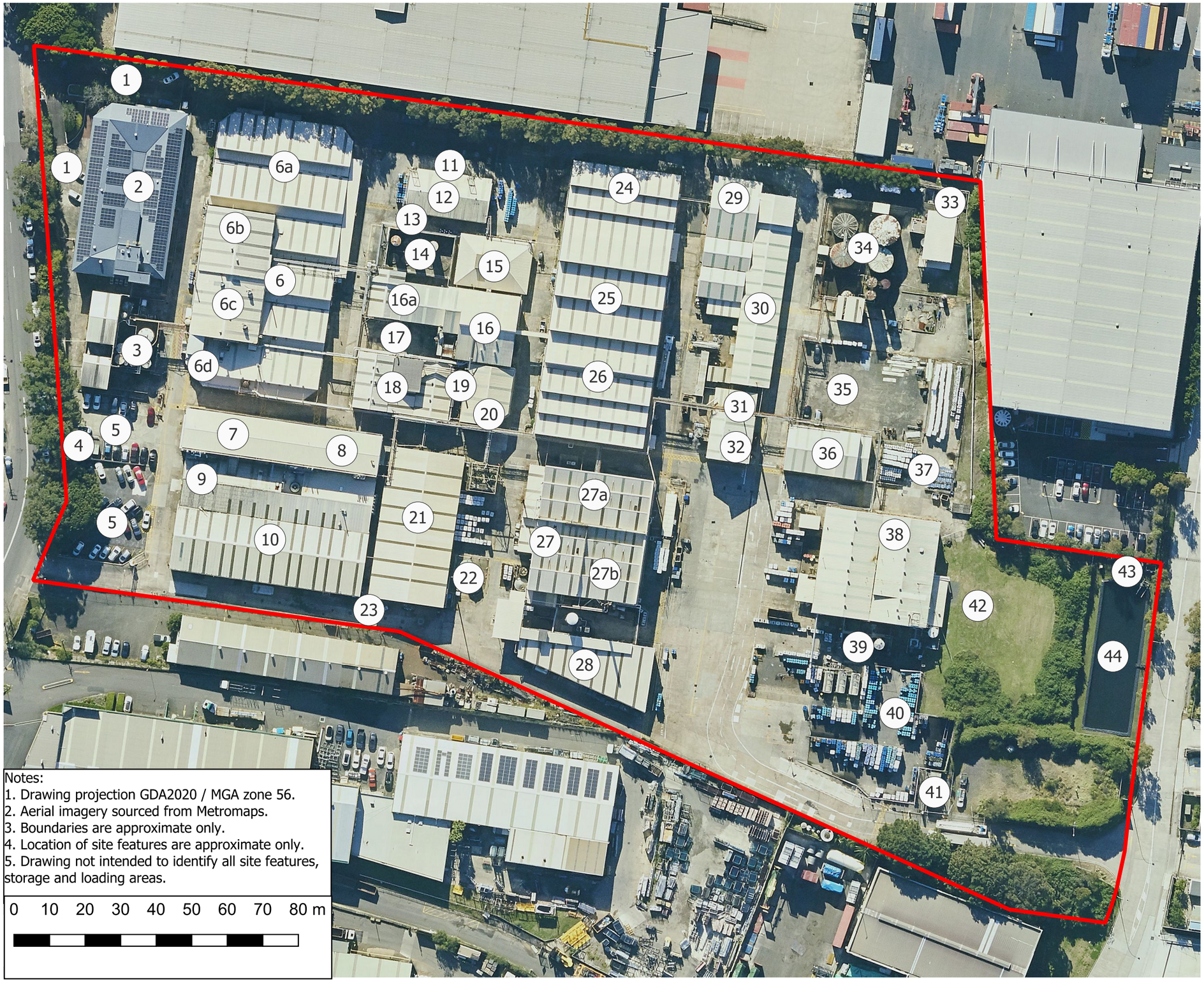
Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT:	ESR Australia		
OFFICE:	Sydney	DRAWN BY:	PJ
SCALE:	1:15000 @ A3	DATE:	09.09.2024

TITLE: **NSW EPA Section 60 Contaminated Land Notified Properties**
Proposed Industrial Development
49-61 Stephen Road, Banksmeadow

N

PROJECT No:	219609.01
DRAWING No:	2
REVISION:	0



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

Legend

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

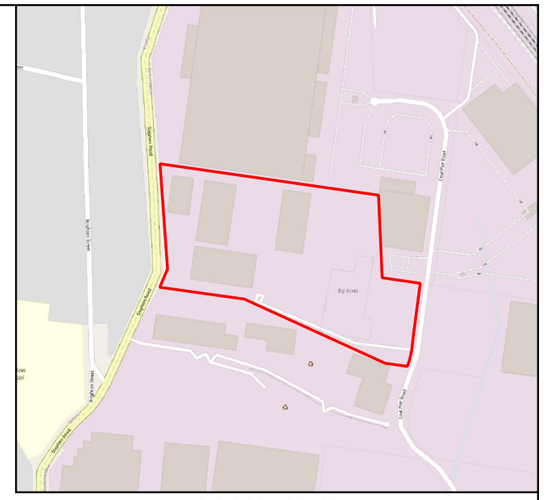
Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT:	ESR Australia		
OFFICE:	Sydney	DRAWN BY:	PJ
SCALE:	1:1100 @ A3	DATE:	04.09.2024

TITLE: **Main Site Features**
Proposed Industrial Development
49-61 Stephen Road, Banksmeadow

N

PROJECT No:	219609.01
DRAWING No:	3
REVISION:	0



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

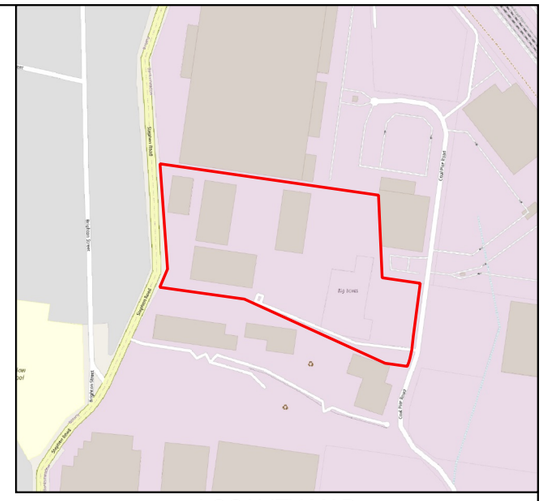
Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT:	ESR Australia		
OFFICE:	Sydney	DRAWN BY:	PJ
SCALE:	1:1100 @ A3	DATE:	23.09.2024

TITLE: **General Summary of Main Site Uses**
Proposed Industrial Development
49-61 Stephen Road, Banksmeadow

N

PROJECT No:	219609.01
DRAWING No:	4
REVISION:	0



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. Does not include JBS&G soil vapour locations.
7. JBS&G test locations extracted from JBS&G drawing 'Sampling Locations' Figure 5, JBS&G report dated 19/01/2023.
8. AECOM test locations extracted from AECOM drawing 'Site Layout' Figure 1, AECOM report dated 22/12/2023.

Legend

- Site Boundary

Test Locations - Previous Investigations

- AECOM Groundwater Well
- Orica Groundwater Well
- JBS&G Groundwater Well
- JBS&G Environmental Borehole
- JBS&G Hand Augers

0 10 20 30 40 50 60 70 80 m

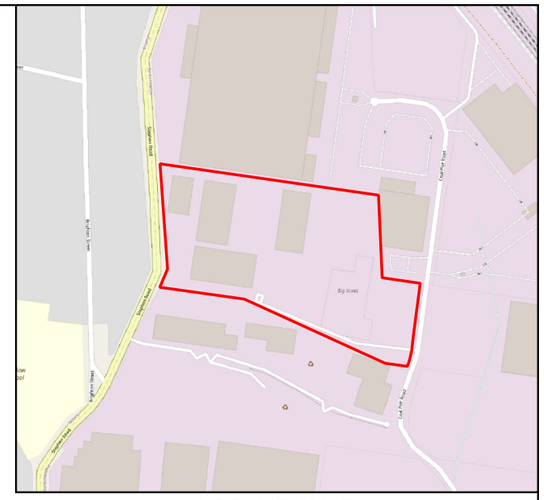
Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT:	ESR Australia		
OFFICE:	Sydney	DRAWN BY:	PJ
SCALE:	1:1100 @ A3	DATE:	19.09.2024

TITLE: **Previous Investigations - Test Location Plan**
Proposed Industrial Development
49-61 Stephen Road, Banksmeadow

N

PROJECT No:	219609.01
DRAWING No:	5
REVISION:	0



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. Does not include JBS&G soil vapour locations.
7. JBS&G test locations extracted from JBS&G drawing 'Sampling Locations' Figure 5, JBS&G report dated 19/01/2023.
8. AECOM test locations extracted from AECOM drawing 'Site Layout' Figure 1, AECOM report dated 22/12/2023.

Legend

- Site Boundary

Test Locations - Previous Investigations

- AECOM Groundwater Well
- Orica Groundwater Well
- JBS&G Groundwater Well
- JBS&G Environmental Borehole
- JBS&G Hand Augers

0 10 20 30 40 50 m

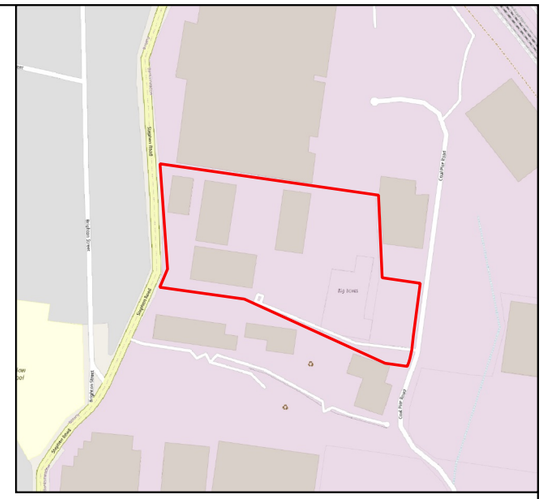
Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT:	ESR Australia		
OFFICE:	Sydney	DRAWN BY:	PJ
SCALE:	1:900 @ A3	DATE:	19.09.2024

TITLE: **Previous Investigations - Test Location Plan (East)**
Proposed Industrial Development
49-61 Stephen Road, Banksmeadow

N

PROJECT No:	219609.01
DRAWING No:	5a
REVISION:	0



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. Does not include JBS&G soil vapour locations.
7. JBS&G test locations extracted from JBS&G drawing 'Sampling Locations' Figure 5, JBS&G report dated 19/01/2023.
8. AECOM test locations extracted from AECOM drawing 'Site Layout' Figure 1, AECOM report dated 22/12/2023.

Legend

- Site Boundary

Test Locations - Previous Investigations

- AECOM Groundwater Well
- Orica Groundwater Well
- JBS&G Groundwater Well
- JBS&G Environmental Borehole
- JBS&G Hand Augers

0 10 20 30 40 50 m

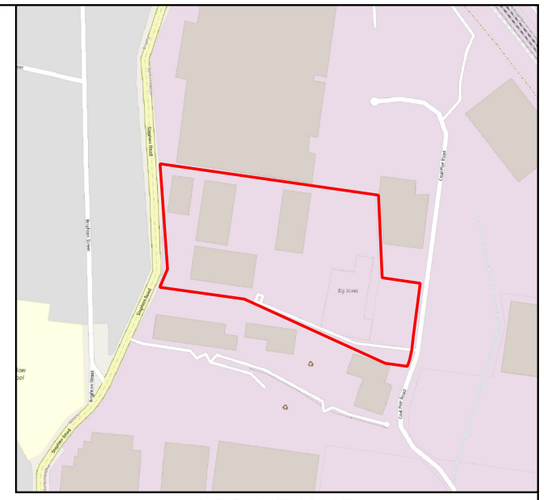
Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT:	ESR Australia		
OFFICE:	Sydney	DRAWN BY:	PJ
SCALE:	1:700 @ A3	DATE:	09.09.2024

TITLE: **Previous Investigations - Test Location Plan (West)**
Proposed Industrial Development
49-61 Stephen Road, Banksmeadow

N

PROJECT No:	219609.01
DRAWING No:	5b
REVISION:	0



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.

Legend

- Site Boundary

Test Locations

- DP Environmental Borehole
- DP Geotechnical Borehole
- DP Geotechnical CPT
- DP Soil Vapour Port
- DP Groundwater Well
- AECOM Groundwater Well
- Orica Groundwater Well
- JBS&G Groundwater Well

0 10 20 30 40 50 60 70 80 m

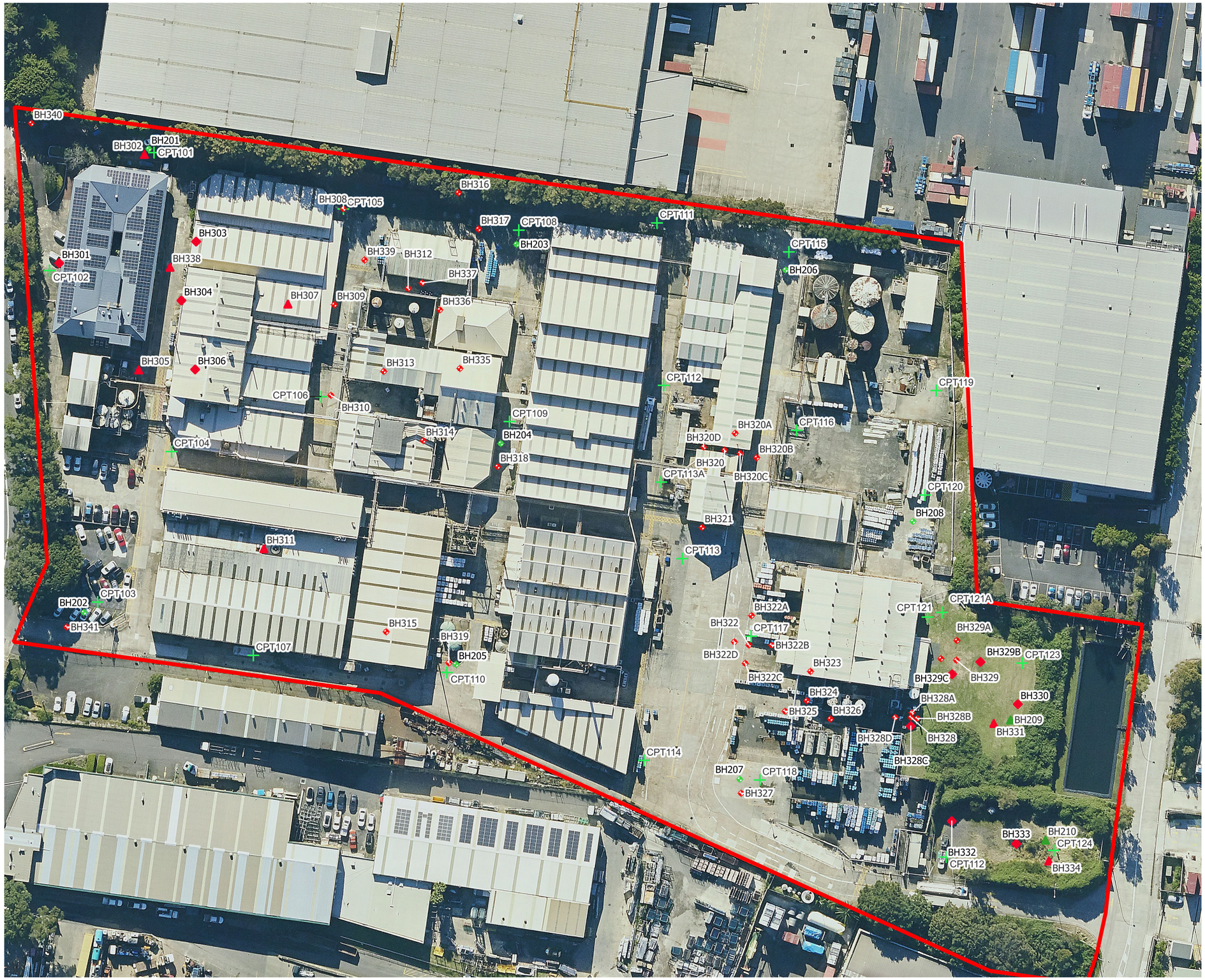
Douglas Partners
Geotechnics / Environment / Groundwater

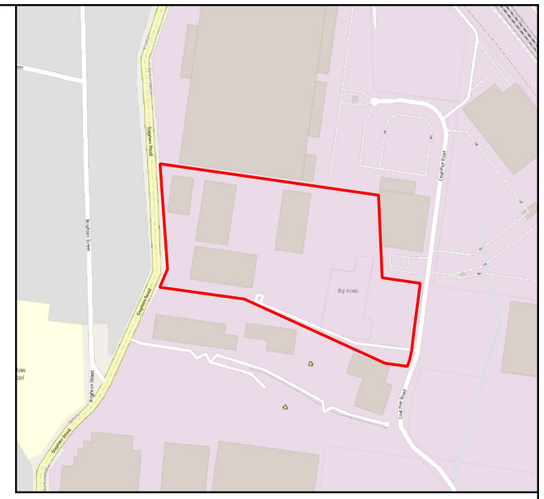
CLIENT:	ESR Australia		
OFFICE:	Sydney	DRAWN BY:	PJ
SCALE:	1:1100 @ A3	DATE:	09.09.2024

TITLE: **Current Investigation - All Sample Locations**
Proposed Industrial Development
49-61 Stephen Road, Banksmeadow

N

PROJECT No:	219609.01
DRAWING No:	6
REVISION:	0





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.

Legend

- Site Boundary

Soil Sample Locations

- Environmental Borehole
- Geotechnical Borehole
- DP Geotechnical CPT
- Groundwater Well
- Soil Vapour Port

0 10 20 30 40 50 60 70 80 m

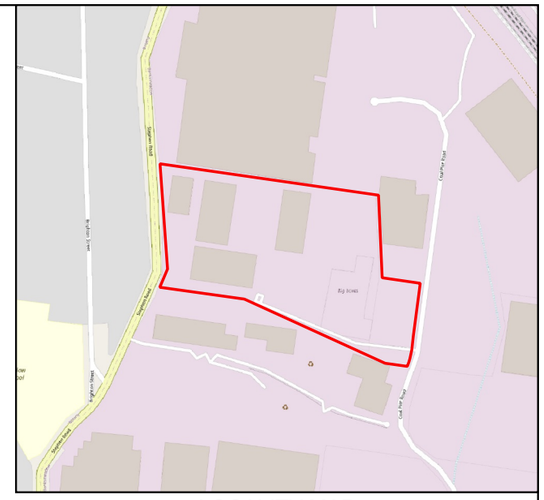
Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT:	ESR Australia		
OFFICE:	Sydney	DRAWN BY:	PJ
SCALE:	1:1100 @ A3	DATE:	19.09.2024

TITLE: **Current Investigation - Soil Sample Locations**
Proposed Warehouse Development
49-61 Stephen Road, Banksmeadow

N

PROJECT No:	219609.01
DRAWING No:	6a
REVISION:	0



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.

Legend

- Site Boundary

Groundwater Wells Sampled for Current Investigation

- AECOM Groundwater Well
- ORICA Groundwater Well
- JBS&G Groundwater Well
- DP Groundwater Well

0 10 20 30 40 50 60 70 80 m

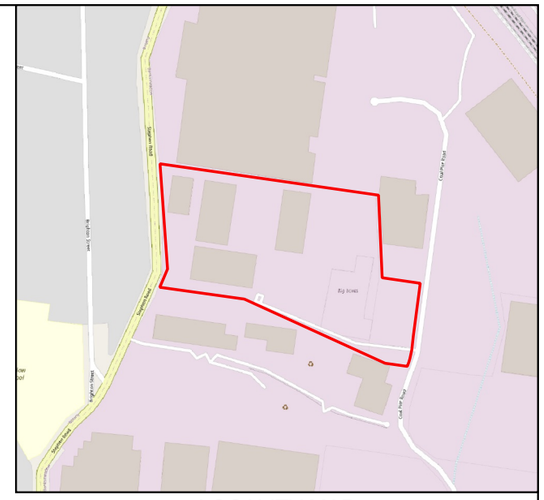
Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT:	ESR Australia		
OFFICE:	Sydney	DRAWN BY:	PJ
SCALE:	1:1100 @ A3	DATE:	04.09.2024

TITLE: **Current Investigation - Groundwater Sample Locations**
Proposed Industrial Development
49-61 Stephen Road, Banksmeadow

N

PROJECT No:	219609.01
DRAWING No:	6b
REVISION:	0



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.

Legend

- Site Boundary

Current Investigation

- Soil Vapour Ports

Previous Investigation

- JBS&G Soil Vapour Pins

0 10 20 30 40 50 60 70 80 m

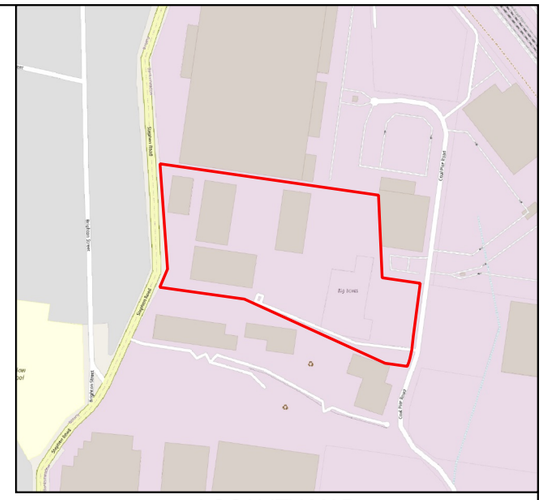
Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT:	ESR Australia		
OFFICE:	Sydney	DRAWN BY:	PJ
SCALE:	1:1100 @ A3	DATE:	04.09.2024

TITLE: **Current and Previous Investigations - Soil Vapour Sample Locations**
Proposed Industrial Development
49-61 Stephen Road, Banksmeadow

N

PROJECT No:	219609.01
DRAWING No:	6c
REVISION:	0



LOCALITY MAP

Notes:
1. Drawing projection GDA2020 / MGA zone 56.
2. Aerial imagery sourced from Metromaps.
3. Boundaries are approximate only.
4. Locations inside buildings are approximate only.
5. PID screening results included from JBS&G's report on 'Detailed Site Investigation, 49-61 Stephen Road, Botany NSW' dated 19 January 2023.
6. PID = Photoionisation detector
7. bgl = below ground level

Legend

- Site Boundary

PID Field Results (0-2.5m bgl)

- 3501->5000 ppm
- 1501-3500 ppm
- 501-1500 ppm
- 101-500 ppm
- 21-100 ppm
- 0-20 ppm

0 10 20 30 40 50 60 70 80 m

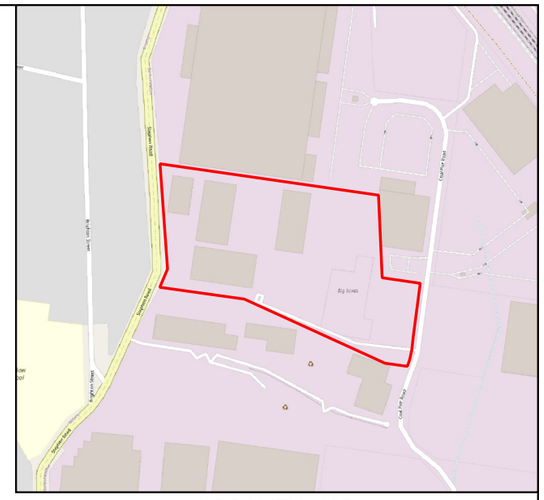
Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT:	ESR Australia		
OFFICE:	Sydney	DRAWN BY:	PJ
SCALE:	1:1100 @ A3	DATE:	19.09.2024

TITLE: **Summary of PID Field Results - 0-2.5m (bgl)**
Proposed Industrial Development
49-61 Stephen Road, Banksmeadow

N

PROJECT No:	219609.01
DRAWING No:	7
REVISION:	0



LOCALITY MAP

Notes:
1. Drawing projection GDA2020 / MGA zone 56.
2. Aerial imagery sourced from Metromaps.
3. Boundaries are approximate only.
4. Locations inside buildings are approximate only.
5. PID screening results included from JBS&G's report on 'Detailed Site Investigation, 49-61 Stephen Road, Botany NSW' dated 19 January 2023.
6. PID = Photoionisation detector
7. bgl = below ground level

Legend

- Site Boundary

PID Field Results (2.5-4.5m bgl)

- 3501->5000 ppm
- 1501-3500 ppm
- 501-1500 ppm
- 101-500 ppm
- 21-100 ppm
- 0-20 ppm

0 10 20 30 40 50 60 70 80 m

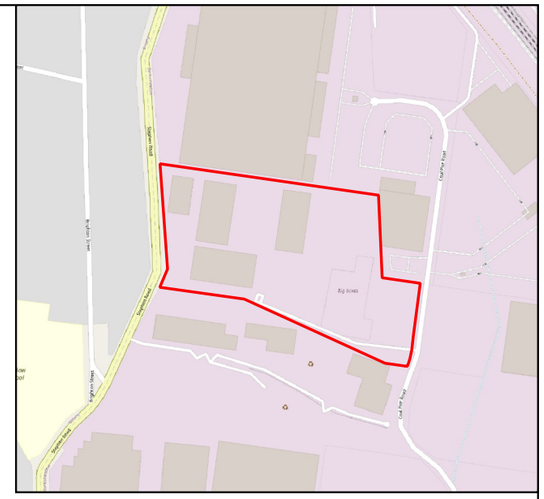
Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT:	ESR Australia		
OFFICE:	Sydney	DRAWN BY:	PJ
SCALE:	1:1100 @ A3	DATE:	19.09.2024

TITLE: **Summary of PID Field Results - 2.5-4.5m (bgl)**
Proposed Industrial Development
49-61 Stephen Road, Banksmeadow

N

PROJECT No:	219609.01
DRAWING No:	7a
REVISION:	0



LOCALITY MAP

Notes:
1. Drawing projection GDA2020 / MGA zone 56.
2. Aerial imagery sourced from Metromaps.
3. Boundaries are approximate only.
4. Locations inside buildings are approximate only.
5. PID screening results included from JBS&G's report on 'Detailed Site Investigation, 49-61 Stephen Road, Botany NSW' dated 19 January 2023.
6. PID = Photoionisation detector
7. bgl = below ground level

Legend

- Site Boundary

PID Field Results (>4.5m bgl)

- 3501->5000 ppm
- 1501-3500 ppm
- 501-1500 ppm
- 101-500 ppm
- 21-100 ppm
- 0-20 ppm

0 10 20 30 40 50 60 70 80 m

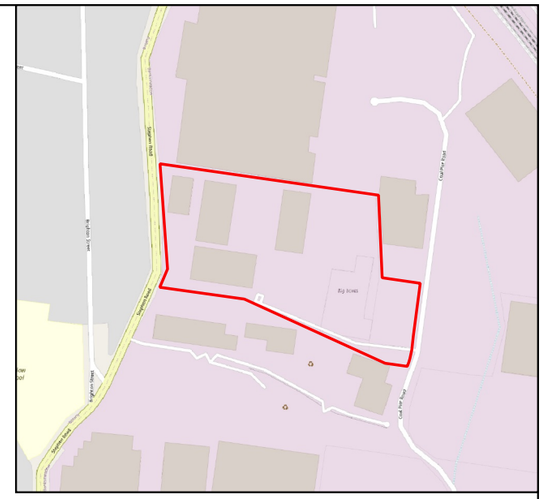
Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT:	ESR Australia		
OFFICE:	Sydney	DRAWN BY:	PJ
SCALE:	1:1100 @ A3	DATE:	19.09.2024

TITLE: **Summary of PID Field Results - Below 4.5m (bgl)**
Proposed Industrial Development
49-61 Stephen Road, Banksmeadow

N

PROJECT No:	219609.01
DRAWING No:	7b
REVISION:	0



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. Results are summarised from DP's current investgation and JBS&G previous investigation.
6. Odours extracted from JBS&G 'Soil Borehole Logs', (Appendix D from JBS&G report) dated 19/01/2023.
7. bgl = below ground level

Legend

Site Boundary

Odours Observed During Fieldwork

Hydrocarbon Odour

0 10 20 30 40 50 60 70 80 m

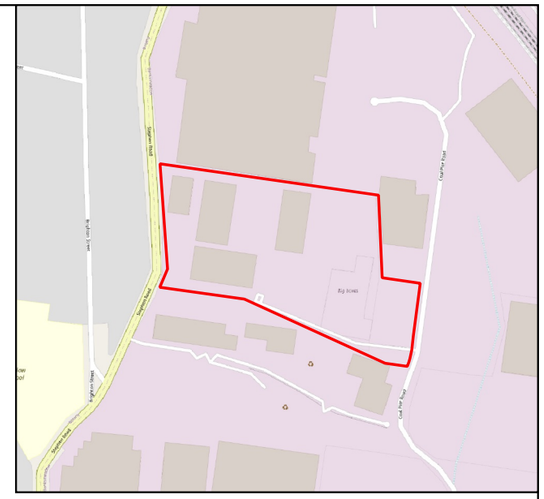
Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT:	ESR Australia		
OFFICE:	Sydney	DRAWN BY:	PJ
SCALE:	1:1100 @ A3	DATE:	09.09.2024

TITLE: **Summary of Odours Observed During Fieldwork - 0-2.5m (bgl)**
Proposed Industrial Development
49-61 Stephen Road, Banksmeadow

N

PROJECT No:	219609.01
DRAWING No:	7c
REVISION:	0



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. Results are summarised from DP's current investgation and JBS&G previous investigation.
6. Odours extracted from JBS&G 'Soil Borehole Logs', (Appendix D from JBS&G report) dated 19/01/2023.
7. bgl = below ground level

Legend

- Site Boundary

Odours Observed During Fieldwork

- Hydrocarbon Odour
- Sweet Odour
- Chemical Odour
- Rotten Cheese Like Odour
- Hydrocarbon and Sulphuric Odours

0 10 20 30 40 50 60 70 80 m

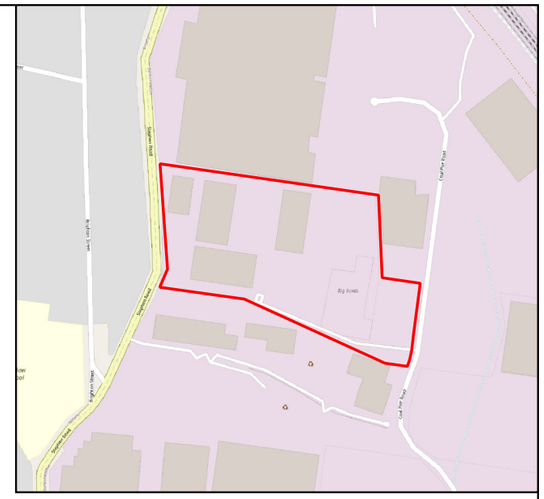
Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT:	ESR Australia		
OFFICE:	Sydney	DRAWN BY:	PJ
SCALE:	1:1100 @ A3	DATE:	09.09.2024

TITLE: **Summary of Odours Observed During Fieldwork - 2.5-4.5m (bgl)**
Proposed Industrial Development
49-61 Stephen Road, Banksmeadow

N

PROJECT No:	219609.01
DRAWING No:	7d
REVISION:	0



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. Results are summarised from DP's current investgation and JBS&G previous investigation.
6. Odours extracted from JBS&G 'Soil Borehole Logs', (Appendix D from JBS&G report) dated 19/01/2023.
7. bgl = below ground level

Legend

- Site Boundary

Odours Observed During Fieldwork

- Hydrocarbon Odour
- Sweet Odour
- Chemical Odour
- Rotten Cheese Like Odour
- Sulphuric Odour
- Hydrocarbon and Sulphuric Odours
- Chemical and Sulphuric Odours
- Rotten Cheese Like and Sulphuric Odours
- Hydrocarbon, Chemical and Sulphuric Odours

0 10 20 30 40 50 60 70 80 m

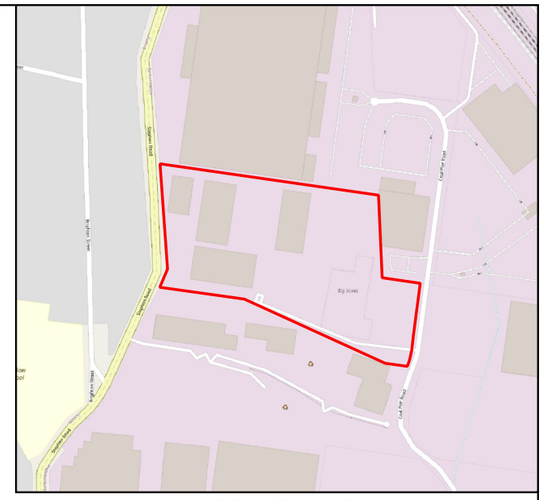
Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT:	ESR Australia		
OFFICE:	Sydney	DRAWN BY:	PJ
SCALE:	1:1100 @ A3	DATE:	09.09.2024

TITLE: **Summary of Odours Observed During Fieldwork - Below 4.5m (bgl)**
Proposed Industrial Development
49-61 Stephen Road, Banksmeadow

N

PROJECT No:	219609.01
DRAWING No:	7e
REVISION:	0



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. Groundwater contours are approximate only generated from groundwater levels gauged from 8-10 November 2023.
6. AHD = Australian height datum

Legend

- Site Boundary

Groundwater Wells Gauged for Groundwater Levels

- AECOM Groundwater Well
- ORICA Groundwater Well
- JBS&G Groundwater Well
- DP Groundwater Well

0 10 20 30 40 50 60 70 80 m

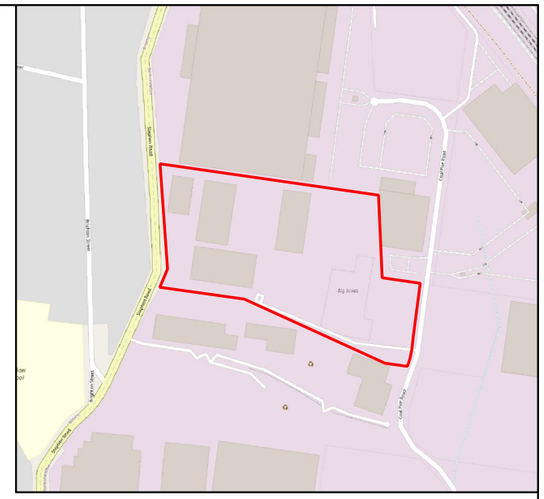
Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT:	ESR Australia		
OFFICE:	Sydney	DRAWN BY:	PJ
SCALE:	1:1100 @ A3	DATE:	19.09.2024

TITLE: **Groundwater Contours (AHD) - 8-10 November 2023**
Proposed Industrial Development
49-61 Stephen Road, Banksmeadow

N

PROJECT No:	219609.01
DRAWING No:	8
REVISION:	0



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

Legend

- Site Boundary
- Area1
- 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

Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT:	ESR Australia		
OFFICE:	Sydney	DRAWN BY:	PJ
SCALE:	1:1100 @ A3	DATE:	23.09.2024

TITLE: **Main Areas of Contamination Concern**
Proposed Industrial Development
49-61 Stephen Road, Banksmeadow

N

PROJECT No:	219609.01
DRAWING No:	9
REVISION:	0