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ALTIS BULKY RETAIL PTY LTD AS TRUSTEE FOR ALTIS ARET SUB TRUST 20 ("ALTIS")

Remediation Action Plan

28 Elizabeth Street, Liverpool NSW

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Executive Summary

Altis Bulky Retail Pty Ltd as trustee for Altis ARET Sub Trust 20 (Altis; the 'client') engaged EI Australia to prepare a Remediation Action Plan (RAP) for the commercial property at 28 Elizabeth Street, Liverpool NSW (the 'site').

The site (approximately 3,609 m^2) is designated for redevelopment, involving the construction of a multi-storey, mixed-use building, including a six-level basement car parking facility. Previous environmental assessments identified asbestos (bonded) in site (fill) soils, posing unacceptable risks to potential human. In addition, five underground storage tanks (USTs) were present *in situ* on the property.

The purpose of this plan is to describe the works required to remediate the site, thereby rendering it suitable for the proposed use (development), in accordance with Clause 7 of *State Environmental Planning Policy 55 - Remediation of Land* (SEPP 55).

The preferred remediation strategy is excavation and off-site disposal of impacted materials to licensed waste landfill facilities.

The remediation works will include (though not necessarily be limited to):

- **Stage 1** – Site establishment;
- **Stage 2** – Additional groundwater investigations to close data gaps;
- **Stage 3** – Surface (clearance) inspection for evidence of contamination (e.g. ACM);
- **Stage 4** – Impact delineation and waste classification;
- **Stage 5** – Excavation of asbestos- impacted hotspots and validation; and
- **Stage 6** – UST removal and validation.

A sampling, analysis and quality plan (SAQP) is included, to guide the validation program.

Should unexpected finds be discovered during site remediation, or should any phase of the validation identify additional (residual), high level contamination, then the procedures described under *Contingency Management* (**Section 6.4**), the *Unexpected Finds Protocol* (**Appendix D**) and/or the *Validation Strategy* (**Section 8**) will be implemented, until the site remediation goals have been achieved and the site is deemed suitable for the proposed (mixed commercial/ residential) use.

Subject to EI's Statement of Limitations (**Section 9**), EI considers that by implementing the works described in this RAP, the site can be made suitable for the proposed development, in accordance with *State Environmental Planning Policy 55 - Remediation of Land*, as well as the *Liverpool Local Environmental Plan 2008* and *Development Control Plan 2008*.

1. Introduction

1.1 Background

Altis Bulky Retail Pty Ltd as trustee for Altis ARET Sub Trust 20 (Altis; the 'client') engaged EI Australia (EI) to prepare a Remediation Action Plan (RAP) for the commercial property at 28 Elizabeth Street, Liverpool NSW (henceforth referred to as the 'site').

The site is within the local government area (LGA) of Liverpool City Council, as shown in **Figure 1, Appendix A and** comprises Lot 1 in DP1261270, with an area of approximately 3,609 m^2 (**Figure 2, Appendix A**).

The site is designated for redevelopment, involving the construction of a multi-storey, mixed-use building. Previous environmental assessments identified asbestos (bonded) in site (fill) soils, posing unacceptable risks to potential human. In addition, five underground storage tanks (USTs) were present *in situ* on the property.

The purpose of this plan, therefore, is to describe the works required to remediate the site, thereby rendering it suitable for the proposed use (development), in accordance with Clause 7 of *State Environmental Planning Policy 55 - Remediation of Land* (SEPP 55).

1.2 Proposed Development

Based on the supplied architectural plans (**Appendix B**), the proposed development involved the construction of a multi-storey, mixed-use building, including a six-level basement car parking facility, a lane way and landscaping areas. The basement car parking facility would excavations to depths of approximately 18m below existing ground level (BEGL) equating to about -5m Australian Height Datum (AHD). The proposed basement footprint would occupy the entire site area with no retained deep soil area(s) (**Figure 2, Appendix A**).

1.3 Objectives

The principal objectives of this RAP are to:

- Identify the required remedial works (including any additional investigations);
- Establish a sequential process of contaminated soil remediation, with particular focus on any asbestos impacted soils and the UST areas;
- Outline the required validation program, to confirm that remedial works were effective; and
- Provide measures ensuring all works occur in a safe and acceptable manner, in compliance with relevant guidelines and minimal adverse effects on human health and the environment.

1.4 Scope of Work

In order to achieve the above objectives, the scope of the RAP includes:

- Outline the legislative framework relevant for the works;
- Provide a summary of the previous investigations relating to the site, identifying the contamination status of the land;
- Define remediation goals and acceptance criteria;
- Review the available remediation technologies, with identification of the most appropriate method of site clean-up;
- Describe the procedures that are compliant with relevant environmental legislation;

- Provide guidance on approvals and licences required for the remediation works;
- Identify the key stakeholders and their responsibilities;
- Provide information to assist contractor(s) in their preparation of a Work, Health and Safety Plan (WHSP) and other site management/planning documents; and
- Provide a preliminary Sampling, Analytical and Quality Plan (SAQP) for the site validation program.

1.5 Legislative Framework

The RAP was prepared in general accordance with the legislative framework and guidelines prescribed in **Table 1-1**.

Table 1-1 Legislative Framework

Regulatory Document	Summary of Requirements
Legislation	
Contaminated Land Management Act 1997	Promotes the effective management of contaminated land in NSW by setting out the roles and responsibilities of the EPA.
Protection of the Environment Operations Act 1997	Aims to protect, restore and enhance the environment. Gives rise to the POEO (Waste) Regulation 2014 and POEO (UPSS) Regulation 2019.
Environmental Planning and Assessment Act 1979	Determines the category of development, and gives rise to State Environmental Planning Policy 55 - Remediation of Land (SEPP 55). Greater Metropolitan Regional Environmental Plan No 2—Georges River Catchment (1999 EPI 52)
Work Health and Safety Act 2011	Primary legislation for management and regulation of work health and safety. Gives rise to WHS Regulation 2017.
Water Management Act 2000 and Water Act 1912	Protects the health of rivers, streams and groundwater systems. Gives rise to water sharing plans and quality objectives for catchments within the state of NSW.
Local Council Plans	Liverpool Local Environmental Plan 2008. Liverpool Development Control Plan 208.
Guidelines	
Relevant Guidelines	ANZG (2018) *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*. AS4482.1 / .2:2005 *Guide to the Investigation and Sampling of Sites with Potentially Contaminated Soil.* AS1726 :2017 *Geotechnical Site Investigations* (for logging of soil). AS 4976:2008 *The Removal and Disposal of Underground Petroleum Storage Tanks.* DEC (2007) *Guidelines for the Assessment and Management of Groundwater Contamination.*

Regulatory Document	Summary of Requirements
	EPA (1995) *Sampling Design Guidelines*. EPA (2014a) *Technical Note: Investigation of Service Station Sites*. EPA (2014b) *Waste Classification Guidelines*. EPA (2017) *Guidelines for the NSW Site Auditor Scheme* – 3rd Edition EPA (2020a) *Consultants Reporting on Contaminated Land*. EPA (2020b) *Guidelines for Implementing the POEO (UPSS) Regulation, 2019*. NEPC (2013) *National Protection (Assessment of Site Contamination) Measure 1999 / Amendment Measure 2013*. WorkCover NSW (2014) *Managing Asbestos In or On Soil.* SafeWork NSW (2019a) *How to Safely Remove Asbestos.*

1.6 Deviations from this RAP

During the course of the remediation, it may be necessary to vary the sequence and/or details of the site works to meet site constraints. Any deviation from the methodology specified in this RAP is to be properly documented and approved, as required under EPA (2020) *Consultants Reporting on Contaminated Land*.

Performing remedial works without the supervision of a qualified environmental consultant may lead to delays and extra costs, due to additional investigation requirements being imposed, to confirm the environmental status of the site.

In worst case scenarios, waste materials removed from the site without proper characterisation and/or tracking, may lead to regulatory action and potential penalties, as described under the *Waste Regulation 2014* and the *Contaminated Land Management Act 1997*.

2. Site Setting

2.1 Site Identification

The site identification details and associated information are presented in **Table 2-1**, while the site locality is shown in **Figure 1, Appendix A**.

Table 2-1 Site Setting

Attribute	Description
Street Address	28 Elizabeth Street, Liverpool NSW.
Site Description and Location	The site is bounded by Elizabeth Street followed by commercial properties (north), George Street followed by commercial properties (west), commercial properties (east) and commercial properties (south).
Lots and Deposited Plan (DP)	Lot 1 in DP1261270
Site Area	Approximately 3,609 m²
Site Coordinates	Northern corner of the site (datum GDA94-MGA56): ▪ Easting: 308226.013 ▪ Northing: 6244722.098 (Source: https://maps.six.nsw.gov.au)
LGA	Liverpool City Council
Current Zoning	B4 – Mixed Use (Liverpool Local Environmental Plan 2008)
Current Land Use	At the time of this assessment the site was vacant and all structures had been demolished. The site was covered by slab on ground while the southern end of the site was unpaved and overgrown with grass and weeds. A GPR survey identified confirmed 5 Underground Storage Tanks exist at this site (**Figure 2**, **Appendix A**). Field inspection identified related infrastructure including UST fill points, and bowser foot prints. It is likely that sub-surface UPSS infrastructure from the former service operation remains in place at the site

2.2 Regional Setting

Regional topography, geology and landscape information is summarised in **Table 2-2**.

Table 2-2 Regional Setting Information

Attribute	Description
Topography	The regional topography consists of gently undulating plains to rolling rises with slopes usually <5%. The site was relatively flat with a slight to slope downwards from west to east at approximately less than 1 degree.
Site Drainage	Site drainage is likely to be consistent with the general slope of the site. Stormwater is likely to be collected by pit and pipe drainage, and drain to the municipal stormwater and then to Georges River.
Regional Geology	The 1:100 000 scale Geological Series Sheet 9030 (Penrith) indicates the site is likely to be underlain by Bringelly Shale, a formation of the Wianamatta Group. Bringelly Shale typically comprises shale, carbonaceous claystone, claystone, laminite, fine-medium

Attribute	Description
	grained lithic sandstone, rare coal and tuff.
Soil Landscapes	The Soil Conservation Service of NSW Soil Landscapes of the Penrith 1:100,000 Sheet (Chapman and Murphy, 2002) indicates that the site overlies a *Residual landscape – Blacktown.* Soils are identified as shallow to moderately deep (>100 cm) hard setting mottled texture contrast soils, red and brown Podzolic soils on crests grading to yellow Podzolic soils on lower slopes and in drainage lines (Ref: Chapman and Murphy, 2002).
Acid Sulfate Soil (ASS) Risk	The Liverpool Acid Sulfate Soil Risk Map (1:25,000 scale; Murphy, 1997), indicates the site lies within the land described as 'No Known Occurrences' with regards to the Acid Sulfate Soil (ASS) risk. Further, the Liverpool LEP (2008) Acid Sulfate Soils Map (Sheet ASS_011) indicates the site lies in an area of 'Class 5' area. Class 5 areas are likely to locate ASS during works within 500 metres of adjacent Class 1, 2, 3, or 4 land which are likely to lower the water table below 1 metre AHD on adjacent Class 1, 2, 3 or 4 land. An Acid Sulfate Soils Management Plan (ASSMP) was prepared for the site (EI, 2021) as a contingency. Based on multiple lines of evidence, unoxidised sulfur compounds (i.e. from AASS or PASS) do not present a risk on the site.
Hydrogeology	The closest receptor of surface and ground water from the site was the Georges River (approximately 400m southeast). Given the site location, the groundwater flow direction is anticipated to be southeast towards Georges River. The underlying residual clays and Bringelly Shale have low groundwater resource value due to salinity and low permeability.

3. Previous Investigations and Conceptual Site Model

The following reports were reviewed, and relied upon for development of this RAP:

- EI (2019a), "*Preliminary Site Investigation, 28 Elizabeth Street, Liverpool, NSW*", (EI Report Ref. E24175.E01, 29 April 2019);
- EI (2019b), "*Geotechnical Investigation Factual Report, 28 Elizabeth Street, Liverpool, NSW*", (EI Report Ref. E24175.G03, 22 May 2019);
- EI (2020), "*Detailed Site Investigation, 28 Elizabeth Street, Liverpool, NSW*", (EI Report Ref. E24175.E02, 8 December 2020);
- EI (2021a), "*Acid Sulfate Soils Management Plan, 28 Elizabeth Street, Liverpool, NSW*", (EI Report Ref. E24175.E14_Rev0, 27 October 2021); and
- EI (2021b), "*Additional Geotechnical Investigation, 28 Elizabeth Street, Liverpool, NSW*", (EI Report Ref. E24175.G04, 26 October 2021).

A summary of these reports are provided in **Table 3-1**.

Table 3-1 Summary of Previous Investigations

Task	Findings
EI (2019a) Preliminary Site Investigation	
Objective	To provide a qualitative assessment of the environmental conditions of the site by appraising the potential for site contamination on the basis of field observations, historical land uses, anecdotal and documentary evidence.
Findings	▪ Land titles records and historic aerial photography indicated that the site was previously used for residential - market gardening purposes, prior to the construction of a commercial/industrial warehouse in the 1960s. Commercial/industrial site use continued at the site from the 1960s. Records also indicated that former site use also included an operational petrol station (Ampol); ▪ The site inspection identified potential asbestos containing materials across the ground surface, poor concrete condition, mixed aggregate, oil waste, overgrown weeds with accessible soils in the southern portion, one groundwater monitoring well in the north-eastern corner and the existence of potentially four USTs; ▪ The site has not reported as being subject to regulation in relation to environmental impacts, as documented in the EPA public registers. Further to this no other sites within 500m radius of the site have been reported. A search of the Protection of the Environment Operations (POEO) Act, did not identify any record for the site although three sites were identified within a 500 m radius; ▪ Records from SafeWork NSW did not indicate historical storage of chemicals and underground storage tanks at the site; however, records for a 10,000L UST containing flammable liquid under property 26 Elizabeth Street was recorded. The location of this UST was not provided and remains unknown. Anecdotal information indicated UPSSs to be present and USTs likely remained in-situ; ▪ Records from Liverpool Council identified potential activities, such as demolition of existing structures that could lead to potential contamination of shallow surface soils at site; and ▪ The presence of a number of contaminating sources at the site, including imported filling, former commercial/industrial uses (i.e. service station), pesticides from market garden use, as well as hazardous building materials from former demolitions, etc., indicate a potential for contamination to be present. In light of this, the CSM developed identified a number of potential exposure pathways which may present a risk to future users of the

Task	Findings
	site and to workers during construction and maintenance activities.
Conclusions	EI concluded that there is potential for contamination to be present on site. With consideration given to the nature of the proposed land use and potential risk of exposure to end users of the site from possible contamination, an intrusive detailed site investigation should be completed to understand the quality of site soils and groundwater.
EI (2019b) Geotechnical Investigation Factual Report	
Objective	The objective of the GI was to assess existing site surface and subsurface conditions at five borehole locations, and to provide geotechnical investigation results and laboratory results.
Findings	Based on the logs for five, mechanically augured boreholes and standard penetration testing (identified as BH1M, BH2, BH3, BH4 and BH5), the sub-surface conditions of the site were generalised as: ▪ Fill (0.55-1.0m thickness), comprised of gravelly to silty sand, and clayey sand to clay; overlying ▪ Residual Soil (2.98-5.95m thickness), further classified as very soft to very stiff silty clay of medium to high plasticity; overlying ▪ Very Low to Low Strength Shale/Sandstone (0.95-2.7m thickness), further classified as distinctly to slightly weathered, very low to low strength sandstone/shale; overlying ▪ Medium Strength Shale/Sandstone (3.96-12.3m thickness), further classified as slightly weathered to fresh shale interbedded with sandstone; overlying ▪ Medium to High Strength Shale/Sandstone (observed at termination depths in all boreholes), further classified as fresh, medium to high strength shale interbedded with sandstone.
EI (2020) Detailed Site Investigation	
Objective	▪ Establish the degree of any site contamination, by means of intrusive sampling and laboratory analysis for the contaminants of potential concern (COPC); ▪ Provide conclusions regarding suitability of the site for the proposed development; and ▪ Make recommendations for the appropriate management of any contaminated soils and/or groundwater (if identified).
Findings	▪ Four underground storage tanks (USTs) were located in situ by ground penetrating radar (GPR) survey at the northern area of the site near Elizabeth Street. Field inspection also identified UST fill points and bowser footings. One UST (waste oil) was located in the central portion of the site near footprint of the former building. This indicates that infrastructure associated with an underground petroleum storage system (UPSS) remains in place at the site; ▪ A total of 12 subsurface assessment locations (BH201 to BH212) were drilled and soil samples were collected. Monitoring wells were installed in three of these locations (BH201M, BH202M and BH205M); ▪ The sub-surface comprised a layer of silty clay and sandy clay fill to 1.0m below ground level (BGL), overlying natural residual clays then weathered shale bedrock. Sand fill, to a depth of 3.5m BGL, was identified at BH202M located near the UST area. Standing water levels of groundwater ranged between 2.97 and 3.76 m BGL; ▪ The field data indicated that the groundwater was slightly acidic to slightly alkaline (pH 6.59 to 7.61), saline (EC: 25,794 to 42,060 µS/cm) and oxidising (Redox 183 to 329 mV) but anoxic (DO: 0-0.68 mg/L); ▪ Laboratory analytical results for the representative soil samples all complied with the adopted SILs except for heavy metals nickel (87 mg/kg) in sample BH209_0.2-0.3 and zinc (250 mg/kg) in sample BH203_0.1-0.2 and asbestos (bonded) was detected in shallow fill in samples BH207_0.2-0.3, BH209_0.2-0.3 and BH210_0.2-0.3; and ▪ Laboratory analytical results for the groundwater samples all complied with the adopted

Task	Findings
	groundwater investigation levels (GILs), except for chromium in BH202M (120 µg/L), copper in BH201M (120 µg/L), nickel in BH205M (13 µg/L) and zinc in BH201M (17 µg/L), BH202M (51 µg/L), and BH205M (63 µg/L).
Conclusions	EI consider that the Site can be made suitable for proposed land use equivalent to a setting of residential with minimal opportunities for soil access, provided the recommendations below are implemented: ▪ Further investigation of groundwater for metals, particularly chromium, is warranted to close existing data gaps. ▪ Preparation and implementation of a Remedial Action Plan (RAP). ▪ Undertake remediation and validation works for the site, as outlined in the RAP. ▪ Any material being imported to the Site (i.e. for landscaping or levelling purposes) should be assessed for potential contamination in accordance with NSW EPA guidelines as being suitable for the intended use or be classified as VENM; and ▪ Preparation of a final Site Validation Report certifying Site suitability of soils and groundwater for the proposed land use.
EI (2021a) Acid Sulfate Soils Management Plan	
Objective	Provide the framework for the management and monitoring of the impacts of Acid Sulfate Soils (ASS), throughout the construction and operation phases of the project, in accordance with the Acid Sulfate Soils Manual (ASSMAC, 1998).
Findings	▪ Visual indicators of actual acid sulfate soils (AASS), (i.e. soils containing pale yellow deposits/coatings of jarosite) were not observed. Indicators of potential acid sulfate soils (PASS) including, hydrogen sulfide odours, shell fragments, and waterlogged soils (potentially indicative of unripe muds, estuarine silty sands or sands, and bottom sediments of estuaries or tidal lakes) were also not observed during sampling. ▪ Analytical results from the SPOCAS analytical procedure reported (TPA) concentrations in two samples exceeding the ASSMAC 1998 action criteria (18 moles H+/tonne): ‣ BH101_1.9-2.0: 27 moles H+/tonne ‣ BH103_2.9-3.0: 30 moles H+/tonne ▪ Analytical results from the SPOCAS analytical procedure reported titratable sulfidic acidity (TSA) concentrations below the ASSMAC 1998 action criteria (18 moles H+/tonne). ▪ Analytical results from the SPOCAS analytical procedure reported Peroxide Oxidisable Sulphur (SPOS) concentrations below the ASSMAC 1998 action criteria (0.03 %w/w).
Conclusions	Based on the findings of the assessment phase, site soils do not present a risk from unoxidised sulfur compounds (i.e. from AASS or PASS). The ASSMP may be used a contingency.
EI (2021b) Additional Geotechnical Investigation	
Objective	▪ Determine the in-situ bedrock conditions; and ▪ Provide advice and recommendations to assist in the preparation of designs for the proposed development
Findings	The sub-surface conditions of the site were generalised as: ▪ Fill (0.55 to 1.0m thickness), comprised of sands and clays; overlying ▪ Residual Soil (2.98 to 5.95m thickness), further classified as silty clay of medium to high plasticity; overlying ▪ Very Low to Low Strength Shale/Sandstone (0.96 to 2.7m thickness), further classified as distinctly to slightly weathered, very low to low strength sandstone/shale; overlying ▪ Medium to High Strength Shale (3.96 to 15m thickness), further classified as distinctly to fresh, medium to high strength shale; overlying ▪ High Strength Shale (observed at termination depth in all boreholes), further classified as fresh, high strength shale.

Task	Findings
Main Issues	The following geotechnical issues were applicable to the proposed development: ▪ Basement excavation and retention to limit lateral deflections and ground loss as a result of excavations, resulting in damage to nearby structures; ▪ Rock excavation; and ▪ Foundation design for building loads.

3.1 Subsurface Conditions

Based on the combined geotechnical (EI, 2019b and 2021b) and environmental (EI, 2020) logs, the subsurface strata typically comprises fill material (to 1.0-2.5m BGL), overlying residual silty clay grading to high strength shale. Shale bedrock was encountered from 3.78m BGL onwards.

Groundwater standing water levels ranged between 2.97 and 3.76 m BGL during the GME in the DSI (EI, 2020). The field data indicated that the groundwater was slightly acidic to slightly alkaline (pH 6.59 to 7.61), saline (EC: 25,794 to 42,060 µS/cm) and oxidising (Redox 183 to 329 mV) but anoxic (DO: 0-0.68 mg/L).

A GPR survey identified five Underground Storage Tanks (USTs) exist at this site (**Figure 2**, **Appendix A**). Four Tanks are located within the same Tank farm on the Elizabeth St side of the site. A fifth tank (waste oil UST) was located towards the central portion of the site, adjacent east of the now demolished building. Due to limitations with the GPR survey and limited anecdotal information, the sizes and number of the tanks on-site are unknown. Records from SafeWork NSW indicated a 10,000L UST containing flammable liquid under property 26 Elizabeth Street, adjacent to the site. The location of this UST was not provided and remains unknown. Field inspection identified related infrastructure including UST fill points, and bowser foot prints. It is likely that sub-surface UPSS infrastructure from the former service station remains in place at the site.

3.2 Extent of Contamination Summary

The DSI (EI, 2020) identified impacted soils within the following localised areas (**Figure 3**, **Appendix A**):

- Five UST's remain in place (quality of soils surrounding the in-situ tanks is unknown);
- No ACM was observed at the surface across the site. However, fragments of potential ACM and a damaged Telstra pit were observed (EI, 2019a);
- Some surface oil staining was observed within the western area of the Site;
- The heavy metals nickel (87 mg/kg) in sample BH209_0.2-0.3 and zinc (250 mg/kg) in sample BH203_0.1-0.2 were above ecological based criteria. EI note, recent development plans provided by the Client indicate these locations are within the basement footprint, therefore ecological criteria does not apply and are no longer considered to exceed the adopted criteria; and
- Asbestos was detected in shallow fill in samples BH207_0.2-0.3, BH209_0.2-0.3 and BH210_0.2-0.3.

The impacts were expected to be limited to shallow fill materials and in the areas of the UST tank pits, given that elevated concentrations were not reported in deeper (natural) soil samples.

3.3 Impacted Groundwater

Petroleum hydrocarbons and PAHs were either non-detected or reported at low concentration in groundwater at the site (EI, 2020). This indicates that impact to groundwater from previous use

as a service station may be localised (if any) to the areas not investigated immediately under any of the USTs.

Elevated concentrations of chromium, copper and zinc were reported in groundwater (EI, 2020). The concentration of metals in fill is low and fill is generally shallow and overlies natural clay. It is unlikely that the site is contributing to concentrations of metals reported in groundwater. The primary sources for the identified elevated heavy metal in groundwater are unknown.

Whilst the reported concentrations exceed the ANZG (2018) criteria, it is likely that the reported concentrations in groundwater represent regional groundwater quality. However, further investigation of groundwater for metals, particularly chromium, is warranted to close existing data gaps (EI, 2020).

3.4 Summary of Conceptual Site Model

The sources of the identified site contamination were the former commercial activities (from the 1960s), including:

- Impacts from the storage and use of petroleum hydrocarbons, in particular leaks from underground petroleum storage systems (UPSS);
- Deep natural soils potentially containing residual impacts from UPSS representing potential secondary sources of contamination;
- Remnant materials from demolition of former structures and service pits (damaged Telstra pits previously observed); and
- Importation of fill from unknown origin.

The contaminants of concern were considered to be:

- Soil - heavy metals, total recoverable hydrocarbons (TRH), the monocyclic aromatic hydrocarbons benzene, toluene, ethylbenzene and xylenes (BTEX), polycyclic aromatic hydrocarbons (PAHs) including naphthalene and benzo(α)pyrene, phenols and asbestos.
- Groundwater – dissolved heavy metals (particularly chromium).

Exposure Pathways, Receptors and Linkages

Being of high clay content, the sub-surface would restrict vertical migration of contaminants to the groundwater resource. Direct exposures were therefore of greatest concern.

The following potential receptors of site contamination were identified:

- Existing and future site occupants, in particular maintenance and service workers;
- Users of the adjacent land; and
- Ecological receptors in areas of exposed soil/landscaping.

A summary of the CSM, with identification of the potential pollutant linkages, is provided in **Table 3-2**.

Table 3-2 Conceptual Site Model

Source of Contamination	Exposure Pathway	Receptor(s)
Impacts from demolition of former structures	Dermal Contact Ingestion (dust) Inhalation	Future Site Users Adjacent Site Users
Impacts from imported fill	Dermal Contact Ingestion (dust) Inhalation	Future Site Users Adjacent Site Users
Impacts from historic service station activities	Dermal Contact Ingestion (dust) Inhalation / vapour intrusion	Future Site Users Adjacent Site Users
In-Situ USTs	Vapour Intrusion to air Leaking to soil	Future Site Users Adjacent Site Users
	Vertical migration to groundwater	Groundwater Bigge Park (170m east) Georges River (490m south east)

4. Remediation Options Assessment

4.1 Extent of Remediation Required

Remediation of impacted fill soils was required for the vicinities of BH207, BH209 and BH210. In addition, the five *in situ* (abandoned) UPSS and associated soils required removal (**Figure 2, Appendix A** and **Appendix B**).

Unexpected finds were, though not necessary limited to:

- Additional abandoned underground tanks and related infrastructure;
- Buried structures including foundation, service and utility pits; and
- ACM and/or other contamination within the existing building footprints and buried below existing concrete slabs.

Any unexpected finds will be managed in accordance with the Unexpected Finds Protocol described in **Appendix D**. In such circumstances, the principal contractor will notify the appointed Environmental Consultant, so that amendments to the RAP can be made.

4.2 Regulatory Overview

The preferred hierarchy of options for site remediation and/or management is set out in the NEPC (2013) Schedules A and B, Section 6(16) *Assessment of Site Contamination Policy Framework*:

- On-site treatment of the contamination so that it is destroyed or the associated risk is reduced to an acceptable level; and
- Off-site treatment of excavated soil, so that the contamination is destroyed or the associated risk is reduced to an acceptable level, after which soil is returned to the site. If either of these options is not practicable, then consider
- Consolidation and isolation of the soil on site by containment with a properly designed barrier; and
- Removal of contaminated material to an approved site or facility, followed, where necessary, by replacement with appropriate material; or
- Where the assessment indicates remediation would have no net environmental benefit or would have a net adverse environmental effect, implementation of an appropriate management strategy.

When deciding which option to choose, the sustainability (environmental, economic and social) of each option should be considered, to achieve an appropriate balance between benefits and effects. It should be emphasised that the appropriateness of any particular option will vary depending on a range of local factors.

Evaluation of the remediation options applicable to this site soils is presented in **Table 4-1**.

Table 4-1 Remediation Options Review – Soil & Groundwater

Remediation Methodology	Advantages	Disadvantages	Suitability
No action. Applies when all contaminant concentrations are below assessment guidelines and are not able to migrate from the site; and any exposure to contaminated soils is unlikely.	No remediation costs. This method creates minimal disturbance and retains material on-site.	Not applicable to the UPSS and other contamination identified.	Not suitable – given a UPSS is present at the site and fill soils are the main contamination; these will need to be remediated.
On-site treatment Excavated soils are mixed with microorganisms /nutrients, stockpiled and aerated in above ground enclosures.	Cost effective - lower disposal costs and no need to import backfill material as materials remain on-site.	Significant area required with undefined remediation timeframe.	Not suitable for removal of USTs but may be suited to reduce soil impacts should significant impacts be identified. Also not suitable for identified asbestos contamination.
Off-site treatment Impacted soils treated by soil vapour extraction (SVE), steam stripping, *in situ* chemical oxidation (ISCO) or injection of oxygen releasing compounds.	Creates minimal disturbance to the site (no excavation).	Expensive establishment and on-going costs, and potential for odour problems.	Not suitable for the contaminants of concern. Excavation required for UPSS removal, regardless.
Consolidation and/or capping. Impacted soils are retained and isolated within inaccessible areas of site.	Removes risks by eliminating exposure pathways. Retains materials on-site and minimises waste disposal. Sustainable, cost effective method.	Contamination would remain *in situ* and will require long term management and ongoing monitoring. Will require contamination noted on land title of property.	Not Suitable - basement extends from boundary to boundary, as such all fill will need to be removed from site. Also an EMP on the land is not an option for the development.
Excavation and off-site disposal. Excavation of impacted materials and disposal at a licensed landfill facility.	Fast – impacted material removed immediately. Minimal design and management costs.	Increased costs associated with the disposal of waste soils / bedrock and importation of clean backfill. Requires waste classification prior to disposal, keeping of thorough waste records, waste tracking and reporting.	Suitable – for meeting the key project objective to make the site suitable, without the need for ongoing management.

Remediation Methodology	Advantages	Disadvantages	Suitability
Chemical Oxidation In a chemical oxidation system oxidants are added to the system in order to oxidise the chemical of concern to less toxic species. The Chemical oxidants most commonly employed include peroxide, ozone, and permanganate. These oxidants cause the rapid and complete chemical destruction of many toxic organic chemicals while some chemicals are subject to partially degradation and subsequently reduced by bioremediation	▪ Oxidants are capable of achieving high treatment efficiencies (e.g., > 90 percent) for unsaturated aliphatic (e.g., trichloroethylene [TCE]), with very fast reaction rates (90 percent destruction in minutes). ▪ Mass removal/destruction by chemical reaction; ▪ Low complexity and relatively low cost; ▪ No offsite disposal or extraction costs; ▪ Known treatment approach; and ▪ Will not interfere with construction of or subsequent occupancy	▪ Requirement for handling large quantities of hazardous oxidizing chemicals. ▪ Potential for process-induced detrimental effects. ▪ Non targeted, relies on dispersion of permanganate through the groundwater aquifer. Permanganate will react with anything in the subsurface that is oxidisable so mass over-dosing (ten times or more) is required ▪ No or minimal impact on saturated chlorinated solvents (the “anes” of 111 TCA, DCA); ▪ No guarantee of improved quality, complicated by offsite source of impacts. ▪ Effectiveness reduced by low permeability of sandstone;	Possibly suitable – This approach is primarily suited to addressing groundwater contamination, which at the time of this report has not been identified. If groundwater contamination is identified, this remediation may be suitable for treating any residual impact at depth.

Remediation Methodology	Advantages	Disadvantages	Suitability
Natural attenuation Processes that work synergistically to reduce the concentration and/or mass of various contaminants in groundwater. Monitored Natural Attenuation (MNA) is a process of monitoring the progress of natural attenuation by regular assessment to evaluate falling contaminant concentrations in the groundwater system.	▪ When it can be demonstrated that these processes are capable of achieving a site-specific remediation objective within an acceptable time frame, without increasing the risk to human or environmental receptors, monitored natural attenuation offers a viable, cost effective and sustainable option	▪ Slow process. ▪ Would require Environmental Management Plan and ongoing monitoring. ▪ Does not reduce immediate vapour intrusion risk ▪ No guarantee of improved quality, complicated by offsite source of impacts. ▪ Effectiveness reduced by low permeability of sandstone. ▪ Pilot trials required to prove efficiency.	Possible – This approach is primarily suited to addressing groundwater contamination, which at the time of this report has not been identified. If groundwater contamination is identified, this remediation technology will be reassessed. Given soils and contamination sources would be removed by excavation and offsite disposal a large portion of secondary source within groundwater would also be removed. If shown during validation to be efficient, then natural attenuation of groundwater may be favourable. Pilot trials required.
Use of Vapour Membrane and Venting Layer For vapours from volatile chemicals, it is possible to include a vapour mitigation system in the construction of a building. Such a system is usually designed to minimise or prevent movement of the vapours into a building. Such systems can include a passive venting layer, a vapour barrier/membrane specifically designed to manage the movement of groundwater containing the volatile contaminants. Consideration has been given to the inclusion of a passive venting layer and a membrane along the southern and western walls only. Additional HHRA will evaluate the effectiveness of such system.	▪ The implementation of a sub-slab ventilation system will prevent significant pressure differences between inside the building and beneath the slab. Hence the potential for advection driven vapour migration is considered negligible. ▪ Reduces contaminant exposure in direct contact with basement ▪ Immediate reduction of vapour intrusion risk	▪ Requires re-design of basement to be constructed. ▪ Increased construction cost.	Not suitable – groundwater contamination at the time of this report has not been identified. If groundwater contamination is identified, this remediation technology will be reassessed.

4.3 Preferred Remediation Strategy

Based on the available remedial options, the proposed site development (mixed residential and commercial building with six-levels of basement), the potential risks to human health and the environment, as well as the relative cost effectiveness of feasible remedial techniques, the preferred strategy (option) for site remediation is:

- Excavation of the onsite UPSS and associated infrastructure, and;
- Off-site disposal of impacted materials to licensed waste landfill facilities.

All wastes shall be transported to appropriate, EPA-licensed facilities, after formal classification, in accordance with the EPA (2014b) *Waste Classification Guidelines*.

All excavated (remediation) areas shall be validated by base and wall soil sampling. Where required, the site will be reinstated with validated, imported (or recovered) excavated natural materials.

It is suggested that hardstand removal be completed prior to the commencement of any remediation works, so as to gain unrestricted access to all parts of the site.

4.4 Category of Works

In accordance with *SEPP 55 - Remediation of Land*, the category of the remediation works defines whether consent is required prior to their commencement. Under *SEPP 55*, works where there is the potential for significant environmental impact are classed as *Category 1* and require development consent. *Category 2* works pose a low potential for environmental impact and do not therefore require prior consent. The determination for the subject site is outlined in **Table 4-2**.

Table 4-2 Category Determination for Remediation

Significant Environment Impact	Yes/No	Category
Designated Development or State Significant Development	No	2
Have significant impact on threatened ecological communities or habitats?	No	2
In area identified environmental significance such as scenic areas, wetlands (see list*)	No	2
Comply with a policy made under the contaminated land planning guidelines by the council.	Yes	2
Is work ancillary to designated development	Yes	2

Note:
* Environmental significance list -coastal protection, conservation or heritage conservation, habitat area, habitat protection area, habitat or wildlife corridor, environment protection, escarpment, escarpment protection or escarpment preservation, floodway, littoral rainforest, nature reserve, scenic area or scenic protection, or wetland.

Based on the above determination, the remediation works for the site are considered Category 2 and will not require development consent. Nevertheless, 30 days prior to their commencement, notification to the consent authority (Liverpool City Council) will be made. Council has the right to intervene after that time for a breach of the *EPA Act 1997* or non-compliance with *SEPP 55*. The notification will also serve as the basis for updating Council records on properties in the local government area and will:

- Be in writing;
- Provide contact details for the notice;
- Briefly describe the remediation work;

- Show why the work is considered Category 2 remediation work;
- Specify the property description and street address on which the remediation work is to be carried out;
- Provide a location map; and
- Provide estimates for commencement and completion dates of the work.
- Provision of this RAP, as well as an indication of commencement and completion dates of the works in writing, is usually sufficient to meet the requirements of this notification.

4.5 Timing of the Work

Timing of the works is dependent on the schedule of the proposed development. The critical benchmark points of the remediation should be discussed by the Remediation Contractor and Environmental Consultant, prior to commencement of the demolition and basement construction stages.

4.6 Remediation Criteria

Remediation criteria to be adopted for this project are identified below (**Table 4-3**). These were selected from available published guidelines that are endorsed by national and/or state regulatory authorities, with due consideration of the exposure scenario that is expected for the site, the likely exposure pathways and the identified potential receptors.

Table 4-3 Proposed Remediation Acceptance Criteria for Soil

Environmental Media	Criteria
Soil	**Human Health** HIL-B: NEPC (2013) Schedule B1, Health Investigation Levels for residential with minimal opportunities for soil access. HSL-D: NEPC (2013) Schedule B1, Health Screening Levels for residential building with basement car parking per Section 2.4.8 of Schedule B1, NEPC (2013). **For asbestos:** No visible asbestos for surface soils. HSL-B: For bonded ACM. 0.001% w/w for friable asbestos in soil. **Management Limits for Petroleum Hydrocarbons** Sample results were also assessed against the NEPC (2013) Management Limits for the F1-F4 TRH fractions, to assess propensity for phase-separated hydrocarbons (PSH), fire and explosive hazards and adverse effects on buried infrastructure.
Groundwater	**Groundwater Investigation Levels (GILs)** ANZG (2018) Groundwater Investigation Levels for Fresh Waters. **Health-based Screening Levels (HSLs)** NEPC (2013) HSL-D for commercial / industrial sites.

4.7 Waste Classification

Prior to being removed from the site, excavated soils must be classified in accordance with the EPA (2014b) *Waste Classification Guidelines*. Under these guidelines, fill soils may be classified into the following groups: *General Solid Waste*, *Restricted Solid Waste*, or *Hazardous Waste*, subject to chemical assessment using NATA-registered laboratory methods for total and

leachable contaminant levels, the latter derived using the TCLP, where required. Any soils containing asbestos would also be classified as *Special Waste - Asbestos Waste*.

Should the analytical results exceed the SCC2 and/or TCLP2 thresholds, then the materials will be classified as *Hazardous Waste*. In such cases, material stabilisation treatment with EPA approval may be required prior to offsite disposal. Unexpected material may need to be segregated depending on the source of the waste, prior to conducting waste classification assessment.

In accordance with the *NSW Waste Regulation 2014*, waste soils must only be disposed at a facility that is appropriately licenced to receive the incoming material. It is therefore recommended that confirmation is obtained from the waste facility prior the material(s) being removed from the site.

Virgin Excavated Natural Material (VENM)

Virgin Excavated Natural Material (VENM) is a material that has been pre-classified as general solid waste (non-putrescible) under the *Protection of the Environment Operations Act 1997* (POEO Act) and is:

- 'Natural material (such as clay, gravel, sand, soil or rock fines) that:

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

  (b) Do not contain any sulfidic ores or soils or any other waste; and

  (c) Includes excavated natural material that meets such criteria for virgin excavated natural material as may be approved for the time being pursuant to an EPA Gazettal notice.'

Classification of excavated natural materials should be in accordance with the NSW EPA waste orders and exemptions (http://www.epa.nsw.gov.au/wasteregulation/orders-exemptions.htm) including:

- The excavated natural material order 2014; and
- The excavated natural material exemption 2014.

5. Remediation Methodology

5.1 Remediation Sequence

Site characterisation revealed the presence of localised areas of asbestos-impacted soils (BH207, BH209 and BH210), as well as five USTs. The preferred remediation strategy is excavation and off-site disposal of impacted materials to licensed waste landfill facilities.

The site remediation works will therefore include (though not necessarily be limited to):

- **Stage 1** – Site establishment;
- **Stage 2** – Surface (clearance) inspection for evidence of contamination (e.g. ACM);
- **Stage 3** – UST removal and validation.
- **Stage 4** – Additional groundwater investigations to close data gaps;
- **Stage 5** – Impact delineation, hotspot excavation and waste classification; and
- **Stage 6** – Validation.

Each stage is summarised in **Table 5-1**, then described in more detail below.

Table 5-1 Summary of Remediation Sequence

Stage	Description of Works
Site Establishment and Demolition	Development of pre-work plans (WHSP and CEMP) and collation of approvals and permits to commence work. Establishment of site pollution monitoring and control measures to be maintained for the duration of the works, as outlined in the management plans. Identify, remove, disconnect, and manage existing services as required. Remove hardstand pavements. Dispose wastes according to EPA (2014b) *Waste Classification Guidelines*.
Surface Inspection	To be completed once the removal of hardstand pavements has occurred. Site inspection, checking for visual/olfactory evidence of contamination, in particular fragments of ACM and evidence of former UPSS infrastructure (including bowser islands).
UST Removal and Validation	Excavation and removal of USTs, plus any remaining infrastructure (including pits, pipes and fill points). Excavation and chase out of impacted soils, by visual inspection, olfactory evidence, in-field screening and laboratory analyses. Track all disposed wastes, collating all tipping dockets. Validate remedial (pit) excavations by appropriate soil sampling and testing. Additional groundwater assessment from the wells existing on-site.
Data Gap Closure Investigation	To be completed following the removal of the UPSSs. Supplementary investigations to close existing groundwater data gaps identified in **Section 3** are to be completed. Collection and analysis of groundwater samples from the three existing groundwater monitoring wells (BH201M, BH202M and BH205M) to assist with establishing the quality of groundwater
Impact Delineation, hot spot excavation and Waste	Collection and analysis of samples for delineation of fill impact and waste classification (**Appendix A, Figure 3**).

Stage	Description of Works
Classification	Excavation and chase out of impacted soils by visual inspection and laboratory analyses, including the hotspots identified to date as follows: ▪ BH207 – Asbestos ▪ BH209 – Asbestos ▪ BH210– Asbestos Track all disposed wastes, collating all tipping dockets. Prepare waste classification certificates, to facilitate off-site disposal according to the EPA (2014b) *Waste Classification Guidelines*. Previous investigation data may be used for classifying waste; however, must only apply results obtained from soil within the excavation areas.
Validation and Surplus Waste Classification	Validate remedial excavations by appropriate soil sampling and testing. Prepare waste classification certificates, to facilitate off-site disposal of waste and surplus material (including VENM and/or ENM) according to the EPA (2014b) *Waste Classification Guidelines*. Previous investigation data may be used for classifying waste; however, must only apply results obtained from soil within the excavation areas.

Supervision

A qualified Environmental Consultant should be appointed to the project, to ensure that critical stages of the site remediation are appropriately supervised and documented. The tasks of the consultant will include, though not necessarily be limited to, induction of personnel in relation to contamination hazards and environmental management issues, marking of remediation areas, inspection of environmental monitoring systems, implementation of specified control measures and validation sampling.

The validation sampling plan will include:

- UPSS tank pit validation (as per POEO UPSS decomissioning guidelines)
- Excavated bases and walls of remediation areas, as well as any stockpile footprints (if soils not placed above geo-fabric, plastic sheeting and/or retained hardstand); and
- The final (non-filled) exposed surface.

The final site validation report will detail the remediation and validation works, in accordance with EPA (2020), and provide a conclusion on the suitability of the land for residential use. See **Section 8** for more details concerning site validation.

Development Consent and Control Plans

All works must be in accordance with the *Liverpool Environmental Plan 2008* and *Development Control Plan 2008*, as well as any relevant conditions stipulated in the DA consent.

Contingencies and Unexpected Finds

Should unexpected finds be discovered during site remediation, or should any phase of the validation identify additional (residual), high level contamination, then the procedures described under *Contingency Management* (**Section 6.4**), the *Unexpected Finds Protocol* (**Appendix D**) and/or the *Validation Strategy* (**Section 8**) will be implemented, until the site remediation goals have been achieved and the site is deemed suitable for the proposed (mixed commercial / residential) use.

Other Requirements

The appointed Remediation Contractor should prepare a WHSP, as well as any other plans required in the DA consent and the *Sydney Development Control Plan 2012*. Where asbestos

removal is required, the contractor must be appropriately licensed to perform such works (*Class B* licenced asbestos removal contractor, at least).

5.2 Site Establishment

Notice will be given to Council at least 30 days prior to the commencement of remediation works. A list of all required work permits will be obtained from Council and arrangements are to be made to obtain the necessary approvals from the relevant regulatory authorities.

The site itself will be prepared in accordance with the management provisions outlined in **Section 6**. The site contractor(s) will also need to prepare and implement any management plans required, such as a construction environmental management plan, and work health and safety management plans prior to any works. Establishment of environmental controls, site access, security, fencing and warning signage are also required prior to works commencement. The main site contractor should include within these plans, details regarding the staging of construction works, stockpiling areas and waste material loading procedures, traffic management and waste tracking requirements.

Demolition of Structures/ Pavements

Removal of on-site structures and/or pavements is required to access the underlying soils and chase impacts surrounding the USTs. The removal of any hazardous material will be completed by a suitably qualified contractor. Demolition should be in accordance with Standards Australia (2001) *Australian Standard AS 2601-2001 The Demolition of Structures*, and wherever possible, waste should be segregated into metal, wood and brick / concrete.

Partial retention of hardstand pavement is recommended, to be used as a base for stockpiled soil awaiting classification and offsite disposal, to limit the likelihood of cross-contamination to underlying soil. When removed, the surface of the soil should be visually assessed for asbestos containing material, by a qualified and experienced environmental scientist/engineer who is also a licensed asbestos assessor (LAA), to determine if any asbestos related waste or visual impacts are present in areas previously inaccessible.

5.3 Surface Inspection

A site walkover inspection shall be performed, focusing on former building footprints and paved areas (post demolition), as well as the abandoned USTs. The walkover will be completed by an experienced consultant in the identification of asbestos (i.e. SafeWork NSW Licensed Asbestos Assessor). The purpose is to assess the site surface for the presence of ACM and any olfactory signs of contamination, prior to the excavation of any soil or UST. Should ACM be identified, the material will be excavated as per the hotspot remediation methodology. Other (suspected) contamination shall be treated as per the *Unexpected Finds Protocol* (**Appendix D**).

This activity will be certified by the licenced asbestos assessor, confirming that the area is ‘free of asbestos’ (or otherwise). A copy of the Clearance Certificate will be included in the site validation report. No soil excavated from building footprint / paved areas can be deemed as ‘free of asbestos’ without completion of this walkover and corresponding clearance, confirming no asbestos materials remain within those parts of the site.

5.4 UPSS Removal and Validation

The method for removal of any UPSS and associated impacted soils will be in accordance with the EPA (2014a) *Technical Note: Investigation of Service Station Sites*, Standards Australia (2008) *Australian Standard AS 4976-2008 The Removal and Disposal of Underground Petroleum Storage Systems* and POEO (UPSS) Regulations (2019).

- Excavation of UPSS pit (back) fill and natural soils, exposing the tank, to enable its extraction from the ground. The tank and any associated infrastructure (feed / supply

pipes) will be removed and disposed off-site a licenced tank recycler. Records of waste disposal shall be maintained, for reporting purposes.

- Any TRH-impacted (odorous) soils will be excavated and stockpiled separately, to enable waste classification. Under no circumstances will UPSS pit soils be mixed with other excavated materials. Delineation of the contamination will be based on validation sampling and testing, as well as visual / olfactory observations and in-field, soil headspace screening for volatile organic compounds (VOC) using a calibrated photoionisation detector (PID).
  - Should odours be significant enough to cause nuisance at a site boundary, then site management measures for odour control will be adopted, as described in **Table 6-3**.
  - Remedial ("chase-out") excavations will only be conducted under the supervision of the appointed Environmental Consultant.
  - Excavated contamination soils will be temporarily stockpiled and isolated from all other excavated materials. The soils will be placed on an impermeable surface (such as a plastic liner). The failure to achieve that will require footprint sampling post stockpile removal, to confirm cross-contamination of underlying soils has not occurred. Stockpiles will also be protected from wind to avoid airborne dispersion. All disposed materials will be transported by licensed contractors and records of waste disposal (tipping dockets) shall be maintained, for reporting purposes.
- Validation samples will be collected from excavation surfaces (walls and base) of the final UPSS pit, for laboratory analysis based on UPSS regulations. Samples will be tested for heavy metals, VOC (including BTEX), TRH, PAH, asbestos and nutrients (at least). Quality control (QC) samples will be collected, as specified in the SAQP (**Section 8.2**).
  - Should any wall or base validation sample be found to contain impacted soils, additional chase-out excavations will be conducted on the corresponding surface, to remove the residual impact, followed by resampling for validation.
  - When all wall and base validation samples confirm the absence of contamination, the 'hotspot' area will be deemed to have been effectively remediated.
- Waste classification of stockpiled soil shall be completed in accordance with the EPA (2014b) *Waste Classification Guidelines* and NEPC (2013) amendment measure (as per **Sections 5.4** and **8**).

Note: This procedure shall be adopted for any additional UST identified during the remediation works program.

Additional Measures

- A licensed liquid waste transporter will be required to remove any liquid contents from a UPSS and associated infrastructure, with the disposal of any waste to a suitably licensed liquid waste facility.
- The contractor must provide appropriate documentation for the waste disposal.
- Tanks should then be excavated, rendered safe and transported off-site by a licensed contractor for destruction/disposal. The contractor must provide formalised certification of the tank destruction and disposal.
- Any soil showing signs of contamination will be screened using a PID and all soil producing readings greater than 30 parts per million (ppm) will be excavated, segregated and stockpiled awaiting further classification. Any impacted soil will be 'chased' and removed until no further signs of contamination are present and PID readings are <30ppm.

- Excavated soil is to remain segregated from clean soil, to enable waste classification. Once classified, material will be transported to an off-site waste disposal facility to minimise dust and odour issues.
- All excavation works should be undertaken by licensed contractors experienced in the decommissioning and removal of fuel infrastructure, demolition of buildings and the remediation of hydrocarbon contaminated soils.

5.5 Data Gap Closure Investigations

Following the removal of the UPSSs, supplementary investigations to close existing groundwater data gaps identified in **Section 3** are to be completed. This will involve an additional round of groundwater sampling from the three existing groundwater monitoring wells (BH201M, BH202M and BH205M) and re-installation of any destroyed monitoring well, to assist with establishing the quality of groundwater. Sampling will be completed from all wells available onsite using micro-purge techniques and will analyse for HM, TRH, BTEX, PAH and VOCs. Field measurements of pH, ORP, electrical conductivity, dissolved oxygen and TDS will also be collected.

Groundwater will be assessed by criteria specific to the environmental values identified for the water body, being the ANZG (2018) protection of (fresh) aquatic ecosystems, aesthetics as well as buildings and structures.

Should further contamination of potential risk be identified, further remedial works may be required and will be addressed via an addendum to this RAP.

5.6 Impact Delineation, Hot Spot Excavation and Waste Classification

Impact Delineation

Prior to any soils being removed from the site, formal waste classification certificates shall be completed in accordance with the EPA (2014b) *Waste Classification Guidelines* and Schedule B2, Section 7.5.2 of the NEPC (2013) amendment measure. It is accepted that previous investigation data may be used for this purpose; however, additional (test pit) sampling and analysis will be necessary. The additional data can serve a dual purpose, in providing delineation of fill impact.

During this stage of the remediation, test pit sampling will be conducted at the proposed delineation sampling locations (identified with an 'X') identified in **Appendix A, Figure 3**. Each pit will be advanced (vertically) into the natural soils. The sample data will allow delineation of the asbestos- impacted soils (BH207, BH209 and BH210); thus initiating the site validation phase, whereby samples with contaminant levels that comply with the RAC will represent the wall, or base, of the corresponding remediation (excavation) area.

Hot Spot Excavation

Due to the presence of ACM, fill soils in the vicinities of hotspots BH207, BH209 and BH210 shall be remediated in the first instance, this representing the initial stage of the bulk excavation program. Ideally, excavated filling shall be loaded directly onto waste transport vehicles, then transported to the designated landfill facility (licensed to accept *Special Waste - Asbestos Waste*, at least).

All material removed from site must be tracked, from 'cradle to grave' and all documentation will be required for inclusion within the site validation report.

For each hotspot, remediation and validation shall be as follows:

- Excavation of each asbestos-impacted area (BH207, BH209 and BH210) is to be performed separately. The lateral and vertical extents of remediation may be guided by

findings from the impact delineation / waste classification activities; however, specific pit validation sampling / testing will confirm when remediation ('chase-out') has been completed. As a minimum, the excavation depth will be to the commencement of natural soil. If direct loading of impacted material cannot be performed, all stockpiles are to be placed on hardstand or builder's plastic and covered to prevent cross contamination.

- Validation samples collected from the surfaces (walls and base) of the excavation pit will be analysed for heavy metals and asbestos, at least. Sampling frequency should be as outlined in **Section 8**. Quality control (QC) samples will be collected, as specified in the SAQP (**Section 8.2**).
- Waste classification of stockpiled soil shall be completed in accordance with the EPA (2014b) *Waste Classification Guidelines* and NEPC (2013) amendment measure (as per **Sections 5.4** and **8**).

Note: This procedure shall be adopted for any additional hotspot identified during the remediation works program. The validation testing will depend on the specific contaminant(s) of concern.

Sample Density and Testing for Waste Classification

Waste soil classification will require a sampling density (rate) of one sample per 25m^3 up to 250m^3 (minimum of three; applies per waste stream / soil type). For spoil exceeding 250m^3 but less than 2500m^3, a minimum of 10 samples is required and for each contaminant the 95% upper confidence limit (UCL) will be compared to the corresponding criterion. Quality control (QC) samples will be collected, as specified in the SAQP (**Section 8.2**).

Soil samples will be analysed for heavy metals, TRH, BTEX, PAH and asbestos, at least. Leachability (TCLP) testing may be necessary.

Results of analyses will be compared to the criteria set out in the EPA (2014b) *Waste Classification Guidelines*. Note: Any previous (*in situ*) sample results for the designated material may be included in the waste classification.

5.7 Validation

Upon removal of the contaminated fill layers, validation of freshly exposed soil will be completed, prior to the commencement of further excavation works. If finishing surface is on natural soil, the natural soil is potentially classifiable as *virgin excavated natural material* (VENM); however, surface inspection and validation by near surface sampling and analysis is required. A validation plan is outlined in **Section 8**.

Where impact is identified in the remaining soils, it will be remediated and validated in accordance with the remedial excavation procedure described in **Stage 5** above (**Section 5.6**). The resulting spoil would be assessed and classified in accordance with the EPA (2014a) *Waste Classification Guidelines*.

Validation of Imported Backfill Soils (if required)

Should reinstatement of remedial excavations require importation of backfill soils from off-site source(s), the imported materials must be deemed suitable prior to importation to the site. Any validation sampling as part of this process is to be completed in accordance with the procedure outlined in **Section 8**.

To deem soils suitable for reuse on the subject site, the following confirmation procedure must be undertaken:

- All imported soils brought to the site should be certified as VENM by the supplier; and
- No soil or rock is to be imported onto the site for backfilling purposes, unless the supporting documentation demonstrates that the material satisfies an EPA Resource Recovery Order, or a NSW EPA Special Exemption by application where a current NSW EPA Resource

Recovery Order does not exist. The documentation required will include a specification sheet from the supplier showing the type of material imported is approved, and the materials are inspected by the appointed Environmental Consultant.

The process for assessment and approval of soils to be imported to the site is as follows:

a) Prior to importing soils (soil, topsoils, aggregates, bedding) to the site, the earthworks/landscape contractor is to provide written certifying documentation of the materials to the environmental consultant for review and comment;

b) The environmental consultant is to issue written assessment of the documentation including review and comment to the earthworks/landscape contractor with any recommendations concerning data gaps;

c) If the material documentation is considered acceptable, the environmental consultant is to visit the source site to obtain a minimum of three soil samples for laboratory testing of the contaminants of potential concern and as a minimum: metals, TRH/BTEX, PAHs, OCP, OPP, PCBs, and asbestos (gravimetric). Additional analytes and /or samples are to be tested if the documentation or the environmental consultant recognises other contaminants of potential concern or areas of potential concern at the source site;

d) Material documentation for VENM will be considered acceptable if it includes:

- A completed NSW EPA VENM Certificate found on-line at: https://www.epa.nsw.gov.au/your-environment/waste/classifying-waste/virgin-excavated-natural-material.
- A report prepared by a qualified environmental consultant containing all of information required in a NSW EPA VENM Certificate.

e) Material documentation for a NSW EPA Resource Recovery Order and Exemption or NSW EPA Special Order and Exemption will be considered acceptable if it includes and meets all documentation requirements specified in the Order and Exemption.

f) Prior to importation, the environmental consultant is to review the results of all imported material laboratory analyses and compare the results to the adopted soil criteria outlined in **Section 4.6.**

g) For VENM, metals are to be within the range of background metals.

h) For VENM, organic analysis results are to be less than the Limit of Reporting (LOR) or Practical Quantification Limit (PQL) outlined in NEPM (2013), Schedule B3, Guideline on Laboratory Analysis of Potentially Contaminated Soils.

i) On the basis of meeting all of the above process requirements, the environmental consultant will provide written communication to the earthwork contractor confirming the outcome of imported soil assessment.

j) The imported material must be visually inspected by the environmental consultant upon receipt of imported soils at the site to confirm that the material is consistent with the documentation.

k) Receipts and dockets are to be provided by the supplier of the imported material for every truck or load of material that is imported into the site. These dockets are to be supplied to the environmental consultant for inclusion in the Site Validation Report.

6. Environmental Management

All demolition and remediation works are to be undertaken in a manner which minimises any adverse environmental effects and complies with the statutory environmental and safety requirements. Environmental management recommendations related to the site remediation are presented in the following sections.

6.1 Responsibilities and Contacts

Roles and responsibilities of key personnel required to complete the remedial works are provided in **Table 6-1**. The details of people responsible should be kept up to date throughout the remedial works.

Table 6-1 Site Management Responsibilities

Party	Details	Responsibilities
Principal Project Manager (This may include the site owner / manager or key contractor for the redevelopment)	Altis Bulky Retail Pty Ltd as trustee for Altis ARET Sub Trust 20	Overall management of the site remedial activities, including ensuring all environmental protection measures are in place and functioning correctly during site remediation works. Implementation of and compliance with the RAP, including liaison between the appointed Environmental Consultant and Council, providing regular updates and informing of any problems encountered. Notification to contractors of the existence of a RAP and provision of copies of the RAP. Any notification of site conditions to the EPA required under the duty to report contamination under the *Contaminated Land Management Act* 1997. Ensuring site remediation works are carried out in an environmentally responsible manner and reporting any environmental issues to owner. Preparation of any site specific management plans.
Environmental Consultant	To be confirmed	Preparation / updating (where required) of the RAP. On-site guidance of the remedial works. Completing validation sampling and monitoring as requested by the Remediation Contractor and dictated by the RAP. Liaison between remediation contractor and the client. Preparation and submission of a report confirming the site suitability for the use proposed.
Earthworks or Remediation Contractor	Engaged by Altis Bulky Retail Pty Ltd as trustee for Altis ARET Sub Trust 20	Ensuring all operations are carried out as identified in the RAP (remediation). Inducting all employees, subcontractors and authorised visitors on procedures with respect to site works, WHSP and environmental management procedures. Maintaining site induction, site visitor and complaint registers. Ensuring that fugitive emissions and dust potentially leaving the confines of the site are suitably controlled and that noise and vibration levels at the site boundaries comply with the legislative requirements. Ensuring that surface water leaving the site is minimised and is suitably controlled, and does not pollute the environment. Ensuring that vehicles are cleaned and secured so that no mud, soil or water is deposited on any public roadways or adjacent areas.

Party	Details	Responsibilities
Council	Liverpool City Council	The RAP will accompany the DA and implementation of the RAP shall become a condition of the Development Consent. Ensuring requirements of Development Consent and other planning instruments are met. Review of RAP, Site Validation Report. Conduct inspections during remedial works (if required).

6.2 Hours of Operation

Remediation works shall only be permitted during the following hours, which may be subject to change based on the conditions prescribed in the consent:

- 7:00 am to 7:00 pm, Mondays to Fridays inclusive (during daylight savings period);
- 7:00 am to 6:00 pm, Mondays to Fridays inclusive (outside daylight savings period);
- 7:00 am to 4:00 pm on Saturdays; and
- No work shall be carried out on Sundays or Public Holidays.

The Principal Project Manager, via the appointed Site Manager, shall be responsible for the compliance of this condition by all sub-contractors, including demolishers. All work, including preparation, demolition, excavation and construction must comply with Australian Standard 2436 (2010) *Guide to Noise Control on Construction, Maintenance and Demolition Sites*.

6.3 Materials Handling

Table 6-2 summarises the measures that should be implemented in respect of materials handling and general environmental management during remedial works at the site.

Table 6-2 Materials Handling Requirements

Item	Description/ Requirements
Demolition (including asbestos management)	Appropriate measures shall be taken to ensure that demolition is completed in accordance with SafeWork NSW standards and codes of practice. Any asbestos identified should be managed in accordance with SafeWork NSW codes of practice and Australian Standards.
Earthworks contractors	Excavation of fill materials should be completed by a suitably qualified contractor to ensure: ▪ All site staff are aware of the environmental and health and safety requirements to be adhered to; ▪ There is no discernible release of dust into the atmosphere as a consequence of the works; ▪ There is no discernible release of contaminated soil into any waterway as a consequence of the works; and ▪ There are no pollution incidents, health impacts or complaints.
UPSS Disposal	As outlined in **Section 5.4**, the method for removal of any UPSS and associated impacted soils shall be in accordance with the EPA (2014a) *Technical Note: Investigation of Service Station Sites*, Standards Australia (2008) *Australian Standard AS 4976-2008 The Removal and Disposal of Underground Petroleum Storage Systems* and POEO (UPSS) Regulations (2019).
Stockpiling of materials	Stockpiles must be located on sealed surfaces such as sealed concrete, asphalt, or high density polyethylene. Should stockpiles be placed on bare soils, they should be so on yet to be remediated areas.

Item	Description/ Requirements
	Contaminated materials should only be stockpiled in locations that do not pose any environmental risk (e.g. hardstand areas). Excavated soils should be stored in an orderly and safe condition (≤2m height). Stockpiles should be battered with sloped angles to prevent collapse. Stockpiles should be covered after being lightly conditioned by sprinkler to prevent dust blow and control odours. Should the stockpile remain in situ for over 24 hours, silt fences or hay bales should be erected around each stockpile to prevent losses from surface erosion (runoff). Stockpiles will be strategically located to mitigate environmental impacts while facilitating material handling requirements.
Loading of material	Measures shall be implemented to ensure no contaminated material is spilled onto public roadways or tracked off-site on vehicle wheels. Such measures should include the use of a wheel washing/cleaning facility, placed before the egress point on the site, and should be able to handle all vehicles and plant operating on-site. Residue from the cleaning facility should be collected and either dewatered on site in a contained / bunded area, or disposed as a slurry to an approved facility. Such residue will be deemed contaminated unless proven otherwise.
Transport of materials	Prior to being assigned to an appropriate waste disposal facility, all waste fill/soils will be classified in accordance with the EPA (2014b) *Waste Classification Guidelines*. If prior immobilisation treatment of the waste soils is required, disposal consent will be obtained from the NSW EPA prior to spoil transport. All trucks transporting soils from the site are to be covered with tarpaulins (or equivalent). All haulage routes for trucks transporting soil, materials, equipment and machinery shall comply with all road traffic rules, minimise noise, vibration and odour to adjacent premises, utilise state roads and minimise use of local road. All deliveries of soil, materials equipment or machinery should be completed during the approved hours of remediation and exit the site in a forward direction. Removal of waste materials from the site shall only be carried out by a recognised contractor holding the appropriate EPA licenses. Unless hazardous, waste materials must be transported less than 150km from the source (POEO 1997, Waste 2014) and landfills are required to be licensed for the category of waste they are scheduled to receive. Transport of contaminated material off the site is to be via a clearly distinguished haul route.
Material tracking	Materials excavated from the site should be tracked from the time of their excavation until their disposal. Tracking of the excavated materials should be completed by recording the following: ▪ Origin of material; ▪ Material type; ▪ Approximate volume; and ▪ Truck registration number. Disposal locations will be determined by the remediation contractor. Disposal location, waste disposal documentation (weighbridge dockets) and the above listed information should be provided to the remediation consultant for reporting purposes.

6.4 Contingency Management

Should unexpected finds be discovered during the course of the site remediation program, or any high level, residual contamination be identified, then the procedures described under the *Unexpected Finds Protocol* (**Appendix D**) and/or the Validation Plan (**Section 8**) will be

implemented, until the site remediation goals have been achieved and the site is deemed suitable for the intended land use.

Other contingencies relating to the remediation stage are identified in **Table 6-3**.

Table 6-3 Remedial Contingencies

Scenario	Remedial Contingencies/Actions Required
Demolition (including asbestos management)	Appropriate measures shall be taken to ensure that demolition works are completed in accordance with SafeWork NSW Standards and Codes of Practice.
Additional asbestos wastes are encountered	Work to be suspended and asbestos removed by a suitably qualified contactor, in accordance with SafeWork NSW regulations.
Highly contaminated soils / sludge's not identified during previous investigations are encountered, particularly at site boundaries	Work to be suspended until the environmental consultant can assess impacted materials and associated risks. The leachability of contaminants to be assessed, before disposal options are considered. Follow the Unexpected Finds Protocol in **Appendix D** of this RAP.
Underground tanks not been previously identified are encountered	Should additional / unexpected USTs be identified at the site, a GPR survey and visual inspection is to be conducted by a certified and experienced service locator, to confirm the presence / absence of any further UPSS and any unknown subsurface infrastructure. Systems to be removed and the excavations appropriately validated and backfilled by an experienced contractor. Tank removal works to be reported by an appropriate environmental consultant. Refer to **Section 5.4** of this RAP.
Residual soil impacts remain on-site	Assess the vapour hazard and delineate plume. Should significant soil vapour contamination be identified, consider soil vapour monitoring and the implementation of a vapour membrane barrier system within the final development design.
Stormwater management and control	Appropriate measures shall be taken to ensure that potentially contaminated water does not leave the site. Such measures should include, but not be limited to: ▪ Diversion and isolation of any stormwater from any contaminated areas; ▪ Provision of sediment traps including geotextiles or hay bales; and ▪ Discharge of any water to drains and water bodies must meet the appropriate effluent discharge consent condition under the *Protection of the Environmental Operations Act 1997*.
Dust and Odour	Control of dust and any odour during the remediation works shall be maintained by the contractor to ensure no nuisance dust or odours are received at the site boundary according to requirements of Council's DCP. Action levels and specific control measures will be described in the site-specific management plan and will include the following: ▪ Site wide water spraying, as and when appropriate, to eliminate wind-blown dust; ▪ Use of mist sprays, and/or sprinklers on stockpiles, fill screening areas and loaded fill to lightly condition the material; ▪ Use of tarpaulin or tack-coat emulsion or sprays to prevent dust blow from stockpiles or from vehicle loads; ▪ Covering of stockpiles or loads with polythene or geotextile membranes; ▪ Restriction of stockpile heights to 2m above surrounding site level; ▪ Ceasing works during periods of inclement weather such as high winds or heavy rain; ▪ Use of vapour masks or respirators for works near VOC-impacted areas (if required); and ▪ Regular checking of the fugitive dust and odour issues to ensure compliance with the CEMP requirements, undertaking immediate remedial measures to rectify any cases of excessive dust or odour (e.g. use of

Scenario	Remedial Contingencies/Actions Required
	misting sprays or odour masking agent). It is advised that all site workers use adequate dust masks during ACM soil excavation and that machine operators remain within an enclosed, air conditioned cabin.
Noise and Vibration	Noise and vibration will be restricted to reasonable levels. All plant and machinery used on site will be noise muffled to ensure emissions do not breach statutory levels as defined within Councils LEP.
Contaminated groundwater (including LNAPL or DNAPL) encountered	Review groundwater conditions (if required) and determine need for further investigation/remediation and/or longer-term management plan. Any dewatering may require approval under the *Water Management Act 2000*. Remedial options may include natural attenuation, extraction, bioremediation, phase-separated hydrocarbon (PSH) recovery using active pumping (including hydraulic control), installation of a groundwater permeability barrier, *in situ* oxidation or stabilisation.
Contaminated groundwater plume is identified and is migrating off-site, or there are increases in concentration due to increased infiltration	Review contaminant increase and analytes. Review active remediation alternatives (if necessary). Ensure down-gradient monitoring is undertaken. Carry out fate / transport modelling and assess need for further action.
Contamination is identified near heritage items or significant trees (if identified)	Stop work. Review contaminant concentrations and risks to heritage items / flora. Assess human health and environmental risks if contamination remains in place. Review natural attenuation options.
Changes in proposed excavation depth	Review remediation works for the site.
Changes in proposed land use(s) at the site	Review remediation works for the site.
Incident management and community relations	While various environmental management and occupational safety plans will be developed to protect human health and the environment, incidents may occur which pose a risk to the various stakeholders. To mitigate these risks and ensure that a suitable response is carried out quickly, a response plan to any incident that may occur on site should be prepared and various responsibilities assigned. The site health and safety plan and environmental management plan should document these procedures and responsibilities, and incident contact numbers should be maintained in an on-site register. All other relevant emergency contact numbers such as Police, Fire Brigade, and Hospital should be listed in the WHSP and posted on-site for easy access. Community engagement should be carried out in accordance with Schedule B(8) of NEPC (2013). Prior to the commencement of any remediation works at the site, every owner and occupier of any land located either wholly or partly within 100m of the boundary of the premises (including local council and the RMS) should be notified at least 30 days in advance. The notice should include: ▪ Advice of demolition and excavation work to be carried out on the premises; ▪ State the time and date such work is to commence; ▪ Indicate that the works are being conducted to minimise any risk of site contamination impacting on off-site receptors; ▪ Provide appropriate site signage at an easily readable location on the site fencing, including site contact name and phone number to be contacted should any matter arise; and ▪ Provide contact information and procedure for registering any complaints.

7. Work Health and Safety

As required by the *NSW Work Health and Safety Act 2011*, a Work Health and Safety Plan (WHSP) should be prepared by the Principal or Remediation Contractor (see **Table 6-1**). The purpose of this plan is to manage the health and safety of site workers and nearby residents, and address such issues as site security, exclusion zones, excavation safety, vibration, noise, odour and dust levels. The plan should address the risks during the remediation works and cover site specific requirements associated with the contaminants present within the site soils (including vapour) and groundwater.

The site officer responsible for implementing health and safety procedures should induct all site personnel so that they are aware of and comply with, the requirements of this document. It is the contractor's responsibility, with assistance from client/owner(s) of the site to ensure that all other permits, approvals, consents or licences are current. Hazards relevant to the remedial works were identified and mitigation measures determined for the remediation as presented in the table below. These should be considered for the preparation of any site specific management procedures.

Table 7-1 Remediation Hazards

Anticipated Problem	Corrective Actions
UPSS	All works associated with the removal of UPSS and impacted soils at the site must be undertaken in accordance with the EPA (2014a) *Technical Note: Investigation of Service Station Sites*, Standards Australia (2008) *Australian Standard AS 4976-2008 The Removal and Disposal of Underground Petroleum Storage Systems* and POEO (UPSS) Regulations (2019). Work on or around abandoned underground tanks or associated pipework is potentially dangerous due to the likely presence of residual, flammable gases, liquids and vapours. The following hazards are associated with conditions that may be created during site works: ▪ Flammable and/or combustible liquids ▪ Product Toxicity ▪ Entry into confined spaces ▪ Entry into excavations
Chemical Hazards	Contaminated sites have chemical substances that may present a risk to human health and the environment. Chemicals of concern and associated risks are as detailed within the Conceptual Site Model, in **Section 3.** If required, a site specific WHSP could set out controls to mitigate any potential risks.
Asbestos (ACM) Hazards	All works associated with the disturbance and removal of asbestos impacted fill at the site must be undertaken in accordance with SafeWork NSW guidelines. A licensed asbestos removalist must notify the regulator in writing at least five days before the licensed asbestos removal work commences and must also obtain a permit (SafeWork NSW, 2019a/b). Removal of asbestos from contaminated soil will typically require a *Class B* licensed asbestos removalist for the ACM (non-friable) asbestos to be removed. The asbestos removalist must prepare an asbestos removal control plan (ARCP) for the proposed earthworks, which will document the management measures required to address risk associated with potential exposure to asbestos in accordance with SafeWork NSW requirements and must include: ▪ Work area isolation (barrier protection, buffer zone); ▪ Removal methods (friable/non-friable); ▪ Contamination control methods (decontamination procedures); and ▪ Health and safety procedures (respiratory protection).

Anticipated Problem	Corrective Actions
	▪ Asbestos related works at the site involving disturbance of soil must be managed strictly in accordance with this RAP and the ARCP. All asbestos and any contaminated soil removed must be disposed of as asbestos waste according to the EPA and the requirements of the local licensed waste disposal facility. Under Clause 473 of the *NSW Work Health and Safety Regulation 2017*, a clearance inspection is required following the removal of ACM. A clearance inspection is to be carried out and a clearance certificate issued before the area can be re-occupied. The company undertaking the clearance inspection should be independent of the demolition and / or asbestos removal company.
Physical Hazards	The following hazards are associated with conditions that may be created during site works: ▪ Heat exposure; ▪ Buried services; ▪ Noise, vibration and dust; ▪ Release of asbestos fibres ▪ Electrical equipment; and ▪ The operation of heavy plant equipment.
Personal Protective Equipment and Monitoring	Personnel should, wherever possible, avoid direct contact with potentially contaminated material. Workers are to ensure that surface waters or groundwater is not ingested or swallowed and that direct skin contact with soil and water is avoided. Standard PPE with the addition of disposable P2 dust masks as specified for the contractor will be sufficient for the prescribed remedial works.

Site workers shall endeavour, wherever possible, to avoid direct contact with potentially contaminated material. Workers are to ensure that surface waters or groundwater is not ingested or swallowed and that direct skin contact with soil and water is avoided. All personnel on site will be required to wear the following protection at all times:

- Steel-capped boots;
- Prior to undertaking any task a risk assessment should be completed to determine the requirements for wearing safety glasses or safety goggles with side shields meeting AS/NZS1337:2010;
- A hard hat meeting AS1800:1998 requirements;
- Hearing protection meeting AS/NZS1270-2002 requirements when working in the vicinity of machinery or plant equipment (if noise levels exceed exposure standards); and
- P2 rated dust masks when working with ACM disturbed soil.

8. Validation Methodology

Remediation of the site will be deemed acceptable based on the achievement of the following validation objectives:

- ***Hotspot and UPSS Remedial Excavations*** – Validation of the hotspot and UPSS excavations will occur in accordance with the methods presented in **Sections 5.4** and **5.6**, to ensure that contaminant concentrations are below the RAC (**Section 4.6**). The sampling frequency will be in accordance with the NEPC (2013) and EPA (1995) *Sampling Design Guidelines*. All tests shall be performed by NATA-accredited environmental analytical laboratories. Excavation of contaminated material shall continue until the analytical results indicate compliance with the criteria (i.e. either the concentrations of all contaminants are within the criteria, or the 95% UCL of the average concentration for each detected parameter is within the corresponding criterion).
    - If results indicate that additional excavation is necessary, the excavation shall be extended until the excavation surface samples indicate that the location is validated as meeting the criteria for each respective contaminant.
- ***Final (Non-Filled) Surface*** – Validation of the final (non-fill), natural site surface will be in accordance with a grid-based sampling pattern, determined using Procedure A of the EPA (1995) *Sampling Design Guidelines.* Contaminant concentrations are to be below the RAC (**Section 4.6**). All tests shall be performed by NATA-accredited environmental analytical laboratories. Excavation of any residual contaminated material shall continue until the analytical results indicate compliance with the criteria (i.e. either the concentrations of all contaminants are within the criteria, or the 95% UCL of the average concentration for each detected parameter is within the corresponding criterion).
    - If results indicate that additional excavation is necessary, the excavation shall be extended until the excavation surface samples indicate that the location is validated as meeting the criteria for each respective contaminant.
    - If finishing surface is on natural soil, the natural soil is potentially classifiable as virgin excavated natural material (VENM) and/or excavated natural material (ENM). Results of analysis will be compared to the waste classification criteria set out in the NSW EPA (2014) *Waste Classification Guidelines* and/or *a* NSW EPA. A classification certificate will be provided, to enable offsite disposal
- ***Backfill Materials*** – Should backfilling be required, validation of imported fill materials used for the backfilling of remediated areas would be required to verify their suitability for the proposed land use.

8.1 Validation Sampling Required

Validation sampling is required to confirm the suitability of material retained at the site for the proposed use. Validation will be achieved when either:

- All requirements of this RAP, including any future addendums / updates, are completed;
- All concentrations of the contaminants of concern within material retained at the site are below the adopted validation criteria, or the 95% upper confidence limit' (95% UCL) of the average concentration for each analyte within retained material is below the adopted validation criteria.

All material imported to site for landscaping and/or drainage aggregate will require validation to ensure the material is fit for use, and does not pose an unacceptable risk to sensitive site users.

Should residual contamination be identified, it would be "chased out" where appropriate until material exceeding the remediation criteria has been removed. A sampling strategy is presented in **Table 8-1** below.

Table 8-1 Validation Sampling Design

Area	Sampling Density	Contaminants of Concern
Hotspot	A visual inspection across the exposed surface is required, to confirm no ACM is present. The validation sampling density of the walls and base of each remedial pit shall be one base sample per 25m^2 of area and one wall sample per 5m, to be analysed for the contaminants of concern.	Metals Asbestos
UPSS	A visual inspection across the exposed surface is required, to confirm no ACM and oil-like staining are present. The validation sampling density of the walls and base of each remedial pit shall be one base sample per 25m^2 of area and one wall sample per 5m, to be analysed for the contaminants of concern.	Metals (including Pb) TRH VOC (including BTEX) PAH pH of the medium Phenols (not required but should be considered) Asbestos
Final soil surface	A visual inspection across the exposed, final site surface is required, to confirm no ACM and oil-like staining are present. Sample frequency according to the grid-based pattern determined using Procedure A of the EPA (1995) *Sampling Design Guidelines.*	Metals TRH PAH Asbestos
Waste/surplus soil to be disposed of off-site	Prior to any soil material being removed from the site, a formal waste classification certificate shall be completed, in accordance with the EPA (2014a) *Waste Classification Guidelines* a rate of one per 100m^3. Classification of excavated natural materials (ENM) should be in accordance with the NSW EPA waste orders and exemptions including: ▪ The excavated natural material order 2014; and ▪ The excavated natural material exemption 2014.	Metals TRH BTEX PAH OC/OP pesticides PCB Asbestos Foreign Materials (ENM) pH (ENM) Electrical Conductivity (ENM)
Backfill / Imported Material	If material is required to be sourced from off-site to reinstate an excavated area, it must be certified as suitable for the intended use. If the material is not *Virgin Natural Excavated Material* (VENM), *Excavated Natural Material* (ENM) or if no suitable certification can be supplied by the source then the material should be sampled at a rate of one per 100m^3.	Metals TRH BTEX PAH OC/OP pesticides PCB Foreign Materials pH Electrical Conductivity Asbestos

8.2 Validation Preliminary SAQP

The methodology for the validation phase, including quality assurance / quality control (QA/QC), is described in **Table 8-2.**

Table 8-2 Validation Sampling Methodology and QA/QC

Task / Action	Description
Field Screening (UST excavation)	Soil will be assessed in the field for contamination indicators such as discolouration, staining and odour. A subset of the sampled material will be collected and placed into a zip lock bag, to be assessed for VOC using a PID fitted with a 10.6eV lamp. Soil at the surface will be visually assessed for the presence of asbestos (ACM) and any such findings will be collected for sampling.
Sample Collection	Samples will be collected / analysed in accordance with the strategy presented in **Table 8-1**. Soil validation sampling will be directly from the exposed surface of the excavated pit, or from the material brought to the surface by the backhoe/excavator bucket. Samples will apply grab techniques from the exposed surface, using stainless-steel or disposable (single use) equipment.
Equipment Decontamination	All sampling equipment (hand tools) to be washed in a 3% solution of phosphate free detergent (e.g. *Decon 90*), followed by a rinse with potable water prior to each sample being collected. Where permissible, excavator parts (bucket) to be hosed with potable water.
Sample Handling, Transport and Tracking	Direct transfer of the sample into new glass jars, bottles, vials or plastic bags is preferred, with each plastic bag individually sealed to eliminate cross contamination during transportation to the laboratory. Label sample containers with individual and unique identification including project number, sample number, depth, date and time of sampling. Place sample containers into a chilled, enclosed, and secure container for transport to the laboratory. Provide chain-of-custody (COC) documentation to ensure that sample tracking and custody can be cross-checked at any point in the transfer of samples from the field to the environmental laboratory.
Sample Containers and Holding Times	For soil: Metals - 250g glass jar / refrigeration 4^{o}C / 6 months (maximum holding period). TRH/BTEX - 250g glass jar / refrigeration 4^{o}C / 14 days (maximum holding period). PAH - 250g glass jar / refrigeration 4^{o}C / 14 days (maximum holding period). Asbestos - zip lock, plastic bag (indefinite holding period).
QA/QC	QA / QC procedures will be adopted throughout the validation phase, to confirm data precision, accuracy, representativeness, comparability and completeness. Field work will be undertaken in accordance with a Standard Operating Procedures Manual. This will entail / ensure: ▪ Standard operating procedures are followed; ▪ Site safety plans are developed prior to works commencement; ▪ Blind and split field duplicate samples are collected and analysed; ▪ Samples are stored under secure, temperature-controlled conditions; ▪ COC documentation is employed for the handling, transport and delivery of samples to the contracted environmental laboratory; and ▪ Contaminated (fill) soil, or groundwater, originating from the site area is disposed in accordance with relevant regulatory guidelines. Field QC measures will include intra- (blind) and inter- (split) laboratory duplicates, equipment rinsate and laboratory-prepared trip spike and trip blank samples, collected and analysed as follows: ▪ one in twenty samples to be tested as intra-laboratory field duplicates; ▪ one in twenty samples to be tested as inter-laboratory (split) duplicates; ▪ one field equipment rinsate blank per sample batch; ▪ one laboratory-prepared trip (VOC) spike per sample batch; and ▪ one laboratory-prepared trip blank per sample batch. Each contracted laboratory will conduct in-house QA/QC procedures in accordance with NATA-accreditation / method requirements, including the routine analysis of:

Task / Action	Description
	▪ Reagent (method) blanks; ▪ Laboratory duplicates; ▪ Matrix spike (duplicate) recoveries; ▪ Surrogates; ▪ Internal standards; ▪ Calibration standards; and ▪ Control samples (including standard reference materials).
Achievement of Data Quality Objectives	Data quality objectives (DQO) will be established by the appointed Environmental Consultant. An assessment of the overall data quality will be presented in the final validation report, in accordance with the EPA (2017) *Guidelines for the NSW Site Auditor Scheme*.

8.3 Validation Report

At the completion of remediation and validation works, a validation report will be prepared in general accordance with the EPA (2020) *Guidelines for Consultants Reporting on Contaminated Land* and other relevant guidance endorsed by the EPA.

The validation report will include, but need not necessarily be limited to:

- Executive summary;
- Scope of work;
- Site identification;
- Summary of site condition, environmental context, and surrounding environment;
- Summary of site history and previous investigations;
- Remediation activities undertaken, including a summary of the extent and observations of excavation/s, waste documentation;
- Validation sampling and analysis plan (including methodology), where relevant;
- Quality assurance / quality control (QA/QC) protocols for field works and laboratory analysis;
- Ongoing site monitoring requirements, if any; and
- Conclusions and recommendations, including confirmation that the site has been remediated to a suitable standard for the proposed commercial development.

The site validation report will be submitted for Council and EPA-accredited Site Auditor review at the completion of the remediation works program.

9. Statement of Limitations

This plan has been prepared for the exclusive use of Altis Bulky Retail Pty Ltd as trustee for Altis ARET Sub Trust 20 ("Altis") (the client), being the only intended beneficiary of our work. The scope of the RAP is limited to that agreed with our client.

No other party should rely on the document without the prior written consent of EI, and EI undertakes no duty, or accepts any responsibility or liability, to any third party who purports to rely upon this document without EI's approval.

In preparing this plan, EI has used a degree of care and skill ordinarily exercised by reputable members of the environmental industry in Australia, as at the date of this document. No other warranty, expressed or implied, is made or intended. Each section of this report must be read in conjunction with the whole of this report, including its appendices.

The methods and conclusions presented in this report are based on a limited investigation of conditions, with specific sampling locations chosen to be as representative as possible under the given circumstances.

EI's professional opinions are reasonable and based on its professional judgment, experience, training and results from analytical data. EI may also have relied upon information provided by the client and other third parties to prepare this document, some of which may not have been verified by EI.

EI's professional opinions contained in this document are subject to modification if additional information is obtained through further investigation, observations and/or validation testing during remedial activities. In some cases, further analysis may be required, which may result in a further report with different conclusions.

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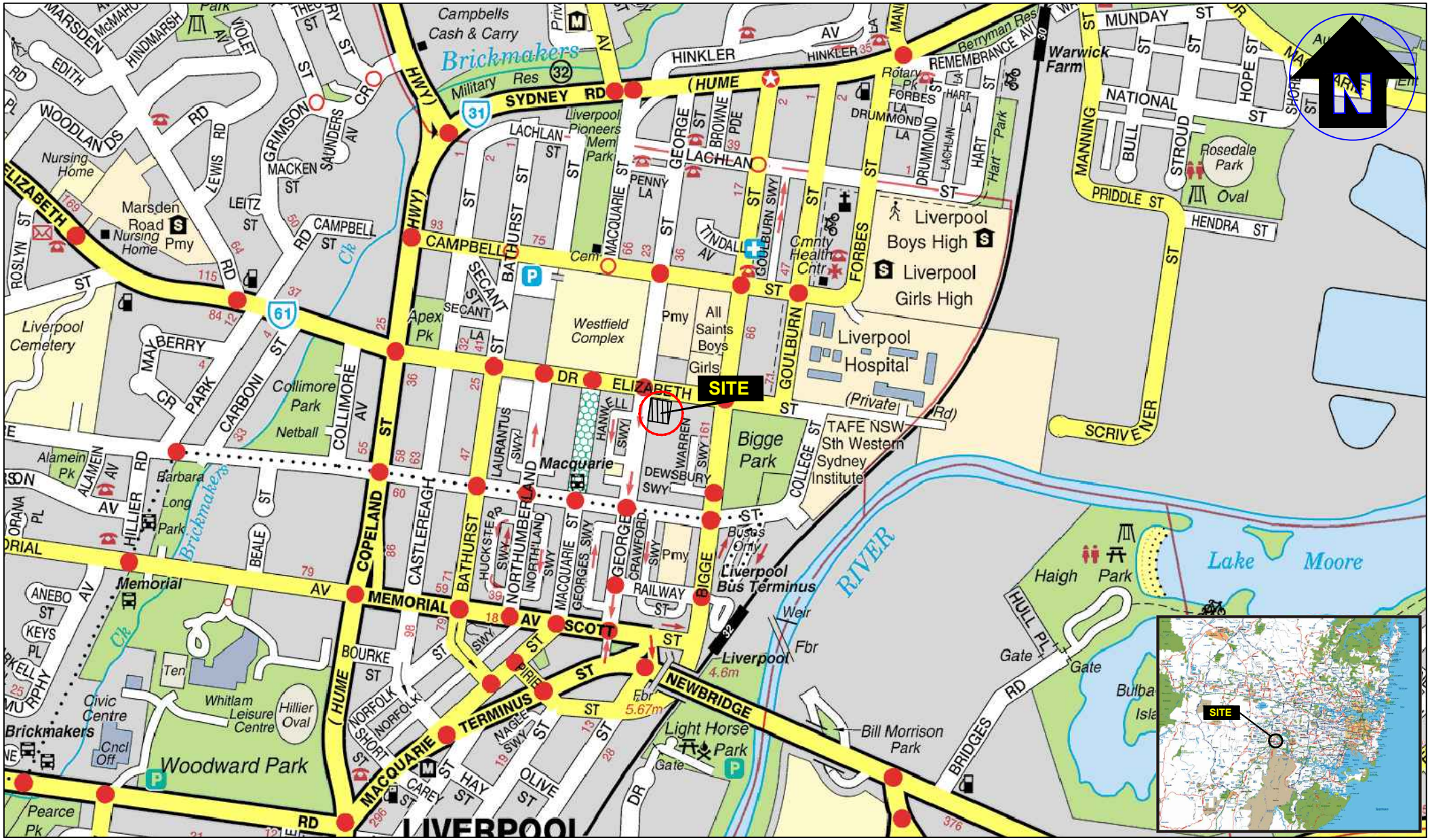
Appendix A - Figures



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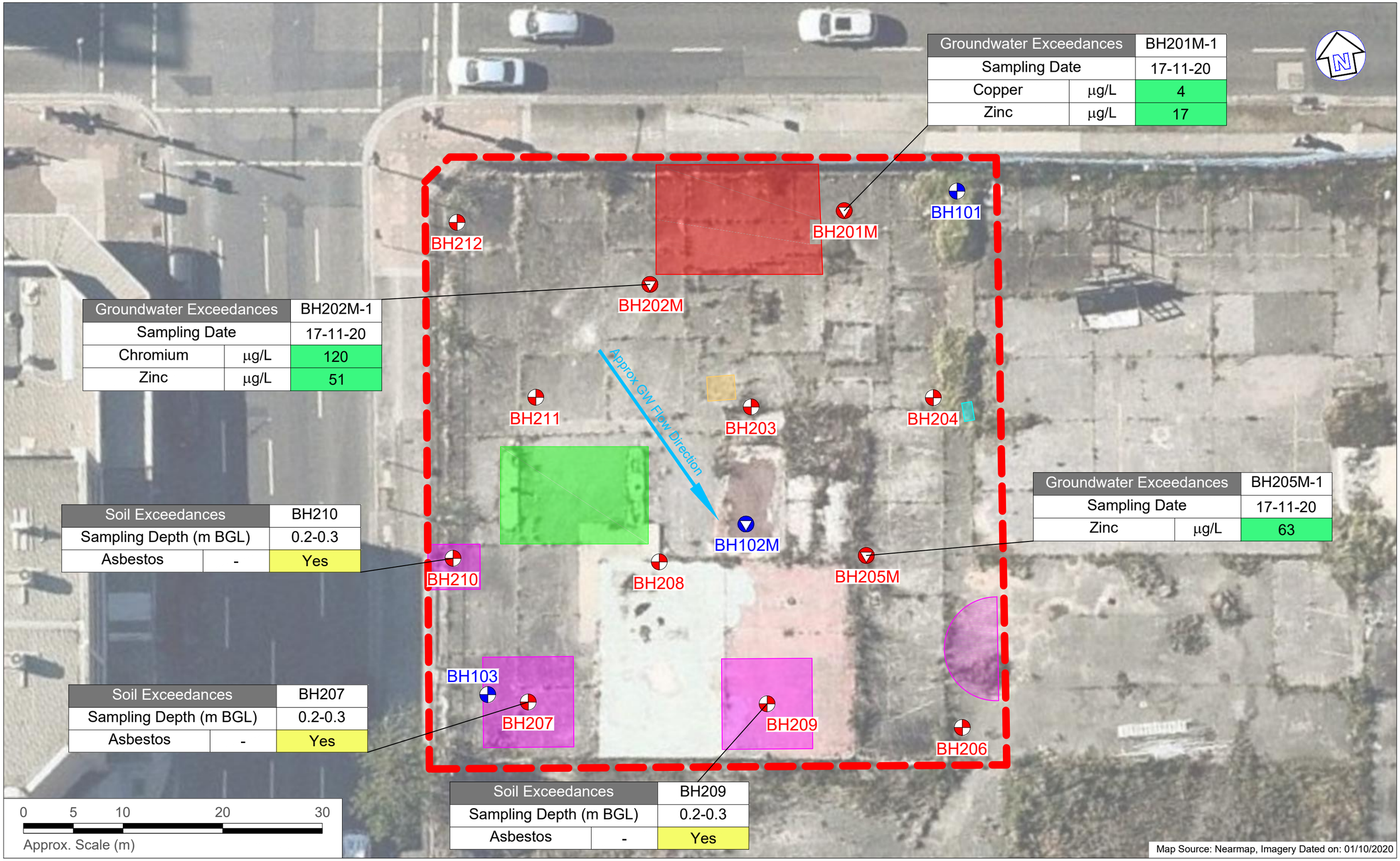
Drawn:	AM.H.
Approved:	E.S.
Date:	21-07-21
Scale:	Not To Scale

Altis Bulky Retail Pty Ltd as Trustee for Altis Aret Sub Trust 20
Remediation Action Plan
28 Elizabeth Street, Liverpool NSW
Site Locality Plan

Figure:
1

Project: E24175.E06



LEGEND (All Locations are Approximate)

- Site boundary
- Area with Asbestos
- UST Farm location
- Waste oil UST location
- Broken telstra pit location
- Former bowser island location
- Oil staining location
- Borehole location
- Borehole/monitoring well location
- Previous borehole location (EI, 2020)
- Previous borehole/monitoring well location (EI, 2020)
- groundwater flow direction

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Altis Bulky Retail Pty Ltd as Trustee for Altis Aret Sub Trust 20
Remediation Action Plan
28 Elizabeth Street, Liverpool NSW
Sampling Location Plan

Figure: 2

Project: E24175.E06

LEGEND (All Locations are Approximate)

- Site boundary
- Previous borehole location (EI, 2020)
- Proposed delineation sampling location

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Altis Bulky Retail Pty Ltd as Trustee for Altis Aret Sub Trust 20
Remediation Action Plan
28 Elizabeth Street, Liverpool NSW
Proposed Remedial Sampling Location Plan

Figure: 3

Project: E24175.E06

Appendix B – Proposed Development Plans

DEP DEVELOPMENT APPLICATION, ILLOURA PLACE LIVERPOOL

Mixed Use Development

28 Elizabeth Street, Liverpool 2170

October 2021

Drawing List

Series	Drawing No.	Drawing Name	Scale	Rev	Size
GENERAL					
	DA-001-001	Title Sheet		S1	A1
	DA-001-110	Architectural Design Story - Massing Development		S1	A1
	DA-001-111	Architectural Design Story - Facade Composition		S1	A1
	DA-001-112	Architectural Design Story - Facade Character		S1	A1
Siteworks					
	DA-010-010	Context Plan		S1	A1
	DA-010-011	Site Plan	1:250	S1	A1
	DA-010-012	Current Site Condition		S1	A1
	DA-010-013	Site Analysis		S1	A1
GA Plans					
	DA-110-001	Basement 06	1:150	S1	A1
	DA-110-002	Basement 04-05	1:150	S1	A1
	DA-110-003	Basement 03	1:150	S1	A1
	DA-110-004	Basement 02	1:150	S1	A1
	DA-110-005	Basement 01	1:150	S1	A1
	DA-110-009	Ground Level	1:150	S1	A1
	DA-110-010	Mezzanine	1:150	S1	A1
	DA-110-011	Level 01	1:150	S1	A1
	DA-110-012	Level 02	1:150	S1	A1
	DA-110-013	Level 03	1:150	S1	A1
	DA-110-014	Level 04	1:150	S1	A1
	DA-110-015	Level 05	1:150	S1	A1
	DA-110-016	Typical Level A Lowrise (Level 6/10)	1:150	S1	A1
	DA-110-017	Typical Level B Lowrise (Level 7/11)	1:150	S1	A1
	DA-110-018	Typical Level C Lowrise (Level 8/12)	1:150	S1	A1
	DA-110-019	Typical Level D Lowrise (Level 9/13)	1:150	S1	A1
	DA-110-120	Typical Level A Highrise (Level 14/18/22/26/30)	1:150	S1	A1
	DA-110-121	Typical Level B Highrise (Level 15/19/23/27/31)	1:150	S1	A1
	DA-110-122	Typical Level C Highrise (Level 16/20/24/28/32)	1:150	S1	A1
	DA-110-123	Typical Level D Highrise (Level 17/21/25/29)	1:150	S1	A1
	DA-110-330	Level 33	1:150	S1	A1
	DA-110-340	Roof Level	1:150	S1	A1
GA Elevations					
	DA-210-101	North Elevation - Elizabeth Street	1:200	S1	A1
	DA-210-201	East Elevation - Through Site Link	1:200	S1	A1
	DA-210-301	South Elevation - Service Laneway	1:200	S1	A1
	DA-210-401	West Elevation - George Street	1:200	S1	A1
GA Sections					
	DA-310-101	Section AA	1:200	S1	A1
	DA-310-102	Section BB	1:200	S1	A1
	DA-310-201	Carpark Entry & Loading Dock Section	1:100	S1	A1
	DA-310-202	Pool & Level 5 Section	1:50	S1	A1
Shadow Diagrams					
	DA-700-001	June 21st 9am - 2pm	1:2250	S1	A1
	DA-700-002	June 21st 3pm	1:2250	S1	A1
	DA-700-011	December 21st 9am - 2pm	1:2250	S1	A1
	DA-700-012	December 21st 3pm	1:2250	S1	A1
	DA-700-021	March / September 21st 9am - 2pm	1:2250	S1	A1
	DA-700-022	March / September 21st 3pm	1:2250	S1	A1
Sun Eye Diagrams					
	DA-710-001	Sun Eye Diagram 21st 9am - 2pm	1:1000	S1	A1
	DA-710-002	Sun Eye Diagram 21st 3pm	1:1000	S1	A1
Apartment Amenity (ADG)					
	DA-720-001	Cross Ventilation Diagram Level 05 - 08	1:400	S1	A1
	DA-720-002	Solar Diagram Level 05 - 33	1:400	S1	A1
Building Amenity					
	DA-730-001	Communal Open Space	1:250	S1	A1
	DA-730-002	Communal Open Space Solar	1:250	S1	A1
	DA-730-201	Landscape Area	1:400	S1	A1
	DA-730-301	Through Site Link	1:250	S1	A1
Storage Compliance Diagrams					
	DA-740-001	Storage Compliance - Typical Levels	1:150	S1	A1
	DA-740-002	Storage Compliance - Typical Levels	1:150	S1	A1
Apartment Amenity					
	DA-750-001	Apartment Depth - Typical Levels	1:150	S1	A1
	DA-750-002	Apartment Depth - Typical Levels	1:150	S1	A1
GFA Diagrams					
	DA-770-001	GFA Ground Level - Level 5	1:400	S1	A1
	DA-770-002	GFA Typical Level A Lowrise - Typical Level B Hig...	1:400	S1	A1
	DA-770-003	GFA Typical Level C Highrise - Level 33	1:400	S1	A1
Adaptable Plan Layouts (DA Stage)					
	DA-810-001	Adaptable & Livable Apartments	1:100	S1	A1
Waste Strategy					
	DA-820-001	Waste Strategy Diagrams	1:300	S1	A1
Materials & Finishes Board					
	DA-890-001	External Material Finishes		S1	A1
3D VIEWS					
	DA-910-101	Perspective - Elizabeth Street - Site Through Link		S1	A1
	DA-910-102	Perspective - Corner of Elizabeth Street and Rear ...		S1	A1
	DA-910-103	Perspective - Aerial View Along Elizabeth Street		S1	A1
	DA-910-104	Perspective - Corner of Elizabeth Street and Geor...		S1	A1

CLIENT

Altis Bulky Retail Pty Ltd as trustee for Altis ARET Sub Trust 20
14/60 Castlereagh Street,
Sydney, NSW, 2000

ALTIS PROPERTY PARTNERS

ILLOURA PLACE

Rev	Date	Approved by	Revision Notes
S1	20.10.21	JMC	Issued for Development Application

Project Title
Illoura Place
28 Elizabeth Street, Liverpool, NSW 2170, Australia

Drawing Title
GENERAL
Title Sheet

Scale: @A1, 50%@A3
Project No.: 20089
Drawn by: JL
North
Status: Development Application
Dwg No.: DA-001-001
Rev: S1

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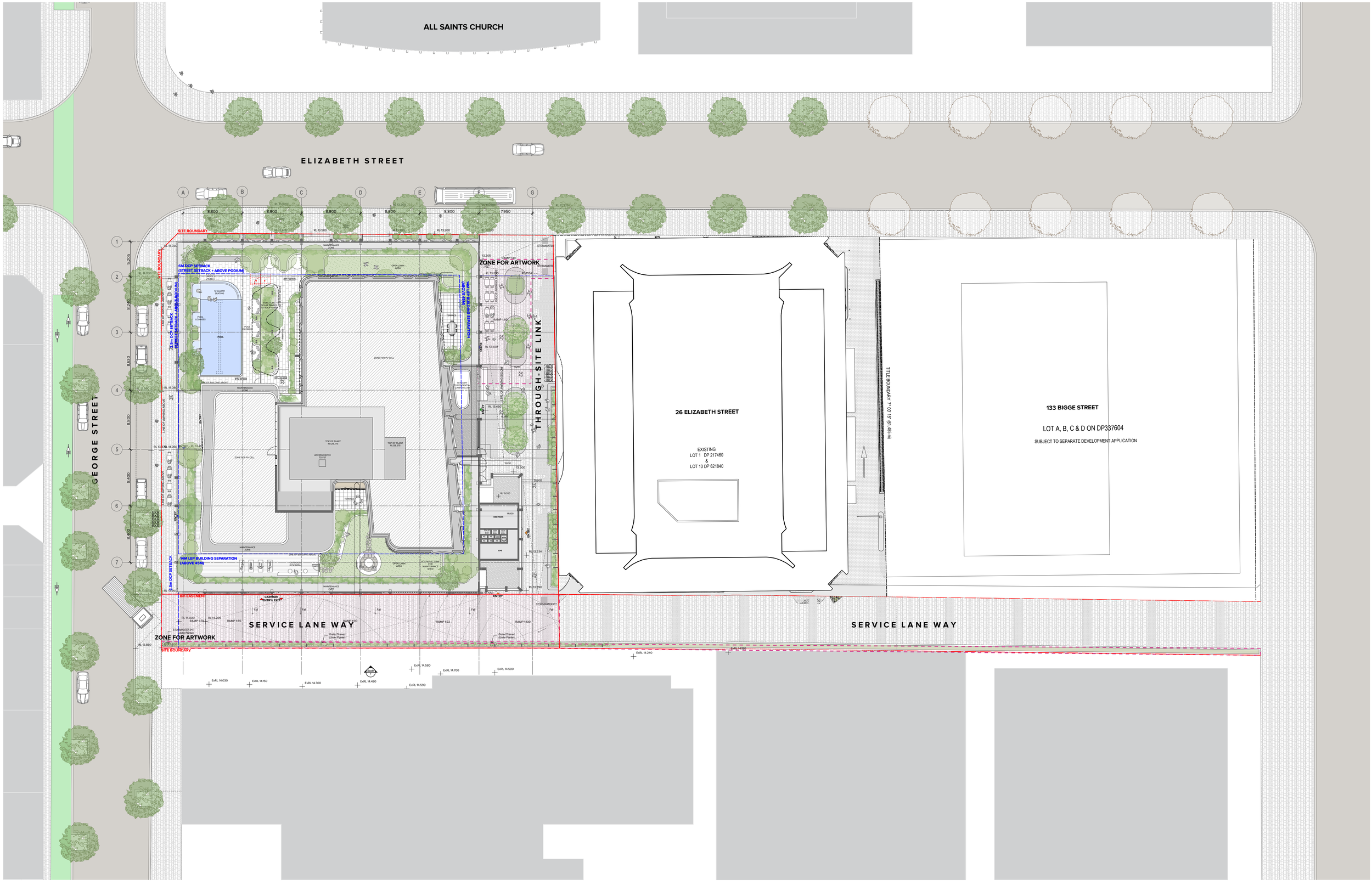

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DLCS Quality Endorsed Company ISO 9001:2015, Registration Number 20476
Nominated Architect: Nicholas Turner 6685, ABN 86 064 084 911

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Sydney, NSW, 2000

ALTIS PROPERTY PARTNERS

ILLOURA PLACE

Rev	Date	Approved by	Revision Notes
S1	20.10.21	JMC	Issued for Development Application

ILLOURA PLACE

Project Title
Illoura Place
28 Elizabeth Street, Liverpool, NSW 2170, Australia

Drawing Title
Siteworks
Site Plan

Scale: 1:250 @A1, 50%@A3
Status: **Development Application**
Project No.: **20089**
Dwg No.: **DA-010-011**
Drawn by: **SE**
Rev: **S1**
North

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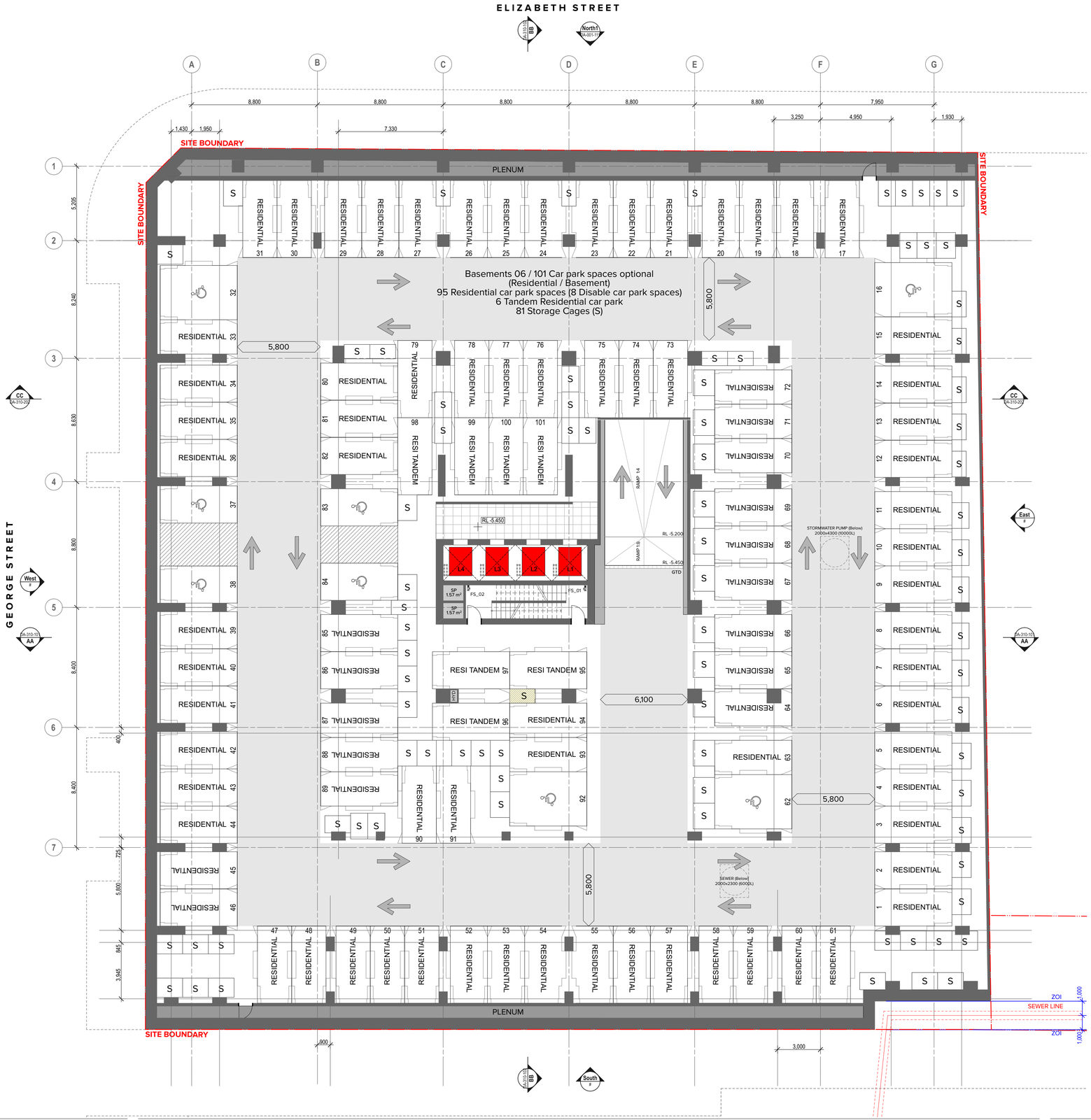

GENERAL ARRANGEMENT
BASEMENT PLANS LEGEND

NOTE: WHERE NOMINATED ON DRAWINGS OR SCHEDULES A NUMERICAL SUFFIX INDICATES MULTIPLE TYPES I.E. BAL1=BALUSTRADE TYPE 1, ETC.

CPE	Carpark Exhaust
CPSA	Carpark Supply Air
FS	Fire Stair
GEN	Generator
GTD	Grated Drain
HYD	Hydraulic Services
L	Lift
RL	Relative Level to AHD
S	Storage
SP	Stair Pressurisation
ZOI	Zone of Influence

CARPARK SPACES

- Residential
- Residential Visitors
- Retail
- Retail Visitors
- Commercial
- Commercial Visitors
- Disable Carpark Spaces
- MBK Motorbike Park Spaces
- BKR Bicycle Park Spaces

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ALTIS PROPERTY PARTNERS

ILLOURA PLACE

Rev	Date	Approved by	Revision Notes
S1	20.10.21	JMC	Issued for Development Application

Project Title
Illoura Place
28 Elizabeth Street, Liverpool, NSW 2170, Australia

Drawing Title
GA Plans
Basement 06

Scale	Project No.	Drawn by	North
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Status	Dwg No.	Rev	
Development Application	DA-110-001	S1	

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ELIZABETH STREET

GEORGE STREET

SITE BOUNDARY

PLENUM

PUMP PIT FOR CAR WASH

HYD

Basements 04-05 / 98 Car park spaces
(Residential / Basement)
92 Residential car park spaces (8 Disable car park spaces)
6 Tandem Residential car park
80 Storage Cages (S)

RESIDENTIAL

RESI TANDEM

RAMP 1:8

RAMP 1:4

RL 0.550

RL 0.300

RL 0.800

GTD

L1 L2 L3 L4

FS_01 FS_02

SP

6,100

5,800

ZOI

SEWER LINE

1,000

3,000

900

GENERAL ARRANGEMENT
BASEMENT PLANS LEGEND

NOTE: WHERE NOMINATED ON DRAWINGS OR SCHEDULES A NUMERICAL SUFFIX INDICATES MULTIPLE TYPES I.E. BAL1=BALUSTRADE TYPE 1, ETC.

CPE	Carpark Exhaust
CPSA	Carpark Supply Air
FS	Fire Stair
GEN	Generator
GTD	Grated Drain
HYD	Hydraulic Services
L	Lift
RL	Relative Level to AHD
S	Storage
SP	Stair Pressurisation
ZOI	Zone of Influence

CARPARK SPACES

- Residential
- Residential Visitors
- Retail
- Retail Visitors
- Commercial
- Commercial Visitors
- Disable Carpark Spaces

MBK	Motorbike Park Spaces
BKR	Bicycle Park Spaces

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ILLOURA PLACE

Rev	Date	Approved by	Revision Notes
S1	20.10.21	JMC	Issued for Development Application

Project Title
Illoura Place
28 Elizabeth Street, Liverpool, NSW 2170, Australia

Drawing Title
GA Plans
Basement 04-05

Scale	Project No.	Drawn by	North
1:150 @A1, 50%@A3	20089	JC	
Status	Dwg No.	Rev	
Development Application	DA-110-002	S1	

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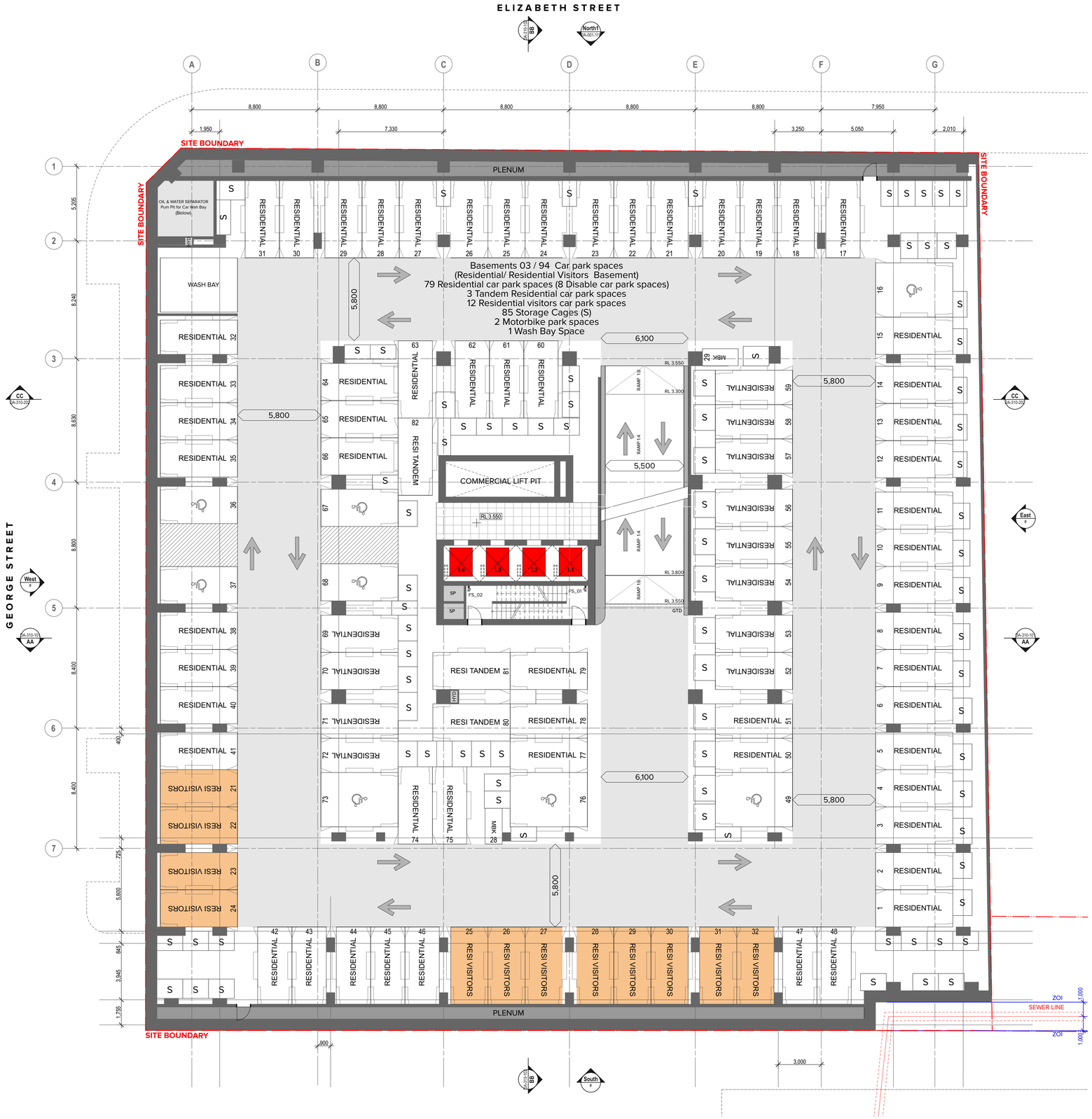

GENERAL ARRANGEMENT BASEMENT PLANS LEGEND

NOTE: WHERE NOMINATED ON DRAWINGS OR SCHEDULES A NUMERICAL SUFFIX INDICATES MULTIPLE TYPES I.E. BAL1=BALUSTRADE TYPE 1, ETC.

CPE	Carpark Exhaust
CPSA	Carpark Supply Air
FS	Fire Stair
GEN	Generator
GTD	Grated Drain
HYD	Hydraulic Services
L	Lift
RL	Relative Level to AHD
S	Storage
SP	Stair Pressurisation
ZOI	Zone of Influence

CARPARK SPACES

- Residential
- Residential Visitors
- Retail
- Retail Visitors
- Commercial
- Commercial Visitors
- Disable Carpark Spaces
- MBK Motorbike Park Spaces
- BKR Bicycle Park Spaces

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ILLOURA PLACE

Rev	Date	Approved by	Revision Notes
S1	20.10.21	JMC	Issued for Development Application

Project Title
Illoura Place
28 Elizabeth Street, Liverpool, NSW 2170, Australia

Drawing Title
GA Plans
Basement 03

Scale	Project No.	Drawn by	North
1:150 @A1, 50%@A3	20089	JC	
Status	Dwg No.	Rev	
Development Application	DA-110-003	S1	

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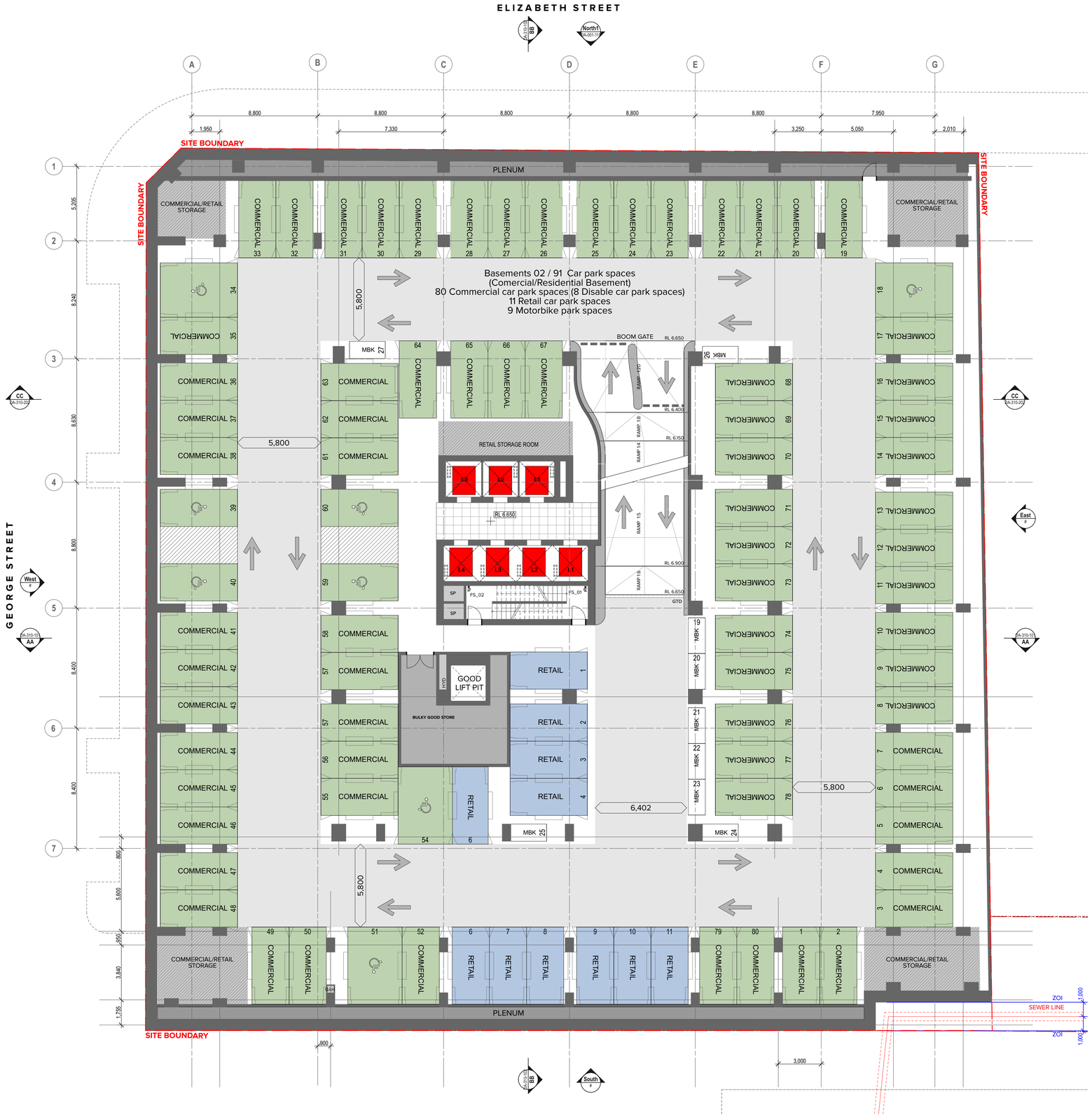

GENERAL ARRANGEMENT
BASEMENT PLANS LEGEND

NOTE: WHERE NOMINATED ON DRAWINGS OR SCHEDULES A NUMERICAL SUFFIX INDICATES MULTIPLE TYPES I.E. BAL1=BALUSTRADE TYPE 1, ETC.

CPE	Carpark Exhaust
CPSA	Carpark Supply Air
FS	Fire Stair
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CARPARK SPACES

- Residential
- Residential Visitors
- Retail
- Retail Visitors
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- Commercial Visitors
- Disable Carpark Spaces

MBK	Motorbike Park Spaces
BKR	Bicycle Park Spaces

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ILLOURA PLACE

Rev	Date	Approved by	Revision Notes
S1	20.10.21	JMC	Issued for Development Application

Project Title
Illoura Place
28 Elizabeth Street, Liverpool, NSW 2170, Australia

Drawing Title
GA Plans
Basement 02

Scale	Project No.	Drawn by	North
1:150 @A1, 50%@A3	20089	JC	
Status	Dwg No.	Rev	
Development Application	DA-110-004	S1	

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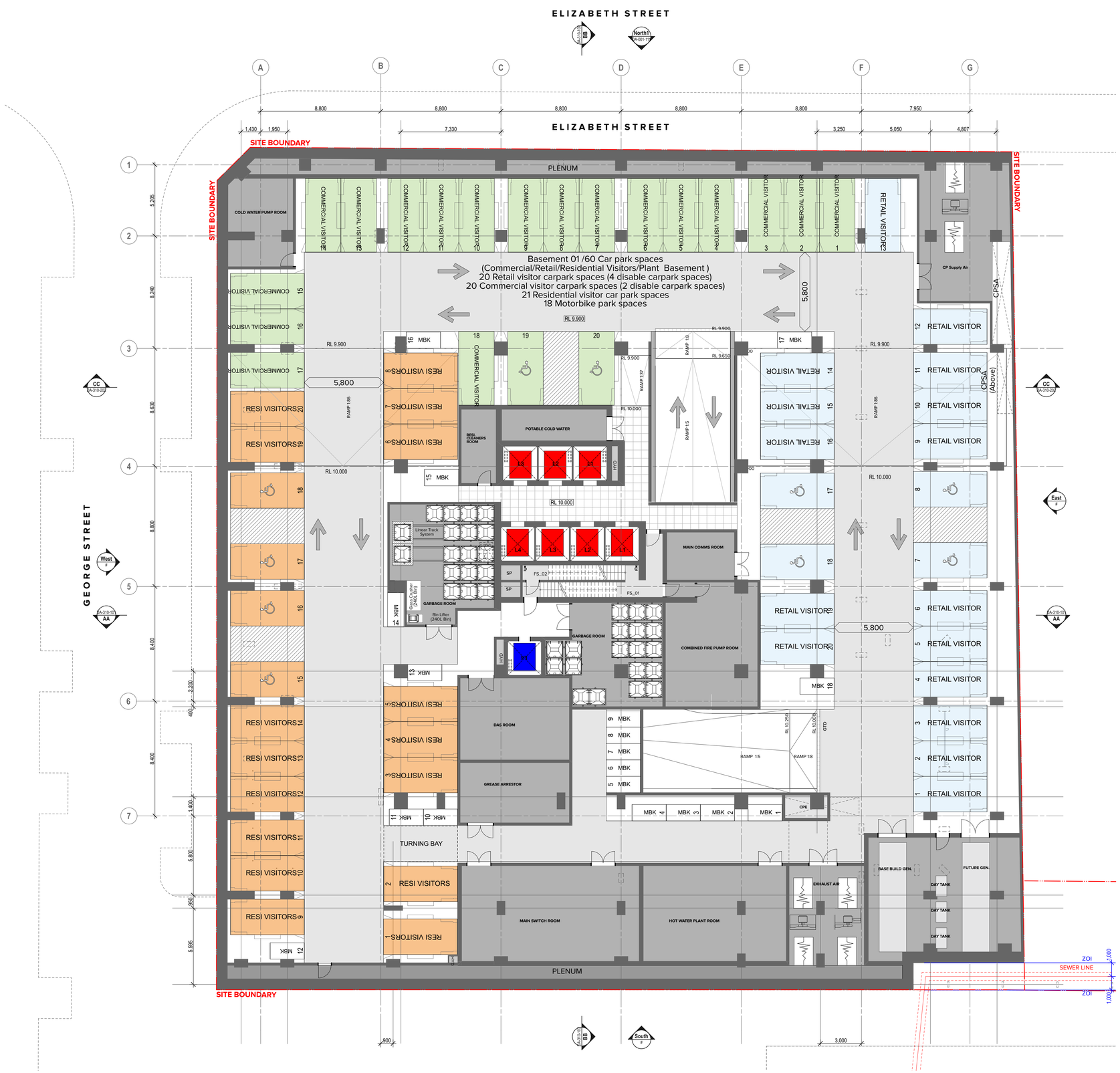

GENERAL ARRANGEMENT
BASEMENT PLANS LEGEND

NOTE: WHERE NOMINATED ON DRAWINGS OR SCHEDULES A NUMERICAL SUFFIX INDICATES MULTIPLE TYPES I.E. BAL1=BALUSTRADE TYPE 1, ETC.

CPE	Carpark Exhaust
CPSA	Carpark Supply Air
FS	Fire Stair
GEN	Generator
GTD	Grated Drain
HYD	Hydraulic Services
L	Lift
RL	Relative Level to AHD
S	Storage
SP	Stair Pressurisation
ZOI	Zone of Influence

CARPARK SPACES

- Residential
- Residential Visitors
- Retail
- Retail Visitors
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- Commercial Visitors
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- BKR Bicycle Park Spaces

NOTES

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14/60 Castlereagh Street,
Sydney, NSW, 2000

ALTIS PROPERTY PARTNERS

ILLOURA PLACE

Rev	Date	Approved by	Revision Notes
S1	20.10.21	JMC	Issued for Development Application

Project Title
Illoura Place
28 Elizabeth Street, Liverpool, NSW 2170, Australia

Drawing Title
GA Plans
Basement 01

Scale: 1:150 @A1, 50%@A3
Project No.: 20089
Drawn by: JC
Status: Development Application
Dwg No.: DA-110-005
Rev: S1

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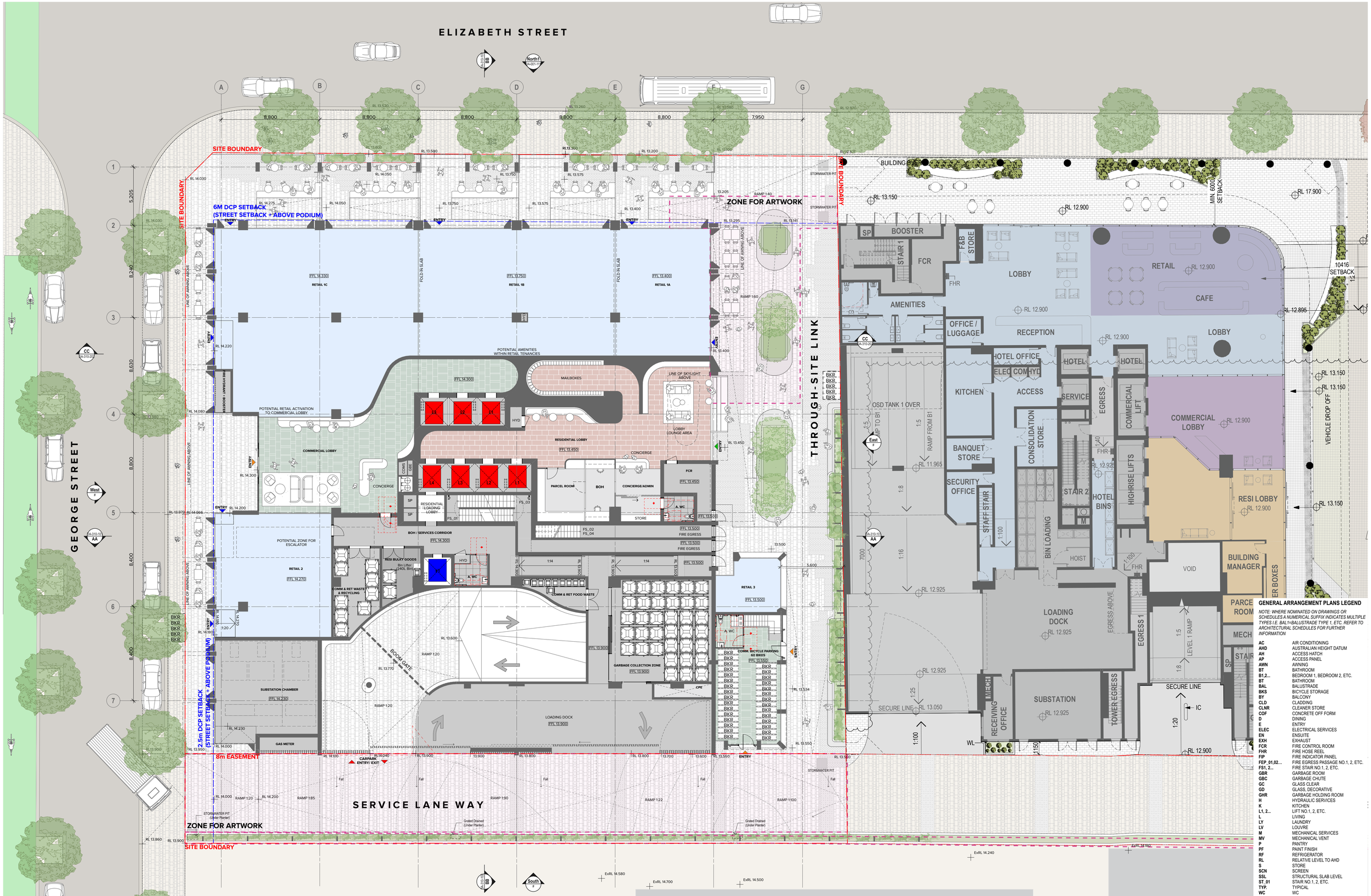

GENERAL ARRANGEMENT PLANS LEGEND

NOTE: WHERE NOMINATED ON DRAWINGS OR SCHEDULES A NUMERICAL SUFFIX INDICATES MULTIPLE TYPES I.E. BAL1=BALUSTRADE TYPE 1, ETC. REFER TO ARCHITECTURAL SCHEDULES FOR FURTHER INFORMATION

AC	AIR CONDITIONING
AHD	AUSTRALIAN HEIGHT DATUM
AH	ACCESS HATCH
AP	ACCESS PANEL
AWN	AWNING
BT	BATHROOM
B1,2...	BEDROOM 1, BEDROOM 2, ETC.
BT	BATHROOM
BAL	BALUSTRADE
BKS	BICYCLE STORAGE
BY	BALCONY
CLD	CLADDING
CLNR	CLEANER STORE
COF	CONCRETE OFF FORM
D	DINING
E	ENTRY
ELEC	ELECTRICAL SERVICES
EN	ENSUITE
EXH	EXHAUST
FCR	FIRE CONTROL ROOM
FHR	FIRE HOSE REEL
FIP	FIRE INDICATOR PANEL
FEP_01,02...	FIRE EGRESS PASSAGE NO.1, 2, ETC.
FS1, 2...	FIRE STAIR NO.1, 2, ETC.
GBR	GARBAGE ROOM
GBC	GARBAGE CHUTE
GC	GLASS CLEAR
GD	GLASS, DECORATIVE
GHR	GARBAGE HOLDING ROOM
H	HYDRAULIC SERVICES
K	KITCHEN
L1, 2...	LIFT NO.1, 2, ETC.
L	LIVING
LY	LAUNDRY
LV	LOUVRE
M	MECHANICAL SERVICES
MV	MECHANICAL VENT
P	PANTRY
PF	PAINT FINISH
RF	REFRIGERATOR
RL	RELATIVE LEVEL TO AHD
S	STORE
SCN	SCREEN
SSL	STRUCTURAL SLAB LEVEL
ST_01	STAIR NO.1, 2, ETC.
TYP.	TYPICAL
WC	WC

NOTES

CLIENT

Altis Bulky Retail Pty Ltd as trustee for Altis ARET Sub Trust 20
14/60 Castlereagh Street,
Sydney, NSW, 2000

ALTIS PROPERTY PARTNERS

LEGEND:

- RETAIL TENANCY ENTRY
- RESIDENTIAL LOBBY ENTRY
- COMMERCIAL LOBBY / EOT FACILITY ENTRY
- CARPARK ENTRY / EXIT

ILLOURA PLACE

Rev	Date	Approved by	Revision Notes
S1	20.10.21	JMC	Issued for Development Application

Project Title
Illoura Place
28 Elizabeth Street, Liverpool, NSW 2170, Australia

Drawing Title
GA Plans
Ground Level

Scale	Project No.	Drawn by	North
1:150 @A1, 50%@A3	20089	AP	
Status	Dwg No.	Rev	
Development Application	DA-110-009	S1	

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CLIENT
Altis Bulky Retail Pty Ltd as trustee for Altis ARET Sub Trust 20
14/60 Castlereagh Street,
Sydney, NSW, 2000

ALTIS PROPERTY PARTNERS

ILLOURA PLACE

Rev	Date	Approved by	Revision Notes
S1	20.10.21	JMC	Issued for Development Application

Project Title
Illoura Place
28 Elizabeth Street, Liverpool, NSW 2170, Australia

Drawing Title
GA Sections
Section AA

Scale **1:200 @A1, 50%@A3**
Status **Development Application**
Project No. **20089**
Dwg No. **DA-310-101**
Drawn by **JL/JE**
Rev **S1**
North

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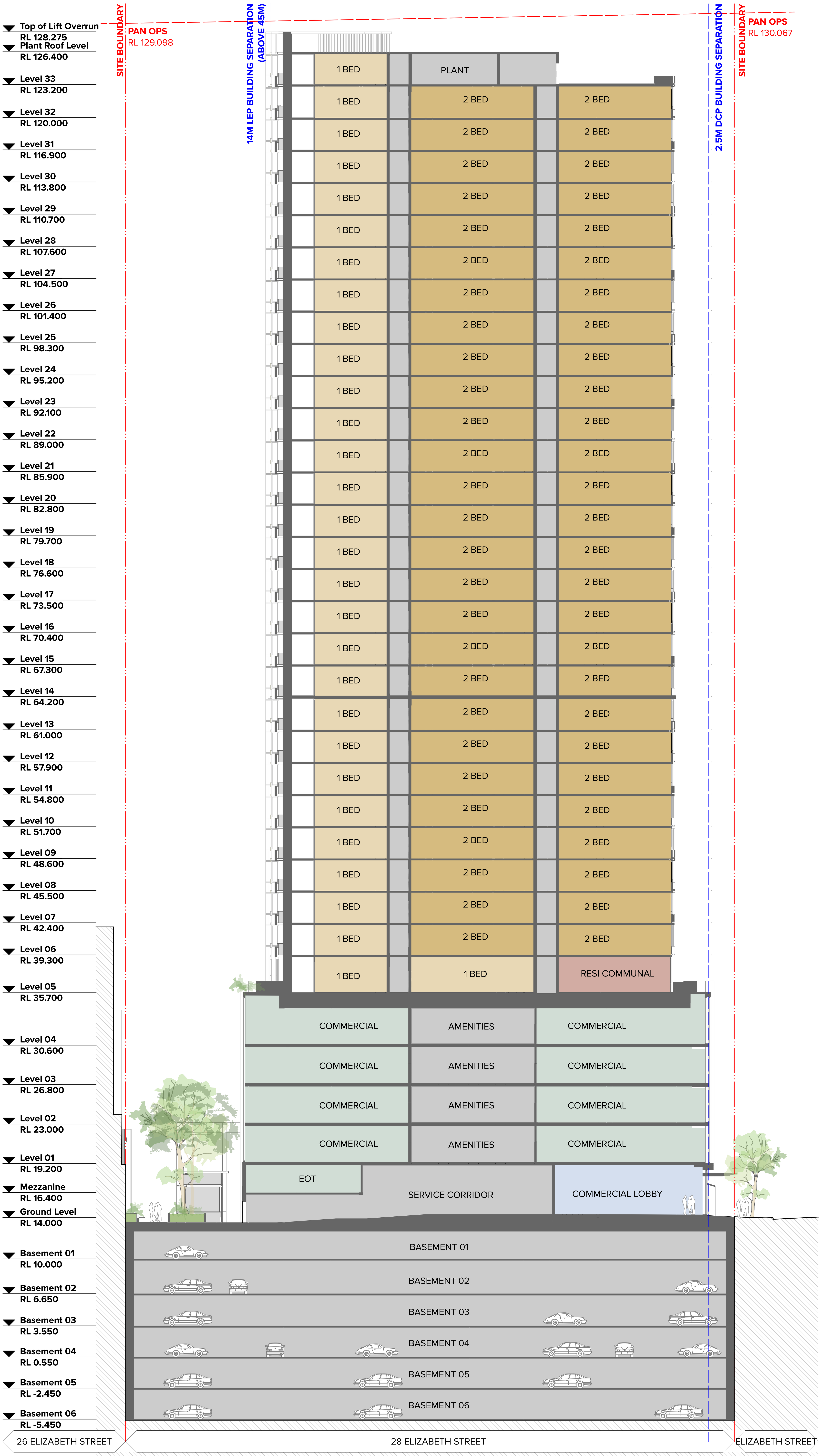

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DLCS Quality Endorsed Company - ISO 9001:2015, Registration Number 30476
Nominated Architect: Nicholas Turner 6695 ABN 86 064 994 911

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14/60 Castlereagh Street,
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ILLOURA PLACE

Rev	Date	Approved by	Revision Notes
S1	20.10.21	JMC	Issued for Development Application

Project Title
Illoura Place
28 Elizabeth Street, Liverpool, NSW 2170, Australia

Drawing Title
GA Sections
Section BB

Scale: **1:200 @A1, 50%@A3**
Status: **Development Application**
Project No.: **20089**
Dwg No.: **DA-310-102**
Rev: **S1**
Drawn by: **JL/JE**
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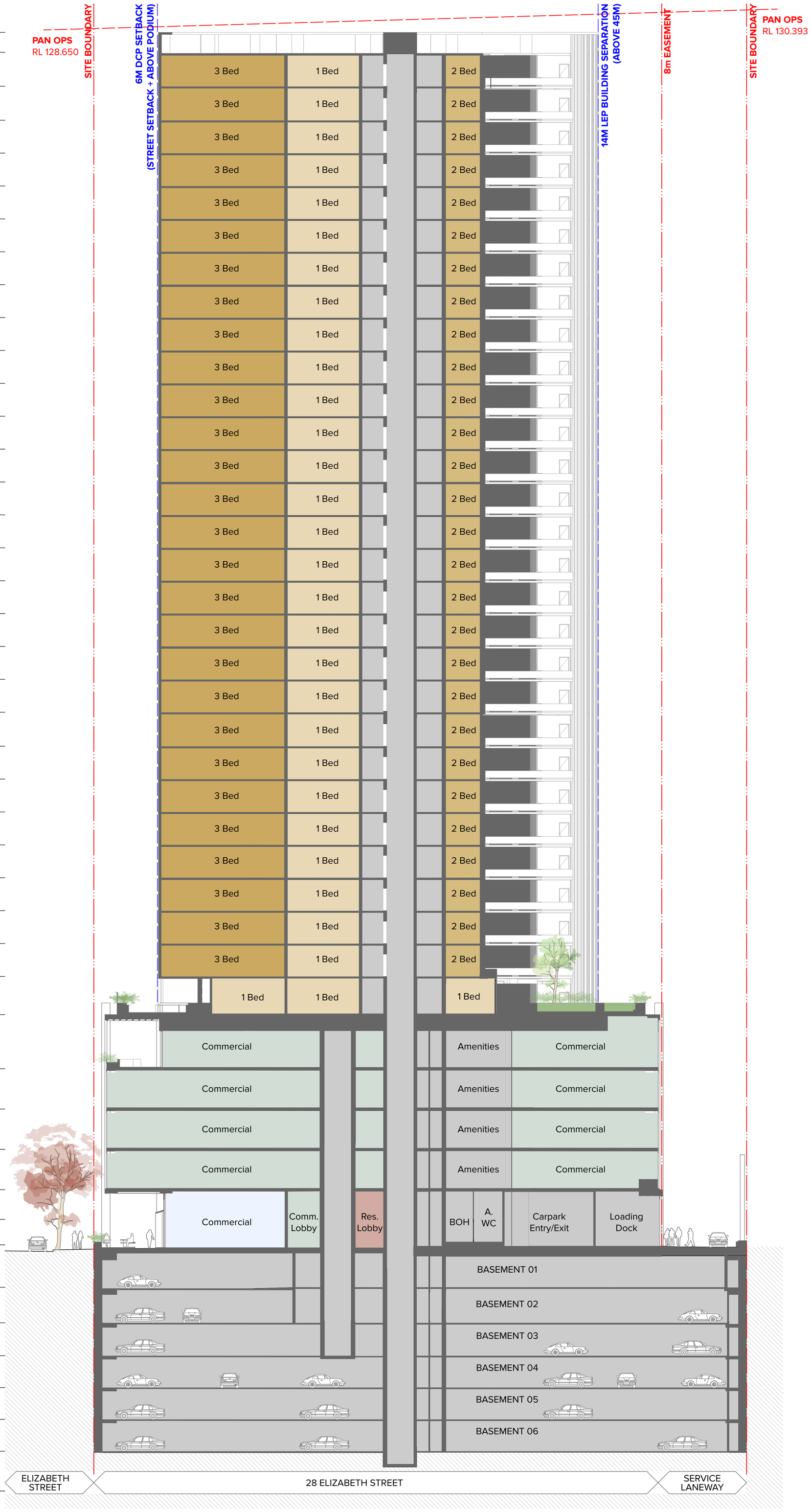
- Top of Lift Overrun — RL 128.275
- Plant Roof Level — RL 126.400
- Level 33 — RL 123.200
- Level 32 — RL 120.000
- Level 31 — RL 116.900
- Level 30 — RL 113.800
- Level 29 — RL 110.700
- Level 28 — RL 107.600
- Level 27 — RL 104.500
- Level 26 — RL 101.400
- Level 25 — RL 98.300
- Level 24 — RL 95.200
- Level 23 — RL 92.100
- Level 22 — RL 89.000
- Level 21 — RL 85.900
- Level 20 — RL 82.800
- Level 19 — RL 79.700
- Level 18 — RL 76.600
- Level 17 — RL 73.500
- Level 16 — RL 70.400
- Level 15 — RL 67.300
- Level 14 — RL 64.200
- Level 13 — RL 61.000
- Level 12 — RL 57.900
- Level 11 — RL 54.800
- Level 10 — RL 51.700
- Level 09 — RL 48.600
- Level 08 — RL 45.500
- Level 07 — RL 42.400
- Level 06 — RL 39.300
- Level 05 — RL 35.700
- Level 04 — RL 30.600
- Level 03 — RL 26.800
- Level 02 — RL 23.000
- Level 01 — RL 19.200
- Mezzanine — RL 16.400
- Ground Level — RL 14.000
- Basement 01 — RL 10.000
- Basement 02 — RL 6.650
- Basement 03 — RL 3.550
- Basement 04 — RL 0.550
- Basement 05 — RL -2.450
- Basement 06 — RL -5.450



Appendix C – Previous Results Tables

Table 1 - Soil Laboratory Results

				Heavy Metals										PAHs					BTEX						TRH								
Batch Number	**Sample Date**	**Sample ID_Sample Depth**	**Soil Type**	**As**	**Cd**	**Cr**	**Cu**	**Pb**	**TCLP (Pb) mg/kg**	**Hg**	**Ni**	**TCLP (Ni) mg/kg**	**Zn**	**Carcinogenic PAHs (as B(a)P TEQ)**	**Benzo(a)pyrene**	**TCLP (B(a)P) mg/kg**	**Total PAH**	**Naphthalene**	**Benzene**	**Toluene**	**Ethylbenzene**	**Total Xylenes**	**F1**	**F2**	**F3**	**F4**	**C_6-C_9**	**C_{10}-C_{36}**	**Total OCPs**	**Total OPPs**	**Total PCBs**	**Asbestos detected (yes/no)**	**Fibre Type**
Detailed Site Investigation (EI, 2020)																																	
SE213398	9/11/2020	BH201M_0.5-0.6	Fill	8	<0.3	17.0	13	16	N.A.	0.12	4.3	N.A.	17	<0.3	0.10	N.A.	1.30	<0.1	<0.1	<0.1	<0.1	<0.3	<25	<25	<90	<120	<20	<110	<1	<1.7	<1	No	-
		BH201M_1.2-1.3	Natural	8	<0.3	11.0	12	11	N.A.	<0.05	2.7	N.A.	9	<0.3	<0.1	N.A.	<0.8	<0.1	<0.1	<0.1	<0.1	<0.3	<25	<25	<90	<120	<20	<110	N.A.	N.A.	N.A.	N.A.	-
		BH202M_0.4-0.5	Fill	2	<0.3	2.5	2	8	N.A.	<0.05	1.0	N.A.	16	<0.3	<0.1	N.A.	<0.8	<0.1	<0.1	<0.1	<0.1	<0.3	<25	<25	<90	<120	<20	<110	<1	<1.7	<1	No	-
		BH202M_2.4-2.5	Fill	N.A.	N.A.	N.A.	N.A.	3	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	<0.1	<0.1	<0.1	<0.1	<0.3	<25	<25	<90	<120	<20	<110	N.A.	N.A.	N.A.	N.A.	-
		BH202M_3.9-4.0	Natural	<1	<0.3	0.7	7	4	N.A.	<0.05	0.9	N.A.	3	<0.3	<0.1	N.A.	<0.8	<0.1	<0.1	<0.1	<0.1	<0.3	<25	<25	<90	<120	<20	<110	N.A.	N.A.	N.A.	N.A.	-
		BH203_0.1-0.2	Fill	7	<0.3	17.0	30	160	N.A.	0.70	8.0	N.A.	250	0.40	0.20	N.A.	3.00	<0.1	<0.1	<0.1	<0.1	<0.3	<25	<25	<90	<120	<20	<110	<1	<1.7	<1	No	-
		BH203_0.6-0.7	Natural	4	<0.3	9.6	8	10	N.A.	<0.05	4.6	N.A.	7	<0.3	<0.1	N.A.	<0.8	<0.1	<0.1	<0.1	<0.1	<0.3	<25	<25	<90	<120	<20	<110	N.A.	N.A.	N.A.	N.A.	-
		BH204_0.2-0.3	Fill	6	<0.3	12.0	15	75	N.A.	0.31	6.3	N.A.	84	<0.3	<0.1	N.A.	1.10	<0.1	<0.1	<0.1	<0.1	<0.3	<25	<25	<90	<120	<20	<110	<1	<1.7	<1	No	-
		BH205M_0.2-0.3	Fill	7	<0.3	17.0	6	17	N.A.	<0.05	3.2	N.A.	12	<0.3	<0.1	N.A.	<0.8	<0.1	<0.1	<0.1	<0.1	<0.3	<25	<25	<90	<120	<20	<110	<1	<1.7	<1	No	-
		BH205M_1.3-1.4	Natural	9	<0.3	15.0	9	12	N.A.	<0.05	1.6	N.A.	11	<0.3	<0.1	N.A.	<0.8	<0.1	<0.1	<0.1	<0.1	<0.3	<25	<25	<90	<120	<20	<110	N.A.	N.A.	N.A.	N.A.	-
		BH206_0.2-0.3	Fill	6	<0.3	13.0	14	43	N.A.	0.20	8.3	N.A.	58	0.80	0.50	N.A.	6.30	<0.1	<0.1	<0.1	<0.1	<0.3	<25	<25	<90	<120	<20	<110	<1	<1.7	<1	No	-
		BH206_0.6-0.7	Natural	4	<0.3	11.0	7	9	N.A.	<0.05	3.4	N.A.	9	<0.3	<0.1	N.A.	<0.8	<0.1	<0.1	<0.1	<0.1	<0.3	<25	<25	<90	<120	<20	<110	N.A.	N.A.	N.A.	N.A.	-
		BH207_0.2-0.3	Fill	4	<0.3	8.7	10	49	N.A.	0.28	3.9	N.A.	42	<0.3	<0.1	N.A.	<0.8	<0.1	<0.1	<0.1	<0.1	<0.3	<25	<25	<90	<120	<20	<110	<1	<1.7	<1	**Yes**	Amosite & Chrysotile Asbestos found in approx 10x6x3mm cement sheet fragments
		BH207_0.9-1.0	Natural	7	<0.3	10.0	8	10	N.A.	<0.05	0.9	N.A.	7	<0.3	<0.1	N.A.	<0.8	<0.1	<0.1	<0.1	<0.1	<0.3	<25	<25	<90	<120	<20	<110	N.A.	N.A.	N.A.	N.A.	-
		BH208_0.2-0.3	Fill	6	<0.3	14.0	28	170	<0.02	0.29	7.7	N.A.	170	1.20	0.80	<0.0001	10.00	<0.1	<0.1	<0.1	<0.1	<0.3	<25	<25	<90	<120	<20	<110	<1	<1.7	<1	No	-
		BH209_0.2-0.3	Fill	8	<0.3	80.0	29	24	N.A.	0.05	87.0	0.047	94	<0.3	<0.1	N.A.	<0.8	<0.1	<0.1	<0.1	<0.1	<0.3	<25	<25	<90	<120	<20	<110	<1	<1.7	<1	**Yes**	Chrysotile Asbestos found in approx 10x5x3mm cement sheet fragment
		BH210_0.2-0.3	Fill	6	<0.3	14.0	35	180	0.08	0.32	8.1	N.A.	240	1.90	1.30	<0.0001	22.00	<0.1	<0.1	<0.1	<0.1	<0.3	<25	<25	**160**	<120	<20	**180**	<1	<1.7	<1	**Yes**	Chrysotile Asbestos found in approx 25x10x4mm cement sheet fragments
		BH211_0.2-0.3	Fill	4	<0.3	5.3	5	41	N.A.	0.10	3.1	N.A.	65	<0.3	<0.1	N.A.	<0.8	<0.1	<0.1	<0.1	<0.1	<0.3	<25	<25	<90	<120	<20	<110	<1	<1.7	<1	No	-
		BH211_0.8-0.9	Natural	4	<0.3	12.0	9	8	N.A.	<0.05	2.7	N.A.	11	<0.3	<0.1	N.A.	<0.8	<0.1	<0.1	<0.1	<0.1	<0.3	<25	<25	<90	<120	<20	<110	N.A.	N.A.	N.A.	N.A.	-
		BH212_0.2-0.3	Fill	5	<0.3	9.0	8	25	N.A.	0.05	4.5	N.A.	20	<0.3	<0.1	N.A.	<0.8	<0.1	<0.1	<0.1	<0.1	<0.3	<25	<25	<90	<120	<20	<110	<1	<1.7	<1	No	-
		QD1	Fill	4	<0.3	15.0	10	13	N.A.	<0.05	3.0	N.A.	11	N.A.	N.A.	N.A.	N.A.	<0.1	<0.1	<0.1	<0.1	<0.1	<0.3	<25	<25	<90	<120	<20	<110	N.A.	N.A.	N.A.	N.A.	-
Statistical Analysis																																	
Stats	Maximum Concentration (mg/kg)			9	<0.3	80	35	180	<0.02	0.70	87	0.047	250	1.90	1.30	<0.0001	22.0	<0.1	<0.1	<0.1	<0.1	<0.1	<0.3	<25	<25	**160**	<120	<20	**180**	<1	<1.7	<1	**Yes**	N.A.
	95% UCL			N.A.	N.A.	N.A.	N.A.	111.8	N.A.	N.A.	74.51	N.A.	124.8	N.A.	0.783	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
SILs																																	
HIL B - *Residential*				500	150	500 Cr(VI)	30,000	1,200		120	1200		60,000	4.00			400												600		1		
HIL D - *Commercial / Industrial*				3,000	900	3,600 Cr(VI)	240,000	1,500		730	6000		400,000	40			4000												3,600		7		
HSL A & HSL B - *Residential* Soil texture classification –Sand [1]				Source depths (0 m to <1 m. BGL)														3.00	0.5	160	55	40	45	110									
				Source depths (1 m to <2 m. BGL)														NL	0.5	220	NL	60	70	240									
				Source depths (2m to <4m. BGL)														NL	0.5	310	NL	95	110	440									
				Source depths (4 m+)														NL	0.5	540	NL	170	200	NL									
HSL D - *Commercial / Industrial* Soil texture classification –Sand [1]				Source depths (0 m to <1 m. BGL)														NL	3	NL	NL	230	260	NL									
				Source depths (1 m to <2 m. BGL)														NL	3	NL	NL	NL	370	NL									
				Source depths (2m to <4 m. BGL)														NL	3	NL	NL	NL	630	NL									
				Source depths (4 m+)														NL	3	NL	NL	NL	NL	NL									
Management Limits – *Residential, parkland and public open space* Coarse grained soil texture[1]																							700	1,000	3,500	10,000							
Asbestos contamination HSL – B Residential with minimal soil access Bonded ACM (%w/w)																															0.04% w/w	
Asbestos contamination HSL – D *Commercial / Industrial* Bonded ACM (%w/w)																															0.05% w/w	
Asbestos contamination HSL for Non Bonded / Friable Asbestos (%w/w)																															0.001% w/w	
Waste Classification Criteria																																	
NSW EPA 2014 [2] General Solid Waste				100	20	100		100		4	40				0.80	200		10	288	600	1,000						650	10,000	<50	If detected material is Special Waste - Asbestos Waste		
				5.0 / 500	1.0 / 100	5 / 1,900		5 / 1,500		0.2 / 50	2 / 1,050				0.04 / 10	NA / 200		0.5 / 18	14.4 / 518	30 / 1,080	50 / 1,800						NR / 650	NR / 10,000	NR / <50			
NSW EPA 2014 [3] Restricted Solid Waste				400	80	400		400		16	160.0				3.20	800		40	1,152	2,400	4,000						2,600	40,000	NR / <50			
				20 / 2,000	4 / 400	20 / 7,600		20 / 6,000		0.8 / 200	8 / 4,200				0.16 / 23	NA / 800		2 / 72	57.6 / 2,073	120 / 4,320	200 / 7,200						NA / 2,600	NA / 40,000	NR / <50			

Notes: All results are recorded in mg/kg (unless otherwise stated)

Exceeds adopted HIL/HSL criteria
Criteria Exceeded
Exceeds adopted NSW EPA Waste Criteria for General Solid Waste CT1
NSW EPA Waste Criteria met

- the sample was not analysed for the indicated parameter.
1 Coarse Grained soil texture values were applied, being the most conservative of the material types.
2 NSW EPA 2014 (Addendum October 2016) General Solid Waste Tresholds, in Waste Classification Guidelines, Table 1 (CT1) and Table 2 (TCLP1/SCC1)
3 NSW EPA 2014 (Addendum October 2016) General Solid Waste Tresholds, in Waste Classification Guidelines, Table 1 (CT2) and Table 2 (TCLP2/SCC2)
4 EIL derivation for Copper, Nickel and Zinc results are based on NEPC Ecological Investigation Level calculation spreadsheet with pH:5 Cation Exchange Capacity : 5 cmolc/kg, state: NSW and traffic volume: high.
5 CRC CARE 2017, Risk-based management and remediation guidance for benzo(a)pyrene, CRC CARE Technical Report no. 39, CRC for Contamination Assessment and Remediation of the Environment, Newcastle, Australia.
AMO Amosite
CRY Chrysotile
CRO Crocidolite
HIL B NEPC 1999 Amendment 2013 'HIL B' Health Based Investigation Levels applicable for residential exposure settings with minimal opportunities for soil access.
HIL D NEPC 1999 Amendment 2013 'HIL D' Health Based Investigation Levels applicable for commercial/industrial exposure settings.
HSL A & B NEPC 1999 Amendment 2013 'HSL A&B' Health Based Screening Levels based on vapour intrusion values applicable for low-medium density residential sites.
HSL D NEPC 1999 Amendment 2013 'HSL D' Health Based Screening Levels based on vapour intrusion values applicable for commercial / industrial sites.
F1 TRH C6-C10 less BTEX.
F2 TRH >C10-C16 less naphthalene.
F3 TRH >C16-C34.
F4 TRH >C34-C40.
N.A. Not Analysed
NL 'Not Limiting' - The contaminant cannot exceed the maximum allowable vapour risk due to its specific chemical solubility limit.
NR No Reference. i.e. No published criteria available

Table 2 - Groundwater Analytical Data **E24175.E02 - Liverpool**

Sample Identification	Date	Metals									PAHs								BTEX					TRHs				VOCs							Other	
		Al	As	Cd	Cr	Cu	Pb	Ni	Zn	Hg	Naphthalene	2-methylnaphthalene	1-methylnaphthalene	Acenaphthylene	Acenaphthene	Phenanthrene	Benzo(a)pyrene	Total PAH[7]	Benzene	Toluene	Ethylbenzene	o-xylene	m + p-xylene	F1	F2	F3	F4	Naphthalene	Carbon disulfide	Chloroform (THM)	Bromodichloromethane (THM)	MIBK (4-methyl-2-pentanone)	Total VOCs [7]	Total Phenols	pH
Detailed Site Investigation (EI, 2020)																																			
BH201M-1	17/11/2020	18	1	<0.1	<1	4	<1	7	17	<0.1	0.2	0.3	0.2	<0.1	<0.1	0.1	<0.1	<1	<0.5	<0.5	0.7	0.5	1	<50	<60	<500	<500	0.6	<2	2.1	<0.5	36	39	10	6.96
BH202M-1		17	1	<0.1	120	1	<1	5	51	<0.1	<0.1	<0.1	0.2	<0.1	0.9	0.1	<0.1	2	1.0	<0.5	<0.5	1.1	2	<50	<60	<500	<500	<0.5	2	<0.5	2.5	<5	27	<10	7.61
BH205M-1		10	3	0.1	<1	<1	<1	13	63	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.5	<0.5	<0.5	<0.5	<1	<50	<60	<500	<500	<0.5	<2	<0.5	<0.5	<5	<10	<10	6.59
BH200_GWQD1		N.A.	3	0.1	<1	<1	<1	13	54	<0.1	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	<0.5	<0.5	<0.5	<0.5	<1	<50	<60	<500	<500	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Statistical Analysis																																			
Maximum		18	3	0.1	120	4	<1	13	63	<0.1	0.2	0.3	0.2	<0.1	0.9	0.1	<0.1	2	1.0	<0.5	0.7	1.1	2	<50	<60	<500	<500	0.6	2.0	2.1	2.5	36	39	10	7.61
Minimum		10	1	<0.1	<1	<1	<1	5	17	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.5	<0.5	<0.5	<0.5	<1	<50	<60	<500	<500	<0.5	<2	<0.5	<0.5	<5	<10	10	6.59
GILs																																			
HSL D [1] *Commercial/Industrial*																			3	NL	NL	NL		NL	NL											
ANZG (2018)	**Marine Water [2]**			5.5	27.4 (CrIII) [4] 4.4 (CrVI)	1.3	4.4	70	15	0.4	70					0.6 [5]	0.1 [5]		700	180	5	350	275	50 [6]	60 [6]	500 [6]	500 [6]			370				400	7.0-8.5
	Fresh Water [2]	55	24 (As III) 13 (As V)	0.2	3.3 (CrIII) [4] 0.4 (CrVI)	1.4	3.4	11	8	0.6	16								950		80							20	370				320	6.5-8.5
NMHRC (2011) [3]	**Drinking Water [3a]**	2,000*	10	2	50 [4]	1,000 *	10	20	3,000*	1							0.01		1	25*	3*	20 *	20 *							250					6.5-8.5
	Recreational Water [3b]	2,000*	100	20	500 [4]	1,000 *	100	200	3,000*	10							0.1		10	25*	3*	20 *	20 *							2,500					

Notes:

All values are µg/L unless stated otherwise

F1 C6-C10 minus BTEX

F2 >C10-C16 minus naphthalene

F3 (>C16-C34)

F4 (>C34-C40)

NA = 'Not Analysed' i.e. the sample was not analysed.

PAH = Polycyclic Aromatic Hydrocarbons

TRH = Total Recoverable Hydrocarbons

[1] Based on NEPM (2013) Groundwater Health Screening Values for vapour intrusion - Table 1A(4) - Sand, for 4m+

[2] Groundwater Investigation Levels for fresh, marine, based on ANZG (2018) Australian and New Zealand Guidelines for Fresh and Marine Water Quality, Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia, August 2018

[3] Based on NHMRC (2011 - update August 2018 v.3.5) Drinking Water Guidelines. The lowest of the Health Guideline or the Aesthetic Guideline has been chosen as the assessment criteria. Aesthetic based criteria have been indicated by *

[3a] The lowest of the Health Guideline or the Aesthetic Guideline has been chosen as the assessment criteria. Aesthetic based criteria have been indicated by *

[3b] The lowest of the Health Guideline x10 or the Aesthetic Guideline has been chosen as the assessment criteria. Aesthetic based criteria have been indicated by *

[4] If site history indicates potential for presence of Cr(VI) - then use 4.4 (marine), 0.4 (freshwater), 50 (drinking water NHRMC), 500 (rec water NHRMC)

[5] To account for the bioaccumulating nature of this toxicant, the 99% species protection level DGV is used for slightly to moderately disturbed systems.

[6] In lack of a criteria the laboratory PQL has been used (DEC, 2007).

[7] Where value is <PQL, it indicates all other tested analytes were below PQL.

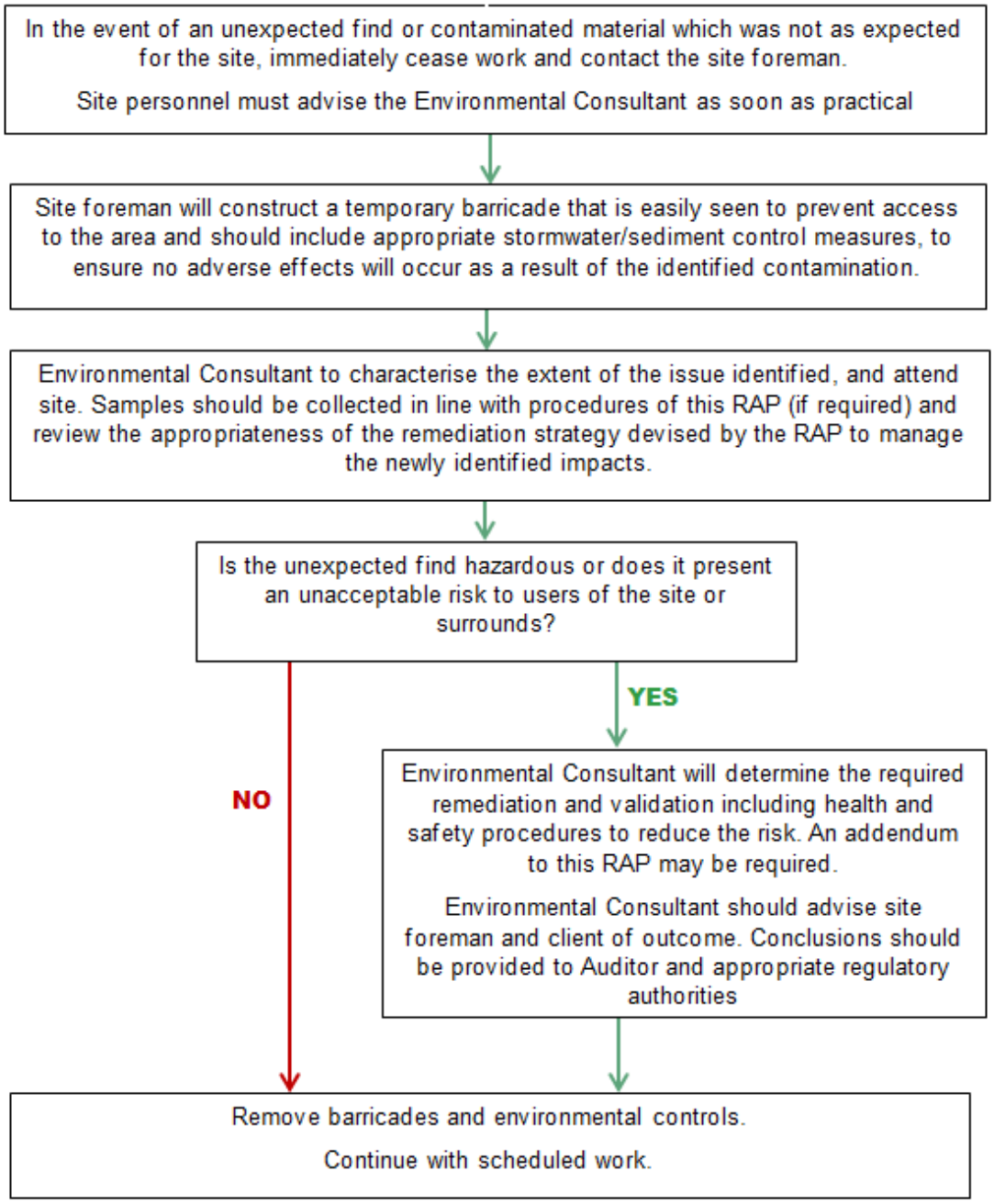
Highlighted indicates ecological criteria exceeded

Highlighted indicates recreational water criteria exceeded

Highlighted indicates criteria exceeded

Appendix D – Unexpected Finds Protocol

Unexpected Finds Protocol



Asbestos Assessment Procedure

In addition to the Unexpected Finds Protocol, should asbestos be identified in soil during any walkover inspection or site-wide soil investigation / validation, further assessment for asbestos should be carried out prior to disturbance of the affected soils. The assessment procedure is described below:

1. Follow the Unexpected Finds Protocol and notify the appointed environmental consultant.
2. The appointed consultant to design an investigation program to delineate asbestos impacts in soil in accordance with relevant, EPA endorsed, asbestos assessment guidelines.

3. An Asbestos Management Plan (AMP) to be prepared by the appointed remediation contractor for the remedial works program.
4. Areas impacted by asbestos should be segregated from the remainder of the area and marked by prominent and durable features that withstand weathering (e.g. star picket and danger tape).
5. Undertake separate waste classification assessments for areas impacted by asbestos.
6. Soils from asbestos-impacted areas will need to be excavated and disposed separately from the remainder of the site. Should temporary stockpiling be required, the material handling and management requirements that are specified by the environmental consultant should be followed.
7. Validate underlying materials after complete removal of asbestos-impacted soils. Validation samples should be analysed for asbestos using the gravimetric method, as endorsed by the NSW EPA.