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DEICORP PROJECTS (TALLAWONG STATION) PTY LTD

Remediation Action Plan

Tallawong Station Precinct South, Rouse Hill
NSW

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Executive Summary

Based on the information available from previous investigations at the site, this RAP has been prepared to inform the remediation works at Tallawong Station Precinct South, Rouse Hill NSW.

The preferred approach involves excavation and offsite disposal of impacted fill materials. Groundwater requires additional assessment to confirm site suitability. It is envisaged that the remediation works will be implemented in stages, as follows:

Task	Timeframe	Description of Work
Preliminaries/Site Establishment	Weeks 1-3	Development of pre-work plans (construction environmental management plan, occupational health and safety plan, hazardous material survey) 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.
Additional Assessment	Weeks 3-5	The additional investigation includes an assessment of groundwater conditions in the vicinity of BH2M.
Waste Management	Weeks 5-6	Provide a method for management of waste classification of soil for offsite disposal or reuse (in case of VENM and ENM)
Excavation	Weeks 6- 7	Excavation of the identified asbestos hotspots
Validation	Weeks 7 - 13	Implement the sampling and validation plan to detailing the remedial works and provide conclusions on site suitability.

Material management procedures are provided to characterise soil for offsite disposal, and contingency measures are provided for any unexpected finds. In summary, EI considers that the site can be made suitable for the proposed mixed commercial and residential land use through the implementation of the works described in this RAP.

1. INTRODUCTION

Deicorp Projects (Tallawong Station) Pty Ltd (the client) engaged EI Australia (EI) to prepare a Remediation Action Plan (RAP) for the property located at Tallawong Station Precinct South, Rouse Hill NSW ('the site'). The purpose of this Remediation Action Plan is to guide remediation and assist the client in making site suitable for the proposed mixed commercial/residential land use. The site (see **Figure A.1**) is located within the local Government Area of the Blacktown City Council, and is identified as Lots 293 and 294 in DP1213279.

EI understands that redevelopment of the site is a State Significant Development (SSD), and that a Secretary's Environment Assessment Requirements (SEARs) has been prepared for the site. This report has been prepared to support the SEARs for the development of the site for mixed commercial and residential use and to enable the proponent to meet their obligations under the *Contaminated Land Management Act 1997* (CLM Act), for the assessment and management of contaminated soil and/or groundwater.

Previous investigations completed at the site included:

- ADE Consulting Group (2018) *Phase 1 Preliminary Site Investigation, Cudgegong Road Station Precinct South, Rouse Hill, NSW* Ref: STC-1023-13390/PSI1/v3f, dated: 7 March 2018.
- *EI (2020) Detailed Site Investigation, Tallawong Station South, Rouse Hill NSW*. Project No. E24445.06_Rev0, dated 13 March 2020.

Based on these investigations, some localised asbestos impacted soils and TRH impacted groundwater was identified. As a result, this RAP has been developed to close data gaps/uncertainties and guide remediation of the site to allow the site to be made suitable for the intended mixed commercial and residential development.

1.1 Proposed Development

To assist with the preparation of this report, the Client supplied EI with the following documents regarding the proposed development of the site:

- Turner Architects, Tallawong Station Precinct South, 1-15 & 2-12 Conferta Avenue Rouse Hill NSW 2155 Australia, Project No. 18095 dated 28/3/20.

Based on the above drawings, EI understands that the proposed development involves the construction of 16 mixed-use apartment towers overlying a three-level basement car park (as illustrated in the proposed development plans attached in **Appendix C**).

EI notes that the most recent plans provided have been updated from the plans that were originally considered during the DSI (EI, 2020). The changes include:

- Details of basement construction; and
- Details of commercial ground floor use.

1.2 Remedial Objective

The main objective of the remediation action plan (RAP) is to inform and guide the site remediation process by providing detailed procedures to enable the works to be undertaken in a

safe and acceptable manner which complies with relevant guidelines including SEPP 55 and the SEARs (Item 16 Section 8.16) while preventing adverse effects on human and environmental receptors. The remedial works are to be undertaken to enable the site to be rendered suitable for the proposed mixed use development.

1.3 Remedial Scope

The remedial objective will be achieved by:

- Outlining the legislative framework and provision of guidance on approvals and licences required for the remediation works;
- Identifying stakeholders and their responsibilities required to complete the remediation;
- Provide a summary of previous investigations and available data, the site setting and contamination status which were relied on for development of the RAP;
- Definition of remediation goals and acceptance criteria;
- Review remediation technologies and evaluation of the most appropriate (or combination of) for the site, including methods and procedures to ensure works are completed in accordance with relevant environmental legislation (e.g. SEPP 55);
- Provision of information to assist the contractor in their preparation of a Work, Health and Safety Plan and other site management/planning documents; and
- Provision of a preliminary Sampling and Analytical Quality Plan (SAQP) for site validation and to evaluate the effectiveness of the remedial works.

1.4 Regulatory Framework

The following regulatory framework and guidelines were considered during the preparation of this report:

- ANZECC & ARMCANZ (2000) Australian and New Zealand Guidelines for Fresh and Marine Water Quality;
- DEC (2007) Guidelines for the Assessment and Management of Groundwater Contamination;
- DEC (2017) Contaminated Land Management: Guidelines for the NSW Site Auditor Scheme (3nd Edition);
- EPA (1995) Sampling Design Guidelines;
- NEPC (2013) Schedule B(1) Guideline on Investigation Levels for Soil and Groundwater;
- NEPC (2013) Schedule B(2) Guideline on Site Characterisation;
- *Contaminated Land Management Act* (1997);
- *State Environment Planning Policy* – Remediation of Land (SEPP 55);
- *State Environmental Planning Policy* (Sydney Region Growth Centres) 2006
- OEH (2011) Guidelines for Consultants Reporting on Contaminated Sites; and
- WADOH (2009) Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia.

The report also considered the:

- Concept State Significant Development Application Sydney Metro Northwest Tallawong Station Precinct South SSD 9063 Volume 1 (July 2018)

1.5 Deviations from this RAP

While it may be possible to vary the sequence and/or details of the actual site remediation and validation works to meet site constraints, a qualified Environmental Scientist performing the roles of Environmental Management Coordinator and Remediation Supervisor will be appointed to the project to ensure that:

- Critical stages of the site remediation/validation process (including, but not limited to, proper site induction of site 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 required data gap closure and validation sampling), are appropriately supervised, implemented and documented, with the relevant data collected for environmental reporting purposes; and
- Any deviations from the works specified in this RAP are properly documented and approved, as required under the DEC (2017) *Contaminated Land Management: Guidelines for the NSW Site Auditor Scheme* (3nd Edition).

Performing remedial works without the presence of a qualified environmental engineer/scientist when necessary may lead to project delays and extra costs due to additional environmental investigation requirements imposed by a Qualified Independent Consultant or the appointed Site Auditor (*if required*), to confirm the environmental status of the site.

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

2. SITE DESCRIPTION

2.1 Property Identification, Location and Physical Setting

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

Table 2-1 Site Identification, Location and Zoning

Attribute	Description
Street Address	1 – 15 & 2 – 12 Conferta Avenue, Rouse Hill NSW 2155
Location Description	Approx. 34 km north west of Sydney CBD, the site was bisected by Conferta Avenue and bound by Themeda Avenue (north), Cudegong Road (east), Schofield Road (south) and open aired car park (west). North Eastern corner of site: GDA2020-MGA56 Easting: 306009.624, Northing: 6270038.315 (Source: http://maps.six.nsw.gov.au).
Site Area	Approx. 4.33 ha (43, 300 m^2) Source: http://maps.six.nsw.gov.au)
Lot and Deposited Plan (DP)	Lot 293 and 294 in DP1213279
State Survey Marks	Seven State Survey (SS) marks were situated in close proximity to the site: ▪ SS191467 ▪ SS176099 ▪ SS176097 ▪ SS176090 ▪ SS191464 ▪ SS164963D ▪ SS13866D All markers were located off the southern boundary of site on Schofield road and Amarco Crescent (Source: http://maps.six.nsw.gov.au).
Local Government Authority	Blacktown City Council
Parish	Gidley
County	Cumberland
Current Zoning	North of Conferta Avenue: B4 – Mixed Use South of Conferta Avenue: R3 – Medium Density Residential South east corner of site: SP2 – Infrastructure Source: State Environmental Planning Policy (Sydney Regional Growth Centres) Amendment (Area 20 Precinct), 2015

2.2 Regional Setting

Local topography, geology, soil landscape and hydrogeological information are summarised in **Table 2-2**.

Table 2-2 Regional Setting Information

Attribute	Description
Ground Topography	The site sloped to the south east, with the northern portion of site appearing to have been substantially filled. The northwest portion of the site had a level of approx. 58mAHD with the lowest elevation in the south east corner having an elevation of 50 mAHD (ADE, 2018)
Site Drainage	Site drainage is likely to consist of mostly surface infiltration. Any run off would be expected to flow into the dam (in the case of the southern portion of the site) or to municipal stormwater pits on Schofields Road and Conferta Avenue and then flow to the nearest drainage line.
Regional Geology	With reference to the 1:100,000 scale Geological Series Sheet 9130 (Penrith), the site lies on the border of two members of the Wianamatta Group, being; Bringelly Shale (Rwb) and Ashfield Shale (Rwa). The two formations are separated by the Minchinbury Sandstone. Bringelly Shale (Rwb) consists of shale, carbonaceous claystone, laminite, fine to medium-grained lithic sandstone, rare coal and tuff. Minchinbury Sandstone (Rwm) Fine to medium grained quartz lithic sandstone. Ashfield Shale (Rwa) consists of dark grey to black claystone-siltstone and fine sandstone-siltstone laminite.
Soil Landscapes	The Soil Conservation Service of NSW Soil Landscapes of the Sydney 1:100,000 Sheet (Chapman and Murphy, 2002) indicates that the site overlies the Blacktown (bt) residual landscape, which is described as gently undulating rises on Wianamatta Group shales. Local relief to 30 m, slopes usually >5%. Broad rounded crests and ridges with gently inclined slopes. Cleared Eucalypt woodland and tall open-forest (dry schlerophyll forest). Soils are described as consisting of shallow to moderately deep (>100 cm) hardsetting mottled texture contrast soils, red and brown podzolic soils (Dr3.21, Dr3.31, Db2.11, Db2.21) on crests grading to yellow podzolic soils (Dy2.11, Dy3.11) on lower slopes and in drainage lines.
Acid Sulfate Soil Risk	The Blacktown LEP 2015 does not specify risk associated with acid sulfate soils. With reference to the Acid Sulfate Soil Risk Maps (1:25,000 scale; Murphy, 1997), the site was not present on any of the maps. EI conducted an acid sulfate soil assessment during works to investigate of ASS/PASS which indicated no ASS were present.
Likelihood & Depth of Filling	Based on observations during the intrusive investigations (EI, 2020), the maximum depth of fill was recorded at approximately 4.5 mBGL. Encountered fill was deeper in the northern portion of site. The southern portion of site had shallower fill in general, with localised deeper pockets, such as in the former dam area.
Typical Soil Profile	A layer of anthropogenic filling overlying residual clays then weathered shale. Deeper fill was largely located on the northern portion of site, and in pockets on the southern portion of site, such as in the former retention pond.

Attribute	Description
Depth to Groundwater	The Standing Water Level (SWL) collected during the GME was reported between 1.44 and 6.80 mBGL (EI, 2020).
Nearest Surface Water Feature	Second Ponds Creek, located approximately 182m east of the site.
Anticipated Groundwater Flow Direction	Groundwater was inferred to flow towards the east towards Second Ponds Creek (EI, 2020).

3. SITE CHARACTERISATION

3.1 Previous Investigations

Two previous investigations have been conducted at the site, by *ADE* and *EI Australia* (EI). The following reports are summarised below in **Table 3-1**.

- ADE Consulting Group (2018) *Phase 1 Preliminary Site Investigation, Cudgegong Road Station Precinct South, Rouse Hill, NSW* Ref: STC-1023-13390/PSI1/v3f, dated: 7 March 2018.
- *EI (2020) Detailed Site Investigation, Tallawong Station South, Rouse Hill NSW*. Project No. E24445.06_Rev0, dated 13 March 2020.

Table 3-1 Summary of Previous Investigation Works and Findings

Assessment Details	Project Tasks and Findings
Preliminary Site Investigation (ADE, 2018)	
Background	The purpose of the ADE PSI report was to assess the environmental condition of the site and suitability for the proposed future land use. This was undertaken through: ▪ Review of the Site's history; and ▪ A site walkover and visual inspection The site walkover and visual inspection was undertaken by an experienced environmental consultant on the 16th of January 2018. The ADE PSI report summarises the findings from the site walkover and discusses the outcomes of the desktop investigation.
Objectives	The scope of work required to achieve the objectives of the investigation involved the following: ▪ Completion of a Health & Safety Plan; ▪ Desktop Site review of: ‣ Land title records; ‣ Section 149 Planning Certificates; ‣ Environment Protection Agency (EPA) contaminated lands register for notations and list of sites notified to EPA; ‣ Dial Before You Dig service search; ‣ Review of past and current activities on the Site; ‣ Review of past and current activities on neighbouring sites and identification of any potential on-site/off-site sources of contamination; ‣ Review of past aerial photographs of the Site and its surrounds to identify the locations of any previous buildings and/or other infrastructure associated with activities that could be onsite/off-site sources of contamination; ‣ Review of local geology and hydrogeology (including groundwater bore search); ▪ Site inspection by an experienced environmental consultant; ▪ Preparation of a Phase I PSI report outlining: ‣ Detailed information on the results of the desktop review and site inspection; ‣ Conclusions regarding the potential for contamination at the Site; ‣ Conclusions regarding measures to ensure the Site is suitable for the proposed development; and ‣ Recommendations for a Phase II Detailed Site Investigation (DSI), should it be

	warranted.
Site History	Historical searches indicate the Site was privately owned until 2012-2013, when Transport for NSW purchased the property to construct Cudgegong Road Metro Station and Cudgegong Road Station Precinct South According to the historical aerial photographs, the Site was predominantly used as four (4) rural residential properties, with an indication of agricultural and livestock use throughout prior to acquisition. During the construction phase of the North West Rapid Transit project, much of the topsoil appears to have been scraped back and potentially stockpiled within the south west corner of Site, with fill material imported. The surrounding area was predominantly rural residential properties until development, with large scale construction works now surrounding the Site.
Conclusions and Recommendations	Areas that may be impacted by potential contamination were identified on the basis of the available Site information and during the Site inspection undertaken on the 16th January 2018. The qualitative assessment of the Site undertaken during this investigation has indicated the potential for contamination to be low with regards to the development and use of land as a town centre. Based on the information available it is likely that the Site can be made suitable. A previous report conducted by Environmental Earth Sciences (2014), found the potential for contamination within the Site to be low, however did note that some ACM material was identified on the surface of the Site. A previous report conducted by ADE (2017) concluded that the soil within the dam in the centre of the Site was found to contain asbestos. In 2012 Transport for NSW purchased the Site as part of the North West Rail Link project. The Site has been predominantly cleared, with extensive cut and fill activities raising the site by up to 8 m. Two (2) dams are located within the Site, where surface water runoff is expected to flow. A large stockpile of topsoil material was observed in the south west corner of site, with presumed ACM fragments observed on the surface. Given the current earthworks and the construction of Cudgegong Road Metro Station, constant alterations to the Site condition make it problematic to fully assess the Sites' suitability for future plans of development of Cudgegong Road Station Precinct South. On Completion of current development works, a Detailed Site Investigation (DSI) targeting imported fill material onto site, stockpiled material within the south west of the Site, and two dam footprints should be conducted to confirm the suitability of the Site for the proposed development. Based on the information available it is likely that the Site can be made suitable for the proposed development. Measures to ensure the Site is suitable for the intended land use are available, in accordance with the State Environmental Planning Policy No.55 - Remediation of Land. Following completion of works on Site associated with the Sydney Metro North West proposal, and prior to further development applications associated with the proposal, a Phase II Detailed Site Investigation of soil and groundwater in accordance with National Environmental Protection Measure (NEPM 2013), Acid Sulfate Soils Assessment Guidelines (Acid Sulfate Soil Management Advisory Committee ((ASSMAC 1998) and ESS (2014) recommendations is required. The DSI should include, but is not limited to, an intrusive subsurface investigation of the following; ▪ The fill materials both historically placed and as part of the current development of the Site in order to determine the vertical and lateral extent (if any) of potential contaminants of concern (i.e. Asbestos, Heavy Metals, PAHs, TRH, OCPs, OPPs, PCBs); ▪ ASS assessment to a maximum of one (1) metre beyond the proposed design depth as per the ASSMAC (1998); ▪ Salinity assessment (both soil and groundwater) of soil material to be collected and analysed prior to the construction phase. This will determine potential impacts of soil salinity on structures i.e. foundations and basements; ▪ The two (2) dam footprints including fill material for dam wall construction and sediments within; and ▪ The large soil stockpile within the south-western sector of the site. Due to the Site's constant evolution as part of the Sydney Metro Northwest Project, the full extent of contamination is unable to be determined. A revision of the information within this report, and intrusive works for the Phase II DSI should be

	undertaken following completion of earthworks within the Site.
EI (2020) – Detailed Site Investigation	
Purpose	▪ To evaluate the potential for site contamination by means of intrusive sampling and laboratory analysis for relevant contaminants of concern.
Scope of Works	▪ Preparation of a Work, Health, Safety & Environment Plan; ▪ A review of existing underground services on site and carry out an underground search for buried services using elector-magnetic equipment; ▪ A review of relevant hydrogeological and soil landscape maps for the project area; ▪ A review of any previous environmental reports; ▪ A detailed site walkover inspection, including clearance of areas identified to contain visual evidence of contamination; ▪ Excavation of test pits at 58 locations distributed in a broad grid pattern across accessible areas of the site; ▪ Drilling of boreholes to assess Acid Sulfate Soils (ASS) at 4 locations (2 in each site) and Salinity at 6 locations (2 in the northern and 4 in the southern site) to approx. 1m below the proposed bulk excavation (approx. 15 mBGL or prior refusal on bedrock); ▪ Drilling of seven groundwater monitoring bores (3 in the northern site and 4 in the southern site) drilled to a maximum depth of 12m (or refusal) both up gradient and downgradient of the proposed redevelopment area. Groundwater monitoring bores will be installed to standard environmental protocols to investigate the potential for groundwater contamination, and potential migration of contaminants off-site; ▪ Multiple level soil sampling within fill and natural soils and one round of groundwater sampling from the seven newly constructed groundwater monitoring bores; ▪ Collection of representative surface soil samples from the following areas where previous stockpiled soils (specifically the large stockpile located in the south west corner of the site) were located; ▪ Collection of representative water and sediment samples from the dams onsite; ▪ Laboratory analysis of selected soil samples for relevant analytical parameters as determined from the site history survey and field observations during the investigation program; and ▪ Data interpretation and reporting.
Findings	▪ The site comprised an irregularly shaped block, covering a total area of approximately 4.33 hectares. The site was bisected by Conferta Avenue and bound by Themeda Avenue (north), Cudegong Road (east), Schofield Road (south) and open aired car park (west); ▪ The site was historically occupied by four (4) rural residential properties, with an indication of agricultural and livestock use throughout prior to acquisition, then used as a holding yard for the Sydney Metro Northwest Project; ▪ A former retention pond was noted from historical aerial photography on the south east corner of site. During the investigation it was found that the retention pond had been emptied and back filled; ▪ The site was free of statutory notices issued by the NSW EPA; ▪ Soil sampling and analysis were conducted at 58 targeted test bore locations (BH1M – TP58). Sampling regime was considered to be appropriate and comprised judgemental and systematic (triangular grid) sampling patterns, with allowance for structural obstacles (e.g. building walls, underground and overhanging services and other physical obstructions in use by existing operating businesses); ▪ The sub-surface layers comprised of anthropogenic fill underlain by residual clays and shale bedrock at depth; ▪ All contaminant concentrations were found to be below the adopted human health

	criteria, indicating a low to minimal risk to human health posed by soil; ▪ Asbestos was detected in fill at location TP26 and TP50. Asbestos impacted fill will require removal during redevelopment; ▪ Groundwater was encountered at depths ranging from 1.44 to 8.6 mBGL; ▪ The heavy metals, copper, nickel, zinc and manganese were detected in groundwater at levels above the adopted GILs. EI considers the reported concentrations to pose a low probability of unacceptable risk to be present, and the presence of a complete migration pathway to the end users of the building was low due to the availability of a reticulated water supply in the area; ▪ TRHs were found at levels above the adopted guidelines at wells BH2M, BH2M, BH7M and BH13M; ▪ On review of the Conceptual Site Model (CSM) developed as part of the DSI, it was concluded that the model remains valid for the proposed development. Analytical testing of the site media did not report concentrations of many of the identified potential contaminants of concern as highlighted within the CSM. Overall, the actual likelihood for complete exposure pathways to exist as highlighted within the CSM was low.
Recommendations	▪ Preparation of a Remediation Action Plan (RAP) detailing the following: ‣ Management and testing of waste on site ‣ Closure of any data gaps ‣ Detailing of an unexpected finds protocol ▪ Additional groundwater investigation in the vicinity of BH2M to confirm and delineate TRH impacts; ▪ Surveying of onsite groundwater wells to accurately model groundwater flow direction; ▪ Management of the asbestos impacted material in accordance with the EPA (2014) *Waste Classification Guidelines*. Any area where asbestos is removed must be validated in accordance with the WaDOH (2009) Guidelines; and ▪ Classification of any soils to be disposed of off-site in accordance with the EPA (2014) *Waste Classification Guidelines*.

4. CONCEPTUAL SITE MODEL

In accordance with NEPM (2013) Schedule B2 – Guideline on Site Characterisation and to aid in the assessment of data collection for the site, EI developed a conceptual site model (CSM) to assess plausible pollutant linkages between potential contamination sources, migration pathways and receptors.

From the DSI (EI, 2020), the site surface has been significantly altered during its use as a holding yard for works on the Sydney Metro North West Project. The investigation found that the tested fill soils generally met the adopted site criteria, with the exception of two locations which exceeded the asbestos guidelines, as well as identified TRH and heavy metal groundwater contamination.

4.1 Existing Site Contamination

Based on the findings of previous investigations, the following sources of contamination were identified, and considered relevant to this RAP:

4.1.1 Asbestos in fill soils

Asbestos was identified in fill soils at two locations at TP26 and TP50. No other locations identified asbestos either visually or in laboratory testing.

4.1.2 Dam water

A dam present on the southern portion of the site was tested as part of the DSI (EI, 2020). Analytical results were found to exceed the ANZG (2018) freshwater criteria. The dewatering of this dam should be managed through a dewatering management plan. A dewatering management plan may also be required for construction of the proposed basement.

4.1.3 Groundwater Contamination

The heavy metals, copper (Cu), mercury (Hg), nickel (Ni) and zinc (Zn) were detected in groundwater at levels above the adopted groundwater investigation levels during the DSI (EI, 2020). The proposed basement does not intercept groundwater and a reticulated water supply is available in the area. EI considers a low probability of an unacceptable risk to be posed to users of the site and surrounds, as a result of the heavy metal contaminants within groundwater.

TRH concentrations in groundwater were found to exceed the adopted environmental guidelines at groundwater wells BH2M, BH2M, BH7M and BH13M. With the exception of BH2M, all these exceedances were at low concentrations and did not exceed the adopted human health criteria.

The concentration of TRH at location BH2M exceeded the adopted ecological criteria for F2, F3 and F4 hydrocarbon fractions. The concentrations of F3 and F4 hydrocarbons were of low risk, as analysis showed these compounds consisted of long chain aliphatic organic compounds which have a low volatility. The concentration of F2 hydrocarbons reported at this location is a potential hazard to future occupants and warranted further investigation.

4.2 Contaminants of Potential Concern

Based on the findings reported in the DSI (EI, 2020), the chemicals of concern (COC) for site remediation, validation and data gap closure are as follows:

- **Soil - A**sbestos.
- **Groundwater** - TRH, BTEXN and other volatile organic compounds (VOC).

4.3 Potential Sources, Exposure Pathways and Receptors

Potential contamination sources, exposure pathways and human and environmental receptors that were considered relevant for the validation and remedial works at the site are summarised along with a qualitative assessment of the potential risks posed by complete exposure pathways in **Table 4-2**.

Table 4-1 Conceptual Site Model

Potential Sources	Impacted Media	Contaminants of Potential Concern	Transport mechanism	Exposure pathway	Potential receptor
▪ Imported fill soils ▪ Contamination derived from historical site uses ▪ Weathering of previous exposed building structures	Soil	Asbestos	Disturbance of surface and subsurface soils during site redevelopment, future site maintenance and future use of the site post redevelopment	Inhalation of dust particulates	Construction and maintenance workers
	Groundwater	TRH, BTEXN and other volatile organic compounds (VOC)	Volatilisation of contamination from groundwater to indoor or outdoor air spaces (onsite and offsite)	Inhalation of vapours	Basement / End users of the site (commercial end users on ground floor) Construction and maintenance workers
			Migration of dissolved phase impacts in groundwater	Biota uptake, Ingestion Dermal contact	Aquatic ecosystems
			Potential seepage into deep basement intercepting water table (on and offsite) Seepage from behind retaining walls.	Dermal contact Ingestion	Residential / Basement users Construction and maintenance workers

4.4 Data Gaps/Uncertainties

Data gaps or uncertainties faced from the DSI (EI, 2020) are as follows:

- Extent of groundwater TRH contamination and presence of any VOCs;
- Condition of sediments under the current retention pond after it has bene drained; and
- Extent of asbestos contamination at the two identified locations.

5. REMEDIATION GOALS

5.1 Remediation Goals

The remediation goals for this RAP are consistent with the NSW EPA, SEPP 55 guidelines and Council's contaminated land policy, and include:

- Meeting the conditions of the planning consent and to render the site suitable for the proposed land use(s);
- Demonstrating that the proposed remediation strategy for the site is environmentally justifiable practical and technically feasible;
- Adopting clean-up criteria appropriate for the future use of the site to mitigate possible impacts to human health and the environment;
- Consideration of the principles of ecologically sustainable development in line with Section 9 of the *Contaminated Land Management Act 1997*;
- Minimising waste generation under the *Waste Avoidance and Resource Recovery Act 2001*;
- To remediate all contamination at the site so there are no unacceptable risks to onsite and offsite receptors; and
- Demonstrating that the plans for site management of remediation work consider work health and safety, environmental management, and site contingencies.

5.2 Remediation Criteria

The assessment criteria proposed for this project are outlined in **Table 5-1** and **5-2.** These were selected from available published guidelines that are endorsed by national or state regulatory authorities, with due consideration of the exposure scenario that is expected for various parts of the site, the likely exposure pathways and the identified potential receptors.

5.2.1 Soil Criteria

Table 5-1 Adopted Investigation Levels for Soil

Adopted Guidelines	Rationale
NEPM, 2013 Soil HILs, EILs, HSLs, ESLs & Management Limits for TPHs DLWC, 2002 ASSMAC, 1998	**Soil Health-based Investigation Levels (HILs)** Samples were assessed against the NEPM 2013 HIL-B thresholds for residential with limited access to soils. **Ecological Investigation Levels (EILs)** EILs / ESLs only apply to the top 2.0 m of soil, being the accepted "root zone" in the northern portion of site where a public park is proposed (as shown in **Figure A.2**). EI derived site-specific ecological criteria, were based on the prescribed methods by NEPM (2013), using the sum of the ambient background concentration (ABC) and the added contaminant limit (ACL) of certain contaminants, for an old high traffic residential suburb. The adopted ESL were based on conservative, fine grained strata types. The EIL applied for the screening of benzo(a)pyrene was based on criteria published by CRC Care (2017). *Risk-based management and remediation guidance for benzo(a)pyrene.* **Soil Health-based Screening Levels (HSLs)** The NEPM 2013 Soil criteria for vapour intrusion specifies the criteria applied should be determined by the primary use of the ground floor of the structure. The proposed plans indicate that a basement car park will exist under the majority of the site. HSL D for industrial/commercial settings has been apllied. Asbestos in soil analysis was compared to the NEPM 2013 Soil HSL thresholds for "all forms of asbestos". **Management Limits for Petroleum Hydrocarbons** Should the ESLs and HSLs be exceeded for petroleum hydrocarbons, soil samples would also assessed against the NEPM 2013 *Management Limits* for the TRH fractions F1 – F4 to assess propensity for phase-separated hydrocarbons (PSH), fire and explosive hazards& aesthetics. **Soil Salinity** Soil salinity classes were calculated from the Indicators of Urban Salinity (DLWC). Soil aggressively to concrete and steel was determined using Australian Standard AS2159-2009 for piling design and installation. **Acid Sulfate Soils** The Acid Sulfate Soils Management Guidelines (1998) screening values were used to assess site soils for ASS/PASS.

5.2.2 Groundwater Criteria

Table 5-2 Adopted Investigation Levels for Groundwater and surface water

Adopted Guidelines	Rationale
ANZG 2018, GILs for Fresh Waters; and NEPM, 2013 Groundwater HSLs.	**Ground and surface water Investigation Levels (GILs) for Fresh Water** NEPM 2013 provides GILs for typical, slightly-moderately disturbed aquatic ecosystems, which are based on the ANZECC & ARMCANZ 2000 Trigger Values (TVs) for the 95% level of protection of aquatic ecosystems; however, the 99% TVs were applied for the bio-accumulative metals *cadmium* and *mercury*. The fresh water criteria were considered relevant as Second Ponds Creek was the closest surface water receptor to the site. **Health-based Screening Levels (HSLs)** The HSL *D* thresholds for industrial/commercial sites were applied for groundwater due to the basement car park across the majority of the site. Where no marine based criteria were available, The NEPM (2013) GILs for drinking water quality were applied for specific parameters, for which freshwater/marine GILs were not provided. These were based on the Australian Drinking Water Guidelines (Ref. NHMRC, 2011).

5.2.3 Waste Classification Criteria

Prior to being removed from the site, excavated soils must be classified in accordance with the NSW EPA (2014) Waste Classification Guidelines (the 'Waste 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 total contaminant threshold concentrations and leachate thresholds tested using the TCLP methodology for each relevant contaminant parameter will then be interpreted against the respective NSW EPA (2014) thresholds. Any soils containing asbestos would also be classified as *Special Waste - Asbestos Waste*. In accordance with the *NSW Waste Regulation 2014*, waste soils must only be disposed to a waste facility that is appropriately licenced to receive the incoming waste. It is therefore recommended that confirmation is obtained from the waste facility prior the materials being removed from the site.

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. This approach is discussed in more detail under *Contingency Management* in **Section 8.2**.

6. SAMPLING, ANALYTICAL AND QUALITY PLAN (SAQP)

The sampling, analytical and quality plan (SAQP) ensures that the data collected is representative and provide a robust basis for site assessment decisions.

6.1 Data Quality Objectives

In accordance with the NEPM and the Australian Standard AS4482.1 *Guide to the Sampling and Investigation of Potentially Contaminated Soil*, Data Quality Objectives (DQO) were developed in a sequential manner as documented in **Table 6-1**. .

Table 6-1 Data Quality Objectives

Step	Description
State the Problem	Removal of previously identified asbestos contaminated fill soils. Further investigation of groundwater conditions to confirm site suitability for the proposed commercial/residential development.
Identify the Decision	Based on the remedial objectives outlined in **Section 1.2**, the following decisions are identified as: ▪ Has the nature and extent of soil and groundwater impacts onsite been defined? ▪ Does the level of impact coupled with the fate and transport of identified contaminants represent an unacceptable risk to identified human and/or environmental receptors on or offsite? and ▪ Will further remediation and/or special management be required before the site is suitable for the intended land use?
Identify Inputs to the Decision	Inputs to the decision process include: ▪ Previous investigation works; ▪ Details of the proposed site use; ▪ Understanding of current site use and historic activities that have occurred, including potential offsite sources of contamination; ▪ Geological and hydrogeological data relevant to the area, including physicochemical parameters for calculating ecological criteria; ▪ Field screening data and site observations for the presence of visual/olfactory contamination indicators; ▪ Contaminant concentrations in soil validation samples confirming effective removal of identified impacts; and ▪ Further input to the decision will be sample collection and handling, field and laboratory QAQC and confirmation that data quality indicators (DQIs) were achieved.

Step	Description
Define the Boundary of the Assessment	**Lateral** – Works are limited to the site boundaries (**Figure A.2**) **Vertical** – From existing ground surface, underlying fill and natural soil horizons, to the base of contaminated soil and/or bulk excavation level (BEL), including underlying water-bearing zones. **Temporal** – The results will be valid on the day samples are collected and will remain valid if no changes to site use occur, and contamination (if present) does not migrate from off-site sources. Constraints of sampling requiring consideration include access restrictions (due to site operations and/or conditions) and presence of both above and underground services / structures.
Develop a Decision Rule	The decision rules for validation are: ▪ Is the site suitable for the proposed land use? *If the concentrations of contaminants that remain are below the relevant criteria for the intended land use; then the site will be deemed suitable for the proposed development.* ▪ Is additional information required to determine the suitability of the site for its proposed use? *Should additional information be required as determined by the conceptual site model (CSM), then appropriate recommendations will be provided.* Decision criteria for analytical data are defined by the Data Quality Indicators (DQI) in **Table 7-2**.
Specify Acceptable Limits on Decision Errors	Specific limits for this project are to be in accordance with NEPM, appropriate data quality indicators (DQIs) for assessing the useability of the data, and EI standard procedures for field sampling and handling. To assess the useability of the data, pre-determined DQIs for completeness, comparability, representativeness, precision and accuracy, as presented below in **Table 7-2**. If any of the DQIs are not met, further assessment will be necessary to determine whether the non-conformance will significantly affect the useability of the data. Corrective actions may include requesting further information from samplers and/or analytical laboratories, downgrading of the quality of the data or alternatively, re-collection of samples.
Optimise the Design for Obtaining Data	▪ Written instructions will be issued to guide field personnel in the required fieldwork activities. ▪ Soil excavation is to be performed as per **Section 8**. Soil validation sampling is to be completed as per the methodology prescribed in **Section 10.** ▪ Validation sampling procedures that would be implemented to optimise data collection for achieving the DQOs. ▪ Review of the results will be undertaken to determine if further excavation and additional sampling is warranted. Additional investigations would be warranted where soil concentrations are found to exceed remediation criteria endorsed by the NSW EPA, relevant to the proposed land use(s).

6.2 Data Quality Indicators

To ensure that the data collected is of an acceptable quality, the data set will be evaluated against the data quality indicators (DQI) outlined in **Table 6-2**, which related to both field and laboratory-based procedures.

Table 6-2 Data Quality Indicators

Data Quality Objective	Data Quality Indicator	Acceptable Range
Accuracy	Field – Trip blank (laboratory prepared) Laboratory – Laboratory control spike and matrix spike	< laboratory limit of reporting (LOR) Prescribed by the laboratories
Precision	Field – Blind replicate and spilt duplicate Laboratory – Laboratory duplicate and matrix spike duplicate	<30% relative percentage difference (RPD [%]) Prescribed by the laboratories
Representativeness	Field – Trip blank (laboratory prepared) Laboratory – Method blank	< laboratory limit of reporting (LOR) Prescribed by the laboratories
Completeness	Completion (%)	The data set used is suitably complete to enable valid environmental decisions.-

7. REMEDIATION TECHNOLOGY

7.1 Regulatory Overview

The policy framework for the NEPC (2013) *National Environmental Protection (Assessment of Site Contamination) s6(16)* indicates that the preferred hierarchy for site remediation options and/or management is:

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

When deciding which option to choose, the sustainability (environmental, economic and social) of each option should be considered, in terms of achieving an appropriate balance between the benefits and effects of undertaking the option.

Other considerations to mitigate groundwater contamination measures, as outlined by the EPA (2007) *Guidelines for the Assessment and Management of Groundwater Contamination*, include:

- Notifying of the affected property (under the CLM Act 1997) and the downgradient receptors;
- Containment of the contamination plume;
- Active or passive clean-up of contaminated groundwater (this may include the concept of clean-up to the extent practicable (CUTEP)), which may include ongoing monitoring of groundwater and/or contingency plans and management plans to mitigate risks; and
- Legislative control through restricting groundwater use in and down-gradient of the contaminant plume.

For this site, a number of remediation options were reviewed to examine the suitability of each method, the surrounding properties, geological and hydrogeological limitations and the following considerations:

- Development requirements (residential, with limited access to soils and landscaped areas);
- Prioritisation of works in areas of most concern;
- Ability of remedial method to treat contamination with respect to material and infrastructure limitations;
- Remedial timetable;

- Defensible method to ensure the site is remediated to appropriate levels / validation criteria; and
- Regulatory compliance.

7.2 Remediation Technologies Review

A number of soil remediation options were reviewed to examine the suitability of each method, with due regard for the surrounding land uses, as well as the geological and hydrogeological limitations. As the site is to be widely excavated for basement construction, many of the in situ remediation techniques are not applicable.

Each of the available remediation technologies are summarised in terms of their suitability in **Table 7-1**.

Table 7-1 Remedial Technology Review - Soils

Remediation Methodology	Description	Advantages	Disadvantages	Suitability
No Action	'No Action' can be considered if: ▪ There is no measurable contamination; ▪ Contaminant concentrations are below assessment guidelines; ▪ Contaminants are not mobile; or ▪ Exposure to contaminated soils is unlikely.	No remediation costs Creates minimal disturbance to the site Retains material on-site	Not applicable to the kind of contamination encountered at the site. Would pose limitations on land use options. May require an Environmental Management Plan and ongoing monitoring.	Not Suitable – As the key objective of the remedial strategy is to make the site suitable for mixed residential / commercial use without the need for ongoing monitoring.
On-site bioremediation	Excavated soils are thoroughly broken down and aerated, mixed with microorganisms and nutrients, stockpiled and aerated in above ground enclosures.	Cost effective if soils are utilised on-site. Lower disposal costs. Limited requirement to import fill material to site. Retains material on-site.	Significant area of site required to land farm material. Undefined remediation timeframe. Potential for odour problems. Not suitable for metals or asbestos contamination.	Not suitable – Not suitable for asbestos contaminated soils.
In-situ treatment	*In-situ* treatment of impacted soils within the smear zone and saturated zone using *in-situ* treatment methods such as soil vapour extraction, injection of oxidising agents etc.	Creates minimal disturbance to the site (no excavation). Cost effective for large scale site remediation of light to mid-weight petroleum hydrocarbons. Potential to simultaneously remediate dissolved phase hydrocarbons in site groundwater.	Not applicable to the kind of contamination encountered at the site. Expensive establishment costs. Potential for odour problems. Requires detailed design, pilot trials and management.	Not suitable – This method is designed for widespread hydrocarbon impacted soils. Since the present dataset does not provide evidence of any hydrocarbon contamination; this is not considered to be an economically viable option. Additionally, soils will be required to be excavated for basement construction.

Remediation Methodology	Description	Advantages	Disadvantages	Suitability
Consolidation and/or capping	Risk minimisation approach where impacted soils are managed on-site by capping the ground surface with a clean, impermeable layer of fill material.	Effectively removes risk to human health by eliminating exposure pathways.	Importance of capping design and materials utilised in the construction of capping layer. Would pose limitations on land use options. Typically requires an Environmental Management Plan and ongoing monitoring.	Not suitable – An environmental management plan (EMP) with ongoing monitoring would be required, due to the retention of contaminated materials on the site. This is in opposition to the key objective of the remedial strategy - to make the site suitable without the need for ongoing monitoring.
Excavation and off-site disposal	Excavate impacted materials. Transport directly to a licensed landfill facility. Reinstate site with imported clean fill material.	Fast – impacted material removed immediately, significantly reducing potential for impact to groundwater. No storage or treatment problems. Reduced vapour/odour issues as impacted materials removed from site. Minimal design and management costs.	Transfer of waste to another location (licensed waste facility). High costs associated with the disposal of waste soils and importation of clean backfill). Requires waste classification prior to disposal, keeping of thorough waste records, waste tracking and reporting. Sustainability issues related with disposal to landfill.	Suitable – For meeting the key project objective to make the site suitable for mixed residential / commercial use without the need for ongoing monitoring. This will remove impacted fill, which would have to be removed from site for offsite disposal. Additionally, fill materials will need to be disposed of for the basement excavation, regardless of whether contamination is present or not.
Natural attenuation	Allowing the contaminants to biodegrade naturally following removal of the contamination source.	No remedial excavation of site. Retains materials on site. Sustainable, cost effective remediation method.	Slow process. Potential for contamination to further impact on the groundwater aquifer and nearby environmental receptors. Typically requires an Environmental Management Plan and ongoing monitoring.	Not Suitable – This approach is primarily suited to addressing groundwater contamination, If groundwater contamination is characterised during the data gap closure assessment, this remediation technology will be reassessed.

7.3 Preferred Remediation Option

Based on the available remedial technologies, the proposed site development (mixed residential/commercial with associated three level basement car parking), the potential risks to human health and the environment, as well as the relative cost effectiveness of feasible remedial techniques, the preferred remedial option for the site is:

- Removal of asbestos hotspots; followed by
- Offsite disposal to licensed waste facilities of all asbestos impacted fill. This coincides with the proposed depth of the proposed three level basement carpark. All wastes shall be transported to appropriate, EPA-licensed facilities, after formal classification. All excavated (remediation) areas (e.g. tank pits) shall be validated by base and wall, soil sampling; and
- Site reinstatement with validated, imported (or recovered) excavated natural materials (where required).

Groundwater remediation options will be considered in an amended RAP once further investigation has been undertaken to characterise groundwater in the vicinity of BH2M.

7.4 Site Preparation, Licences & Approvals

7.4.1 Consent Requirements

In accordance with *SEPP 55 - Remediation of Land*, the category of the remediation works defines whether consent is required prior to the commencement of the works. 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 7-2**.

Table 7-2 Remediation Works Category Determination

Significant Environment Impact	Yes/No	Category
Designated Development or State Significant Development	Yes	1
Critical or threatened species habitat	No	2
Have significant impact on threatened species, populations, ecological communities or their 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

Notes: * 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.

Being a state significant development the site is subject to conditions outlined in the SEARs, however for practical purposes the site was defined based on the criteria outlined in SEPP 55.

Based on the above assessment, the remediation works for the site are considered as Category 1 and will require development consent. Category 1 works require notification to the consent authority.

It is assumed that as the site is a SSD site, no further notification is required as the site SEARs have already be issued. There may be some requirement to also notify Council of any works, but EI is unaware of any notification process.

7.4.2 Development Consent & Control Plans

All works should be in accordance with State Environmental Planning Policy (Sydney Growth Centres) and any development consent issued by Council for the development.

7.4.3 Other Licence Requirements

The appointed site contractor should prepare an appropriate Construction Environmental Management Plan (CEMP), health and safety plans and other plans required by the SEARs. Where asbestos removal is required, the contractor must be appropriately licensed to perform such works. If the removal of asbestos is required, it should be considered if SafeWork requires notification for the planned works.

8. REMEDIATION WORKS

Site characterisations revealed the presence asbestos. Groundwater on site requires further assessment to ascertain site suitability. The remedial tasks required were:

- Removal of asbestos contaminated soils;
- Address existing data gaps by guiding future works and ensuring that all future samples collected are representative of end use condition proposed for the site;
- Development of a dewatering management plan for dam water and groundwater based with due consideration for results of the data gap closure investigation; and
- Development of an Unexpected Finds Protocol (**Appendix C)** to act as a contingency should unidentified contamination be encountered.

8.1 Remediation Sequence

The sequence of work for the remediation is summarised in **Table 8-1**, with an indicative timeframe of each task. Further details provided in the sections below.

Table 8-1 Summary of Remediation Sequence

Task	Timeframe	Description of Work
Preliminaries/Site Establishment	Weeks 1-3	Development of pre-work plans (construction environmental management plan, occupational health and safety plan, hazardous material survey) 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.
Additional Assessment	Weeks 3-5	The additional investigation includes an assessment of groundwater conditions in the vicinity of BH2M.
Waste Management	Weeks 5-6	Provide a method for management of waste classification of soil for offsite disposal or reuse (in case of VENM and ENM)
Excavation	Weeks 6- 7	Excavation of the identified asbestos hotspots
Validation	Weeks 7 - 13	Implement the sampling and validation plan to detailing the remedial works and provide conclusions on site suitability.

8.1.1 Preliminaries/Site Establishment

Notice should be given to the consent authority (The Minister of Planning) 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. A notice of completion should also be submitted to council and the Department of Planning and Environment as per the SEPP 55 requirements.

The site itself will be prepared in accordance with the requirements of the Site Management Plan outlined in **Section 9**. The site developer would also need to prepare and implement a Construction Environmental Management Plan (CEMP) and Site Work Health and Safety (WHS) Plan prior to any site works. Establishment of environmental controls, site access, security, fencing, warning signage and preparation of a Health Safety and Environment Plan is required prior to works commencement. A project plan should also be developed to outline

engineering design for excavation support (if required), water treatment requirements and design, staging of excavation works, stockpiling, waste stabilisation, waste material loading, traffic management and waste tracking.

As part of the site preparation phase and preliminary tasks a remediation workshop should be conducted with the appointed contractor(s) to further develop any remedial measures, excavation plans and environmental management requirements.

Also prior to commencing work the site contractor is to complete a staging or project plan that outlines the basic stages of the remediation works. The staging plan should include, but not be limited to:

- Staging of areas to be excavated;
- Areas designated for waste segregation, screening and storage (stockpiling), amenities, soil and groundwater treatment (if required);
- Truck movements to allow loading to mitigate impacts to surrounding land users and council infrastructure; and
- Proposed environmental mitigation measures.

8.1.2 Additional Assessment

Groundwater

Additional groundwater wells will be installed in vicinity of BH2M, in up gradient and down gradient areas.

Groundwater samples will be collected in a single groundwater monitoring event (GME) from newly installed wells as well as BH2M. Samples will be collected via low flow sampling and tested for contaminants of concern (TRH, BTEXN and VOCs).

Should further unexpected contamination be identified, an amendment to this RAP may be required to update remediation options.

8.1.3 Waste Management

1 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*.

2 Soil samples designated for waste classification will be collected at a rate of one sample per 25m^3 (minimum of three per stockpile), up to 250m^3. For soil exceeding 250m^3 but less than 2,500m^3, a minimum of 10 samples is required and 95% UCL statistical calculations of contaminant concentrations may be compared to the criteria. Samples are to be analysed for HMs, TRH, BTEX, PAH, organochlorine / organophosphorus pesticides (OCP / OPP), polychlorinated biphenyls (PCBs) and asbestos.

3 Any further asbestos identified will be treated as an unexpected find and the unexpected finds protocol (**Appendix C**) will be engaged.

4 Results of analysis will be compared to the waste classification criteria set out in the NSW EPA (2014) *Waste Classification Guidelines* and a classification certificate will be provided, to enable offsite disposal.

5 Ensuring that the waste fill/soil streams are kept separate, material will be loaded, transported and disposed offsite to waste landfill facilities that are appropriately licensed to receive the materials corresponding to the documented waste classifications.

6 In accordance with the *POEO (Waste) Regulation 2014*, waste movements will be tracked and disposal receipts (dockets) will be maintained by the site manager and copies provided to EI for final reporting purposes.

7 Disposal of dam water with due consideration to the ANZG (2018) *Guidelines for Fresh and Marine Water Quality*, which are based on the ANZECC and ARMCANZ (2000) water criteria for the protection of Freshwater and Marine Water ecosystems. Water may need to be treated based on the results from the DSI (EI, 2020)

8.1.4 Validation

All fill and contaminated soil needing to be remediated must be removed from the site and a shallow validation assessment of freshly exposed soil must be completed prior to the commencement of bulk excavation works.

All findings and investigation methodologies of the additional investigations will be reported within a validation report. Should significant contamination be identified, further works will be addressed via an addendum to this RAP. These works may include soil vapour sampling, indoor air quality assessment, active groundwater remediation and bioremediation of significantly contaminated soil.

Once site validation has been achieved, the findings of the work will be reported and conclusions on suitability of the land will be evaluated.

8.2 Remedial Contingencies

At this stage it is anticipated that the proposed remedial technologies should be effective in dealing with the contamination present, however, remedial contingencies may be required should scenarios detailed in **Table 8-2** arise.

Table 8-2 Remedial Contingencies

Scenario	Remedial Contingencies/Actions Required
Highly contaminated soils / sludges not identified during previous investigations are encountered, particularly at site boundaries	Work to be suspended until the Environmental Project Manager 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 C** of this RAP.
Underground tanks (i.e. USTs that have not been previously identified) are encountered at the site	Should unexpected USTs be identified at the site, a GPR survey and visual inspection may 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, in accordance with EPA (2014b) *Technical Note: Investigation of Service Station Sites* and Australian Standard AS4976 (2008). Follow the unexpected finds protocol in **Appendix C** of this RAP.
Asbestos wastes are encountered	Work to be suspended and asbestos removed by a suitably qualified contactor, in accordance with SafeWork NSW regulations. Follow the unexpected finds protocol in **Appendix C** of this RAP.
Residual soil impacts remain on-site post removal of USTs	Assess potential vapour hazard and delineate plume. Should significant soil vapour contamination be identified, consider soil vapour monitoring program and the implementation of a vapour membrane barrier system within the final development design.

Contaminated groundwater (including LNAPL or DNAPL) encountered	Review groundwater conditions on site (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, 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 and transport modelling and assess the 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 basement excavation depth	Review remediation works for the site.
Changes in proposed land use(s) at the site	Review remediation works for the site.

9. SITE MANAGEMENT

9.1 Roles and Responsibilities

Roles and responsibilities of key personnel required to make up the remedial management team, to support the completion of remedial works are provided in **Table 9-1,** and details of people responsible should be kept up to date throughout the remedial works.

Table 9-1 Remedial Management Team

Team Member	Organisation	Responsibilities
Project Manager – Site Operations	TBA	▪ Overall site management and day to day decision maker. ▪ Key communicator between site and owner. ▪ Ensure relevant control plans are developed and implemented and appoints required staff to the roles required. ▪ Overall responsibility of site and key liaison for council. ▪ Appoint site contractors and all other members of the remediation.
Earthworks contractor	TBA	▪ Site preparation including the implementation of environmental controls required by the site management plans and relevant legislation. ▪ Completion of remedial tasks in accordance with the methods of the RAP and relevant legislation. ▪ Ensure consultant is informed of remedial schedules and is employed for key components, such as waste classification and validation. ▪ Effectiveness of mitigating measures required for remedial activities. ▪ Ensure appropriate handling of all material and correct offsite disposal of waste under appropriate documentation. Copies of all waste documents are required by the environmental consultant for inclusion to the site validation report. ▪ Reporting any environmental issues, complaints or unexpected finds to the project manager and environmental consultant.
Environmental Consultant	EI Australia	▪ Development of the remediation objectives and strategy. ▪ Support all other members involved in executing the remediation in understanding the requirements of the RAP and the potential risks posed should measures not be implemented. ▪ Supervision of key remediation components, collection of all environmental samples and provide guidance to ensure the remediation is understood and effective. ▪ Complete site validation tasks and detail the works in a validation report concluding on site suitability.
Planning Authority	The Department of Planning and Environment	▪ Responsible for the granting of all consents and ensuring the recommendations of environmental reports are implemented. ▪ Regulator of consent conditions

Team Member	Organisation	Responsibilities
Qualified Independent Consultant – NSW Accredited Site Auditor (if required)	TBA	▪ Reviews RAP and Site Validation Report, along with preparation of Site Audit Statement and Site Audit Report. ▪ Review of updates, revisions or amendments as applicable. ▪ Provide interim audit advice of consultant or client submissions. ▪ Conduct inspections during remedial works.

9.2 Materials Handling and Management

Table 9-2 summarises the measures that should be implemented in respect of materials handling during remedial and bulk excavation works at site.

Table 9-2 Materials Handling and Management Requirements

Item	Description/ Requirements
Excavation Contractors	Excavation should be completed by a suitably qualified contractor to ensure staff are aware of the sites environmental and health and safety requirements, and that all adverse effects are mitigated, isolated or reduced.
Stockpiling of Materials	All stockpiles will be maintained as follows: ▪ Present on sealed surfaces such as concrete, asphalt, or high-density polyethylene. If placed on bare soil, the land will be over-excavated to ensure adequate removal of all impacted material and located in areas of the site which do not pose environmental risk (e.g. sheltered areas). ▪ No greater than 2m in height, be appropriately battered and sediment measures surrounding each base to manage stormwater runoff. Material will either be covered or kept moist to prevent dust blow. ▪ Stockpiles will be in approved locations of the site, selected to mitigate environmental impacts while facilitating material handling requirements. Any contaminated material will only be stockpiled in non-remediated areas of the site or at locations that do not pose any risk (e.g. sheltered areas).
Transport of Material (off-site)	Material shall be transported via a clearly distinguished haul route defined within construction management plans. All haulage routes for trucks transporting soil, materials, equipment and machinery shall comply with all road traffic rules. Implementation of sediment measures to reduce the mechanical movement of soil onto public roadways or vehicle wheels is required, such as wheel washing/cleaning facilities placed at each site entry/exit. Any residue from the cleaning facility will be collected and deemed contaminated unless proven otherwise. Spoil material will require offsite disposal. Trucks transporting soils from the site are to be covered with tarpaulins (or equivalent). 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 NSW licenses, consents and approvals.

Table 6-1 Mitigation Measures for Potential Dewatering Issues

Anticipated Problem	Corrective Actions
Water Quality Criteria Non-Compliance	
Water Quality Criteria Exceedance Laboratory analytical report for any monitoring event reveals that the quality of treated discharge water does not satisfy the adopted criteria detailed in **Table 5-1**	Immediate action must be taken to halt the release of water into the municipal stormwater system, where water quality is found not to meet the adopted criteria detailed in **Table 5-1.** Discharge to the stormwater system must be suspended to enable the following procedure to be implemented: 1) Discharge water will be redirected to the spare retention basin; 2) A water sample will then be collected and sent to the laboratory for confirmation analysis for the non-compliant parameter(s) on an express (24hr) results turn-around basis; 3) Should the analytical result for the confirmation sample show that the previously non-compliant parameter(s) is/are now meet the adopted criteria, the treated water outlet may be redirected to the stormwater system; 4) Should the analytical result for the confirmation sample show that the discharge water quality does not comply with the adopted criteria, the environmental consultant / water treatment specialist will be required to modify the water treatment system, in order to achieve compliant discharge water quality. Collection of further treated water samples will be required to confirm the effectiveness of the modifications; 5) After laboratory confirmation that the revised treated water quality complies with criteria, extracted groundwater may be re-directed to the stormwater discharge point; and 6) Weekly monitoring of treated discharge water quality monitoring will be required, until such time that contaminant concentrations are within the adopted criteria values for three consecutive sampling events. Once this is achieved, fortnightly monitoring may be reinstated. **Note:** It may be necessary to have collected waters removed by a licensed wastewater contractor, should quantities exceed the on-site capacity for temporary storage.
Visible and Olfactory Impacts Visual and/or olfactory anomalies (e.g. change in water colour, turbidity, odour, presence of oil / grease) are observed in extracted groundwater	Similar to the above procedure (Steps 1 to 6) treated water will be redirected to an alternative retention vessel, while the treatment system is adjusted. It may be necessary to have collected waters removed by a licensed wastewater contractor, should retained quantities exceed the on-site capacity for temporary storage. The contractor is to seek advice from a suitably experienced environmental consultant in regard to the additional assessment and treatment that may be required for any observed changes to water appearance or detectable odours. In accordance with Council's Contaminated Land Policy, no nuisance odours are to be detected at any site boundary during the dewatering stage. Should odour emissions be detected at a site boundary, the following measures will be implemented: 1. Stop work, to allow odour to subside. 2. Monitor ambient air across the site and boundaries with a portable photo-ionisation detector (PID). 3. Implement control measures, including respirators for on-site workers, use of odour suppressants and wetting down of excavated material.

Anticipated Problem	Corrective Actions
	4. Notify the occupants of adjoining premises regarding odour issues. Notification should be in writing, providing the contact details of the responsible site personnel. 5. Record logs for volatile emissions and odours.
Repeated Criteria Exceedances After three non-compliances for discharge water quality	Retain extracted water on-site in spare retention basin(s) and appropriate bulk containers, until it can be removed by a licensed waste contractor. Determine an alternative discharge method, if necessary, updating the DMP accordingly.
Groundwater Take Non-Compliance	
Excessive Extraction Daily discharge rate is greater than expected and it is apparent that the projected total groundwater extraction volume will be exceeded	Advise the appointed environmental consultant and determine the cause of the increased dewatering rate. If reduction in dewatering rate cannot be implemented, WaterNSW should be contacted to review options, which may include a combination of: ▪ Temporary retention of tail water on-site in appropriate bulk containers for subsequent removal by a licensed wastewater contractor; ▪ Aquifer re-injection after obtaining regulatory approval; and/or ▪ Fast-tracking of construction works to complete dewatering sooner than the scheduled timeframe.
System Performance Issues	
Dewatering system failures	Ensure that spare equipment parts (where practical) are on hand. Ensure that the failed equipment can be serviced by site personnel or an appointed contractor who can rapidly report to site when needed.
Power outages	Ensure that a backup generator is readily available. In this event, an assessment across the site and surrounding sites should also be completed in order to identify whether any other lights and electrical equipment are working so to identify if the issue is site specific or if it is across a whole area. In addition to having the back-up generator running, the contractor should also seek advice from an electrician in regard to the additional assessment and repairs that may be required.
Unexpected contaminants found during monitoring	Contact the appointed environmental consultant / water quality expert and collect samples for analysis, to assess the identified concentrations against relevant criteria. If the contaminant is found to exceed the adopted criteria for the 95% species protection for fresh waters (ANZG, 2018), follow the corrective actions corresponding to *Water Quality Criteria Exceedance* above. Expand the adopted criteria accordingly.
Chemical / fuel spill and leaks from machinery	Stop earthworks, notify site project manager. Use accessible soil or appropriate absorbent material to absorb the spill (if practicable). Stockpile the impacted material in a secure location, on builder's plastic to avoid cross contamination. Inspect groundwater and note any visual and/or changes. The contractor should also seek advice from environmental consultant in regard to the additional assessment and treatment that may be required.
Excessive rainfall	Ensure sediment and surface water controls are in place and functioning as intended, as per the designs provided in the site specific Soil and Water Management Plan. Any non-conformance is to be documented and rectified. The capacity of the dewatering system to dispose larger volumes of water should be evaluated and if required, a

shall be extended until the excavation surface samples indicate that the location is validated as meeting the criteria for each respective contaminant.

Soil sampling and handling of the collected samples will be as described in **Table 10-2**.

Table 10-2 Validation Sample Collection and Handling Procedures

Action	Description of Required Works
Sample Collection	Soil validation sampling will be directly from the exposed surface of excavation, or from the material brought to the surface by the backhoe/excavator bucket. Groundwater sampling will be completed using micropurge techniques within the top 0.5 m of the water column. Water level gauging, well purging and field testing of water quality parameters will be collected and data shall be recorded to comply with routine chain of custody requirements.
Sampling, Handling, Transport and Tracking	▪ The use of stainless-steel or disposable (one time use) sampling equipment; ▪ All sampling equipment (including hand tools or excavator parts) to be washed in a 3% solution of phosphate free detergent (Decon 90), followed by a rinse with potable water prior to each sample being collected; ▪ 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 No., Sample No., depth, date and time of sampling; ▪ Place sample containers into a chilled, enclosed and secure container for transport to the laboratory; and ▪ Provide chain of custody 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 & Holding Times	▪ Metals - 250g glass jar / refrigeration 4°C / 6 months (maximum holding period); ▪ TRH/BTEX - 250g glass jar / refrigeration 4°C / 14 days (maximum holding period); ▪ PAH - 250g glass jar / refrigeration 4°C / 14 days (maximum holding period); and ▪ Asbestos – up to a 10 Litre resealable plastic (polyethylene) bag / no refrigeration / indefinite holding time.

Action	Description of Required Works
Field QA/QC	Quality assurance (QA) and quality control (QC) procedures will be adopted throughout the field sampling program to ensure sampling precision and accuracy, which will be assessed through the analysis of 10% field duplicate/replicate samples. Appropriate sampling procedures will be undertaken to prevent cross contamination, in accordance with EI's Standard Operating Procedures Manual. This will ensure: ▪ Standard operating procedures are followed; ▪ Site safety plans are developed prior to works commencement; ▪ Split duplicate field samples are collected and analysed; ▪ Samples are stored under secure, temperature-controlled conditions; ▪ Chain of custody documentation is employed for the handling, transport and delivery of samples to the contracted environmental laboratory; and ▪ Contaminated soil, fill or groundwater originating from the site area is disposed in accordance with relevant regulatory guidelines. In total, field QA/QC will include one in 10 samples to be tested as intra-laboratory, blind field duplicates, one in 20 samples to be tested as inter-laboratory, split field duplicates, as well as one VOC trip blank, one VOC spike sample and one equipment wash blank sample per sample batch.
Laboratory Quality Assurance and Quality Control	The contract laboratory will conduct in-house QA/QC procedures involving the routine analysis of: ▪ Reagent blanks; ▪ Spike recoveries; ▪ Laboratory duplicates; ▪ Calibration standards and blanks; ▪ QC statistical data; and ▪ Control standards and recovery plots.
Achievement of Data Quality Objectives	Data quality objectives (**Table 6-1**) are to be achieved and an assessment of the overall data quality should be presented in the final validation report, in accordance with the EPA (2017) *Guidelines for the NSW Site Auditor Scheme*.

10.2 Validation Reporting

All fieldwork, chemical analyses, discussions, conclusions and recommendations will be documented in a validation report for the site. The validation report will be prepared in general accordance with requirements of the EPA (2011) *Guidelines for Consultants Reporting on Contaminated Sites* and EPA (2017) *Guidelines for the NSW Site Auditor Scheme* and will confirm that the site has been remediated to a suitable standard for the proposed development.

The Site Validation Report will be submitted in support of the SEARS and/or Site Auditor review at the completion of the remediation works program. Validation reporting may be completed in stages if required by the construction schedule.

11. CONCLUSIONS

Based on the information available from previous investigations at the site, this RAP has been prepared to inform the remediation works at Tallawong Station Precinct South, Rouse Hill NSW.

The preferred approach involves excavation and offsite disposal of impacted fill materials. Groundwater requires additional assessment to confirm site suitability. It is envisaged that the remediation works will be implemented in stages, as follows:

- Preliminaries/Site Establishment
- Additional Assessment
- Waste Management
- Excavation
- Validation

Material management procedures are provided to characterise soil for offsite disposal, and contingency measures are provided for any unexpected finds. In summary, EI considers that the site can be made suitable for the proposed mixed commercial and residential land use through the implementation of the works described in this RAP.

12. STATEMENT OF LIMITATIONS

This report has been prepared for the exclusive use of Deicorp Projects (Tallawong Station) Pty Ltd (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.

EI has used a degree of care and skill ordinarily exercised in similar investigations 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 and attachments.

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, or validation testing and analysis during remedial activities. In some cases, further testing and analysis may be required, which may result in a further report with different conclusions.

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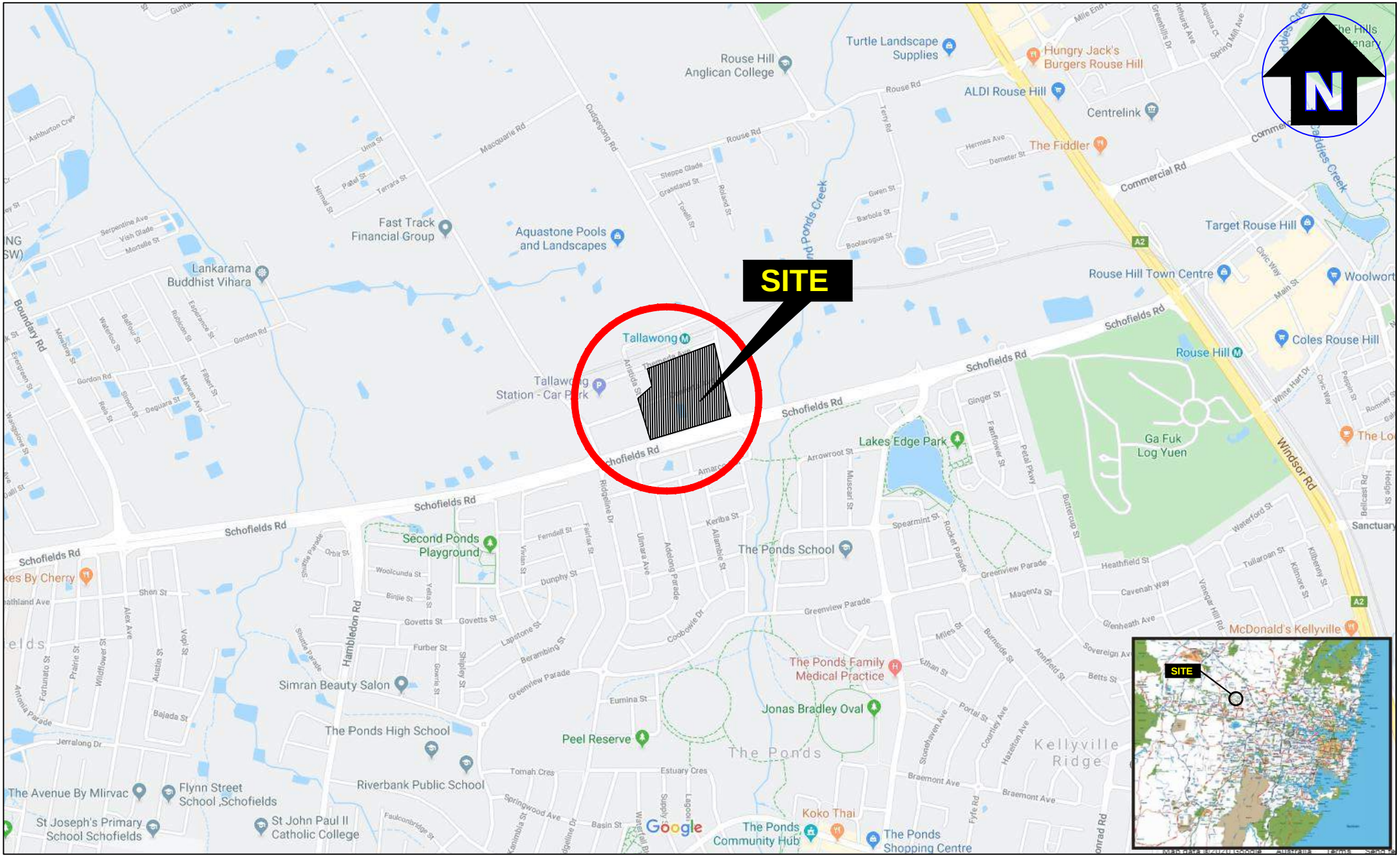
Appendix A - Figures



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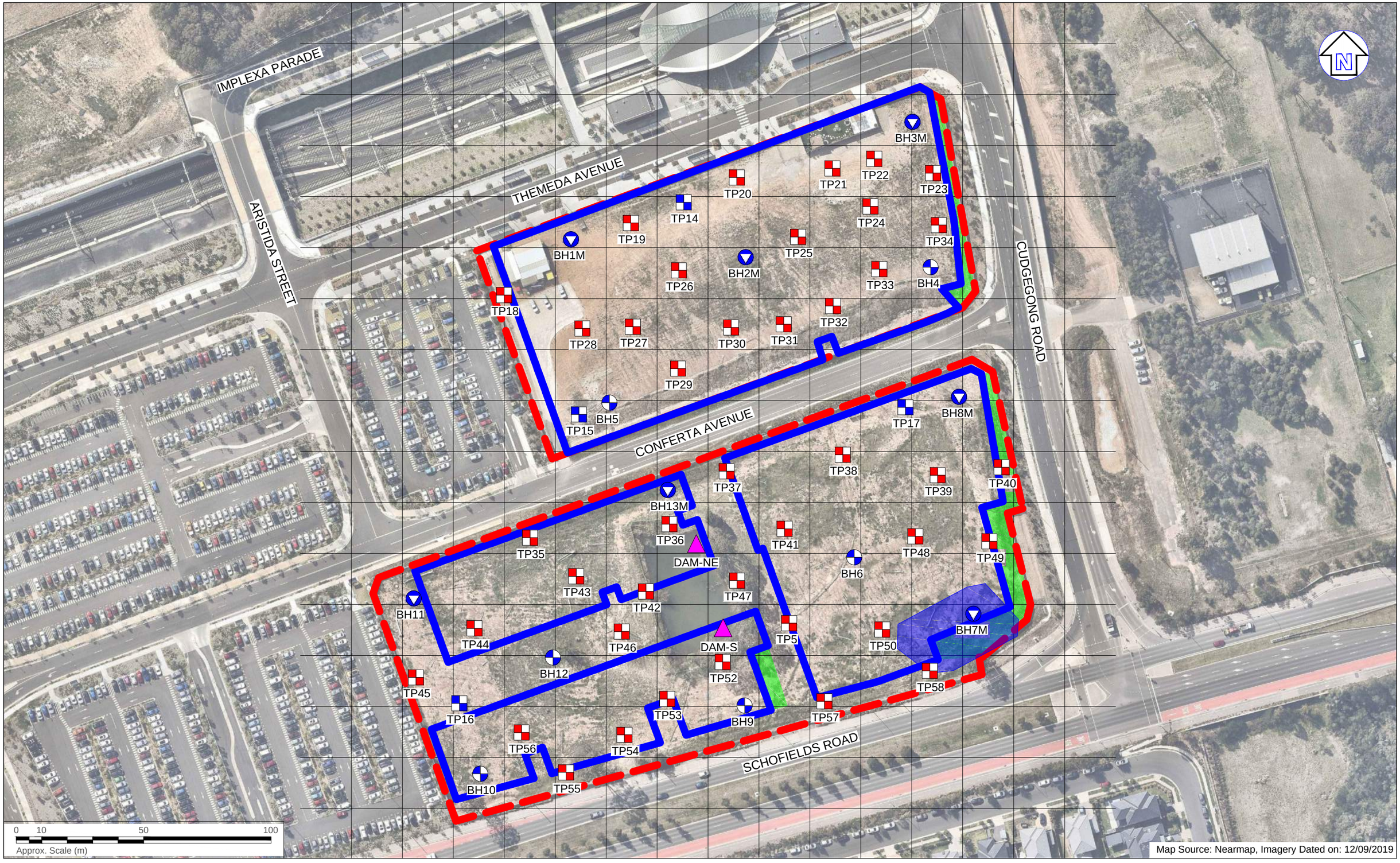
	Approved:	N.G.	
	Date:	14-04-20	
	Scale:	Not To Scale	

Figure: 1

Project: E24445 E06_Rev1



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- Approximate site boundary
- Approximate retained soil area
- Approximate geotechnical borehole location
- Approximate geotechnical test pit location
- Approximate environmental test pit location
- Approximate Surfacewater sampling location
- Approximate monitoring well location
- Approximate basement boundary
- Approximate area of former dam

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Remediation Action Plan
Tallawong Station Precinct South, Rouse Hill NSW

Sampling Location Plan

Figure: 2

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Appendix B – Proposed Development Plans

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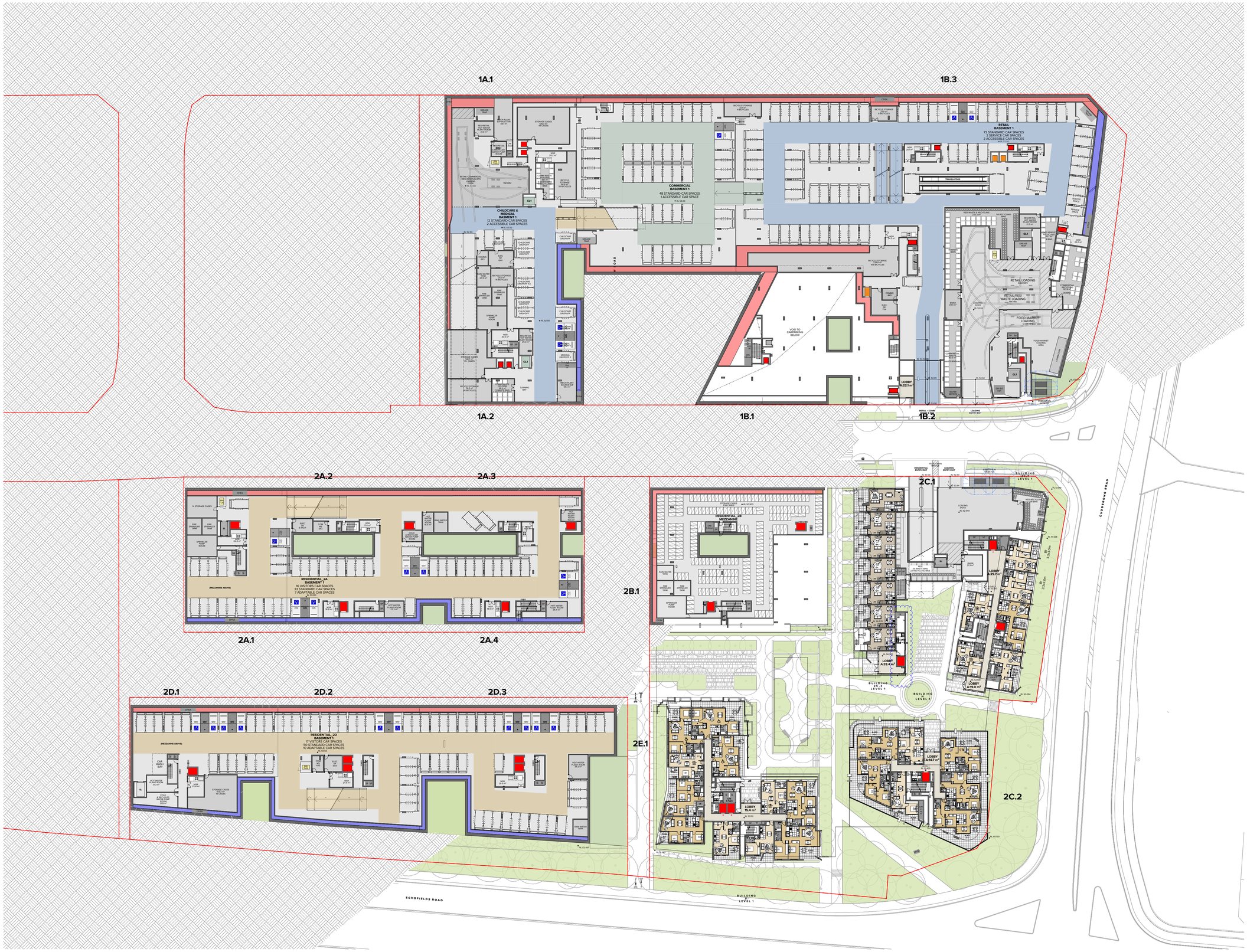

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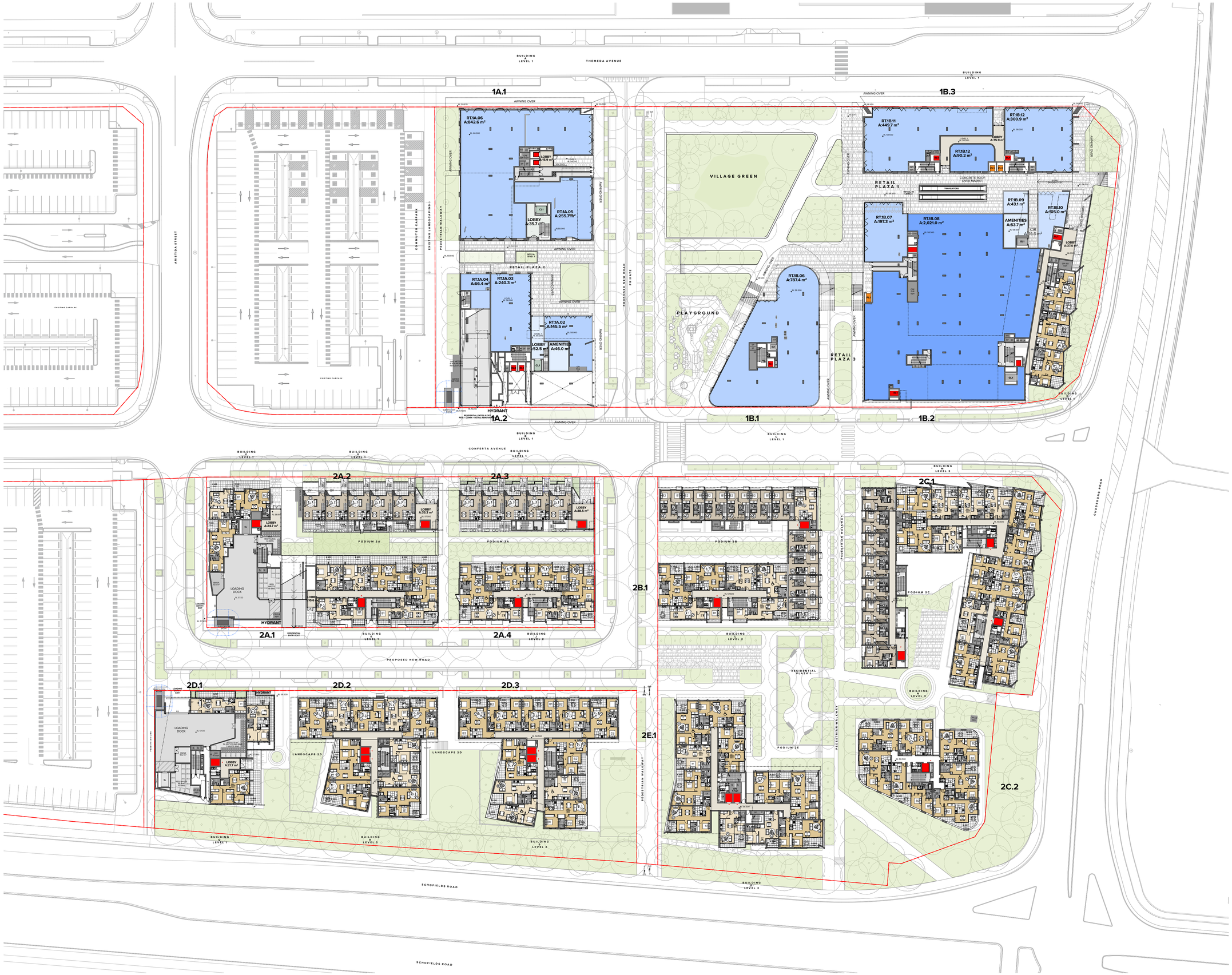

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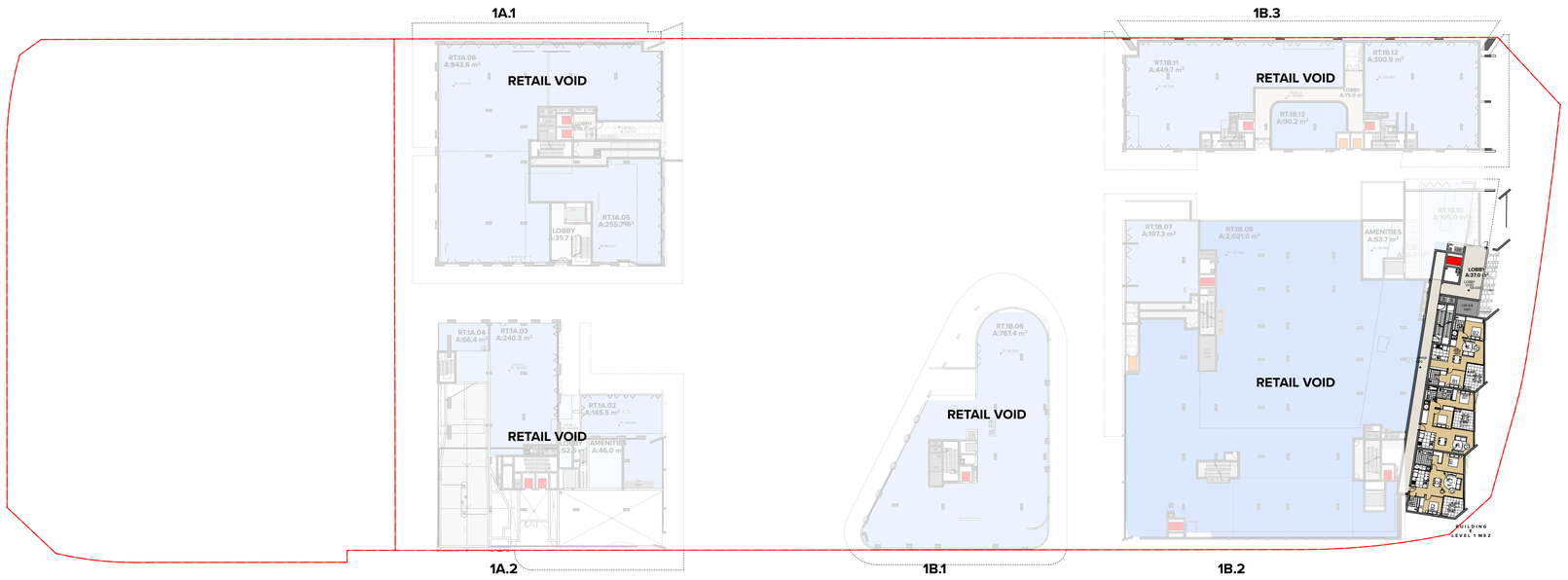

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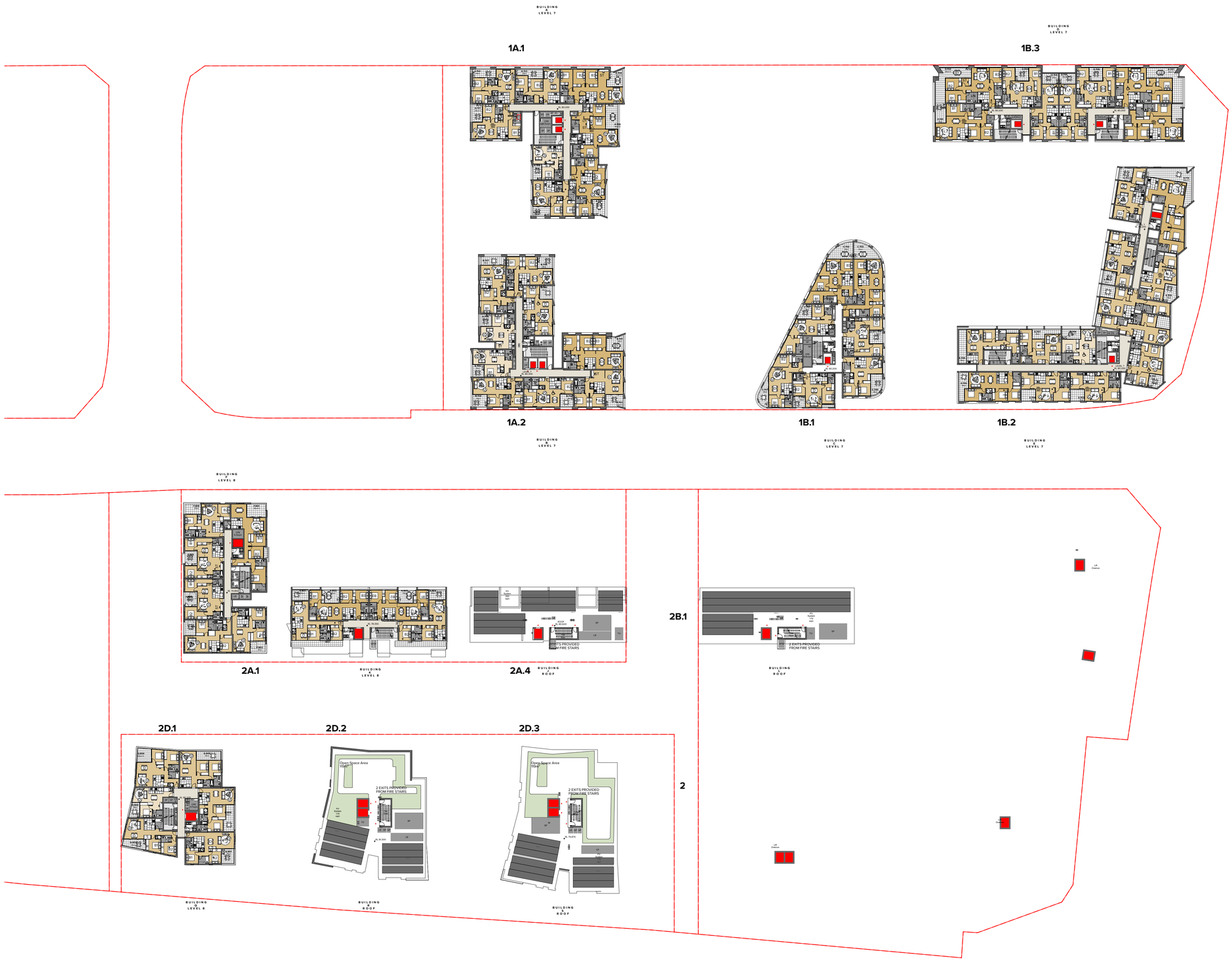

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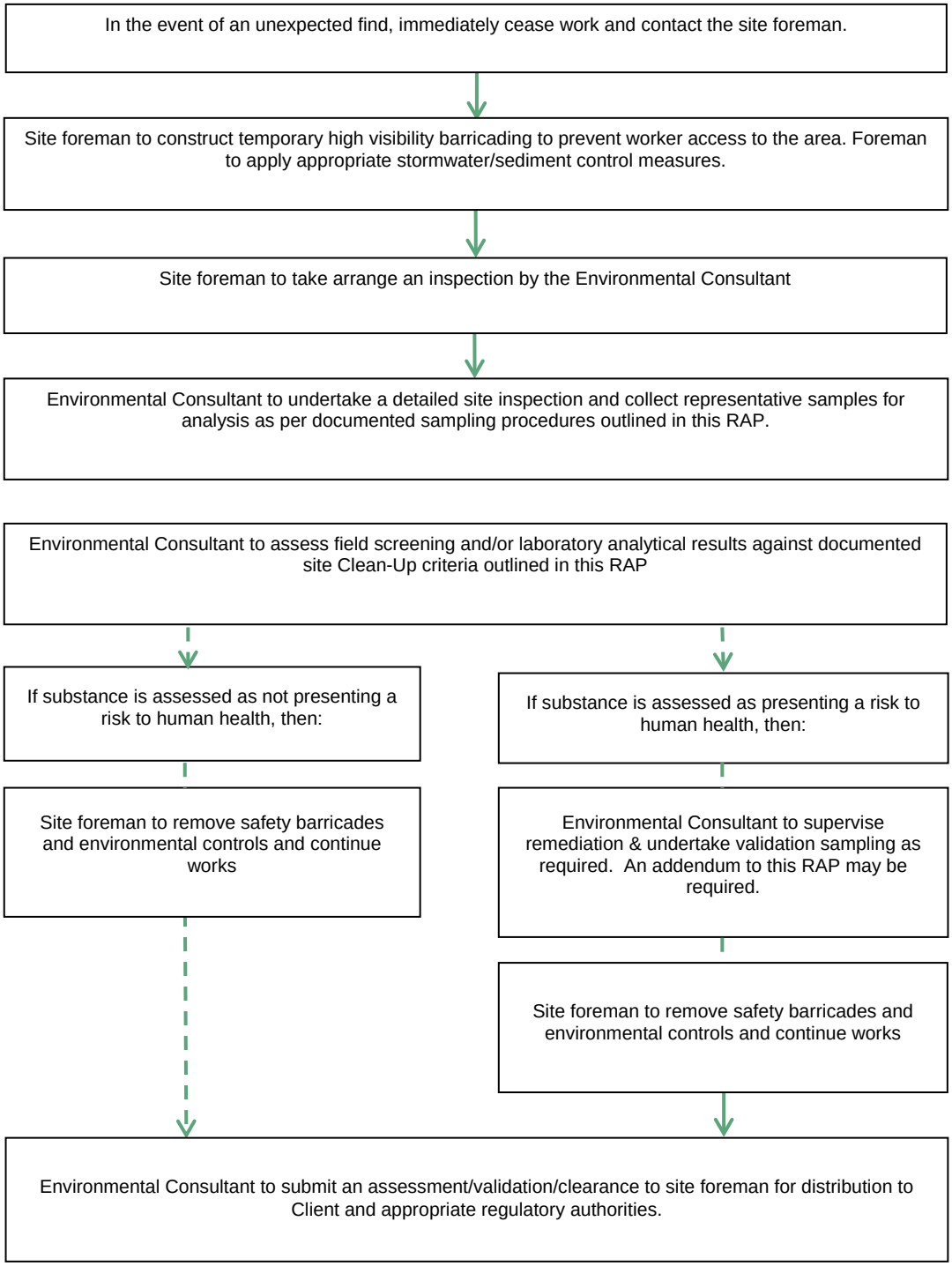
Appendix C – Unexpected Finds Protocol

Unexpected Finds Protocol



Appendix G
Noise and Vibration Management Plan

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Tallawong Station Precinct - Site 2

Construction Noise & Vibration Management Plan

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Project ID	20211446.7
Document Title	Construction Noise & Vibration Management Plan
Attention To	Deicorp Pty Ltd

Revision	Date	Document Reference	Prepared By	Checked By	Approved By
0	13/05/2022	20211446.7/1305A/R0/RF	RF		AW

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1 INTRODUCTION

Acoustic Logic has been engaged to prepare a Noise and Vibration Management Plan for the excavation and construction works associated with the Tallawong Station Precinct – Site 2 to satisfy Condition of Consent C20 for SSD 10425.

The issues which will be addressed in this report are:

- Identification of the noise and vibration standards which will be applicable to this project.
- Identification of potentially impacted nearby development.
- Identification of likely sources of noise and vibration generation and prediction of noise levels at nearby development.
- Formulation of a strategy to comply with the standards identified and mitigation treatments in the event that compliance is not achievable.

2 CONSENT CONDITIONS SSD 10425.

2.1 CONDITION C20

Construction Noise and Vibration Management Sub-Plan

Prior to the commencement of any earthwork or construction, the Applicant shall submit to the satisfaction of the Certifier a Construction Noise and Vibration Management Sub-Plan (CNVMP) for the development. A copy of the CNVMP must be submitted to the Planning Secretary and Council for information. The Sub-Plan must include:

(a) identification of the specific activities that will be carried out and associated noise sources at the premises;

(b) identification of all potentially affected sensitive residential receiver locations;

(c) quantification of the rating background noise level (RBL) for sensitive receivers, as part of the Sub-Plan, or as undertaken in the EIS;

(d) the construction noise, ground-borne noise and vibration objectives derived from an application of the EPA Interim Construction Noise Guideline (ICNG), as reflected in conditions of approval;

(e) prediction and assessment of potential noise, ground-borne noise (as relevant) and vibration levels from the proposed construction methods expected at sensitive receiver premises against the objectives identified in the ICNG and conditions of approval;

(f) where objectives are predicted to be exceeded, an analysis of feasible and reasonable noise mitigation measures that can be implemented to reduce construction noise and vibration impacts;

(g) description of management methods and procedures, and specific noise mitigation treatments/measures that can be implemented to control noise and vibration during construction;

(h) where objectives cannot be met, additional measures including, but not necessarily limited to, the following should be considered and implemented where practicable; reduce hours of construction, the provision of respite from noise/vibration intensive activities, acoustic barriers/enclosures, alternative excavation methods or other negotiated outcomes with the affected community;

(i) where night-time noise management levels cannot be satisfied, a report shall be submitted to the Planning Secretary outlining the mitigation measures applied, the noise levels achieved and justification that the outcome is consistent with best practice;

(j) measures to identify non-conformances with the requirements of the Sub-Plan, and procedures to implement corrective and preventative action;

(k) suitable contractual arrangements to ensure that all site personnel, including sub-contractors, are required to adhere to the noise management provisions in the Sub-Plan;

(l) procedures for notifying residents of construction activities that are likely to affect their noise and vibration amenity;

(m) measures to monitor noise performance and respond to complaints;

(n) measures to reduce noise related impacts associated with offsite vehicle movements on nearby access and egress routes from the site;

(o) procedures to allow for regular professional acoustic input to construction activities and planning; and

(p) effective site induction, and ongoing training and awareness measures for personnel (e.g. toolbox talks, meetings etc).

3 SITE DESCRIPTION

3.1 PROPOSED WORKS

The proposed mixed use development comprises five residential apartment towers, ground floor retail, playground area and a park.

Typical works are as follows:

- Civil Works
- Excavation
- Erection of building structure
- Façade Installation
- Landscaping
- Internal fit out of apartments.

3.2 HOURS OF WORK

The hours of work are specified in Part D of the Consent Conditions detailed below:

HOURS OF CONSTRUCTION

D3. Construction, including the delivery of materials to and from the site, may only be carried out between the following hours:

(a) between 7am and 6pm, Mondays to Fridays inclusive; and

(b) between 8am and 1pm, Saturdays.

D4. No work may be carried out on Sundays or public holidays.

D5. Activities may be undertaken outside of these hours if required:

(a) by the Police or a public authority for the delivery of vehicles, plant or materials; or

(b) in an emergency to avoid the loss of life, damage to property or to prevent environmental harm.

D6. Notification of such activities must be given to affected residents before undertaking the activities or as soon as is practical afterwards.

D7. Rock breaking, rock hammering, sheet piling, pile driving and similar activities may only be carried out between the following hours:

(a) 9am to 12pm, Monday to Friday;

(b) 2pm to 5pm Monday to Friday; and

(c) 9am to 12pm, Saturday.

3.3 RECEIVER LOCATIONS

Surrounding receiver locations as presented in Figure 1 and detailed below. These locations will be used as a basis for this assessment.

- **R1**: Tallawong Stage 1 development to the north.
- **R2**: Residential Receivers located along Schofields Road to the south.
- **R3**: Residential receivers located along Arrowroot Street to the south east.
- **R4**: Single Residential Receiver located at 28 Tallawong Road and 34 Cudgegong Road to the north.
- **T1**: Tallawong Metro Station to the north.
- Tallawong Switching Station is located to the east.

It is also noted that receiver R4 (located north of Tallawong Station) is also proposed to be developed in the near future. As such, it is likely that during all or part of the construction works proposed, these locations will either be vacant or under construction. Stage 1 of the development is also likely to still be under construction during the early works on site 2. In any case, potential noise impacts to these receivers have been considered as part of the assessment.

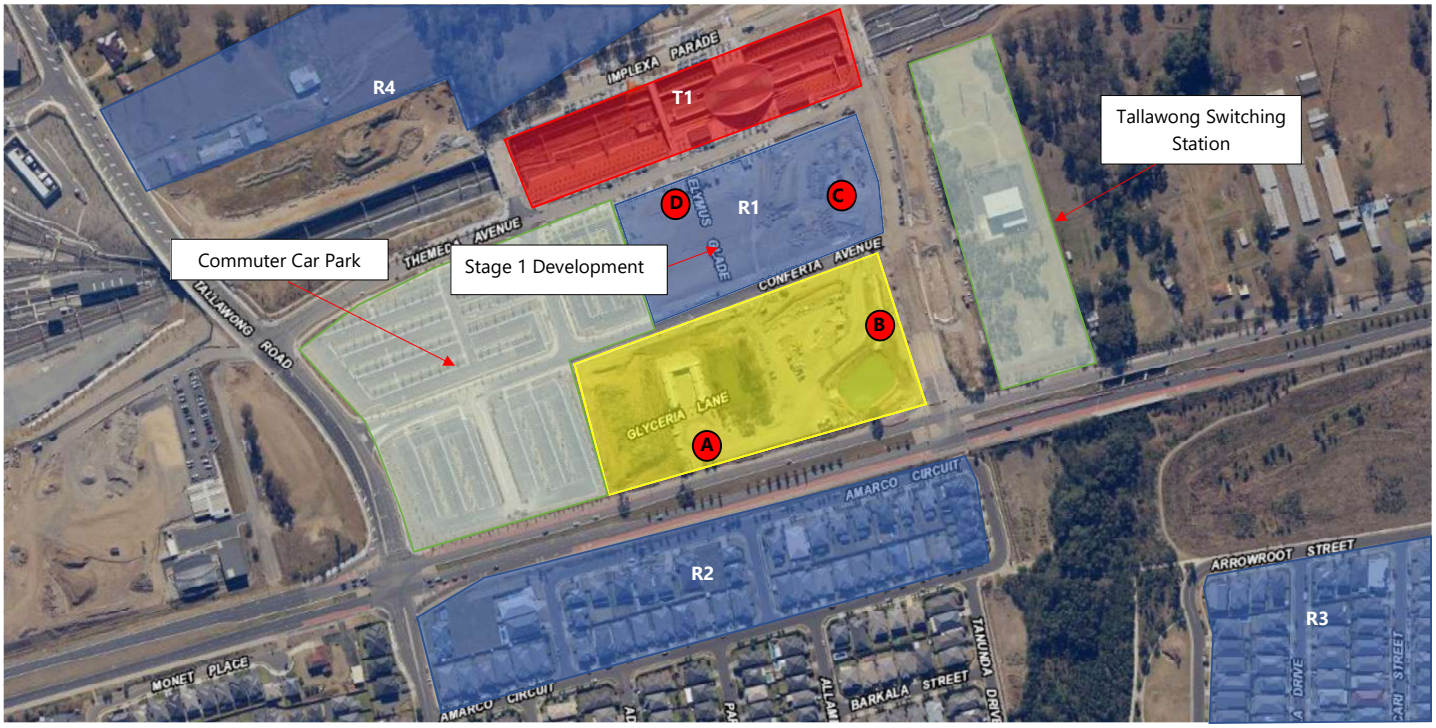


Figure 1 – Aerial Site Map

Source: Six Maps

Project Site

Tallawong Station

Residential Receiver

Unattended Noise Monitor Location

4 NOISE AND VIBRATION CRITERIA

4.1 NOISE

4.1.1 EPA Interim Construction Noise Guideline

The EPA Interim Construction Noise Guideline (ICNG) assessment requires:

- Determination of noise management levels (based on ambient noise monitoring).
- Review of operational noise levels at nearby development.
- If necessary, recommendation of noise controls strategies in the event that compliance with noise emission management levels is not possible.

EPA guidelines adopt differing strategies for noise control depending on the predicted noise level at the nearest residences:

- *"Noise affected" level*. Where construction noise is predicted to exceed the "noise effected" level at a nearby residence, the proponent should take reasonable/feasible work practices to ensure compliance with the "noise effected level". For residential properties, the "noise effected" level occurs when construction noise exceeds ambient levels by more than 10dB(A)$L_{eq(15min)}$.
- "*Highly noise affected level*". Where noise emissions are such that nearby properties are "highly noise effected", noise controls such as respite periods should be considered. For residential properties, the "highly noise effected" level occurs when construction noise exceeds 75dB(A)$L_{eq(15min)}$ at nearby residences.

In addition to the above management levels for residential receivers, the ICNG nominates a Management Level of 70dB(A) $L_{eq(15min)}$ at commercial receiver facades. This level will be applied for the adjacent switching station.

Unattended noise monitoring was conducted and detailed in the Koikas Acoustics report for the development (document ref: *3947R20200202jtTallawong StationPrecinctSouth_DAv3.docx, Version 3, dated 07/05/2020*). See **Figure 1** for noise monitor locations.

In order to establish management noise levels pertaining to the site, results of background noise monitoring are presented in the Table 1 below.

Table 1 – Measured Background Noise Levels, dB(A) L_{90}

Noise Monitor Location	Period / Time	Background Noise Level dB(A) L_{90}
A	Day (7am to 6pm)	50
B		46
C		43
D		41

A summary of the recommended noise levels from the ICNG is presented below in Table 2.

Table 2 – Noise Management Levels

Receiver Type	Affected Receiver	"Noise Affected" Level - dB(A)$L_{eq(15min)}$	"Highly Noise Affected" Level - dB(A)$L_{eq(15min)}$
Residential	R1	53	75
	R2	60	75
	R3	60	75
	R4	51	75
Commercial	Tallawong Switching Yard	70	-

If noise levels exceed the management levels identified in the tables above, reasonable and feasible noise management techniques will be reviewed.

4.2 VIBRATION

Vibration impacts on surrounding residential receivers will be assessed to the following documents:

- For structural damage vibration, German Standard DIN 4150-3 *Structural Vibration: Effects of Vibration on Structures; and*
- For human exposure to vibration, the acceptable vibration values set out in the Environmental Noise Management Assessing Vibration: a technical guideline (DEC, 2006).

Vibration impacts to the Tallawong Metro Station will be assessed with reference to TfNSW requirements detailed in condition A32, and other relevant guidelines and technical submissions relevant to rail infrastructure.

4.2.1 For Residential Receivers

4.2.1.1 Structure Borne Vibrations (Building Damage Criteria)

German Standard DIN 4150-3 (1999-02) provides vibration velocity guideline levels for use in evaluating the effects of vibration on structures. The criteria presented in DIN 4150-3 (1999-02) are presented in Table 4.

It is noted that the peak velocity is the value of the maximum of any of the three orthogonal component particle velocities as measured at the foundation, and the maximum levels measured in the x- and y-horizontal directions in the plane of the floor of the uppermost storey.

Table 3 – DIN 4150-3 (1999-02) Safe Limits for Building Vibration

TYPE OF STRUCTURE		PEAK PARTICLE VELOCITY (mms^{-1})			
		At Foundation at a Frequency of			**Plane of Floor of Uppermost Storey**
		< 10Hz	**10Hz to 50Hz**	**50Hz to 100Hz**	**All Frequencies**
1	Buildings used in commercial purposes, industrial buildings and buildings of similar design	20	20 to 40	40 to 50	40
2	Dwellings and buildings of similar design and/or use	5	5 to 15	15 to 20	15
3	Structures that because of their particular sensitivity to vibration, do not correspond to those listed in Lines 1 or 2 and have intrinsic value (e.g. buildings that are under a preservation order)	3	3 to 8	8 to 10	8

The surrounding educational buildings would be considered a Type 1 structure, whilst residences would be considered a Type 2 structure.

4.2.1.2 Assessing Amenity

The NSW EPA document "*Assessing Vibration: A Technical Guideline*" provides procedures for assessing tactile vibration and regenerated noise within potentially affected buildings and is used in the assessment of vibration impact on amenity.

Relevant criteria are presented below.

Table 4 – EPA Recommended Vibration Criteria

		RMS acceleration (m/s^2)		RMS velocity (mm/s)		Peak velocity (mm/s)	
Place	Time	Preferred	Maximum	Preferred	Maximum	Preferred	Maximum
Continuous Vibration							
Residences	Daytime	0.01	0.02	0.2	0.4	0.28	0.56
Offices		0.02	0.04	0.4	0.8	0.56	1.1
Workshops		0.04	0.08	0.8	1.6	1.1	2.2
Impulsive Vibration							
Residences	Daytime	0.3	0.6	6.0	12.0	8.6	17.0
Offices		0.64	1.28	13.0	26.0	18.0	36.0
Workshops		0.64	1.28	13.0	26.0	18.0	36.0

4.2.2 Vibration Impacts to Tallawong Metro Train Station

In the absence of specific vibration controls for construction impacts to the Tallawong Metro Station, the following guidelines have been referenced to provide guidance on appropriate criteria. The criteria nominated in the following section have been developed based on relevant Australian Standards and vibration criteria typically adopted by Transport for NSW with respect to damage to rail infrastructure.

The following documents have been utilised to form vibration emission goals at the location of the Stabling Yard.

- Australian Standard AS2187.2 (2006) – "Explosives – Storage and Use – Part 2: Use of Explosives";
- NSW Department of Planning document titled *"Development Near Rail Corridors and Busy Roads – Interim Guideline"*;
- Transport for NSW Standard *"External Developments"* (*Ref: T HR CI 12080 ST*).
- Transport for NSW Standard *"Development Near Rail Tunnels"* (*Ref: T HR CI 12051 ST*); and

These standards and their application at the site are discussed in the following sections.

4.2.2.1 Australian Standard AS2187.2 (2006) – Building Damage

Australian Standard AS2187.2 (2006) – "*Explosives – Storage and Use – Part 2: Use of Explosives*" presents vibration guide values to determine the effect of ground movement on structures. The values in AS2187.2 are directly reproduced from British Standard BS7385-2.

The guidelines are presented in the table below:

Table 3.2 AS 2187.2 (2006) - Guideline for Building Vibration

Line	Type of Building	Peak component particle velocity in frequency range of predominant pulse	
		4 Hz – 15 Hz	15 Hz and above
1	Reinforced or framed structures. Industrial and heavy commercial buildings	50 mm/s at 4 Hz and above	
2	Unreinforced or light framed structure. Residential or light commercial type buildings	15 mm/s at 4 Hz and above increasing to 20mm/s at 15 Hz	20 mm/s at 4 Hz and above increasing to 50mm/s at 40 Hz and above

Notes:
1. Values referred to are at the base of the building
2. For line 2, at frequencies below 4 Hz, a maximum displacement of 0.6 mm ZTP (zero to peak) should not be exceeded.

4.2.2.2 NSW Department of Planning Development Near Busy Roads and Rail Corridors – Interim Guideline

Part D of the NSW Department of Planning document *"Development Near Busy Roads and Rail Corridors – Interim Guideline"* outlines potential impacts of adjacent development on roads and railway. As there are no specific guidelines with regard to maximum vibration levels towards the rail corridor during construction, Transport for NSW standards have been used to assess recommended maximum vibration levels.

4.2.2.3 Transport for NSW External Developments (T HR CI 12080 ST)

Section 6.4 of the NSW Government document titled *"External Developments (Version 1.0)"* dated 5th February 2015 states the following with regard to noise and vibration levels from new development adjacent to rail infrastructure:

> *"The effects of noise and vibration from rail operations shall be considered in the design of the development. The noise from construction and rail operation shall be considered against statutory and project noise vibration limit requirements."*

4.2.2.4 Transport for NSW Development Near Rail Tunnels (T HR CI 12051 ST)

NSW Government Transport Asset Standards Authority Standard *Development Near Rail Tunnels* dated 15 November 2018 states*:*

> *Any development that occurs within a distance of 25 m horizontally from first reserve shall assess the vibration on the rail tunnels. The assessment criteria shall be a maximum peak particle velocity (PPV) of 15 mm/s at the tunnel lining for brick or mass concrete in good condition or a maximum PPV of 20 mm/s at the tunnel lining for cast iron, steel or concrete segment lining*

4.2.2.5 Summary of Vibration Criteria

consideration of the above guidelines, we note:

- AS2178.2 provides reference for the point at which vibration is likely to cause structural damage. Considering the disruption structural damage to the rail infrastructure would provide, vibration should be below this level at all times.
- The TfNSW guideline relating to train tunnels provides further guidance on an appropriate maximum level of vibration that is acceptable to buried rail assets (as opposed to on grade lines). This level is nominated as a maximum of 20mm/s PPV, which is consistent with the upper limits of AS2178.2.
- Based on the above, a maximum/stop work PPV vibration level of 15mm/s is considered acceptable to protect the light rail infrastructure.
    - A trigger/notification level is typically set below this maximum criterion to alert construction workers the maximum vibration limit is being approached - this is typically 25% lower than the maximum allowable vibration level, or 12mm/s PPV in this case.
    - If the nominated vibration levels are exceeded, the following should occur:
        - 12mm/s PPV – If this level is exceeded as a result of construction activities, a full review of the ongoing site activities and potential cause of exceedance is to be undertaken.
        - 17mm/s PPV - If this level is exceeded as a result of construction activities then work is to cease immediately.

Table 5 – Summary of Vibration Criteria

Scenario	Vibration Level
Trigger Level/Assessment Level	12 mm/s PPV
Stop Work Level	17 mm/s PPV

5 NOISE AND VIBRATION ASSESSMENT AND RECOMMENDATIONS

5.1 ACTIVITIES TO BE CONDUCTED AND THE ASSOCIATED NOISE LEVELS

Typically, the most significant sources of noise generated during a construction project will be demolition, excavation, civil works and piling. A summary of sound power levels of major construction processes/equipment is detailed in Table 5.

With respect to construction noise, the impact on nearby development will be dependent on the activity in question and where on the site the activity is undertaken. The primary construction equipment and sound power levels associated with the works are as follows:

Table 6 – Sound Power Levels (SWL) of Equipment

EQUIPMENT /PROCESS	SOUND POWER LEVEL dB(A)
Excavation	
Excavator with Bucket (up to 35 tonnes)	114
Angle Grinder	114
Rock Hammering	120*
Concrete Saw	115
Trucks (up to 12 tonnes)	100
Concrete Pump	107
Construction	
Electric Tower Crane	104
Trucks (up to 12 tonnes)	100
Large Trailers	116
Drilling	94*
Hammering (jackhammers)	120*
Angle grinders	114*
Power Saw	115*
Impact drill	110*
Concrete/Shortcrete Pump	107
Cement Mixing Truck	105

***Noise levels take into account correction factors for tonality where necessary).**

The noise levels presented in the above table are derived from the following sources:

1. Table D2 of Australian Standard 2436-1981 & Table A1 of Australian Standard 2436-2010; and
2. Data held by this office from other similar studies.

5.2 NOISE IMPACT ASSESSMENT

The predicted noise levels during excavation and construction will depend on:

- The activity undertaken; and
- The distance between the work site and the receiver. For many of the work areas, the distance between the noise source and the receiver will vary depending on which end of the site the work is undertaken. For this reason, the predicted noise levels will be presented as a range.

Predicted noise levels are presented in the tables below. Predictions take into account the noise reduction as a result of distance only.

Table 7 – Predicted Noise Generation to R1

Activity	Predicted Level – dB(A) $L_{eq(15min)}$ (External Areas)	Comment
Excavator with Bucket (up to 35 tonnes)	60-76	Exceeds Noise Management Level. Exceeds HANML when operating near receiver boundary. Refer Section 5.5 for recommendations
Angle Grinder	60-76	
Rock Hammering	69-85	
Concrete Saw	61-77	
Trucks (up to 12 tonnes)	46-62	Exceeds Noise Management Levels when operating near receiver boundary. Refer Section 5.5 for recommendations
Concrete Pump	53-69	
Electric Tower Crane	57	
Drilling	40-56	
Hammering (jackhammers)	66-82	Exceeds Noise Management Level. Exceeds HANML when operating near receiver boundary. Refer Section 5.5 for recommendations
Powered Hand Tools	56-72	Exceeds Noise Management Levels when operating near receiver boundary. Refer Section 5.5 for recommendations
Cement Mixing Truck	51-67	

Table 8 – Predicted Noise Generation to R2

Activity	Predicted Level – dB(A) $L_{eq(15min)}$ (External Areas)	Comment
Excavator with Bucket (up to 35 tonnes)	60-71	Exceeds Noise Management Level when operating near receiver boundary. Refer Section 5.5 for recommendations
Angle Grinder	60-71	
Rock Hammering	69-80	Exceeds Noise Management Level. Exceeds HANML when operating near receiver boundary. Refer Section 5.5 for recommendations
Concrete Saw	61-72	Exceeds Noise Management Level when operating near receiver boundary. Refer Section 5.5 for recommendations
Trucks (up to 12 tonnes)	46-57	Below Noise Management Level at all times
Concrete Pump	53-64	Exceeds Noise Management Level when operating near receiver boundary. Refer Section 5.5 for recommendations
Electric Tower Crane	54	Below Noise Management Level at all times
Drilling	40-51	
Hammering (jackhammers)	66-77	Exceeds Noise Management Level. Exceeds HANML when operating near receiver boundary. Refer Section 5.5 for recommendations
Powered Hand Tools	53-67	Exceeds Noise Management Level when operating near receiver boundary. Refer Section 5.5 for recommendations
Cement Mixing Truck	51-62	

Table 9 – Predicted Noise Generation to R3

Activity	Predicted Level – dB(A) $L_{eq(15min)}$ (External Areas)	Comment
Excavator with Bucket (up to 35 tonnes)	52-58	Below Noise Management Level at all times
Angle Grinder	52-58	
Rock Hammering	61-67	Exceeds Noise Management Level when operating near receiver boundary. Refer Section 5.5 for recommendations
Concrete Saw	53-59	Below Noise Management Level at all times
Trucks (up to 12 tonnes)	38-44	
Concrete Pump	45-51	
Electric Tower Crane	44	
Drilling	32-38	
Hammering (jackhammers)	58-64	Exceeds Noise Management Level when operating near receiver boundary. Refer Section 5.5 for recommendations
Powered Hand Tools	48-54	Below Noise Management Level at all times
Cement Mixing Truck	43-49	

Table 10 – Predicted Noise Generation to R4

Activity	Predicted Level – dB(A) $L_{eq(15min)}$ (External Areas)	Comment
Excavator with Bucket (up to 35 tonnes)	54-60	Exceeds Noise Management Level when operating near receiver boundary. Refer Section 5.5 for recommendations
Angle Grinder	54-60	
Pneumatic Hammering	63-69	
Concrete Saw	55-61	
Trucks (up to 12 tonnes)	40-46	Below Noise Management Level at all times
Concrete Pump	47-53	Marginal exceedance of Noise Management Level when operating near receiver boundary. Refer Section 5.5 for recommendations
Electric Tower Crane	47	Below Noise Management Level at all times
Drilling	34-40	
Hammering (jackhammers)	60-66	Exceeds Noise Management Level when operating near receiver boundary. Refer Section 5.5 for recommendations
Powered Hand Tools	50-56	
Cement Mixing Truck	45-51	Below Noise Management Level at all times

Table 11 – Predicted Noise Generation to Switching Station

Activity	Predicted Level – dB(A) $L_{eq(15min)}$ (External Areas)	Comment
Excavator with Bucket (up to 35 tonnes)	60-74	Marginal exceedance of NAML when operating close to the boundary
Angle Grinder	60-74	
Pneumatic Hammering	69-83	Generally Exceeds NAML, below HNAML at all times
Concrete Saw	63-74	Marginal exceedance of NAML when operating close to the boundary
Trucks (up to 12 tonnes)	46-60	Below NAML at all times
Concrete Pump	53-67	
Electric Tower Crane	53	
Drilling	40-54	
Hammering (jackhammers)	66-80	Generally Exceeds NAML, below HNAML at all times
Powered Hand Tools	56-70	Below NAML at all times
Cement Mixing Truck	51-65	

5.3 DISCUSSION – NOISE

It is expected that the proposed construction works would generally be below the highly noise affected management level at all times, other than a marginal exceedance for one set of receivers when operating close to the southern boundary. Activities expected to exceed the noise affected management level are generally restricted to heavy works such as hammering, concrete sawing and grinding which are typically limited to the excavation and structural phases of the project.

Noise impacts to surrounding receivers is expected during this time, however we note the following:

- Concrete truck/pumping activities are intended to be scheduled, and as such a notification process will be possible to assist surrounding receivers to manage noise impacts.
- The duration of the excavation and structural works of the development will be of a relatively short duration. Once complete, noise impacts from general construction activities are expected to be reduced.

The majority of works required during general construction (which will be of a longer duration) are generally below the noise affected management level.

5.4 DISCUSSION - VIBRATION

Typically, excavation in rock or vibrated piling are the activities with the greatest potential for generation of vibration. It is recommended that vibration monitoring be undertaken representative of impacts to the Tallawong Metro station and the eastern boundary respectively. Section 5.6 addresses the vibration monitoring proposal for the site.

5.5 RECOMMENDATIONS

In light of the above, we recommend:

- The scheduling of construction activities should be undertaken to reasonably minimise noise impacts to all surrounding land uses.
    - In this regard, rock breaking or rock hammering should be limited to the times identified in condition D7.
- Community consultation/notification - Notification (leaflet or similar) of nearby residents is recommended, detailing the duration of excavation works and schedule of planned concrete pours.
- Materials handling/vehicles:
    - vehicles not to idle outside of site prior to working hours
    - Access routes to and from site should be planned to minimise noise impact on nearby residential receivers.
    - Trucks and bobcats to use a non-tonal reversing beacon (subject to OH&S requirements) to minimise potential disturbance of neighbours.
    - Avoid careless dropping of construction materials into empty trucks.
    - Trucks, trailers and concrete trucks (if feasible) should turn off their engines during idling to reduce noise impacts (unless truck ignition needs to remain on during concrete pumping).
- Vibration monitoring is recommended at the southern and eastern boundaries of the site. Refer to Section 5.6 for further detail.

- Complaints handling:
  - An after hours contact number is displayed outside of the building site, so that in the event that surrounding development believes that a noise breach is occurring, they may contact the site.
  - In the event of complaint, the procedures outlined in Section 8 are to be adopted. Additional methods of control of construction noise and additional noise control measures which may be adopted by the site are detailed in Sections 6 and 7.
  - In the event of strong community reaction to construction noise, or complaint from a specific receiver, attended noise measurements may be required to quantify the levels of construction noise at identified locations. The measured levels are to be compared to the relevant management levels, and where exceedances are identified a review of the reasonable and feasible measures in place to be undertaken to further mitigate noise impacts.

5.6 VIBRATION MONITORING

5.6.1 Vibration Monitoring Equipment

Vibration monitoring is to be conducted using Texcel ETM type monitors with externally mounted tri-axial geophones. The geophones will be located as close as practicably possible to the location of the sensitive structure. It is noted that the location of the monitor may need to be placed within the site in question due to security risks.

The monitors are to be set to send an SMS message when alert levels have been exceeded at the location of the geophone.

5.6.2 Vibration Monitoring Locations

Vibration monitoring is recommended when rock hammering is required to be undertaken (generally limited to the excavation stage of the project) at the following locations:

- Eastern boundary of site – representative of the switching station.
- Southern boundary of site – representative of worst affected residents.

In the event that ongoing construction activities are considerably below the relevant vibration levels, it is recommended that vibration monitoring requirements for the project be reviewed with the relevant stakeholders.

5.6.3 Vibration Monitoring Results

The ETM vibration monitors can be downloaded remotely to actively review all monitoring data recorded at the monitoring location, including any vibration events found to exceed the trigger levels nominated in Section 4.2..

In the event multiple events exceeding the nominated trigger levels are recorded, all data recorded by the monitor is to be reviewed and forwarded to a nominated representative of the building contractor. It is proposed that reports are provided regular intervals, with any exceedance in the nominated vibration criteria documented.

5.6.4 Vibration Monitoring Alerts

The following personnel will receive alarms in the event that the nominated vibration trigger levels are exceeded at the site:

1. Acoustic consultant/advisor;
2. Excavation site foreman;
3. The superintendent and any other representative nominated by the project superintendent.

5.6.5 Additional Recommendations

Should ongoing measurements of excessive vibration criteria occur (or in the event trigger levels are exceeded) immediate measures shall be undertaken to investigate the cause of the exceedance and identify the required changes to work practices.

In the case of exceedances of the vibration limits all vibration intensive equipment shall cease until the exceedance is investigated.

The effectiveness of any changes shall be verified before continuing. Documentation and training of site staff shall occur to ensure the practices that produced the exceedances are not repeated.

All repeated exceedances of the trigger level should be fully investigated and reported to management. The investigation of a complaint shall involve where applicable:

- Measurement of vibration at the affected location;
- An investigation of the activities occurring at the time of the incident;
- Inspection of the activity to determine whether any undue vibration is being emitted by equipment/activity; and
- Whether work practices were being carried out either within established guidelines or outside these guidelines.

Where an activity is found to be emitting excessive vibration, the cause is to be rectified as soon as possible.

5.6.6 Contingency Plans

The following course of action is recommended to address situations where vibration exceeding recommended levels are recorded at the site.

Selection of Alternate Equipment or Process

Where an activity is found to generate excessive vibration levels, it may be possible to select an alternative approach or appliance. For example; the use of a hydraulic hammer on certain areas of the site may potentially generate high levels of vibration. By replacing this activity with the use of pneumatic hammers, bulldozers ripping and/or milling machines; the result will be a reduction of vibration at the vibration sensitive rail line.

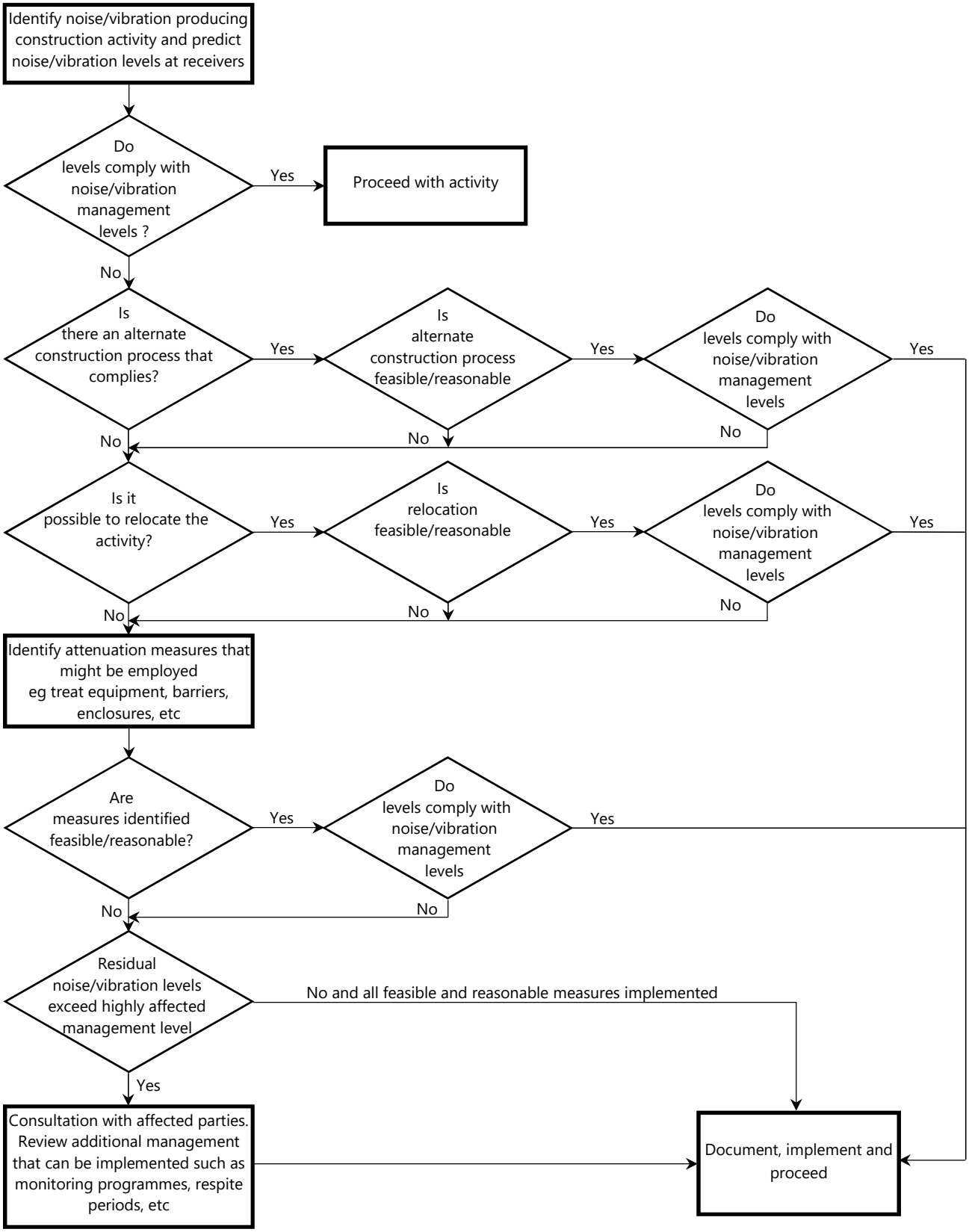
The use of saw cutting equipment to break the ridged connection between areas of rock being excavated and vibration sensitive structure is also an effective way to significantly reduce the transfer of vibration.

Additional Vibration Monitoring

Additional attended vibration monitoring measurements can be undertaken to determine the effectiveness of measures which have been implemented. The results of monitoring can be used to devise further control measures and identify vibration generating activity.

6 CONTROL OF CONSTRUCTION NOISE AND VIBRATION – PROCEDURAL STEPS

The flow chart presented below illustrates the process that will be followed in assessing construction activities.



7 ADDITIONAL NOISE AND VIBRATION CONTROL METHODS

In the event of complaints, there are a number of noise mitigation strategies available which can be considered.

The determination of appropriate noise control measures will be dependent on the particular activities and construction appliances. This section provides an outline of available methods.

7.1 SELECTION OF ALTERNATE APPLIANCE OR PROCESS

Where a particular activity or construction appliance is found to generate excessive noise levels, it may be possible to select an alternative approach or appliance. For example; the use of a hydraulic hammer on certain areas of the site may potentially generate high levels of noise. Undertaking this activity using bulldozers, ripping and/or milling machines will result in lower noise levels.

7.2 ACOUSTIC BARRIER

The placement of barriers at the source is generally only effective for static plant. Equipment which is on the move or working in rough or undulating terrain cannot be effectively attenuated by placing barriers at the source.

Barriers can also be placed between the source and the receiver.

The degree of noise reduction provided by barriers is dependent on the amount by which line of sight can be blocked by the barrier. If the receiver is totally shielded from the noise source reductions of up to 15dB(A) can be effected. Where only partial obstruction of line of sight occurs, noise reductions of 5 to 8dB(A) may be achieved. Where no line of sight is obstructed by the barrier, generally no noise reduction will occur.

As barriers are used to provide shielding and do not act as an enclosure, the material they are constructed from should have a noise reduction performance that is approximately 10dB(A) greater than the maximum reduction provided by the barrier. In this case the use of a material such as 10mm or 15mm thick plywood (radiata plywood) would be acceptable for the barriers.

7.3 MATERIAL HANDLING

The installation of rubber matting over material handling areas can reduce the sound of impacts due to material being dropped by up to 20dB(A).

7.4 TREATMENT OF SPECIFIC EQUIPMENT

In certain cases it may be possible to specially treat a piece of equipment to dramatically reduce the sound levels emitted.

7.5 ESTABLISHMENT OF SITE PRACTICES

This involves the formulation of work practices to reduce noise generation. A more detailed management plan will be developed for this project in accordance to the construction methodology outlining work procedures and methods for minimising noise.

A copy of the CNVMP should be made available at the site office and included as part of site induction. Management to ensure ongoing awareness of requirements of CNVMP is maintained.

7.6 ACOUSTIC ADVICE

Ongoing consultation with project acoustic consultant is recommended to ensure noise and vibration objectives are achieved and to provide advice regarding noise and vibration mitigation where objective cannot be met.

7.7 COMBINATION OF METHODS

In some cases it may be necessary that two or more control measures be implemented to minimise noise.

8 DEALING WITH COMPLAINTS

Should ongoing complaints of excessive noise or vibration criteria occur immediate measures shall be undertaken to investigate the complaint, the cause of the exceedances and identify the required changes to work practices.

If a noise complaint is received the complaint should be recorded. Any complaint form should list:

- The name and address of the complainant (if provided);
- The time and date the complaint was received;
- The nature of the complaint and the time and date the noise was heard;
- The name of the employee who received the complaint;
- Actions taken to investigate the complaint, and a summary of the results of the investigation;
- Required remedial action, if required;
- Validation of the remedial action; and
- Summary of feedback to the complainant.

A permanent register of complaints should be held.

9 CONCLUSION

An assessment of noise from construction works associated with Tallawong Station Precinct – Site 2 has been presented within this report to satisfy Condition Consent C20 for SSD 10425.

Potential noise and vibration impacts on nearby development have been assessed. Provided that the mitigation techniques recommended in sections 5.5, 5.6, 6, 7 & 8 of this report are adopted, noise and vibration impacts on the adjacent buildings are expected to be acceptable.

Please contact us should you have any further queries.

Yours faithfully,

Acoustic Logic Pty Ltd
Ross Ferraro

Appendix H
Dewatering Management Plan