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Deicorp Projects (Tallawong Station) Pty Ltd

Construction Environmental Management Plan

Tallawong Station Precinct South – Site 2

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1 Introduction

This Construction Environmental Management Plan (CEMP) has been prepared in accordance with the requirements of SSD 10425 Condition C18 for the approved mixed-use development at Tallawong Station Precinct South Site 2.

This CEMP has been prepared to outline the excavation and building process for the proposed development and how the builder and contractors will manage potential impacts caused by the demolition, excavation and building works.

This CEMP is to be adjusted as required by the builder/contractor during the progress of works. Where this plan conflicts with the requirements of the builder/contractors Safe Work Method Statements (SWMS) or Work Health and Safety (WHS) Policy then the SWMS's and WHS and their safety and environmental obligations of the builder/contractors shall override this CEMP.

The CEMP includes a description of the project, outlines the process and addresses mitigation measures relating to the potential impacts of construction on the environment and the public, including noise and vibration, air pollution, water pollution, waste and recycling measures and traffic management.

Condition Requirement	Comment
CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN *C18. Prior to the commencement of any earthwork or construction, a Construction Environmental Management Plan (CEMP) shall be submitted to the Certifying Authority. The CEMP shall address, but not be limited to, the following matters where relevant:* *(a) Details of:*	
(i) hours of work	Refer to Section 7 – Operating Hours.
(ii) 24 hour contact details of site manager and details of complaint handling	Refer to Section 2.3 – Construction Contacts.
(iii) traffic management	Refer to the Construction Pedestrian and Traffic Management Plan attached in Appendix E.
(iv) construction noise and vibration management, prepared by a suitably qualified person	Refer to Noise and Vibration Management Plan attached in Appendix G.
(v) management of dust to protect the amenity of the neighbourhood	Refer to Section 9.4 – Air and Dust Management.
(vi) erosion and sediment control	Refer to Soil and Water Management Plan attached in Appendix C and discussion in Section 10 -Soild and Water Management.
(vii) measures to ensure that sediment and other materials are not tracked onto the roadway by vehicles leaving the Site	Refer to Section 10 – Soil and Water Management.
(viii) works in accordance with any remedial works plan	Refer to the Remedial Action Plan prepared by eiaustralia and attached in Appendix F for further information.
(ix) air quality management including issues associated with odour, minimising dust on site and prevention of dust from leaving the site during construction works incorporation of all acoustic management and treatments.	Refer to Section 9.4 – Air and Dust Management and the Air Quality Management Plan attached in Appendix B.
(b) Construction Traffic and Pedestrian Management Sub-Plan	Refer to Appendix E – Construction Pedestrian and Traffic Management Plan.

(c) Construction Noise and Vibration Management Sub-Plan	Refer to Appendix G – Noise and Virbration Management Plan.
(d) Air Quality Management Sub-Plan	Refer to Appendix B – Air and Dust Management Plan.
(e) Construction Waste Management Sub-Plan	Refer to Appendix D – Construction Waste Management Plan.
(f) Construction Soil and Water Management Sub-Plan	Refer to Appendix C – Soil and Water Management Plan
(g) an unexpected finds protocol for contamination and associated communications procedure	Refer to Section 12.1 – Unexpected Finds Protocol, Contamination.
(h) an unexpected finds protocol for Aboriginal and non-Aboriginal heritage and associated communications procedure	Refer to Section 12.2 – Unexpected Finds Protocol, Aboriginal and European Heritage.
(i) waste classification (for materials to be removed) and validation (for materials to remain) be undertaken to confirm the contamination status in these areas of the site.	Refer to Remediation Action Plan in Appendix F.

2 Project Overview

2.1 Existing Development

The site is currently undeveloped with existing vegetation cleared.

2.2 Approved Development

A State Significant Development (SSD 10425) application has been approved by the NSW Department of Planning, Industry and Environment for the excavation and construction of a mixed-use precinct comprising the development outlined in the table below.

Land Use		Yield
Residential	1 Bedroom	252 units
	2 Bedroom	682 units
	3 Bedroom	53 units
	Total	**987 units**
Retail		6,000m²
Commercial		3,000m²

The development also includes construction of new roads and public open space elements as provided in the approved Architectural Plans.

The location of the site is shown below in Figure 2.1.

Figure 2.1: Locality Plan Showing the Site of the Full Development

2.3 Construction Contacts

Details of 24 hour site management are provided in the table below.

Name	Construction Role	Contact Number
Grant Madsen	Project Manager	0421 078 360
Carl Hely	Site Manager	0418 216 583

3 Project Staging and Program

3.1 Project Staging

This CEMP covers the excavation, shoring and the construction of the Tallawong Station Precinct South Site 2.

Stage 1 relates to Site 1 of the development. Site 2 will be constructed in four stages as outlined below.

- Stage 2 involves the construction and dedication of public roads and footpaths
- Stage 3 includes the construction of Site 2A, the north-west tower.
- Stage 4 includes the construction of Site 2D, the south-west tower.
- Stage 5 is the concurrent construction of Site 2B, C and E, the remaining towers.

This CEMP addressed the life cycle of the development including excavation through to the construction of a mixed-use precinct comprising of residential apartments, commercial and retail space, basement parking spaces and associated facilities.

These stages are outlined in *Figure 3.1* below.

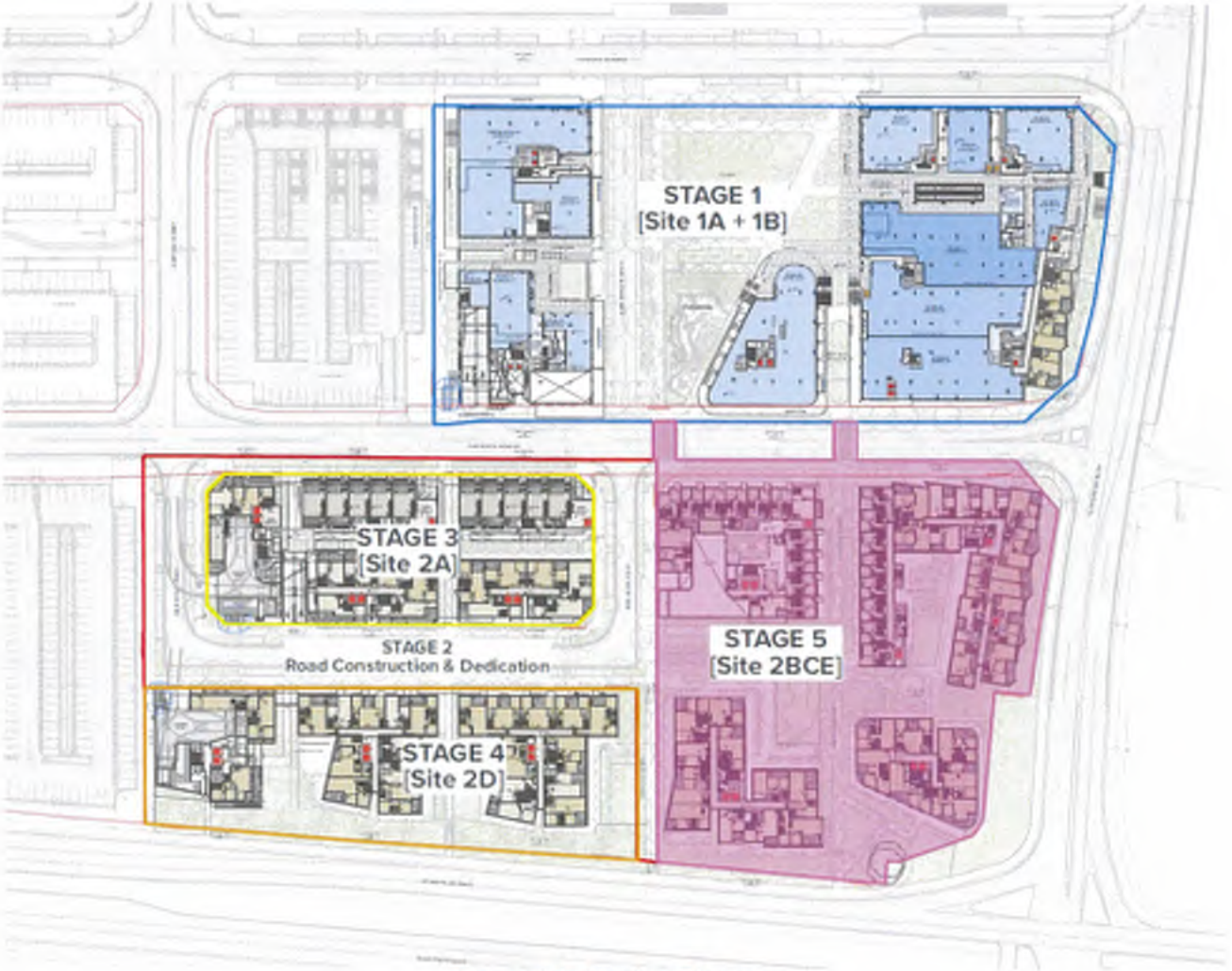


Figure 3.1: Staging Diagram

3.2 Project Program

The project duration for the excavation and building works are outlined below:

STAGE	ESTIMATED START DATE	ESTIMATED END DATE	ESTIMATED DURATION
Stage 2 Road construction works	09/05/2023	17/06/2023	1 - 2 months
Stage 3 Excavation	30/07/2022	08/02/2023	6 - 7 months
Stage 3 Building Works	25/01/2023	15/04/2024	15 - 16 months
Stage 4 Excavation	06/10/2022	09/05/2023	7 months
Stage 4 Building Works	21/ 04 /2023	13/ 07/ 2024	15 - 16 months
Stage 5 Excavation	30/07/2022	09/05/2023	6 - 7 months
Stage 5 Building Works	25/01/2023	15/04/2024	15 - 16 months

It is noted that the estimations of traffic and truck generation includes the concurrence and overlap occurring.

3.3 Building and Construction Works

All excavation and building works are to be undertaken in accordance with the SSD 10425 conditions of development consent.

The following items summarise the aspects of the excavation and building works that need to be considered in relation to the application of this Construction Management Plan;

- All construction vehicles enter and exit the site via site entry gates, as shown in the site management plans in **Appendix A.**
- Construction Traffic is managed to minimise the impact on the local residents in the vicinity of the site.
- The proposed crane, hoist and landing platform locations are shown on the Site Management Plans in **Appendix A.**
- A combination of Heavy Rigid Vehicles (HRV) and Truck and Dog (Articulated) will be used to export approximately 380,000m³ of excavated material from the site, with a combined length of 12.5m - 17m. The swept paths are shown in the Construction Pedestrian and Traffic Management Plan in **Appendix E.**
- Cranes and other machines will be floated on HRV's, which are approximately 12.5m in length.
- The cranes are to be located as shown on the Crane Location Plan at **Appendix B.**
- The estimated maximum heavy vehicle movements (at peak time) is approximately 50 per day.
- Waste materials are to be removed off site and recycled where possible to approved facilities.
- The Deicorp building team will have approximately 5 crew members onsite during each excavation stage and up to 10 crew members during the building works at any one time.
- There will be approximately 20 personnel onsite during excavation. There will be approximately 1 principal building contractor onsite at any one time to undertake the building works. Daily averages will be in the vicinity of approximately 250 people during the building works.
- It is anticipated that stockpile sites are not required as the material will be progressively loaded and removed from site on a daily basis.

- One shaker pad for each site will be constructed at both site egress points in Conferta Avenue for erosion sediment control.
- Waste and recycling containers are to be located within storage area shown in the Construction Waste Management Plan in **Appendix D**.
- The majority of concrete pumping is to be from within the site at the locations shown on the site plan at **Appendix A.**
- All excavation and building works are to be undertaken in accordance with the conditions of development consent once it is issued.
- The estimated time frame to complete the excavation works is 6 - 8 months per stage (refer to page 7).
- The estimated time frame to complete the building works is 14 - 24 months (refer to page 7).
- All construction vehicles enter and exit the site via approved entry points, as shown in the site management plan in **Appendix A**.
- Construction traffic is managed to minimise the impact on the users of the existing Tallawong Station car parks in the vicinity of the site.
- The proposed crane, hoist and landing platform locations are shown on the Site Management Plan in **Appendix A**.

4 Construction Staff, Amenities and Machinery

The excavation and building sites require detailed management of staff, facilities and services. It is important to understand the number and type of staff on site to ensure appropriate facilities, services, parking and training is provided.

The follow table outlines potential issues and the measures adopted by the builders, contractors and construction workers to ensure an adequate and safe working environment for staff.

4.1 Construction Staff and Amenities

POTENTIAL ISSUE	CONTROL MEASURES	TIMING	OFFICER
Staff numbers	**Staff – Site 2 - Stages 2 - 5 Early Works** • Approximately 2 Deicorp staff will be onsite during each stage of demolition and excavation works. • Approximately 4 building contractor's staff will be onsite during each stage of demolition and excavation works **Staff – Site 2 – Stages 2 -5 Building Works** • Approximately 7 Deicorp staff will be onsite during each stage of building works. • Approximately 120 -250 building contractor's staff will be onsite during each stage of building works.	Ongoing	Supervisor
Provide sufficient amenities for both male and female staff	**Staff Amenities – Site 2 Stages 2 - 5** • Each stage will be provided with suitable on-site staff amenities (refer to the Site Management Plan at Appendix A). • The staff amenities block will include the main office, meeting rooms, induction room, office toilet amenities, first aid facilities and a lunch room.	Ongoing	Supervisor
Construction Car Parking Strategy	**Staff parking – Site 2 Stages 2 - 5** • Where possible construction workers will park in areas located on site and/or in designated offsite areas in accordance with the Construction Pedestrian and Traffic Management Plan at **Appendix E**.	Ongoing	Supervisor
Ongoing supervision	**Measurement and Monitoring** • Monitoring of the staff amenities cleanliness, security, etc to ensure their effectiveness, safety and compliance is to be carried out by the Supervisor and recorded in the weekly Inspection.	Ongoing	Supervisor

4.2 Construction Machinery

POTENTIAL ISSUE	CONTROL MEASURES	TIMING	OFFICER
Location, operation and security of cranes	**Crane location** • The crane location is shown on the Site Management Plan at Appendix A. • The tower crane and hoist area is to be secured with fencing. • All crane operators are to have undertaken training with appropriate accreditation in the use of the cranes.	Ongoing	Supervisor
Use of machinery resulting in a negative impact on neighbouring properties	**Machinery** • Unloading of machinery to occur within the site accessed from the designated loading area as shown on the Site Management Plan at Appendix A. • The machinery will be secured during non-operating times. • All staff are to have undertaken training with appropriate accreditation in the use of the machinery. • When using cranes or mobile lifting equipment, the following steps are to be taken to prevent disruption to public areas: o Ensure equipment does not restrict public thoroughfares and pedestrian access or, where restricted access is unavoidable, use gantries or other overhead protection o Determine lifting zones for medium to long term use of the equipment o Protect pavements and streets and conduct dilapidation surveys before and after works have taken place o Implement procedures and lifting techniques to ensure safety on adjoining streets and footpaths o Use traffic management controls and signage.	Ongoing	Supervisor
Concrete pumping location	**Concrete pumping** • Concrete pumping for the works will be commonly pumped from on site or the construction/work zone.	Ongoing	Supervisor
Ongoing supervision	**Measurement and Monitoring** • Monitoring of the crane, hoist and concrete pouring facilities to ensure their effectiveness, safety and compliance is to be carried out by the Supervisor and recorded in the daily and weekly Inspection.	Ongoing	Supervisor

5 Construction Pedestrian and Traffic Management

Appropriate access to and from the site by staff, contractors, deliveries and the general public is to be managed through the implementation of a Construction Pedestrian and Traffic Management Plan (see Appendix E).

The follow table summarises the potential issues and how they are to be controlled.

IMPACT	CONTROL MEASURES	TIMING	OFFICER
Increased traffic congestion	**Construction Pedestrian and Traffic Management Plan** • Refer to Construction Pedestrian and Traffic Management Plan at Appendix E for measures to address increase traffic in the local road network.	Ongoing	Supervisor
Construction Car Parking Strategy	**Staff/Contractors Car Parking** • Construction workers will park on-site and use Metro Train services and/ or other local public transport options. Staff and contractor parking is not to occur within the commuter car parks or the residential areas to the south of Schofields Road.	Ongoing	Supervisor
Altered traffic conditions	**Control Measures** • A range of traffic control measures will be implemented to provide safe movement of traffic. • Public road use by vehicles is to be maintained with minimal disruptions. • Pedestrian and cyclist routes are to be maintained at all times unless otherwise approved by Council/ Authorities. • Truck control on the site and surrounding streets will be signed to control operation. • RMS accredited traffic controllers are to manage the traffic in accordance with the requirements of the Traffic Control Plans at Appendix E.	Ongoing	Supervisor and RMS accredited traffic controllers
Vehicular queueing at entrances	**Access** • RMS accredited traffic controllers are to manage the traffic in accordance with the requirements of the Traffic Control Plans at Appendix E. • Access into and out of the site will be via the designated entrance, refer to Appendix E, Construction Pedestrian and Traffic Management Plan. • Adjacent public roads will be maintained free of construction material. • Loaded trucks leaving the site will have tray covers and tailgates closed to prevent dust during transport.	Ongoing	Supervisor and RMS accredited traffic controllers
Limited access and parking impacting on pedestrian and vehicle traffic on the local road network and Tallawong Station car parks	**General Public** • No general admission will be provided during the works. • Appropriate fencing and gates will be provided to restrict access. • Pedestrians will be protected by construction fencing (or similar) in the locations shown on the site management plans in Appendix A.	Ongoing	Supervisor
Reduced safety due to altered traffic conditions and increased rates of heavy vehicles	**Safety** • RMS accredited traffic controllers are to manage the traffic in accordance with the requirements of the Traffic Control Plan. • Loading and unloading is to be undertaken on site or within the construction/loading zone.	Ongoing	Supervisor and RMS accredited traffic controllers

IMPACT	CONTROL MEASURES	TIMING	OFFICER
	• The use of mobile phones will be banned on site whilst operating machinery.		
Dispersal of dust from site	**Cleanliness** • Shaker pad on exit will be maintained to ensure wheel cleanliness. • The roads surrounding the site shall be regularly swept to ensure pavements are kept clean and safe.	Ongoing	Supervisor
Staff movements impact traffic and parking on the local road network	**Construction workers parking** • Construction workers will park on-site and use Metro Train services and/ or other local public transport options. Staff and contractor parking is not to occur within the commuter car parks or the residential areas to the south of Schofields Road.	Ongoing	Supervisor
Regular deliveries impacting traffic and safety on the local road network.	**Delivery of goods and materials** • Construction vehicles will enter the site via Conferta Avenue (See Appendix A). • Loading and unloading will occur on site in the hoist location shown on the Site Management Plan (See Appendix A).	Ongoing	Supervisor
Increased traffic congestion impacting movements into and out of the neighbouring properties	**Adjacent properties** • Appropriate traffic management procedures will be in place to minimise the impact of increased traffic and queueing vehicles on neighbouring properties. • Traffic movements are to be minimised where possible during the morning and evening peak periods. • Special attention is to be given to not detrimentally impacting on the operation of the Tallawong Station across the road in Themeda Avenue. Refer to the Construction Pedestrian and Traffic Management Plan at Appendix E.	Ongoing	Supervisor
	Crane and Hoist Locations **NOTE: outlined in other sections**		
Ongoing supervision	**Measurement and Monitoring** Monitoring of the traffic control measures to ensure their effectiveness and compliance with TMP's is to be carried out by the Supervisor and recorded in the daily and weekly Inspection	Ongoing	Supervisor

6 Public Safety, Amenity and Site Security

The demolition, excavation and building works raises a number of concerns and potential risks. These risks include damage to neighbouring properties, injury to local residents, a decrease in amenity for locals and site security for the builders and contractors.

The following table outlines potential impacts and mitigation measures adopted by the builders, sub-contractors and construction workers to ensure a safe and secure working site for the community and workers.

POTENTIAL ISSUE	CONTROL MEASURES	TIMING	OFFICER
Restricting public access to the site.	**Hoarding/Fencing** • The site will be secured by construction fencing or A and B class hoardings as required around the entire perimeter. • Gates will be secured after work hours to prevent unauthorised entry. • The demolition, excavation and building site will be fenced to prevent entry. • All fencing and hoardings will screen public view of the site to minimise any impact on pedestrian traffic flow.	Ongoing	Supervisor
Impacts of Piling	**Piling** • The Impacts of piling are to be mitigated in accordance with the requirements outlined in the Safe Work Method Statement prepared by the contractors that will undertake the demolition and building works.	Ongoing	Supervisor
Impacts of Demolition	**Demolition** • The Impacts of demolition are to be mitigated in accordance with the requirements outlined in the Safe Work Method Statement and Management Plan prepared by the contractors that will undertake the demolition and building works.	Ongoing	Supervisor
Impacts of Excavation	**Excavation** • The Impacts of excavation are to be mitigated in accordance with the requirements outlined in the Safe Work Method Statement and Management Plan prepared by the contractors that will undertake the demolition and building works.	Ongoing	Supervisor
Reduced way finding and unauthorised access to the site	**Safety & Security** • Lighting will be provided across the site at night. • The site will be fully secured outside of working hours. Security measures will include fencing, locks, surveillance systems, security lighting and motion detectors. • Site equipment and materials will be fully secured at night. • Site materials and equipment will be located away from neighbouring properties to limit the potential use as climbing aids. • All chemicals will be securely stored aware from emergency exits and stormwater pits.	Ongoing	Supervisor

POTENTIAL ISSUE	CONTROL MEASURES	TIMING	OFFICER
Security signage	**Signage** • Contact and procedural details will be provided, at entrances and exits, in case of an emergency or security breach. • Safety, traffic control and restricted access signage will be located on fencing and at entrances to the site.	Ongoing	Supervisor
Damage to public areas	**Public Areas** • Any damage to public areas and assets will be rectified. • The construction team will ensure there are no trip hazards from the hoarding or fencing on adjacent footpaths. • Any utilities or services that cross the path will be covered in accordance with the relevant standards. • Public areas will be protected from construction activities including vehicle loading and unloading. • All bins will be stored on site in secure areas away from public access. • All materials and machinery will be stored onsite, away from public areas.	Ongoing	Supervisor
Use of street and pathway	**Street Space Occupation** • All necessary permits will be obtained from the Council permitting occupation of the public footpath.	Ongoing	Supervisor
Reduced visual amenity and outlook for neighbouring properties	**Prevent Unsightly Premises** • Trucks will be washed down to prevent soil, dust or debris falling on the adjacent road way and footpaths. • Hoardings must be designed to reduce the potential for posters and graffiti through the use of wire mesh guards, signage and/or public art. Graffiti and posters will be removed on a regular basis.	Ongoing	Supervisor
General Site Management	**General Management** • The Principal Contractor will provide written notice prior to commencement of works in accordance with the Conditions of Consent. • Existing pedestrian and traffic signs will be retained. • Additional safety signage will be in accordance with requirements.	Ongoing	Supervisor
Ongoing supervision	**Measurement and Monitoring** Monitoring of public safety, amenity and site security to ensure their effectiveness and compliance is to be carried out by the Supervisor.	Ongoing	Supervisor

7 Operating Hours

Construction contractors must adhere to the approved hours of construction. Refer to Conditions D3 – D7 respectively which are reproduced below for reference.

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.

8 Noise and Vibration Controls

A Construction Noise and Vibration Plan prepared by Acoustic Logic, refer Appendix G. All commended measures identified in the Construction Noise and Vibration Management Plan should be adhered to during construction.

In addition to emasures recommended in the Construction Noise and Vibration Plan, the following table outlines the noise and vibration controls and mitigation measures to be adopted by the builders, sub-contractors and construction workers to meet the compliance requirements of the consent authority and the relevant Australian Standards. The development must be constructed to achieve the construction noise management levels detailed in the Interim Construction Noise Guideline (DECC, 2009).

POTENTIAL ISSUE	CONTROL MEASURES	TIMING	OFFICER
Noise impacts on neighbouring residents and businesses	**Hours of Operation** • Hours of onsite work operation will be limited to the approved hours reproduced in Section 7.	Ongoing	Supervisor
Noise nuisance Noise pollution caused by loud noise from site disturbing workers	**Noise - Plant and equipment** • All practical precautions are to be taken to minimise the impact of noise emissions from the site. • Equipment and machinery will be selected to meet the noise emissions requirements outlined in the Noise and Vibration Assessment report. Where practical equipment will be fitted with silencers. • Regular monitoring of equipment will be undertaken to ensure all equipment meets requirements. • Vehicles and machinery will be turned off when not in use.	Ongoing	Supervisor
Vibration	**Vibration – consent conditions** • Vibration caused by construction at any residence or structure outside the Site must be limited to: (a) for structural damage, the latest version of DIN 4150-3 (1992-02) Structural vibration - Effects of vibration on structures (German Institute for Standardisation, 1999); (b) for human exposure to vibration, the evaluation criteria set out in the Environmental Noise Management Assessing Vibration: A Technical Guideline (Department of Environment and Conservation, 2006) (as may be updated or replaced from time to time). • Vibratory compactors must not be used closer than 30 metres from residential or heritage buildings unless vibration monitoring confirms compliance with the vibration criteria specified above. These limits apply unless otherwise outlined in the project specific CNVMP required by this consent.	Ongoing	Supervisor/ Noise and Vibration Consultant

Vibration damage to structures and potential impacts to nearby business, residents and public infrastructure	**Vibration – Plant and equipment** • The major sources of vibration caused by the project during demolition and construction will include the use of excavators with rock breakers (or grinding heads attached), bulldozers and vibratory rollers. • From the Noise and Vibration Assessment the following vibration mitigation measures will be adopted during site project activities: • Staging of site works to maximise use of the existing site features/facilities as barriers where possible. • All site personnel must adhere to the site WHS requirements in relation to use of appropriate personal protective equipment (PPE) when operating, or in the vicinity of noise/vibration generating plant/equipment. • Noise and vibration awareness training for all site staff including subcontractors as part of general site induction and tool-box talk activities. • Strict adherence to approved works times. In the event that out of hours delivery activities are required, the approval process will be completed via consultation with the Project Managers office. • Regular and effective plant/equipment maintenance will be completed and documented throughout the project period and documentation will be maintained on site demonstrating completion of maintenance logs and associated checklists in order to ensure all machinery is in good working order and use does not generate excess noise/vibration. • Plant, equipment and vehicles will not be operated in the event that excessive noise/vibration is produced at start up as a result of maintenance being required. • Care will be taken by site personnel to ensure materials will not be dropped from a height either onto or from vehicles or from the roof, overhead bridge or other raised location. Power drills, saws, planers, nail guns etc will be used inside where possible to achieve acoustic muffling or where possible, to the south of buildings to provide shielding between the user and sensitive receptors.	Ongoing	Supervisor
Construction noise impacting the amenity of neighbouring properties	**Neighbours** • Activities which may impact on the amenity of neighbouring properties will only be conducted for short durations and these neighbours will be notified prior to the works.	Ongoing	Supervisor
Ongoing supervision	**Measurement and Monitoring** Noise effects shall be observed and recorded on the daily inspection report in accordance with the requirements of the Noise and Vibration Assessment Report.	Ongoing	Supervisor

9 Environmental Management

9.1 Detailed Site Investigations

A Remediation Action Plan and Dewatering Management Plan were prepared by EI Australia. The objective of the investigation was to evaluate the potential for site contamination, to investigate the degree of any potential contamination and where site contamination is confirmed, to make recommendations for the appropriate management of any contaminated soils and/or goundwater.

All contamination concentration levels were found to be below the adopted human health criteria, some of the findings included a small amount of asbestos, some heavy metals were detected in the ground water and TRHs found in a few test sites.

The following table outlines the recommendations of the report that would need to be considered during the construction.

POTENTIAL ISSUE	CONTROL MEASURES	TIMING	OFFICER
Management and testing of Waste and Contaminants on site	**Remediation Action Plan** Where required, remediation works are to be undertaken in accordance with the Remediation Action Plan prepared by EI Australia and will be implemented in the following stages: • Preliminaries/Site Establishment (Weeks 1-3) • Additional Assessment (Weeks 3-5) • Waste Management (Weeks 5-6) • Excavation (Weeks 6-7) • Validation (Weeks 7-13)	Ongoing	Supervisor / Geotechnical consultant
Ground Water Investigation and Surveying	**Geotechnical Engineering requirements** • Additional groundwater investigation in the vicinity of BH2M (referenced in Detailed Site Investigation Report). • Surveying of onsite ground water wells.	Ongoing	Supervisor / Geotechnical consultant
Asbestos	• Management of asbsestos in accordance with EPA (2014) Waste Clasification Guidelines.	Ongoing	Supervisor / Geotechnical consultant
Soil Classifications of soils to be disposed	• Classification of soils to be disposed off site in accordance with EPA (2014) Waste Clasification Guidelines.	Ongoing	Supervisor / Geotechnical consultant
Ongoing Supervision	**Measurement and Monitoring** • Measuring and monitoring is to be undertaken in accordance of the requirements of the Remediation Action Plan.	Ongoing	Supervisor / Geotechnical consultant

9.2 Geotechnical Considerations

A Geotechnical investigation was prepared by EI Australia for the following purpose:

- Assess the subsurface conditions over the site,
- Site classification to AS2870,
- Groundwater within the depth of excavation
- Provide recommendations regarding the appropriate foundation system for the site including design parameters,
- Provide parameters for the temporary and permanent support of the excavation,
- Provide recommendations regarding vibration control during rock excavation and,
- Comment on the impact of the development in the vicinity of the rail corridor.

The excavation and construction works should be undertaken in accordance with the recommendations of the Geotechnical Investigation Report.

The following table summarises the receommedations of the Geotechnical Investigation.

POTENTIAL ISSUE	CONTROL MEASURES	TIMING	OFFICER
Geotechnical requirements and excavation support	**Geotechnical requirements** • Prior to excavations reference is to be made to Safe Work Australia Excavation Work Code of Practice dated August 2019. • The excavation and construction is to be undertaken in accordance with the Geotechnical Investigation report's recommendations. During construction, should the subsurface conditions vary from those inferred in the Geotechnical Investigation Report, then the Geotechnical Consultant should be contacted to determine if any changes should be made to their recommendations. • Monitoring of deflections of retaining structures and surface settlements should be undertaken. • Management of groundwater in accordance with the recommendations of the report. • Retaining wall design parameters in accordance with the recommdations of the report. • Foundations and base slab design in accordance with the recommendations of the report. • The exposed bearing surfaces for footings should be inspected by the Geotechnical Consultant.	Ongoing	Supervisor / Geotechnical consultant
Road Authorities	**Road Authority requirements** • Prior to excavation and construction a detailed dilapidation survey is to be carried out on all structures and infrastructure surrounding the site. • Pavement Design in accordance with the recommendations of the Geoptchnical Consultant. • Any Geotechnical requirements of the road authority should be addressed where required.	Ongoing	Supervisor / Geotechnical consultant
Ongoing supervision	**Measurement and Monitoring** • Measuring and monitoring is to be undertaken in accordance of the requirements of any Geotechnical Report.	Ongoing	Supervisor / Geotechnical consultant

9.3 Contamination Management

The following table outlines the contamination management items that are to be considered.

POTENTIAL ISSUE	CONTROL MEASURES	TIMING	OFFICER
Pollution of soils on the site and pollution of ground waters by chemical, organic or physical contamination	**General** • All staff to be made aware of proper handling procedures and appropriate measures will be taken to minimise the potential for contamination. • Chemical spillage kits will be kept on site, staff will be made aware of the appropriate use of kits.	Ongoing	Supervisor
Contamination from machinery	**Machinery** • High risk activities, including refuelling and servicing, will be undertaken allocated areas, controlled to reduce environmental impact. • Fuel and oil storage areas will be bunded. • Machinery will be inspected on a regular basis for leaks. Repairs will be undertaken immediately.	Ongoing	Supervisor
Contamination from chemicals/materials	**Chemicals/materials** • All contaminants shall be handled in a manner so as to confine the material completely and prevent any fugitive emission. Material will be kept on segregated, covered, bunded areas and then disposed of by removal to a registered waste depot. • Paint and slurry will not be discharged into the stormwater. A designated paint brush and roller washing area will be located near each building to prevent contaminating the stormwater. • Construction materials and chemical will be stored appropriately to prevent leakages into surrounding water ways.	Ongoing	Supervisor
Ongoing supervision	**Measurement and Monitoring** • Waste product will be assessed and categorised as contaminated or non-contaminated and disposed of accordingly • If contaminated material is encountered, then it will be monitored for each type of material and the method of disposal recorded in the Contaminated Material Register. • All hazardous materials will be removed from site and correctly disposed on completion of the works.	Ongoing	Supervisor

9.4 Air and Dust Management

An Air Quality Management Plan has been prepared by AECOM and attached in Appendix B. The report assists in managing air emissions during the construction phase of the project in accordance with requirements and conditions listed in the Development Consent, application number SSD 10425.

All mitigation measures provided in the Air Quality Management Report must be implemented at all times during construction.

Notwithstanding the above, the following table outlines the air and dust management items that are to be considered during the excavation and construction phase of the proposal.

POTENTIAL ISSUE	CONTROL MEASURES	TIMING	OFFICER
Generating dust pollution	**Dust** • Fencing will be designed to minimise the impact of dust on neighbouring sites. • Soil and other materials stored onsite will be covered to prevent dust.	Ongoing	Supervisor
Dust pollution generated by machinery	**Machinery** • Equipment used on site shall not emit visible exhaust fumes for no more than 10 seconds after power has been applied.	Ongoing	Supervisor
Dust pollution generated by machinery	**Excavation** • Exposed or excavated soils will be regularly rehabilitated where possible to minimise dust. • Exposed areas will be watered down to prevent dust, especially on windy days and in close proximity to dwellings and public areas.	Ongoing	Supervisor
Dust pollution generated due to vehicular movements into and out of the site	**Traffic/Vehicular Movement** • Loaded trucks leaving the site will have tray covers to prevent dust during transport. • A shaker pad will be located at exits to remove soil from vehicle tyres. • Internal driveway near the boundaries will be watered down to minimise airborne particles.	Ongoing	Supervisor
Impacts of Piling	**Piling** • The impacts of piling are to be mitigated in accordance with the requirements outlined in the Safe Work Method Statement prepared by the contractors that will undertake the demolition and building works.	Ongoing	Supervisor
Impacts of Excavation	**Excavation** • The impacts of excavation are to be mitigated in accordance with the requirements outlined in the Safe Work Method Statement and Management Plan prepared by the contractors that will undertake the demolition and building works.	Ongoing	Supervisor
	Other • No burning will be undertaken on site. • Waste and scrap materials will be stored to prevent dust emissions.	Ongoing	Supervisor

Ongoing supervision	**Measurement and Monitoring** Continual visual monitoring by the Supervisor. Any evidence of dust shall be recorded.	Ongoing	Supervisor

10 Soil and Water Management

During construction activities the soil and water management procedures are to be implemented so as to ensure all runoff and discharge from the site is done so without environmental impact. A Soil and Water Management Plan prepared by Sky Engineering and Project Management has been prepared and is attached at Appendix C.

The following table outlines potential impacts as well as appropriate erosion and sediment control and stormwater measures to control sediment and reduce runoff generally.

POTENTIAL ISSUE	CONTROL MEASURES	TIMING	OFFICER
Erosion and sediment control	**Erosion Sediment Control Measures** • All control measures will be installed prior to commencing works in accordance with the Soil and Water Management Plan, refer to Appendix C. • Works will be appropriately staged where possible to minimise potential for erosion and sedimentation during the project. • Silt fencing will be erected along batter slopes, stockpiles, and any disturbed surfaces that may drain into any adjacent water bodies and stormwater systems. • Sandbags and other sediment controls shall be installed around stormwater inlets and outlets to prevent dirty discharge from works area entering stormwater systems. • Soil and waste stores will be located in designated areas to prevent run off into drains. • On project completion, the site will be left protected by temporary measures as required. Once permanent measures (i.e. revegetation) have been established the temporary measures may be removed. • All sediment basins and traps will be managed in accordance with the requirements of the Soil and Water Management Plan at Appendix C.	Ongoing	Supervisor
Stockpile locations	**Stockpiles** • Stockpiles for loose materials such as soil, sand and gravel are to be located in areas clear of overland flow paths. Sediment barriers are required around the stockpiles.	Ongoing	Supervisor
Reduced water quality	**Water Quality** • The site is not identified as having Acid Sulfate Soil issues. • Temporary diversion drains will be installed to divert clean run-off around the works area. • Drainage system outlets will be directed to temporary or permanent retention basins.	Ongoing	Supervisor
Sediment runoff due to excavation	**Excavation** • Disturbance onsite will be minimised by clearly marking boundaries and designating areas for construction activities and traffic movements. • Exposed surfaces will be stabilised as soon as possible by hydro mulching or other means.	Ongoing	Supervisor

Sediment washed into the stormwater network	**Stormwater** • Stormwater measures will be put in place during construction. • The entrances/exit be stabilised with rock. • Shaker pads will be installed to collect mud from exiting vehicles. • Shaker pads will be cleaned on a daily basis and link to the designated stormwater outlets.	Ongoing	Supervisor
Dispersal of sediments during the transportation of material	**Traffic** • Trucks transporting materials will be inspected before leaving or entering the site to prevent spillage of soil and other materials on roads and footpaths. • The wash down area is identified in the Soil and Water Management plan at Appendix C.	Ongoing	Supervisor
Excessive use of water during construction	**Water Saving Measures** • All hoses will be in good condition and fitted with a trigger nozzle. • Any wash down areas will utilise high pressure water nozzles.	Ongoing	Supervisor

Ongoing Supervision	**Measurement and Monitoring**
	• Ensure the soil erosion and sediment control devices are installed and maintained accordance with the Soil and Water Management Plan (See Appendix C)
	• Weekly site inspections by the Supervisor with appropriate corrective actions taken immediately.
	• Additional inspections after each rain event by the Supervisor
	• Maintenance of control measures:
	  • Repair damaged or blocked sections
	  • Remove silt from fencing where built up
	• Records shall be kept of all ESC device installations, inspections and maintenance activities
	• The quality and quantity of water released from site must be recorded
		Ongoing	Supervisor

11 Waste & Material Reuse Management

During excavation and building works there are numerous opportunities to reduce, reuse and recycle waste through the implementation of a Construction Waste Management Plan (WMP), see attached in Appendix D.

The following table outlines potential impacts as well as appropriate waste management measures reduce, reuse and recycle waste, as well as education and training for staff. At least 95% of waste generation is to be diverted from landill in accordance with Landcom requirements.

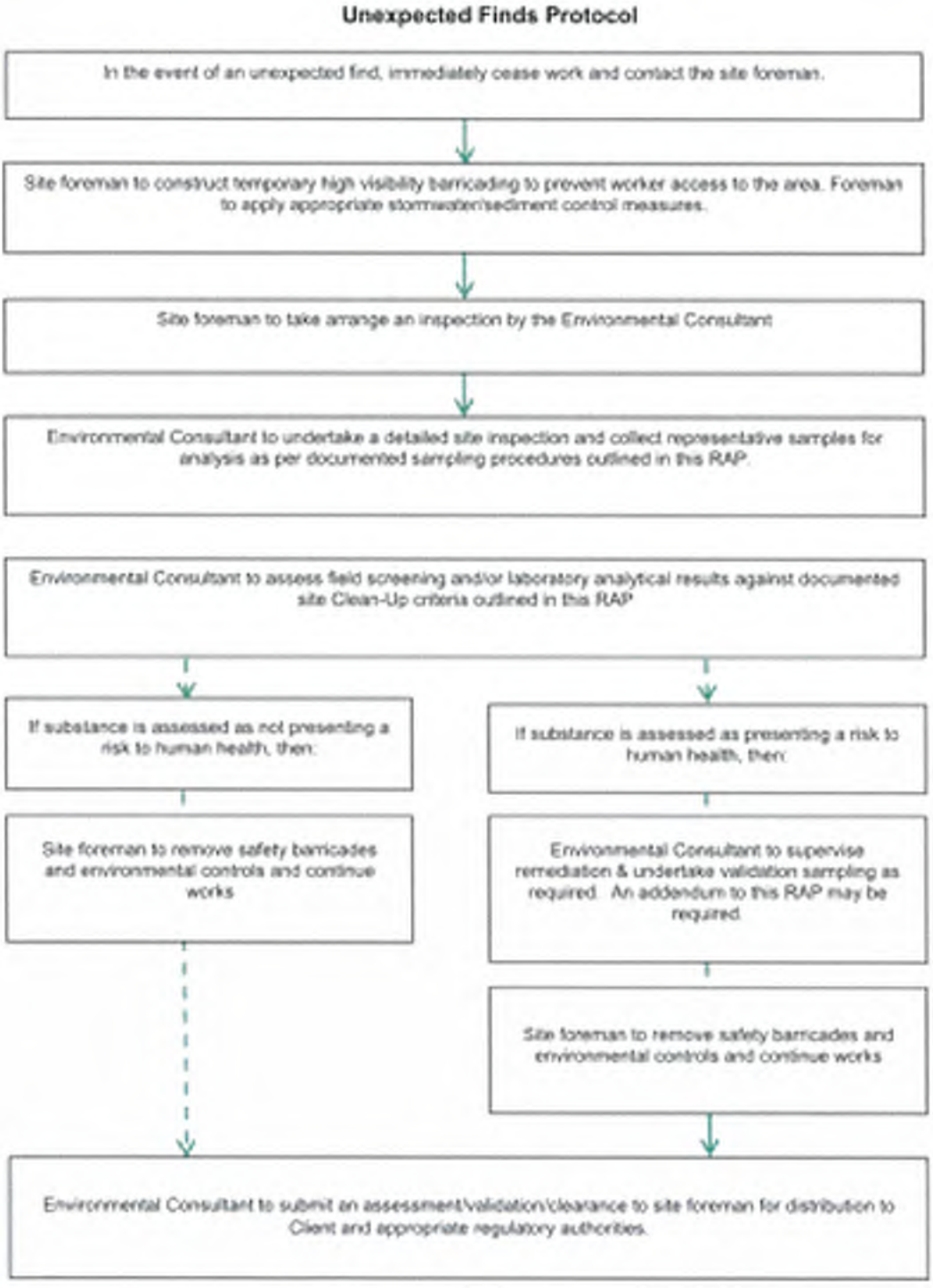
C	CONTROL MEASURES	TIMING	OFFICER
General Site Management	**Site management** • The construction site will be kept free of rubbish, waste material and debris. • Waste will be disposed of in accordance with the WMP at Appendix D.	Ongoing	Supervisor
Waste storage and removal	**Waste Management Plan** • Chemical waste will be removed from site and disposed of at licenced facilities. • Procedures for removal of other hazardous or dangerous materials from the site in accordance with State and Federal legislation including WorkSafe requirements. • Waste collection shall only occur during permitted hours. • Litter and debris 'trapped' against site fencing must be regularly cleaned • Removal of waste (materials that cannot be reused or recycled) from the site • Demolished concrete will be reused on site for temporary construction driveways where possible or sent to a concrete recycling plant. • General waste will be stored in the designated bin/skip and removed by the waste contractor on a regular basis. • Recyclable waste will be stored in a designated bin/skip and removed by the waste contractor on a regular basis. • The waste bins will be stored in the designated areas, refer to the Site Management Plan at Appendix A.	Ongoing	Supervisor
Excess waste	**Reduce** • Efforts to minimise waste on site by avoiding over-estimation of purchasing requirements, minimizing packaging materials, and buying environmentally approved and recycled content products • Minimise use of packaging materials and recycle packaging products where possible • Utilise quantity surveyor estimates to order materials, to prevent wasted materials.	Ongoing	Supervisor
Not re-using material on-site	**Reuse** • Native vegetation will be mulched and reused onsite. • Weeds and contaminated mulch will be disposed of separately. • The office will utilise recycle waste paper bins. • The re-use of timber, glass and other materials	Ongoing	Supervisor

	• The type and quantity of materials that are to be re-used are to be detailed in the WMP at Appendix D.		
Not separating recycle material from general waste	**Recycle** • Procedures are to be put in place for the collection and sorting of recyclable construction materials • Training will be provided to all staff outlining the appropriate recycling procedures. • Recycled waste bins will be appropriately sign posted. • The type and quantity of materials that are to be recycled are to be detailed in the WMP at Appendix D.	Ongoing	Supervisor
Construction staff and contractors waste	**Staff waste** • Provision of containers for recyclable materials including cardboard, glass, metal, and plastic and green waste • Provisions for collection of daily rubbish from workers.	Ongoing	Supervisor
Ongoing supervision	**Measurement and Monitoring** Waste monitoring will be recorded on the daily and weekly inspection report.	Ongoing	Supervisor

12 Unexpected Finds Protocols

12.1 Contamination

An Unexpected Finds Protocol was provided in the Remedial Action Plan prepared by eiaustralia, refer below.



12.2 Aboriginal and European Heritage

A Statement of Heritage Impact was prepared by OCP Architects for the concept SSD application (SSD 9063). The report detailed an investigation, excavation and salvage program which was undertaken in accordance with the Guide to investigating, assessing and reporting on Aboriginal Cultural Heritage in NSW (DECWW, 2011) and Aboriginal Cultural Heritage Consultation requirements for Proponents 2010, and the site area has been confirmed to be cleared of Aboriginal heritage by Transport for NSW.

Notwithstanding the above, the following Unexpected Finds Protocol should be followed if previously unrecorded or unanticipated historic objects are encountered:

1. All ground surface disturbance in the area of the finds should cease immediately, then:
   a) The discoverer of the find(s) will notify machinery operators in the immediate vicinity of the find(s) so that work can be halted
   b) The site supervisor will be informed of the find(s).

2. If finds are suspected to be human skeletal remains, then NSW Police must be contacted as a matter of priority.

3. If there is substantial doubt regarding the historic significance for the finds, then gain a qualified opinion from an archaeologist as soon as possible. This can circumvent proceeding further along the protocol for items which turn out not to be significant. If a quick opinion cannot be gained, or the identification is that the item is likely to be significant, then proceed to the next step.

4. Notify Heritage NSW as soon as practical on (02) 9873 8500 providing any details of the historic find and its location.

5. If in the view of the heritage specialist or Heritage NSW that the finds appear not to be significant, work may recommence without further investigation. Keep a copy of all correspondence for future reference.

6. If in the view of the heritage specialist or Heritage NSW that the finds appear to be significant, facilitate the recording and assessment of the finds by a suitably qualified heritage specialist. Such a study should include the development of appropriate management strategies.

7. If the find(s) are determined to be significant historic items (i.e. of local or state significance), any re-commencement of ground surface disturbance may only resume following compliance with any legal requirements and gaining written approval from Heritage NSW.

13 Management Responsibility

13.1 Accountabilities

13.1.1 Project Manager

The Project Manager is responsible for construction management and shall establish and maintain the Company's policies for this project and shall be responsible for their effectiveness.

The Project Manager ensures that the Project Team understands and implements the requirements of the Construction Management Plan for the course of the project.

13.1.2 Supervisor

The Project Supervisor is responsible to the Project Manager for the day to day co-ordination and site control of direct labour, plant, subcontractors and suppliers for construction works.

The Project Supervisor is responsible for the correct implementation of the controls and their on-going monitoring and maintenance and correction of non-conformances.

13.1.3 QA Manager

The QA Manager reports to the Project Manager and is responsible for the preparation and implementation of the management system for a project. The QA Manager shall ensure that all work be carried out in accordance with the Management System procedures.

The QA Manager shall establish audit schedules in consultation with the Project Manager and assign personnel to carry out planned audits. Any deviation from the Management System will be reported to the Project Manager for rectification. Trends and cumulative effects from all projects shall be assessed and corrective actions determined.

13.1.4 Geotechnical Consultant

The Geotechnical consultant is engaged by the client to manage Geotechnical Engineering issues onsite. The Geotechnical consultant is to liaise with the site supervisor to ensure that all excavation, stabilisation and shoring is undertaken in accordance with the requirements of the Geotechnical Report.

13.2 Subcontractors

The Project Manager shall clearly define the scope of subcontracted work including the subcontractor's duties for:

- Planning, installation and monitoring of the controls outlined in the Construction Management Plan
- Record keeping

The subcontractor may only enter the site from the designated access points shown on the relevant Construction Traffic Management Plan.

The subcontractor may only enter the site from the designated access points shown on the relevant Construction Traffic Management Plan.

The subcontractor cannot proceed without the approval of the Project Manager.

13.3 Principal Contractor's Responsibility

The Principal Contractor's Project Manager shall review the proposed controls outlined in the Construction Management Plan.

Subcontractor's personnel will be given the Principal Contractor's site induction before starting work.

The Principal Contractor's Project Supervisor will monitor the subcontractor's compliance with the approved environmental controls and report any deficiency or non-conformance to the Project Manager

13.4 Communication Protocols

Both formal and informal communication systems are in place on this project to ensure that information regarding the Construction Management Plan is circulated effectively to relevant personnel both internal and external to the project. Also, that information is distributed to other the Principal Contractor workplaces that might benefit from system improvements.

Subcontractors shall be included in communications to ensure the compatibility and effectiveness of their systems.

Communication with the community shall be done through the Project Manager. The Project Manager is responsible for the timing and effectiveness of all communications.

The Principal Contractor is to promote the following initiatives for communication and encourages all personnel to participate enthusiastically:

- Induction
- Tool box talk
- Risk assessment
- Pre-start briefing
- Site inspection and reporting
- Incident reporting and corrective action
- Complaint Procedure
- Incident Procedure

13.5 Work Site Monitoring and Inspection

The Principal Contract's contact person with regard to implementation of the Construction Management Plan on this project is the Project Manager.

The Supervisor shall carry out regular inspections of all work areas to ensure that the following standards and processes are being maintained. All controls of the site shall be monitored at least weekly by the Project Supervisor and the results recorded.

After each rain event site soil erosion and sediment controls shall be inspected by the Supervisor and any necessary maintenance done as soon as practicable. A record of the inspection and maintenance shall be kept on site.

The Project Supervisor has authority to initiate emergency response procedures. If a potentially environmentally hazardous situation is identified and cannot be rectified immediately, a Non-Conformance Report shall be made and, if needed, work in the area shall cease until the situation is rectified.

The Project Manager shall determine appropriate corrective action to address the immediate consequences of the non-conformance including containment, clean up and restoration work.

The Project Manager shall regularly review reports to confirm that clean up, restoration and corrective actions have been completed and are effective. The Project Manager shall review all non-conformances and report significant findings to monthly management review meetings.

Any damage to areas outside the work site shall be immediately reported to the Supervisor who may advise on the nature of appropriate corrective action.

13.6 Training

A Project Management Plan should be prepared to outline the expected qualifications and training requirements for project personnel. It shall be kept current with any additional training that may become necessary during the course of the work. Records of training done on site shall be kept in the project file system including dates, personnel attending and trainer details.

All site staff and workers undergo a site-specific site induction or other training which includes:

- Environmental aspects relevant to their working on site
- Description of control measures used, their construction & maintenance
- The potential impacts from ineffective controls
- Monitoring and reporting procedures
- Emergency and incident response

Any alteration to the CEMP relevant to site personnel shall be immediately communicated via updated inductions and tool box talks.

Subcontractors shall be inducted into the Principal Contractor system, and if their works require such, they shall be required to submit relevant work method statements with associated environmental protection measures.

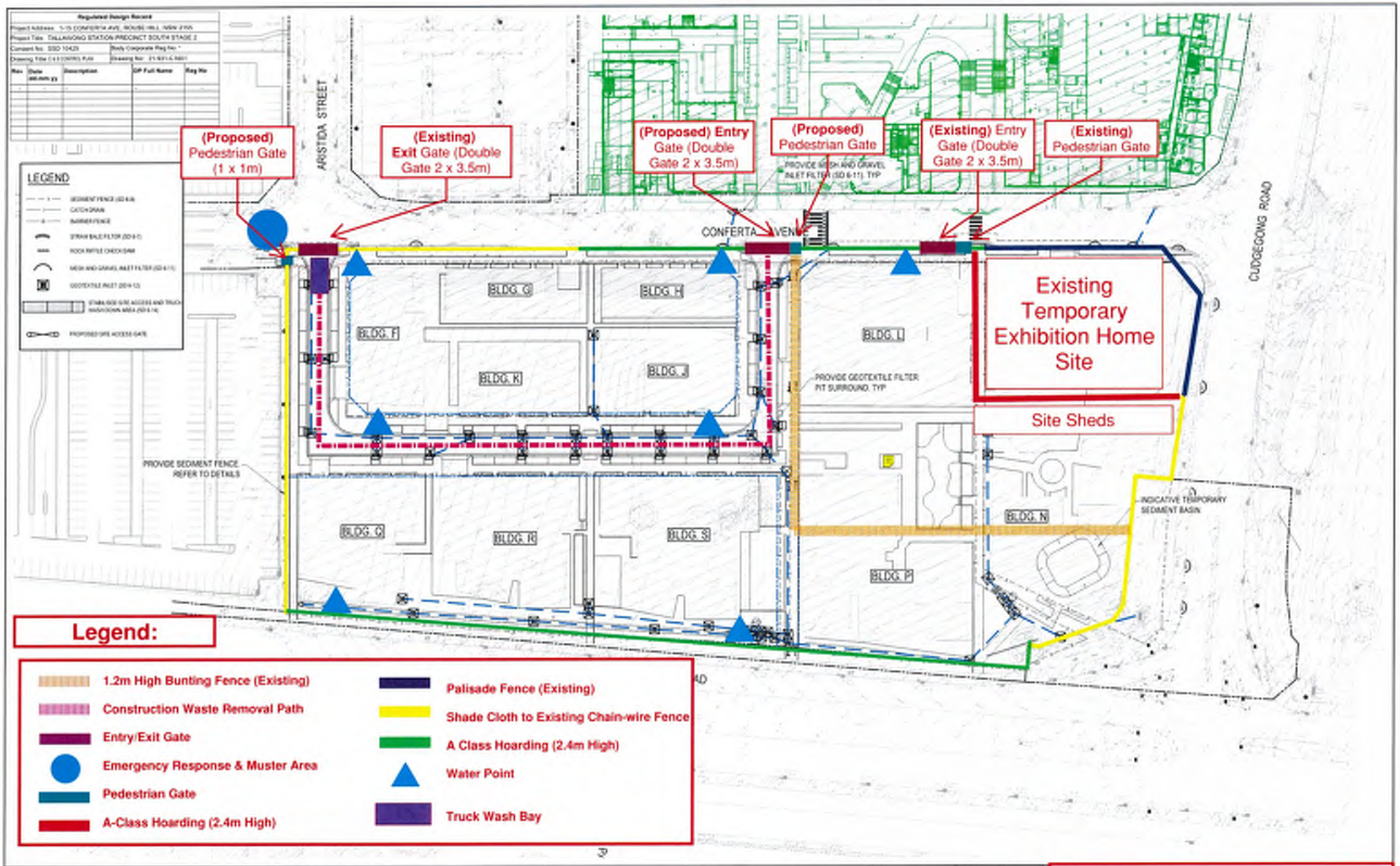
Additional Supplychain Sustainability School training shall be provided free of charge to contractors and management. Resources can encourage and guide staff in the development of sustainable supply chain management through identification of social, environmental and economic sustainability measures in construction.

13.7 Specific Emergency Responses, Contact Details, Emergency Preparedness

Any specific Emergency Response procedures required to be implemented are to be outlined by the Project Manager/Site supervisor.

The Contact detailed of the emergency services are to be located on site at a location that is easily accessible to all.

Appendix A
Site Management Plan



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DEICORP BUILT TO DELIVER

DRAFT

SM-03 (Rev A) Site Management Plan (Construction Works) Site 2

Appendix B
Air Quality Management Plan

Prepared for
Deicorp Construction Pty Ltd
ABN: 15117191885

AECOM

Tallawong Station South Precinct

Air Quality Management Plan

13-May-2022
Tallawong Station South Project

aecom.com

Delivering a better world

Tallawong Station South Precinct

Air Quality Management Plan

Client: Deicorp Construction Pty Ltd

ABN: 15117191885

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13-May-2022

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AECOM in Australia and New Zealand is certified to ISO9001, ISO14001 and ISO45001.

Quality Information

Document Tallawong Station South Precinct

Ref 60618532

Date 13-May-2022

Prepared by Julian Ward

Reviewed by David Rollings

Revision History

Rev	Revision Date	Details	Authorised	
			Name/Position	Signature
0	16-Jul-2021	Draft	David Rollings Associate Director - Air Quality	
1	27-Jul-2021	Final	David Rollings Associate Director - Air Quality	
2	13-May-2022	Final - Updated for Site 2	David Rollings Associate Director - Air Quality	

Table of Contents

1.0 Introduction

Deicorp Construction Pty Ltd (Deicorp) engaged AECOM Australia to prepare an Air Quality Management Plan (AQMP) for the construction of the Tallawong Station South Precinct Project located at Rouse Hill, NSW (the Project).

The purpose of this AQMP is to assist Deicorp in managing air emissions during the construction phase of the Project in accordance with requirements and conditions listed in the draft Development Consent, application number SSD 10425. The AQMP constitutes a sub-plan that forms part of an overarching Construction Environmental Management Plan for the Project.

The AQMP has been prepared in accordance with requirements listed in the NSW Environment Protection Agency's Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (the Approved Methods).

1.1 Proposed Development

The proposed development consists of the construction of a mixed-use development on Lots 294/DP 1213279 (Site 1) and 293DP/1213279 (Site 2) at 2-12 Conferta Avenue, Rouse Hill. The construction of Site 1 has now been completed and this AQMP (updated for Site 2) will focus on the construction of Site 2. The location of the Project site in relation to Tallawong Station is presented in Figure 1. The proposed construction staging is presented in Figure 2. Site 2 is divided into three stages, Stage 2, Stage 3 (Site 2A), Stage 4 (Site 2D) and Stage 5 (Site 2BCE). The proposed construction site layout for Site 2 is presented in Figure 3 (Construction Works).

Figure 1 Location of the Project site on Lot 294/DP 1213279 (Site 1) and 293/DP 1213279 (Site 2)

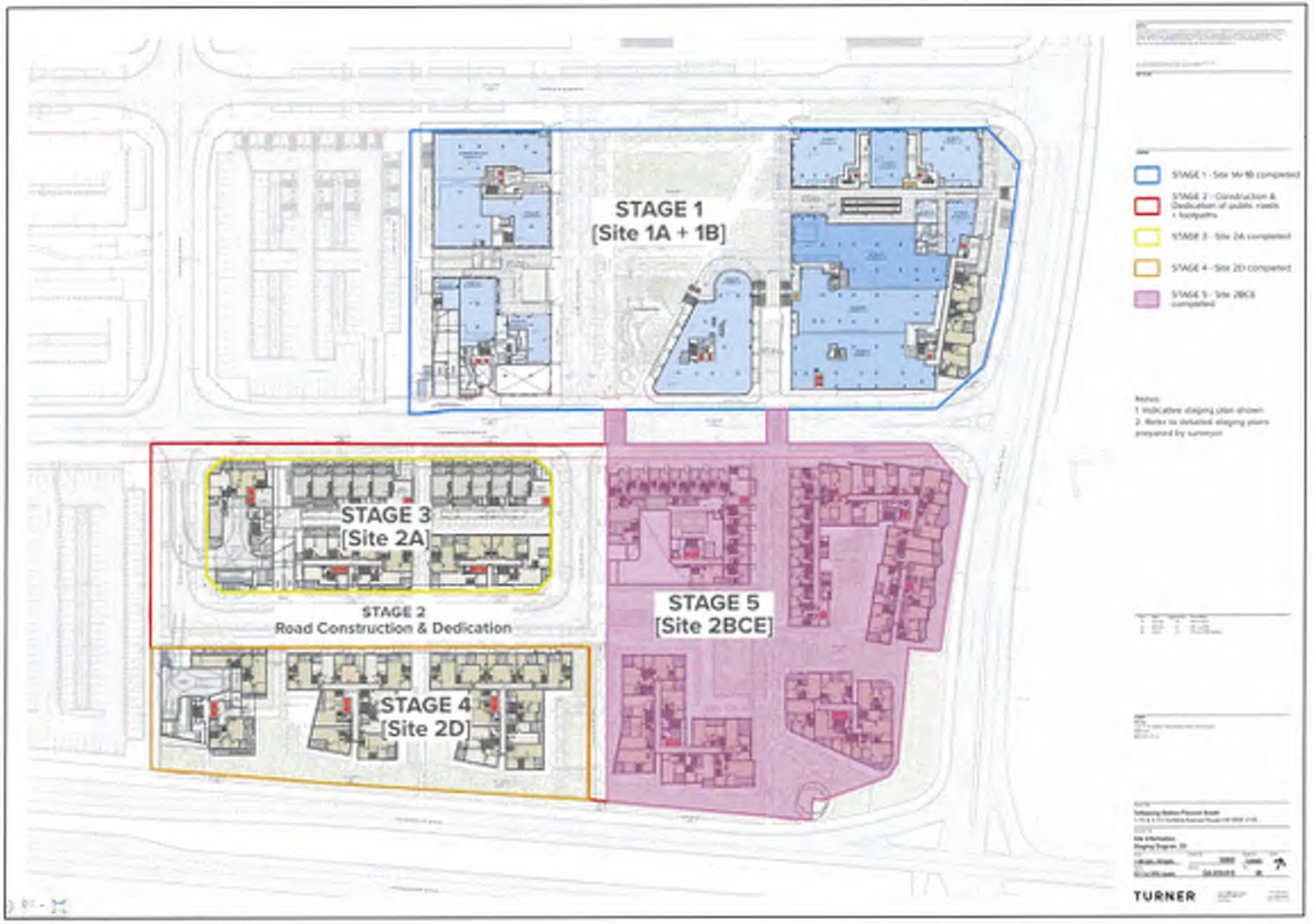

Figure 2 Construction staging

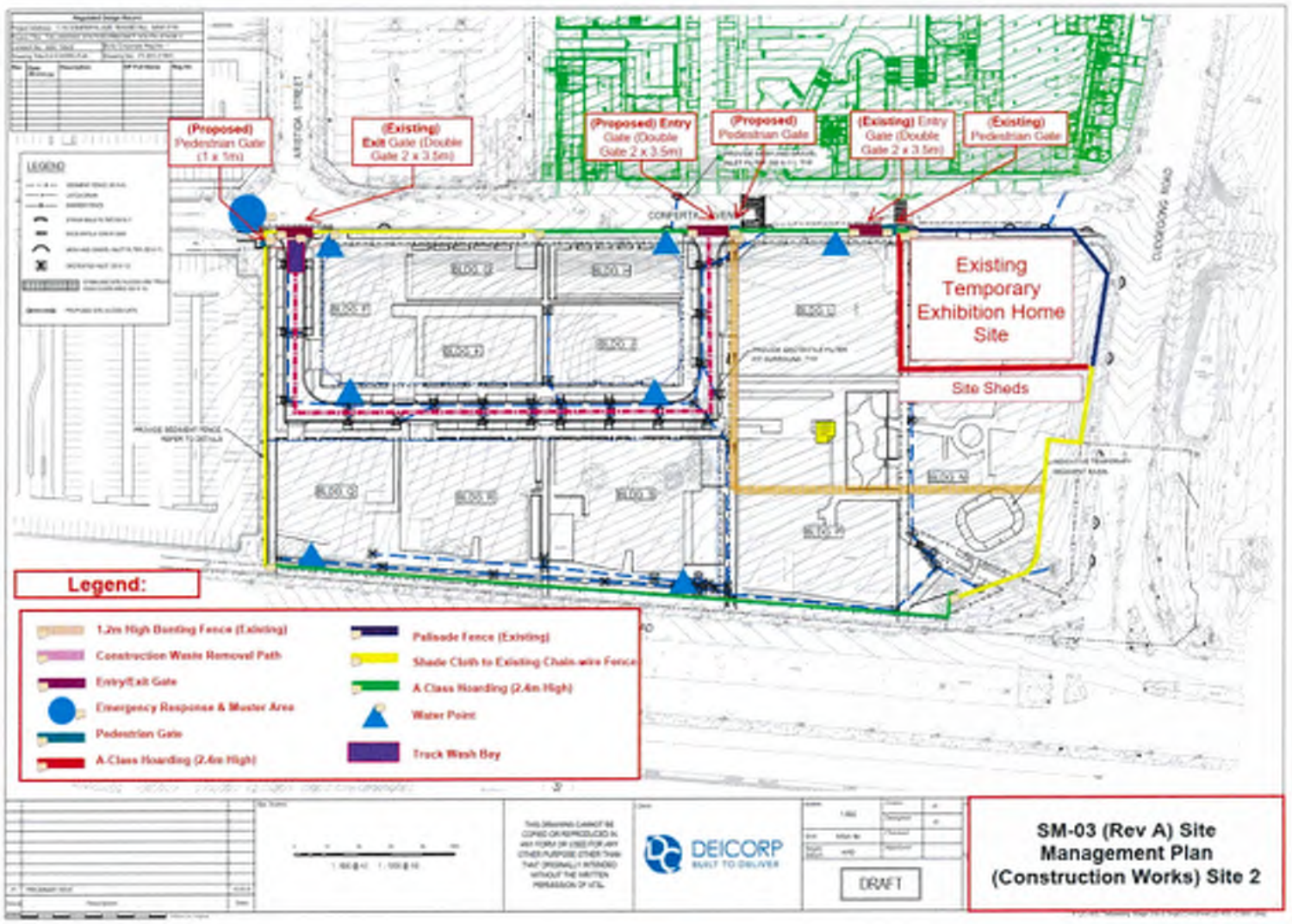

Figure 3 Site Management Plan Site 2 (Construction Works)

2.0 Goals, Outcomes, Key Issues

Table 1 Goal, outcomes and key issues for the Project

Scope	This *Air Quality & Odour Management Sub-Plan* details prevention and management measures for air quality issues associated with construction of the Project. It defines mitigation measures to be implemented during relevant construction activities, a monitoring program that would enable assessment of the impacts of construction activities on potentially affected areas if required, and contingency measures that may be implemented if complaints are received or exceedances are measured. This sub-plan forms part of the Environmental Management Plan (EMP) and should be read in conjunction with other plans that form part of the Environmental Management Plan.
Goals (Mission Statement)	• To ensure that construction activities are managed to meet air quality and odour objectives as set out in environmental assessments and the Development Consent SSD 10425 issued by the Minister for Planning and Public Spaces. • To provide a reactive monitoring regime that if required, would allow early detection of air quality and odour issues associated with construction and allow a real-time assessment of various activities on the site. • To effectively manage excavation/construction activities to prevent potential odour / air quality issues.
Intended Outcomes	• Mitigation measures are implemented and maintained to achieve ambient air criteria for airborne pollutants that minimise adverse effects on sensitive receptors. • Air quality and odour mitigation measures effective and properly maintained.
Key Issues and Sensitive Areas	Air quality is regulated by the EPA and Minister's Conditions of Approval (MCOA) requirements. **Surrounding Land Use & Receptors** The nearest receptors are located approximately 70 m south of the site, on the southern side of Schofields Road. The Tallawong Train station is immediately to the north of the Project site, and the Tallawong Station carparks to the west of the Project site. There are two rural residences to the east of the site, the closest located approximately 180m from the Project boundary. The locations of sensitive receptors are included in Appendix A. **Adverse Wind Conditions** Due to the proximity to receptors on the southern side of the Project, winds from the northwest, north and northeast would present the highest potential for offsite impacts. These winds blow frequently during autumn, spring and winter, both during the day and night-time hours. A summary of existing wind conditions at the nearby Rouse Hill EES station is presented in Appendix B. **Potential Impacts - Air Quality** Dust can be generated from all types of construction activities involving soil, including excavation, handling, loading and unloading from stockpiles, and wind erosion of exposed areas and stockpiles. Disturbance of contaminated soil may generate emissions of odour and/or Volatile Organic Compounds (VOCs)/ Semi-Volatile Organic Compounds (SVOCs) and Polycyclic Aromatic Hydrocarbons (PAHs). However, no soil hydrocarbon contamination was found by the Detailed Site Investigation (Appendix 12 of the Project Environmental Impact Statement). Therefore, the potential for odour or VOC emissions due to soil contamination is low. Construction activities will involve use of diesel-powered plant and equipment. The combustion of diesel fuel generates a range of pollutant emissions, such as oxides of nitrogen (NO_X), carbon monoxide (CO) and particulate matter.

Statutory Requirements	**Protection of the Environment Operations Act 1997 (POEO Act) (NSW)** Section 129 provides that the applicant must not cause or permit the emission of any offensive odour from the premises, apart from where the emission is identified in an EPL as a potentially offensive odour and the odour was emitted in accordance with the condition of a licence directed at minimising odour. Sections 124 & 125 require that no air pollution is caused by failing to maintain and operate plant, or carry out maintenance work on plant, in a proper and efficient manner. Section 126 states that soil or dust must not be deposited or blown onto a public place. **Protection of the Environment Operations (Clean Air) Regulation 2010 (NSW):** Vehicles must not emit visible air impurities for a continuous period of 10 seconds or more (clauses 8 & 9). Stack emissions must not exceed the regulatory limits for the type of plant operated on site.
Relationship to Other Plans	Construction Management Plan Construction Environmental Management Plan Construction Waste Management Sub-Plan. Construction Soil and Water Management Sub-Plan Remediation Action Plan Community Communication Strategy.

3.0 Air Quality DA Consent Requirements

Table 2 DA Consent Conditions relevant to Air Quality

No.	Original Ref.	Relevant Requirement	Reference in This Document
1	C21	Prior to the commencement of any earthwork or construction, the Applicant shall submit to the satisfaction of the Certifier an Air Quality Management Sub-Plan (AQMP) for the development. A copy of the AQMP must be submitted to the Planning Secretary and Council for information. The Sub-Plan must include, as a minimum, the following elements:	-
		• Relevant environmental criteria to be used in day to day management of dust and volatile organic compounds (VOC's) / odour;	Section 5.0
		• Mission statement;	Section 2.0
		• Dust and VOC's / odour management strategies;	Section 4.0
		• Objectives and targets;	Section 2.0
		• Risk assessment;	Appendix C
		• Suppression improvement plan;	Section 4.0 Section 8.0
		• Monitoring requirements including assigning responsibility (for all employees and contractors);	Section 5.0
		• Communication strategy; and	Section 6.0 and Project Community Communication Strategy
		• System and performance review for continuous improvement.	Section 8.0
2	C22	The Sub-Plan must detail management practices to be implemented for all dust and VOC/odour sources at the site. The Sub-Plan must also detail the dust, odour, VOC and semi-volatile organic compounds (SVOC) monitoring program (e.g. frequency, duration and method of monitoring) to be undertaken for the project.	Section 4.0 and Section 5.0
3	C23	The Applicant must also develop and implement an appropriate comprehensive Reactive Air Quality and Odour Management Plan which will incorporate an Ambient Air Monitoring Program and Reactive Management Strategy to ensure that the assessment criteria are met during the works.	Section 6.0
4	D22	The Applicant must take all reasonable steps to minimise dust generated during all works authorised by this consent. During construction, the Applicant must ensure that:	Section 4.0

No.	Original Ref.	Relevant Requirement	Reference in This Document
		• exposed surfaces and stockpiles are suppressed by regular watering; • all trucks entering or leaving the site with loads have their loads covered; • trucks associated with the development do not track dirt onto the public road network; • public roads used by these trucks are kept clean; and land stabilisation works are carried out progressively on site to minimise exposed surfaces.	

4.0 Mitigation Measures

Table 3. Mitigation control measures

Ref	Mitigation Measure	Relevant Location/ Activity	Relevant Approval Condition Reference	Responsibility	Timing
Dust and Material Management					
AQ1	Cover all loads coming onto the site and departing site, including internal loads, to minimise potential spillage / dust generation. Immediately clean up any spills.	Entire site	C21, C22, D22	Construction Manager (CM), Environmental Manager (EM)	Throughout construction
AQ2	Ensure all vehicles leaving the site pass a rumble-grid and pit prior to exiting, with physical removal of dirt / mud using a pressure washer if required.	Entire site	C21, C22, D22	CM, EM	Until all roads are sealed
AQ3	The roads surrounding the site shall be regularly swept to ensure pavements are kept free of dust	Off-site roads	C21, C22, D22	CM, EM	Throughout construction
AQ4	Locate stockpiles to minimise wind erosion. Maintain all stockpiles at manageable sizes to allow covering or spraying, if required.	Stockpile areas	C21, C22, D22	CM	Throughout construction
AQ5	Cover any stockpiled spoil material identified as being restricted, hazardous or special waste whilst not active, including overnight.	Stockpile areas	C21, C22, D22	CM, EM	Throughout construction
AQ6	Use water sprays to suppress dust emissions from spoil stockpiles, loading and unloading activities, unless spoil is damp.	Entire site	C21, C22, D22	CM, EM	Throughout construction
AQ7	Cover or coat with sealant stockpiled material that is to remain inactive for a period greater than two weeks to prevent odour / dust generation.	Stockpile areas	C21, C22, D22	CM, EM	Throughout construction
AQ8	Use dust sealants or hydromulch on exposed areas vulnerable to wind erosion.	Entire site	C21, C22, D22	CM, EM	Throughout construction
AQ9	Where feasible, reduce handling / stockpiling of excavated materials through pre-testing and validation, allowing direct transport off-site.	Entire site	C21, C22, D22	CM, EM	Throughout construction
AQ10	Use solid 2.4m or 3m high hoardings at the site perimeter, and wind barriers at internal excavation boundaries where possible.	Entire site	C21, C22, D22	CM	Throughout construction

Ref	Mitigation Measure	Relevant Location/ Activity	Relevant Approval Condition Reference	Responsibility	Timing
AQ11	Sweep and water haul routes, materials handling areas, site entry points and other areas as needed using on-site sweepers and water carts. A watering rate of greater than 2L per m^2 per hour is required.	Entire site	C21, C22, D22	CM	Throughout construction
AQ12	Minimise dust by limiting accessibility to roads for construction vehicles. Seal haul roads outside the bulk excavation area.	Entire site	C21, C22, D22	CM, EM	Throughout construction
AQ13	Adjust work practices based on wind and weather conditions, inclusion of the day's weather forecast and potential background particulate concentrations shall be included in the daily pre-start toolbox talks. Air quality alerts are available from NSW EPA at: https://www.dpie.nsw.gov.au/air-quality/air-quality-alerts	Entire site	C21, C22, D22	CM, EM	Throughout construction
AQ14	Undertake emergency dust suppression if needed during dust generating conditions (e.g. dry and windy weather) during longer non-working periods (e.g. long weekends, holidays).	Bulk excavation area	C21, C22, D22	CM, EM	Throughout construction
AQ15	All staff and contractors to actively monitor for visible dust and unexpected odour and report observations to Construction Manager or Environmental Manager.	Entire site	C21, C22, D22	All staff and contractors	Throughout construction
Control volatilisation/ odours during excavation					
AQ16	Apply covers, odour sealant or odour suppressant to control odours generated at the point of excavation or at stockpiles, where required.	Excavations and stockpiles	C21, C22	CM, EM	Throughout excavation works
Minimise combustion emissions					
AQ17	Turn engines off while parked on site.	Entire site	C21, C22	CM, EM	Throughout construction
AQ18	Regularly tune and maintain equipment, plant and machinery to minimise visible smoke / emissions.	Entire site	C21, C22	CM, EM	Throughout construction
AQ19	Implement site speed limits.	Entire site	C21, C22	CM, EM	Throughout construction
AQ20	Use mains power where available and suitable.	Entire site	C21, C22	CM, EM	Throughout construction

5.0 Air Quality Monitoring Strategy

Table 4 Air quality monitoring equipment and strategy

Monitoring Requirements						
Dust Construction dust emissions can generally be adequately managed using standard mitigation controls such the use of water to wet surfaces and the covering of stockpiles. The mitigation strategies outlined in Section 4.0 are expected to adequately reduce dust emissions from the Project. Based on this, continuous monitoring of dust is not recommended for the Project. However, in case of multiple substantiated dust complaints, or persistent visible observed dust leaving site, monitoring may be required, and suitable monitoring equipment and methodologies are provided in this table. **VOCs/ Odour** In general, the likelihood of significant VOC or odour emissions due Project excavation works is low. Soil concentrations of hydrocarbons were below the investigation levels for all soil samples tested as part of the Project's Detailed Site Investigation. Based on this, mandatory air monitoring for VOCs and odour is not recommended for the construction of the Project. However, in case of unexpected significantly contaminated soil being uncovered, reactive monitoring may be required and therefore suitable air monitoring equipment and methodology are provided in this table.						
Monitoring Equipment						
Parameter	**Equipment**	**Frequency**	**Locations**	**Criteria**	**Sampling Method**	**Timing**
PM_{10}	Dustrak or similar optical method particulate analyser	If required	To be determined based on requirement	50 µg/m^3 as a 24 hour average; 25 µg/m^3 as an annual average	AM-16 AS 2724.4-1987	If required
VOCs and SVOCs	Photo Ionisation Detector (PID)	If required	On Project boundary Immediately downwind from earthworks activities	0.4 ppm 1-minute average[1]	AM-21 AS 3580.11.1-1993	If required
Odour	Portable olfactometer	Upon receipt of odour complaint	Off-site both upwind and downwind from suspected odour source	Project-attributable 4 Odour Units above background odour (based on a population of ~125 people)	Odour annoyance survey	Within 24 hours of receipt of odour complaint

1. Based on EPA1-hour benzene criteria of 0.009 ppm, assuming 5 % benzene, converted via Turners equation ((1-hr avg * [60/1])^0.2) to 1-minute average

6.0 Communication and Complaints Handling

The Community Communication Strategy identifies policies and procedures for managing community specific issues arising from construction activities. If an environmental complaint is received, the complaints management process outlined in the Strategy will be followed. This will involve the complaint being referred directly to the Environment Manager and/or Construction Manager. If they are on site at the time an entry in the Project consultation database will be made to ensure appropriate action and monitoring. A response would be required to 'close out' the complaint, and the resolution would be recorded in the database.

The Community Communication Strategy also outlines several proactive strategies for dealing with community and stakeholder issues.

7.0 Reactive Air Quality and Odour Management Plan

Table 5 Reactive management plan and situation handling

No.	Situation	Response	Responsibility
1	Visible emissions evident from site machinery / plant.	Switch off the plant or machinery immediately if safe to do so. Investigate causes of the emissions and tag-out the plant or machinery until the problem is resolved. If required, replace the item of plant or machinery.	CM, EM
2	Unexpected odour detected by staff / contractors on the site.	Cease works if safe to do so and remove workers from the immediate vicinity of the detected odour. Investigate the source and nature of the odour in consultation with the Environment Manager or Construction Manager. Eliminate or mitigate the source of the odour as per item 4 below. Only after the area has been deemed safe to work are workers permitted to return the area. In the event of an odour complaint; information would be obtained regarding the character of the odour, frequency, duration and intensity of odour observations and whether impacts of offensive odours are currently occurring An investigation of the odour complaint would be conducted as soon as practicable after an odour complaint has been received; and If odour impacts are immediately occurring; action would be undertaken to reduce odour impacts.	CM, EM
3	High levels of dust due to weather conditions.	Cease dust generating activities under direction of the Environment Manager or Construction Manager until adverse conditions subside. Spray (with water or sealant) or cover exposed stockpiles and other dust generating areas, and remove other causes of dust such as sediment accumulation on sealed surfaces.	CM, EM
4	High levels of dust, contaminants, or odour due to site activities	Investigate causes of the exceedance, and if necessary implement the following additional measures: • Increase the use of water sprays to suppress dust in open areas or roadways. • Consolidate material stockpiles. • Promptly remove exposed heavily contaminated materials. • Use fine mist sprays around the excavation area.	CM, EM

8.0 Performance and Review

This AQMP will be reviewed and updated, with the necessary approval, throughout the course of the Project to reflect changes in construction techniques, staging, or the natural environment. The review will take into consideration:

- Any significant changes to construction activities or methods;
- Key changes to roles and responsibilities within the Project;
- Changes in industry best practice standards or recommended dust controls;
- Changes in response to any complaints received;
- Implementation of any dust, VOC or odour monitoring;
- Changes in legal or other requirements (social and environmental legal requirements, consent conditions, Transport Agency objectives and relevant policies, plans, standards, specifications and guidelines);

9.0 Training

Compliance with this AQMP is the responsibility of all Deicorp staff and contractors employed on or working in association with the Project. All staff and contractors shall be educated on the contents of the plan and their responsibility as part of their site inductions and ongoing tool box talks.

With respect to air quality management, the training programme for all personnel on site will include at minimum the following aspects:

- The responsibilities of all personnel for carrying out the work on site in a manner which does not result in adverse effects on the environment, local residents and in accordance with DMP;
- The potential legal ramifications of adverse environmental effects occurring as a result of the project and non-compliance with resource consent conditions;
- The minimum requirements for dust and odour control for all activities on site;
- The requirements for staff to monitor weather and visually inspect the site for dust discharges, assess the adequacy of dust control methods and implement additional dust control methods when required;
- The actions to be taken in an extreme dust and weather event; and
- The actions to be taken if a complaint is received from the public or consent authority.

Appendix A

Sensitive Receptor Locations

Appendix A Sensitive Receptor Locations

Appendix B

Existing Meteorological Conditions

Appendix B Existing Wind Conditions

The nearest automatic weather station to the Project is the NSW Department of Environment, Energy and Science (EES) operated station at Rouse Hill, about one kilometre north of the Project site. Rouse Hill EES Monitoring station wind data is presented in the following wind roses. The data period is May 2019 to December 2020. Winds often blow from the north, especially during spring, winter and autumn. Although these winds from the north are frequently light. The strongest winds are from the east and southeast during summer daytimes.

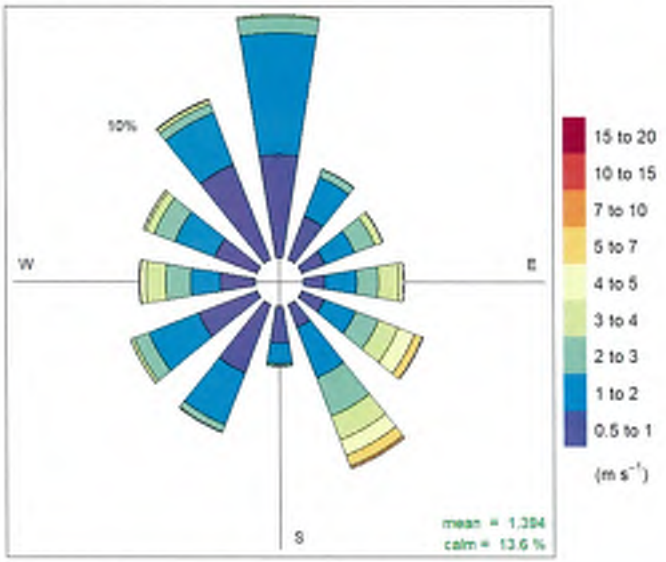

Figure 4 All hours (May 2019 to December 2020) for Rouse Hill

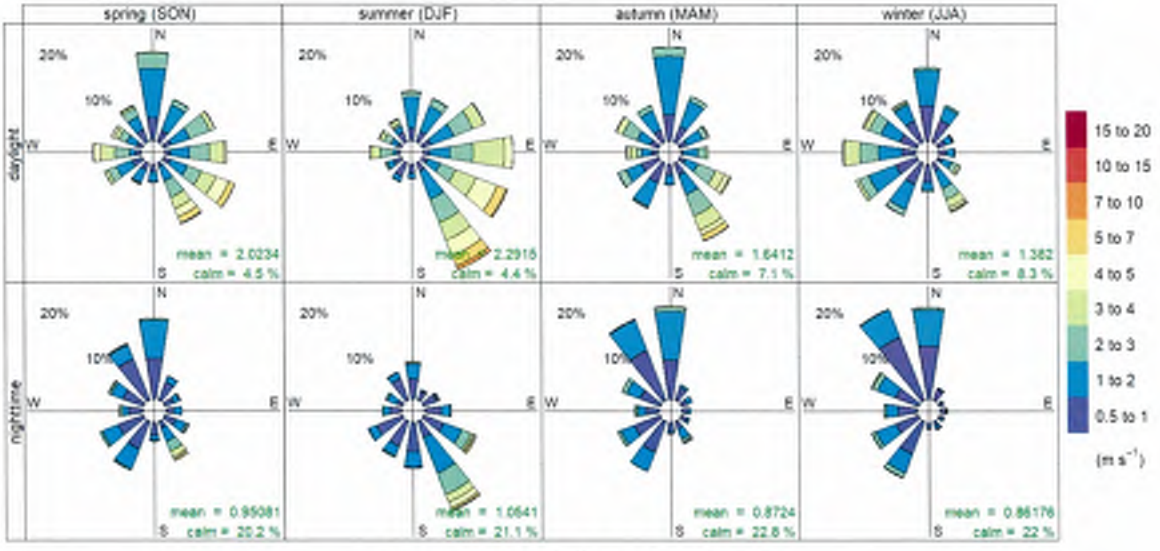

Figure 5 Day/night winds by season (May 2019 to December 2020) for Rouse Hill

Appendix C

Risk Assessment

Appendix C Risk Assessment

Risk assessment process

As risk assessment to potential air quality impacts was undertaken to determine the suitability and requirement of the mitigation controls listed in Section 4.0. This section presents an overview of the risk assessment process.

Rating Risk

Risk ratings were assessed by considering the consequence and likelihood of an event occurring. In assessing the consequence, the extent, severity and duration of the risks were considered. These are discussed below.

Assigning the consequences of risks

'Consequence' refers to the maximum credible outcome of an event affecting an asset, value or use. Consequence criteria were developed for the GB Energy Gas Project to enable a consistent assessment of consequence across the range of potential environmental effects. Consequence criteria were assigned based on the maximum credible consequence of the risk pathway occurring. Where there was uncertainty or incomplete information, a conservative assessment was made on the basis of the maximum credible consequence.

Consequence criteria have been developed to consider the following characteristics:

- Extent of impact
- Severity of impact
- Duration of threat.

The consequence framework and consequence criteria are presented in the following tables, C-1 and C-2, respectively.

Table C- 1 Consequence framework

Level	Qualitative or quantitative description of biophysical/environmental consequence	Qualitative or quantitative description of socio-economic consequence
Negligible	No detectable change in a local environmental setting	No detectable impact on economic, public health and safety, cultural, recreational, aesthetic or social values
Minor	Short-term, reversible changes, within natural variability range, in a local environmental setting	Short-term, localised impact on economic, public health and safety, cultural, recreational, aesthetic or social values
Moderate	Medium-term but limited changes to local environmental setting that can be managed	Medium-term change in quality of economic, public health and safety, cultural, recreational, aesthetic or social values in local setting. Limited impacts at regional level
Major	Long-term, significant changes resulting in risks to human health and/or the environment beyond the local environmental setting	Significant, long-term change in quality of economic, public health and safety, cultural, recreational, aesthetic or social values at local, regional and State levels. Limited impacts at national level
Severe	Irreversible, significant changes resulting in widespread risks to human health and/or the environment at a regional scale or broader	Significant, permanent impact on regional economy, public health and safety and/or irreversible changes to cultural, recreational, aesthetic or social values at regional, state and national levels

Table C- 2 Air Quality Consequence criteria

Aspect	Negligible	Minor	Moderate	Major	Severe
Air Quality	Undetected changes to ambient air quality, beyond the site boundaries	Detectable changes to air quality result in amenity impacts on a small number (<10) of sensitive receptors, and no exceedances of relevant air quality criteria beyond site boundaries.	Detectable localised changes to air quality result in amenity impacts on 10 to 100 sensitive receptors and/or short-term exceedances of relevant air quality criteria beyond site boundaries.	Detectable widespread changes to air quality result in amenity impacts on a large number (>100) of sensitive receptors and/or substantial medium-term exceedances of relevant air quality criteria beyond site boundaries.	Detectable widespread changes to air quality result in amenity impacts on a large number (>100) of sensitive receptors and substantial long-term exceedances of relevant air quality criteria beyond site boundaries.

Assigning the likelihood of risks

'Likelihood' refers to the chance of an event happening and the maximum credible consequence occurring from that event. The likelihood criteria are presented in Table A-3.

Table C- 3 Likelihood guide

Level	Description
Rare	The event may occur only in exceptional circumstances
Unlikely	The event could occur but is not expected
Possible	The event could occur
Likely	The event will probably occur in most circumstances
Almost Certain	The event is expected to occur in most circumstances

Risk matrix and risk rating

Risk levels are assessed using the matrix presented in Table C-4.

Table C- 4 Risk assessment matrix

		Consequence ratings				
		Negligible	Minor	Moderate	Major	Severe
Likelihood rating	Rare	Very Low	Very Low	Low	Medium	Medium
	Unlikely	Very Low	Low	Low	Medium	High
	Possible	Low	Low	Medium	High	High
	Likely	Low	Medium	Medium	High	Very High
	Almost Certain	Low	Medium	High	Very High	Very High

Risk evaluation and treatment

The risk assessment process was used as a screening tool to prioritise potential impacts and the subsequent level of assessment undertaken as part of the impact assessment. Where initial risk ratings were found to be 'medium' or higher, options for additional design changes or mitigation and management measures were considered where practicable.

Risk assessment

The air quality risk assessment for the project is presented in Table A-5.

Table C- 5 Risk assessment

Risk ID	Risk name	Risk pathway	Initial risk			Mitigation Measures	Residual risk		
			C	L	Risk		C	L	Risk
AQR1	Dust from excavation and construction works	Excavation and/or construction activities result in the generation of dust (particulates) resulting in deterioration of the existing air quality environment.	Moderate	Possible	Medium	AQ4-AQ15	Moderate	Rare	Low
AQ3	Extreme weather (hot windy conditions)	Climatic conditions result in the generation of dust (particulates) resulting in deterioration of the existing air quality environment.	Moderate	Likely	Medium	AQ13	Moderate	Unlikely	Low
AQ4	Transportation of materials to and from site	Increased dust emissions near the construction worksite (within urban environment) due to transportation of materials resulting in deterioration of the existing air quality environment.	Moderate	Possible	Medium	AQ1-AQ3	Moderate	Rare	Low
AQ5	Combustion emissions from construction activities	Construction equipment, vehicles and plant results in the generation of combustion emissions resulting in deterioration of the existing air quality environment.	Minor	Unlikely	Low	AQ17-20	Minor	Unlikely	Low
AQ6	Odour from construction activities	Odour from contaminated soils resulting in amenity impacts.	Moderate	Unlikely	Low	AQ7, AQ9, AQ16	Moderate	Rare	Low

Appendix C
Soil and Water Management Plan

1-15 & 2-12 CONFERTA AVENUE, ROUSE HILL

FOR

DEICORP

LGA : BLACKTOWN CITY COUNCIL

LOT : 293/ DP1213279

SKY Engineering & Project Management

SITE LOCATION PLAN

NTS

DRAWING LIST

DRAWING NUMBER	DRAWING TITLE
C-0000	COVER SHEET LOCALITY PLAN AND DRAWING INDEX
C-0001	GENERAL NOTES
C-0800	EROSION AND SEDIMENT CONTROL PLAN SHEET 1
C-0801	EROSION AND SEDIMENT CONTROL PLAN SHEET 2
C-0802	EROSION AND SEDIMENT CONTROL PLAN SHEET 3
C-0810	EROSION AND SEDIMENT CONTROL DETAILS SHEET 1
C-0811	EROSION AND SEDIMENT CONTROL DETAILS SHEET 2

EROSION AND SEDIMENT CONTROL WORKS

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REVISIONS	P1 ISSUE FOR INFORMATION 20.05.2022
CLIENT	DC
PROJECT	STORMWATER MANAGEMENT PLAN
TITLE	COVER SHEET LOCALITY PLAN AND DRAWING INDEX
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Drawn	SY
Designed	SY
Checked	PM
Approved	FX
Height Datum	AHD
Grid	MGA
Scale	NTS
Project No.	SY22-066
Drawing No.	C-0000
Issue	P1

SKY Engineering & Project Management

GENERAL

1. ALL CONSTRUCTION TO BE IN ACCORDANCE WITH THE SPECIFICATION AND THE REQUIREMENTS OF THE LOCAL COUNCIL.
2. THE CONTRACTOR SHALL LIAISE WITH ALL RELEVANT AUTHORITIES TO LOCATE ALL EXISTING SERVICES WITHIN THE CONTRACT AREA PRIOR TO THE COMMENCEMENT OF WORK. SERVICES INFORMATION SHOWN ON THE DRAWINGS IS INDICATIVE ONLY AND MAY NOT BE COMPLETE. WHERE EXISTING AND PROPOSED WORKS CONFLICT, LEVELS ARE TO BE TAKEN AND SUPPLIED TO THE SUPERINTENDENT IMMEDIATELY.
3. THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH ALL OTHER CONSULTANTS' DRAWINGS, SPECIFICATIONS AND ANY OTHER WRITTEN INSTRUCTIONS THAT MAY BE ISSUED DURING THE COURSE OF THE CONTRACT. ANY DISCREPANCY SHALL BE REFERRED TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK.
4. CONTRACTOR MUST VERIFY ALL DIMENSIONS AND EXISTING LEVELS ON SITE PRIOR TO COMMENCEMENT OF WORK. ANY DISCREPANCIES TO BE REPORTED TO THE ENGINEER.
5. ALL HEIGHTS ARE TO AHD AND ALL LEVELS SHALL BE DERIVED FROM EXISTING BENCHMARKS.
6. ALL BENCH MARKS ARE TO BE PROTECTED AND PRESERVED.
7. ALL CONSTRUCTION SHALL MAKE SMOOTH CONNECTION TO EXISTING WORK.
8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE SUPPORT OF ALL EXISTING SERVICES.
9. WD CONSTRUCTED DRAWINGS ARE TO BE PREPARED TO THE REQUIREMENTS OF THE RELEVANT AUTHORITIES.
10. THE SITE IS TO BE LEFT CLEAN AND FREE OF DEBRIS UPON COMPLETION OF WORKS. ALL EXCAVATED AND DEMOLISHED MATERIAL IS TO BE DISPOSED OF AT AN APPROVED DISPOSAL SITE AT THE CONTRACTORS COST.
11. CONTRACTOR TO ENSURE THE RELEVANT AUTHORITIES OCCUPATIONAL HEALTH AND SAFETY PROCEDURES ARE COMPLIED WITH.

SURVEY

1. THE EXISTING SITE CONDITIONS SHOWN ON THE FOLLOWING DRAWINGS WERE SOURCED FROM SURVEY INFORMATION SUPPLIED FROM _____
2. THE SURVEY INFORMATION IS SHOWN TO PROVIDE A BASIS FOR DESIGN BY SKY ENGINEERING. PTY LTD DOES NOT GUARANTEE THE ACCURACY OR COMPLETENESS OF THE SURVEY BASE OR ITS SUITABILITY AS A BASIS FOR CONSTRUCTION DRAWINGS.
3. SHOULD DISCREPANCIES BE ENCOUNTERED DURING CONSTRUCTION BETWEEN THE SURVEY DATA AND ACTUAL FIELD DATA, PLEASE NOTIFY THE ENGINEER.
4. THE CONTRACTOR SHALL ARRANGE ALL SURVEY SETOUT TO BE CARRIED OUT BY A REGISTERED SURVEYOR.
5. BENCHMARK, SURVEY PEGS, LEVEL PEGS OR SUPPLEMENTARY REFERENCE MARKS SHALL NOT BE ADJUSTED OR MOVED WITHOUT WRITTEN APPROVAL FROM THE SUPERINTENDENT. THE CONTRACTOR SHALL TRANSFER ANY PEGS AFFECTED BY THE PROPOSED WORKS TO SIDE POSITIONS CLEAR OF OPERATIONS AND SHALL NOTE THE EXTENT OF THE MOVEMENT IN DISTANCE AND LEVEL.

EXISTING SERVICES AND FEATURES

1. THE CONTRACTOR MUST CONFIRM THE EXACT LOCATION AND EXTENT OF EXISTING SERVICES PRIOR TO CONSTRUCTION AND NOTIFY ANY CONFLICT WITH THE DRAWINGS IMMEDIATELY TO THE ENGINEER/SUPERINTENDENT.
2. EXISTING SERVICES UNLESS SHOWN ON SURVEY PLAN HAVE BEEN PLOTTED FROM SERVICES SEARCH PLANS AND AS SUCH THEIR ACCURACY CANNOT BE GUARANTEED.
3. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO COMPLETE A DIAL BEFORE YOU DIG SEARCH AND TO ESTABLISH THE LOCATION AND LEVEL OF ALL EXISTING SERVICES PRIOR TO THE COMMENCEMENT OF ANY WORK. ANY DISCREPANCIES SHALL BE REPORTED TO THE ENGINEER/SUPERINTENDENT.
4. THE CONTRACTOR HAS A DUTY OF CARE WHEN EXCAVATING NEAR SERVICES. DO NOT ASSUME DEPTH OR ALIGNMENTS OF CABLES OR PLANT AS THESE MAY VARY SIGNIFICANTLY. THE CONTRACTOR MUST ACCEPT ALL RESPONSIBILITY TO ENSURE TO EXISTING SERVICES AS SERVICE AUTHORITIES MAY SEEK COMPENSATION FOR DAMAGES CAUSED TO THEIR PROPERTY AND SUBSEQUENT LOSSES CAUSED.
5. THE CONTRACTOR SHALL ALLOW FOR THE CAPPING OFF, EXCAVATION AND REMOVAL OR RELOCATION (IF REQUIRED) TO RELEVANT AUTHORITIES GUIDELINES OF ALL EXISTING SERVICES IN AREAS AFFECTED BY WORKS WITHIN THE CONTRACT AREA OR AS SHOWN ON THE DRAWINGS.
7. THE CONTRACTOR SHALL CONSTRUCT TEMPORARY SERVICES TO MAINTAIN SUPPLY TO EXISTING BUILDINGS REMAINING IN OPERATION DURING WORKS TO THE SATISFACTION AND APPROVAL OF ANY RELEVANT AUTHORITIES. ONCE DIVERSION IS COMPLETE AND COMMISSIONED, THE CONTRACTOR SHALL REMOVE ALL SUCH TEMPORARY SERVICES AND MAKE GOOD TO THE SATISFACTION OF THE RELEVANT AUTHORITY/SUPERINTENDENT.
8. INTERRUPTION TO SUPPLY OF EXISTING SERVICES SHALL BE DONE SO AS NOT TO CAUSE ANY INCONVENIENCE TO SURROUNDING ALLOTMENTS. CONTRACTOR TO OBTAIN APPROVAL FROM THE RELEVANT AUTHORITIES FOR TIME OF INTERRUPTION.
9. ALL EXISTING SERVICE UTILITIES COVERS AND GRATES ARE TO BE ADJUSTED (TO RELEVANT AUTHORITY GUIDELINES) TO SUIT NEW FINISHED SURFACE LEVELS WHERE APPLICABLE.
10. IF EXISTING SERVICE (UTILITY) COVERS AND GRATES OR SURROUNDING SURFACE LEVELS ARE TO BE LOWERED, THE CONTRACTOR IS TO MAKE CERTAIN THAT MANHOLE COVERS (TO RELEVANT SERVICE AUTHORITY GUIDELINES) TO SERVICES ARE MAINTAINED. IF MANHOLE COVERS ARE NOT MAINTAINED THE CONTRACTOR IS TO LOWER OR PROTECT SERVICES TO THE SATISFACTION OF THE RELEVANT SERVICE AUTHORITY/SUPERINTENDENT.

EROSION AND SEDIMENT CONTROL

1. ALL SEDIMENT CONTROL DEVICES ARE TO BE CONSTRUCTED, PLACED AND MAINTAINED IN ACCORDANCE WITH RELEVANT AUTHORITY GUIDELINES AND AS DETAILED SHOWN ON THESE DRAWINGS.
2. ALL PERIMETER AND EXTENTION CONTROL MEASURES ARE TO BE PLACED PRIOR TO, OR AS THE FIRST STEP IN EARTHWORKS AND/OR CLEARING.
3. THE EROSION AND SEDIMENT CONTROL PLAN MAY REQUIRE FUTURE ADJUSTMENT TO REFLECT CONSTRUCTION STAGING. IT IS THE CONTRACTORS RESPONSIBILITY TO PREPARE THEIR OWN EROSION AND SEDIMENT CONTROL PLAN WHICH SUITS THE DESIGNED CONSTRUCTION STAGING TO THE SUPERINTENDENT'S SATISFACTION.
4. FILTRATION BUFFER ZONES ARE TO BE FENCED OFF AND ACCESS PROHIBITED TO ALL PLANT AND MACHINERY.
5. CONTRACTOR IS TO ENSURE ALL EROSION & SEDIMENT CONTROL DEVICES ARE MAINTAINED IN GOOD WORKING ORDER AND OPERATE EFFECTIVELY. REPAIRS AND OR MAINTENANCE SHALL BE UNDERTAKEN AS REQUIRED, PARTICULARLY FOLLOWING STORM EVENTS.
6. ALL TOPSOIL IS TO BE STOCKPILED ON SITE AWAY FROM TREES AND DRAINAGE LINES IN ACCORDANCE WITH DETAILS PROVIDED AND WITH RELEVANT AUTHORITY GUIDELINES. MEASURES SHALL BE APPLIED TO PREVENT EROSION OF THE STOCKPILES.
7. ALL EARTHWORK AREAS SHALL BE ROLLED EACH EVENING TO SEAL THE EARTHWORKS. DUST SUPPRESSION SHALL BE CARRIED OUT IN ACCORDANCE WITH RELEVANT AUTHORITIES GUIDELINES.
8. UPON COMPLETION OF ALL EARTHWORKS OR AS DIRECTED BY RELEVANT AUTHORITY, SOIL CONSERVATION TREATMENTS SHALL BE APPLIED SO AS TO RENDER AREAS THAT HAVE BEEN DISTURBED, ERODION PROOF WITHIN 14 DAYS.
9. ALL CUT AND FILL SLOPES ARE TO BE SEEDED AND STRAW MULCHED WITHIN 14 DAYS OF COMPLETION OF FORMATION U.N.O. BY LANDSCAPE ARCHITECTS.
10. ALL CONSTRUCTION VEHICLES SHALL ENTER AND EXIT THE SITE VIA THE TEMPORARY CONSTRUCTION ENTRY/EXIT AS PER DETAILS PROVIDED OR WITH RELEVANT AUTHORITY GUIDELINES.
11. ALL VEHICLES LEAVING THE SITE SHALL BE CLEANED AND INSPECTED BEFORE LEAVING SITE TO LIMIT SEDIMENT TRACKING TO ROADWAYS.
12. FINAL SITE LANDSCAPING WILL BE UNDERTAKEN AS SOON AS POSSIBLE AND WITHIN 20 WORKING DAYS FROM COMPLETION OF CONSTRUCTION ACTIVITIES.
13. ANY EXISTING TREES WHICH FORM PART OF THE FINAL LANDSCAPING PLAN WILL BE PROTECTED FROM CONSTRUCTION ACTIVITIES BY:
   A. PROTECTING THEM WITH BARRIER FENCING OF SIMILAR MATERIALS INSTALLED OUTSIDE THE DRIPLINE
   B. ENSURING THAT NOTHING IS NAILED TO THEM
   C. PROHIBITING PAVING, GRADING, SEDIMENT WASH OR PLACING OF STOCKPILES WITHIN THE DRIP LINE EXCEPT UNDER THE FOLLOWING CONDITIONS:
   - ENCROACHMENT ONLY OCCURS ON ONE SIDE AND NO CLOSER TO THE TRUNK THAN EITHER 1.5 METRES OR HALF THE DISTANCE BETWEEN THE OUTER EDGE OF THE DRIPLINE AND THE TRUNK, WHICHEVER IS THE GREATER
   - A DRAINAGE SYSTEM THAT ALLOWS AIR AND WATER TO CIRCULATE THROUGH THE ROOT ZONE (E.G. A GRAVEL BED) IS PLACED UNDER ALL FILL LAYERS OF MORE THAN 200 MILLIMETRES DEPTH
   - CARE IS TAKEN NOT TO CUT ROOTS UNNECESSARILY NOR TO COMPACT THE SOIL AROUND THEM

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REV	DESCRIPTION	DATE
P1	ISSUE FOR INFORMATION	26.05.2023

REVISIONS

BAR SCALES

CLIENT

PROJECT: STORMWATER MANAGEMENT PLAN

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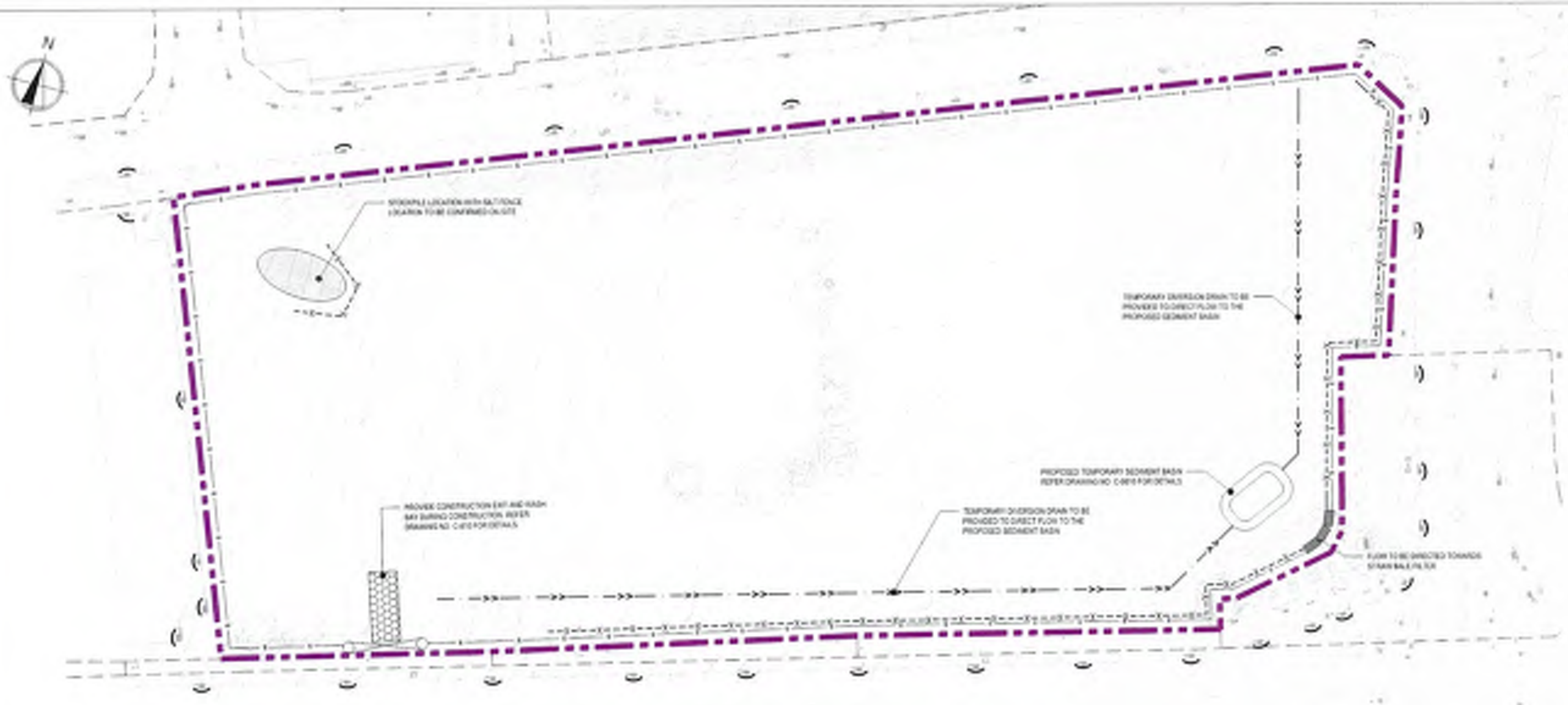
Project No.	Drawing No.	Issue
SY22-066	C-0001	P1



LEGEND

EXISTING

- LOT DP CADASTRAL BOUNDARY
- EXISTING CADASTRAL BOUNDARY
- EXISTING CONTOURS

NEW

- CONSTRUCTION VEHICLE EXIT
- BARRIER FENCE
- SEDIMENT FENCE
- STRAW BALE FILTER
- DIVERSION DRAIN
- SITE ACCESS GATE
- GEOTEXTILE INLET FILTER TYPE A
- MESH AND GRAVEL INLET FILTER

STAGE 1 SITE SETUP AND EARTHWORKS STRIPPING

1. PRIOR TO ANY WORKS BEING UNDERTAKEN, THE SOIL AND WATER MANAGEMENT MEASURES ARE TO BE INSTATED
2. A CATCH DRAIN AND SILT FENCE ARE TO BE PLACED AROUND THE PERIMETER OF THE LOW SIDE OF THE SITE
3. THE SITE IS TO HAVE A SINGLE POINT OF ACCESS AWAY FROM THE SEDIMENT BASIN
4. FENCING IS TO BE ERECTED ON THE HIGH SIDE OF THE SITE TO PREVENT ACCESS
5. ALL RUNOFF FROM DISTURBED AREAS IS TO BE DIVERTED TO A CENTRAL LOW POINT
6. THE LOW POINT (WHICH IS TO STAY IN THE GENERAL LOCATION FOR THE DURATION OF THE EARTHWORKS OPERATION) IS TO A SEDIMENT BASIN
7. THE SEDIMENT BASIN IS TO BE TREATED IN ACCORDANCE WITH THE BLUE BOOK AND WATER ONLY PUMPED OUT WHEN THE SEDIMENT CONTENT IS BELOW 50mg/L
8. A WASH DOWN BAY IS TO BE SET UP TO WASH DOWN SILT LADEN TYRES FROM VEHICLES PRIOR TO LEAVING THE SITE

BASIN CALCULATIONS FOR TYPE D SOILS	
SITE AREA	BASIN
	1
TOTAL CATCHMENT AREA(ha)	2.7046
DISTURBED CATCHMENT AREA(ha)	2.7046

SOIL ANALYSIS	
SOIL LANDSCAPE	BLACKTOWN
SOIL TEXTURE GROUP	TYPE D

RAINFALL DATA	
DESIGN RAINFALL DEPTH(DAYS)	5
DESIGN RAINFALL DEPTH (PERCENTILE)	75
X-DAY, Y-PERCENTILE RAINFALL EVENT	19
RAINFALL INTENSITY: 2 YEAR, 6 HOUR STORM	10.1
RAINFALL EROSIVITY (R FACTOR)	2050

TOTAL BASIN VOLUME						
SITE	Cv	X X-DAY Y-%ILE	TOTAL CATCHMENT AREA (ha)	SETTLING ZONE VOLUME (m³)	SEDIMENT STORAGE VOLUME (m³)	TOTAL BASIN VOLUME (m³)
A	0.39	19	2.7046	200.61	100	300.62

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P1	ISSUE FOR INFORMATION	20.05.2022
REV	DESCRIPTION	DATE
REVISIONS		

BAR SCALES: 0 5 10 15 20 25 30m — SCALE 1:500 AT A1 SIZE

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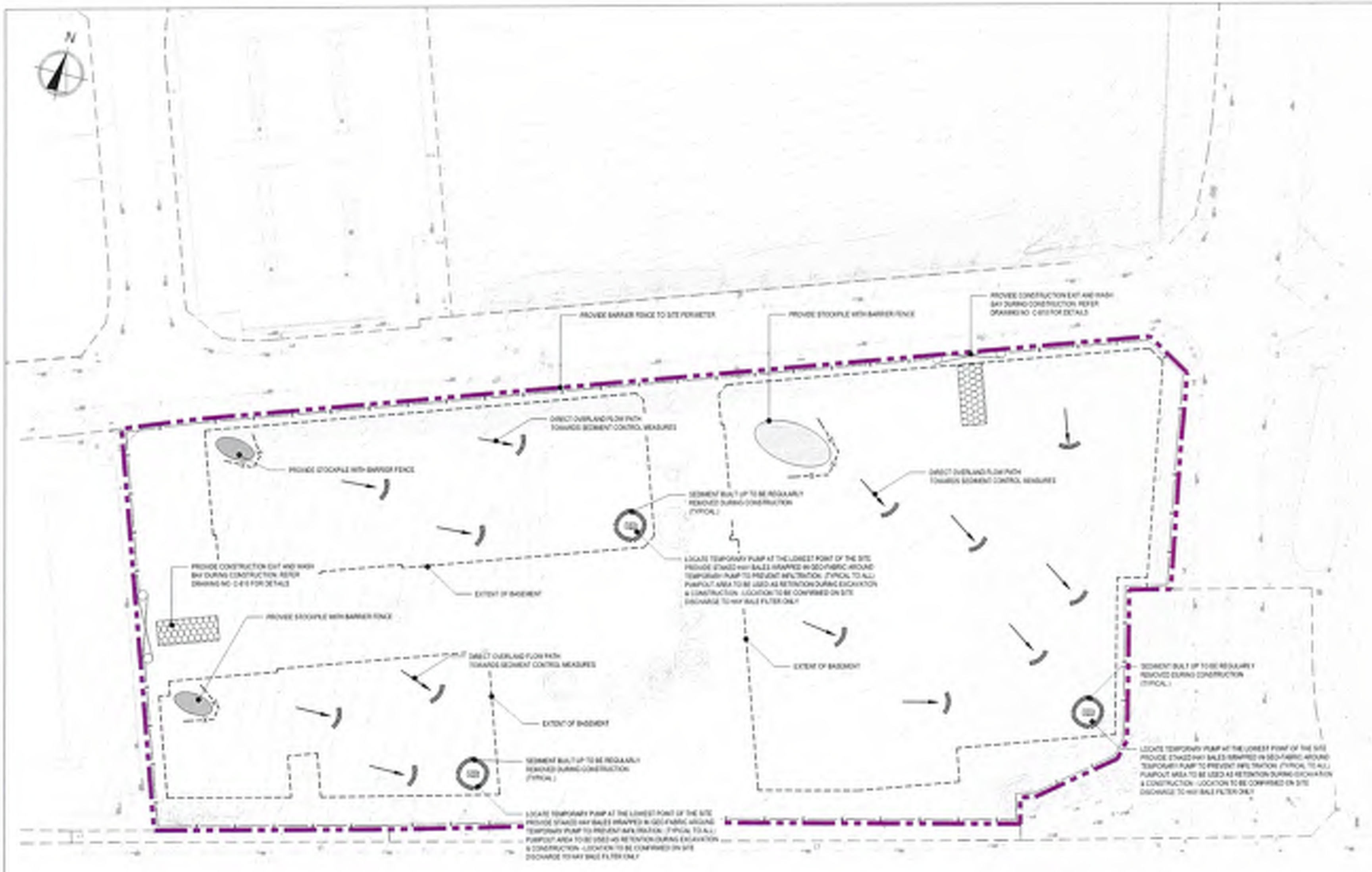
SKY Engineering & Project Management

Project No.	Drawing No.	Issue
SY22-066	C-0800	P1



LEGEND

EXISTING

- LOT 203 DP CADASTRAL BOUNDARY
- EXISTING CADASTRAL BOUNDARY
- EXISTING CONTOURS

NEW

- CONSTRUCTION VEHICLE EXIT
- BARRIER FENCE
- SEDIMENT FENCE
- STRAW BALE FILTER (SD 6-7)
- DIVERSION DRAIN
- SITE ACCESS GATE
- GEOTEXTILE INLET FILTER TYPE A
- MESH AND GRAVEL INLET FILTER

STAGE 2 BULK EARTHWORKS STAGE

1. THE LOW POINT WHICH IS TO STAY IN GENERAL LOCATION FOR THE DURATION IF THE EARTHWORKS OPERATIONS IS TO A SEDIMENT BASIN.
2. AS THE SITE IS EXCAVATED THE SEDIMENT BASIN IS TO BE LOWERED AND LOCATED IN THE LOWEST AREA.
3. THE SEDIMENT BASIN IS TO BE TREATED IN ACCORDANCE WITH THE BLUE BOOK AND WATER ONLY PUMPED OUT WHEN THE SEDIMENT CONTENT IS BELOW 50mg/L
4. A WASH DOWN BAY IS TO BE SET UP TO WASH DOWN SILT LADEN TYRES FROM VEHICLES PRIOR TO LEAVING THE SITE.
5. THE SITE IS TO HAVE A MATERIAL DROP OFF SPOT THAT IS SEALED DURING THE COURSE OF WORKS.
6. THE WATER ONCE CLEAN IS TO BE PUMPED OUT AND DISCHARGED IN ACCORDANCE WITH COUNCIL REQUIREMENTS TO A STREET PIT.
7. WHERE THE EXCAVATION METHOD CREATES TWO SEPERATE DEPRESSIONS THEN A SECOND SEDIMENT BASIN AND PUMP OUT SYSTEM ARE TO BE CONSTRUCTED.

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REV	DESCRIPTION	DATE
P1	ISSUE FOR INFORMATION	

REVISIONS

BAR SCALES: 0 5 10 15 20 25 30m — SCALE 1:500 AT A1 SIZE

CLIENT: DC

PROJECT: STORMWATER MANAGEMENT PLAN

TITLE: EROSION AND SEDIMENT CONTROL PLAN SHEET 2

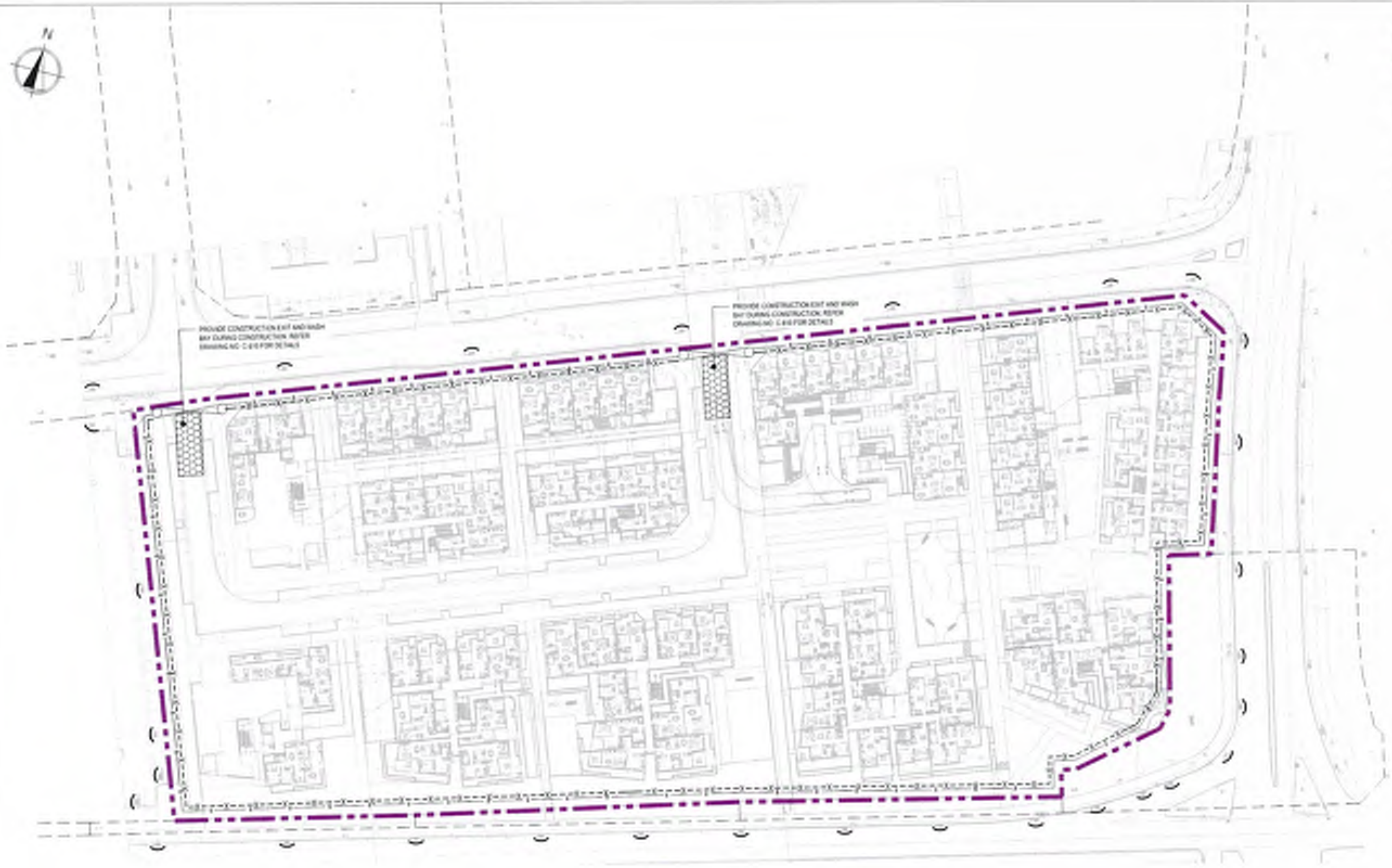
STATUS: ISSUED FOR INFORMATION

Drawn	Designed	Checked	Approved
ZW	ZW	PM	FX

Height Datum	Grid	Scale
AHD	MGA	1:500

SKY Engineering & Project Management

Project No.	Drawing No.	Issue
SY22-066	C-0801	P1



LEGEND

EXISTING

- LOT 316 DP1213276 CADASTRAL BOUNDARY
- EXISTING CADASTRAL BOUNDARY
- EXISTING CONTOURS

NEW

- CONSTRUCTION VEHICLE EXIT
- BARRIER FENCE
- SEDIMENT FENCE
- STRAW BALE FILTER (SD 6.7)
- DIVERSION DRAIN
- SITE ACCESS GATE
- GEOTEXTILE INLET FILTER TYPE A
- MESH AND GRAVEL INLET FILTER

STAGE 3 ABOVE GROUND BUILDING CONSTRUCTION

1. SILT FENCING IS TO REMAIN AROUND THE LOW SIDE PERIMETER. WHERE IT IS TAKEN DOWN FOR DELIVERIES, IT SHOULD BE REINSTATED IMMEDIATELY.
2. THE SITE IS TO HAVE A MATERIAL DROP OFF SPOT THAT IS SEALED DURING THE COURSE OF THE WORKS.
3. VEHICLES ARE NOT ALLOWED TO PARK ON THE FOOTPATH AND CREATE AREAS PRONE TO SOIL EROSION.
4. DISTURBED AREAS SHOULD BE EITHER FINISHED AS SOON AS POSSIBLE OR TEMPORARY GEOFABRIC (OR SIMILAR) PLACED DOWN TO PREVENT BARE GROUND BEING EXPOSED TO THE WEATHER.

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REV	DESCRIPTION	DATE
P1	ISSUE FOR INFORMATION	20.05.2022

REVISIONS

BAR SCALES: 0 5 10 15 20 25 30m — SCALE 1:500 AT A1 SIZE

CLIENT: DC

PROJECT: STORMWATER MANAGEMENT PLAN

TITLE: EROSION AND SEDIMENT CONTROL PLAN SHEET 3

STATUS: ISSUED FOR INFORMATION

Drawn	Designed	Checked	Approved
SY	SY	PM	FX

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AHD	MGA	1:500 at A1 size

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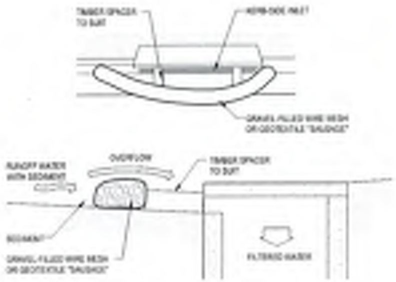
Project No.	Drawing No.	Issue
SY22-066	C-0802	P1

STOCKPILE CONSTRUCTION NOTES:

1. PLACE STOCKPILES MORE THAN 2 (PREFERABLY 5) METRES FROM EXISTING VEGETATION, CONCENTRATED WATER FLOW, ROADS AND HAZARD AREAS.
2. CONSTRUCT ON THE CONTOUR AS LOW, FLAT, ELONGATED MOUNDS.
3. WHERE THERE IS SUFFICIENT AREA, TOPSOIL STOCKPILES SHALL BE LESS THAN 2 METRES IN HEIGHT.
4. WHERE THEY ARE TO BE PLACE FOR MORE THAN 10 DAYS, STABILISE FOLLOWING THE APPROVED ESCP OR SWMP TO REDUCE THE C-FACTOR TO LESS THAN 0.10.
5. CONSTRUCT EARTH BANKS ON THE UPSLOPE SIDE TO DIVERT WATER AROUND STOCKPILES AND SEDIMENT FENCES 1 TO 2 METRES DOWNSLOPE.

STOCKPILES

SCALE N.T.S

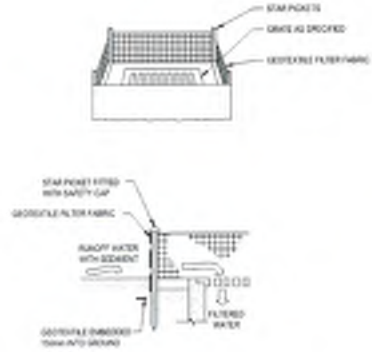


MESH & GRAVEL INLET FILTER CONSTRUCTION NOTES:

1. INSTALL FILTERS TO KERB INLETS ONLY AT SAG POINTS.
2. FABRICATE A SLEEVE MADE FROM GEOTEXTILE OR WIRE MESH LONGER THAN THE LENGTH OF THE INLET PIT AND FILL IT WITH 25mm TO 50mm GRAVEL.
3. FORM AN ELLIPTICAL CROSS-SECTION ABOUT 150mm HIGH x 400mm WIDE.
4. PLACE THE FILTER AT THE OPENING LEAVING AT LEAST A 100mm SPACE BETWEEN IT AND THE KERB INLET. MAINTAIN THE OPENING WITH SPACER BLOCKS.
5. FORM A SEAL WITH THE KERB TO PREVENT SEDIMENT BYPASSING THE FILTER.
6. SANDBAGS FILLED WITH GRAVEL CAN SUBSTITUTE FOR THE MESH OR GEOTEXTILE PROVIDING THEY ARE PLACED SO THAT THEY CAN FIRMLY ABUT EACH OTHER AND SEDIMENT LADEN WATERS CANNOT PASS BETWEEN.

MESH & GRAVEL INLET FILTER

SCALE N.T.S

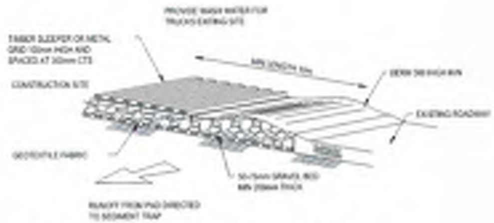


GEOTEXTILE INLET FILTER CONSTRUCTION NOTES:

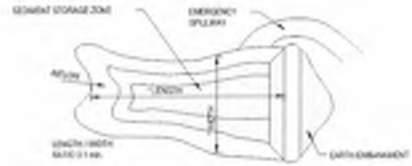
1. FABRICATE A SEDIMENT BARRIER MADE FROM GEOTEXTILE OR STRAW BALES.
2. PICKET SPACING TO BE A MAXIMUM 1.0m CENTRES.
3. IN WATERWAYS, ARTIFICIAL SAG POINTS CAN BE CREATED WITH SANDBAGS OR EARTH BANKS AS SHOWN IN THE DRAWING.
4. DO NOT COVER THE INLET WITH GEOTEXTILES UNLESS THE DESIGN IS ADEQUATE TO ALLOW FOR ALL WATERS TO BYPASS IT.

GEOTEXTILE INLET FILTER - TYPE A

SCALE N.T.S



TEMPORARY CONSTRUCTION VEHICLE EXIT SCALE N.T.S



PLAN VIEW

SCALE N.T.S

CROSS-SECTION

SCALE N.T.S

EARTH BASIN WET CONSTRUCTION NOTES:

1. REMOVE ALL VEGETATION AND TOPSOIL FROM UNDER THE DAM WALL AND FROM WITHIN THE STORAGE AREA.
2. CONSTRUCT A CUT-OFF TRENCH 500mm DEEP AND 1,200mm WIDE ALONG THE CENTRELINE OF THE EMBANKMENT EXTENDING TO A POINT ON THE GULLY WALL LEVEL WITH THE RISER CREST.
3. MAINTAIN THE TRENCH FREE OF WATER AND RECOMPACT THE MATERIALS WITH EQUIPMENT AS SPECIFIED IN THE SWMP TO 95% STANDARD PROCTOR DENSITY.
4. SELECT FILL FOLLOWING THE SWMP THAT IS FREE OF ROOTS, WOOD, ROCK, LARGE STONE OR FOREIGN MATERIAL.
5. PREPARE THE SITE UNDER THE EMBANKMENT BY RIPPING TO AT LEAST 100mm TO HELP BOND COMPACTED FILL TO THE EXISTING SUBSTRATE.
6. SPREAD THE FILL IN 100mm TO 150mm LAYERS AND COMPACT IT AT OPTIMUM MOISTURE CONTENT FOLLOWING THE SWMP.
7. CONSTRUCT THE EMERGENCY SPILLWAY.
8. REHABILITATE THE STRUCTURE FOLLOWING THE SWMP.

EARTH BASIN - WET

SCALE N.T.S

REV	DESCRIPTION	DATE
P1	ISSUE FOR INFORMATION	30.05.2023

REVISIONS

BAR SCALES

CLIENT

PROJECT: STORMWATER MANAGEMENT PLAN

TITLE: EROSION AND SEDIMENT CONTROL DETAILS SHEET 1

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Project No.	Drawing No.	Issue
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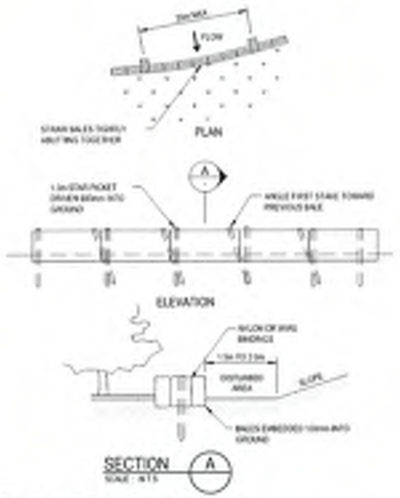


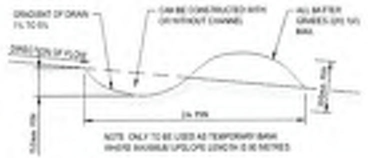
SECTION A
SCALE : NTS

STRAW BALE FILTER CONSTRUCTION NOTES:

1. CONSTRUCT THE STRAW BALE FILTER AS CLOSE AS POSSIBLE TO BEING PARALLEL TO THE CONTOURS OF THE SITE.
2. PLACE BALES LENGTHWISE IN A ROW WITH ENDS TIGHTLY ABUTTING. USE STRAW TO FILL ANY GAPS BETWEEN BALES. STRAWS ARE TO BE PLACED PARALLEL TO GROUND.
3. ENSURE THAT THE MAXIMUM HEIGHT OF THE FILTER IS ONE BALE.
4. EMBED EACH BALE IN THE GROUND 75mm-100mm AND ANCHOR WITH TWO 1.2 METER STAR PICKETS OR STAKES. ANGLE THE FIRST STAR PICKET OR STAKE IN EACH BALE TOWARDS THE PREVIOUSLY LAID BALE. DRIVE THEM 600mm INTO THE GROUND AND, IF POSSIBLE, FLUSH WITH THE TOP OF THE BALES. WHERE STAR PICKETS ARE USED AND THEY PROTRUDE ABOVE THE BALES, ENSURE THEY ARE FITTED WITH SAFETY CAPS.
5. WHERE A STRAW BALE FILTER IS CONSTRUCTED DOWNSLOPE FROM A DISTURBED BATTER, ENSURE THE BALES ARE PLACED 1 TO 2 METERS DOWNSLOPE FROM THE TOE.
6. ESTABLISH A MAINTENANCE PROGRAM THAT ENSURES THE INTEGRITY OF THE BALES IS RETAINED - THEY COULD REQUIRE REPLACEMENT EACH 2 TO 4 MONTHS.

STRAW BALE FILTER

SCALE: N.T.S



EARTH BANK CONSTRUCTION NOTES:

1. BUILD WITH GRADIENTS BETWEEN 1% AND 5%.
2. AVOID REMOVING TREES AND SHRUBS IF POSSIBLE - WORK AROUND THEM.
3. ENSURE THE STRUCTURES ARE FREE OF PROJECTIONS OR OTHER IRREGULARITIES THAT COULD IMPEDE WATER FLOW.
4. BUILD THE DRAINS WITH CIRCULAR, PARABOLIC OR TRAPEZOIDAL CROSS SECTIONS, NOT 'V' SHAPED.
5. ENSURE BANKS ARE PROPERLY COMPACTED TO PREVENT FAILURE.
6. COMPLETE PERMANENT OR TEMPORARY STABILISATION WITHIN 10 DAYS OF CONSTRUCTION.

EARTH BANK (LOW FLOW)

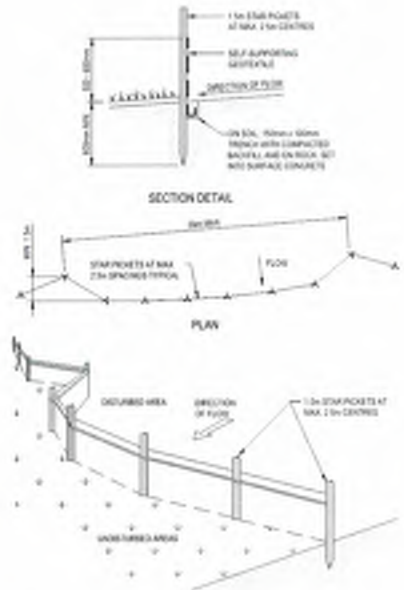
SCALE N.T.S

STABILISED SITE ACCESS CONSTRUCTION NOTES:

1. STRIP THE TOPSOIL, LEVEL THE SITE AND COMPACT THE SUBGRADE.
2. COVER THE AREA WITH NEEDLE-PUNCHED GEOTEXTILE.
3. CONSTRUCT A 200mm THICK PAD OVER THE GEOTEXTILE USING ROAD BASE OR 30mm AGGREGATE.
4. ENSURE THE STRUCTURE IS AT LEAST 15 METRES LONG OR TO BUILDING ALIGNMENT AND AT LEAST 3 METRES WIDE.
5. WHERE A SEDIMENT FENCE JOINS ONTO THE STABILISED ACCESS, CONSTRUCT A HUMP IN THE STABILISED ACCESS TO DIVERT WATER TO THE SEDIMENT FENCE.

STABILISED SITE ACCESS

SCALE N.T.S



SEDIMENT FENCE CONSTRUCTION NOTES:

1. CONSTRUCT SEDIMENT FENCES AS CLOSE AS POSSIBLE TO BEING PARALLEL TO THE CONTOURS OF THE SITE, BUT WITH SMALL RETURNS AS SHOWN IN THE DRAWING TO LIMIT THE CATCHMENT AREA OF ANY ONE SECTION. THE CATCHMENT AREA SHOULD BE SMALL ENOUGH TO LIMIT WATER FLOW IF CONCENTRATED AT ONE POINT TO 50 LITRES PER SECOND IN THE DESIGN STORM EVENT, USUALLY THE 10 YEAR EVENT.
2. CUT A 150mm DEEP TRENCH ALONG THE UPSLOPE LINE OF THE FENCE FOR THE BOTTOM OF THE FABRIC TO BE ENTRENCHED.
3. DRIVE 1.5m LONG STAR PICKETS INTO GROUND AT 2.5m INTERVALS (MAX.) AT THE DOWNSLOPE EDGE OF THE TRENCH. ENSURE ANY STAR PICKETS ARE FITTED WITH SAFETY CAPS.
4. FIX SELF SUPPORTING GEOTEXTILE TO THE UPSLOPE SIDE OF THE POSTS ENSURING IT GOES TO THE BASE OF THE TRENCH. FIX THE GEOTEXTILE WITH WIRE TIES OR AS RECOMMENDED BY THE MANUFACTURER. ONLY USE GEOTEXTILE SPECIFICALLY PRODUCED FOR SEDIMENT FENCING. THE USE OF SHADE CLOTH FOR THIS PURPOSE IS NOT SATISFACTORY.
5. JOIN SECTIONS OF FABRIC AT A SUPPORT POST WITH A 150mm OVERLAP.
6. BACKFILL THE TRENCH OVER THE BASE OF THE FABRIC AND COMPACT IT THOROUGHLY OVER THE GEOTEXTILE.

SEDIMENT FENCE

SCALE N.T.S

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P1	ISSUE FOR INFORMATION	30.08.2023

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BAR SCALES

CLIENT: DC

PROJECT: STORMWATER MANAGEMENT PLAN

TITLE: EROSION AND SEDIMENT CONTROL DETAILS SHEET 2

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Project No	Drawing No	Issue
SY22-066	C-0811	P1

Engineering &
Project Management

20 May 2022

Deicorp

Level 3, 161 Redfern Street
Redfern NSW 2016

Reference: CE01-01-SY22-066.docx
Our Contact: 0435 144 005

Email admin@skyeng.com.au

Dear Mark,

RE: COMPLIANCE STATEMENT – 1-15 & 2-12 CONFERTA AVENUE, ROUSE HILL (SITE 2)

Sky Engineering acting as professional consulting engineers and project managers confirm that the Civil Engineering Plans prepared by Sky Engineering generally satisfies the following condition of consent (SSD 10425).

25. Construction Soil and Water Management Plan

C25. Prior to the commencement of any earthwork or construction, the Applicant shall submit to the satisfaction of the Certifier a Construction Soil and Water Management Sub-Plan (CSWMSP) which must address, but not be limited to the following:

- *(a) be prepared by a suitably qualified expert, in consultation with Council.*
- *(b) describe all erosion and sediment controls to be implemented during construction*
- *(c) provide a plan of how all construction works will be managed in a wet-weather events (i.e. storage of equipment, stabilisation of the Site)*
- *(d) detail all off-Site flows from the Site*
- *(e) describe the measures that must be implemented to manage stormwater and flood flows for small and large sized events, including, but not limited to 1 in 1-year ARI, 1 in 5-year ARI and 1 in 100-year ARI.*

This letter is to certify that the Civil Engineering documentation titled 'Erosion and Sediment Control Works', Drawing No. as in the table below,

DRAWING NUMBER	DRAWING TITLE
C-0000	COVER SHEET LOCALITY PLAN AND DRAWING INDEX
C-0001	GENERAL NOTES
C-0800	EROSION AND SEDIMENT CONTROL PLAN SHEET 1
C-0801	EROSION AND SEDIMENT CONTROL PLAN SHEET 2
C-0802	EROSION AND SEDIMENT CONTROL PLAN SHEET 3
C-0810	EROSION AND SEDIMENT CONTROL DETAILS SHEET 1
C-0811	EROSION AND SEDIMENT CONTROL DETAILS SHEET 2

SKY Engineering & Project Management

Revision P1, prepared by Sky Engineering relating to the Site 2, 1-15 & 2-12 Conferta Ave, Rouse Hill, is generally in accordance with the above.

This certificate shall not be construed as relieving any other parties of their responsibilities.

Should you have any questions, please don't hesitate to contact the undersigned.

Yours sincerely,

Peter McCallum
CPEng NER

Director
peter@skyeng.com.au

Appendix D
Construction Waste Management Plan

BARKER RYAN STEWART

Deicorp Projects (Tallawong Station) Pty Ltd

Construction Waste Management Plan

Approved Mixed Use Development

Tallawong Station Precinct South – Site 2

May 2022

ENGINEERING
PLANNING
SURVEYING
CERTIFICATION

brs.com.au

Project No.	SY190226
Author	BM
Checked	GB
Approved	GB

Rev No.	Status	Date	Comments
1	Draft	06/07/2021	
2	Final	19/07/2021	
3	Final	26/05/2022	Site 2

REPORT DISCLAIMER
This report has been prepared for the client identified in section 1.0 only and cannot be relied on or used by any third party. Any representation, statement, opinion or advice, expressed or implied in this report is made in good faith but on the basis that Barker Ryan Stewart are not liable (whether by reason of negligence, lack of care or otherwise) to any person for any damage or loss whatsoever which has occurred or may occur in relation to that person taking or not taking (as the case may be) action in any respect of any representation, statement, or advice referred to above.

This report is for development application purposes only and is not to be relied upon for construction purposes. The waste calculations included in the report are an estimate only, based on the plans and documents supplied by the client and waste generation guidelines from Council, the EPA and other third parties. This report is a guideline only and should not be used as a basis for feasibility studies, safety procedures, operational costs, demolition / construction estimates or bills of quantities. Should waste generation be higher than expected, the site manager shall make appropriate adjustments to accommodate additional waste. Any equipment recommended in this report shall be assessed by the supplier and site manager to determine it is fit for the intended purpose.

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TABLE OF CONTENTS

Page numbers

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1 Author and Contact Details

AUTHOR DETAILS	
Name	Barker Ryan Stewart
Address	Suite 603, Level 6, 12 Century Circuit, Norwest Business Park
Phone number(s)	02 9659 0005
Email	sydney@brs.com.au

DEVELOPMENT DETAILS	
Project Details	Tallawong Station Precinct South
Address of Development	1-15 Conferta Avenue, Rouse Hill (Lot 293 DP 1213279) and 2 -12 Conferta Avenue (Lot 294 DP 1213279)
DA Details	SSD 10425
Existing Buildings and other structures currently on the site	The site is currently vacant of buildings.
Description of approved development	Construction of a staged mixed-use development (Tallawong Station Precinct South).

This development achieves the waste objectives set out in the DCP. The details on this form are the provisions and intentions for minimising waste relating to this project. All records demonstrating lawful disposal of waste will be retained and kept readily accessible for inspection by regulatory authorities such as council, OEH or WorkCover NSW.

Contact Name	Glenn Barker
Signature	
Date	26/05/2022

2 Introduction

Barker Ryan Stewart have been engaged by Deicorp Projects (Tallawong Station) Pty Ltd to prepare a Construction Waste Management Plan (CWMP) in order to obtain a Construction Certificate for the approved Tallawong Station South mixed use precinct (SSD 10425).

Conditions associated with the Construction Waste Management Sub-Plan are discussed in Table 1 below.

Table 1: Condition Review (C.24)

Condition Requirement	Comment
C24. Prior to the commencement of any earthwork or construction, the Applicant shall submit to the satisfaction of the Certifier a Construction Waste Management Sub-Plan (CWMP) for the development. A copy of the CWMP must be submitted to the Planning Secretary and Council for information. The Sub-Plan must include, as a minimum, the following elements:	
(a) require that all waste generated during the project is assessed, classified and managed in accordance with the EPA's "Waste Classification Guidelines Part 1: Classifying Waste";	Refer to Section 4.6 for waste classification guidelines.
(b) demonstrate that an appropriate area will be provided for the storage of bins and recycling containers and all waste and recyclable material generated by the works;	Location of waste bins is shown on the Plan provided in Appendix A.
(c) procedures for minimising the movement of waste material around the site and double handling;	Refer to Section 4.2 – Waste Strategy which identified methods to prevent double handling.
(d) waste (including litter, debris or other matter) is not caused or permitted to enter any waterways;	The site is not located in close proximity to any waterways. Notwithstanding, measures will be implemented to ensure waste is contained within designated waste bin enclosures throughout construction. Refer to Site Management Plan in Appendix A which identifies site fencing and waste storage areas.
(e) any vehicle used to transport waste or excavation spoil from the site is covered before leaving the premises;	Refer to Section 4.6 - Waste Avoidance and Reduction, which details waste vehicle measures.
(f) the wheels of any vehicle, trailer or mobilised plant leaving the site and cleaned of debris prior to leaving the premises;	Refer to Section 4.6 - Waste Avoidance and Reduction, for details of vehicle cleaning prior to exiting the site.
(g) details in relation to the transport of waste material around the site (on-site) and from the site, including (at a minimum):	
• *a traffic plan showing transport routes within the site;*	A Site Management Plan is provided in Appendix A detailing transport routes within the site.
• *a commitment to retain waste transport details for the life of the project to demonstrate compliance with the Protection of the Environment Operations Act 1997; and*	Refer to Section 4.3 – Construction Waste Monitoring and Reporting. Management will be required to retain all waste transport details, including receipts and contract details, for the life of the project.

Condition Requirement	Comment
• *the name and address of each licensed facility that will receive waste from the site (if appropriate).*	Details of end destinations for waste streams is provided in Section 4.7.

3 Proposed Development

The proposal also includes construction of new roads and public open space elements as provided in the Architectural Plans submitted with the EIS.

Table 2: Proposed Development

Land Use		Yield
Residential	1 Bedroom	252 units
	2 Bedroom	682 units
	3 Bedroom	53 units
	Total	**987 units**
Retail		6,000m²
Commercial		3,000 m²

The Construction Waste Management Plan covers the estimated quantities for the entire development Site 1 and Site 2. This later revision of the Construction Waste Management Plan was prepared as a supporting document with respect to issuing a Construction Certificate for Site 2.

The construction of Site 2 will be split into four stages, beginning from Stage 2 (Stage 1 relates to Site 1 of the development).

Stage 2 involves the construction and dedication of public roads and footpaths

Stage 3 includes the construction of Site 2A, the north-west tower.

Stage 4 includes the construction of Site 2D, the south-west tower.

Stage 5 is the concurrent construction of Site 2B, C and E, the remaining towers.

These stages are outlined in the Staging Plan for Site 2 attached at **Appendix A** and the Site Management Plan for Site 2 is located at **Appendix B.**

4 Project Requirements

In collaboration with Landcom and Sydney Metro, Deicorp have made a commitment to divert ≥95% of construction waste away from landfill. As discussed in Section 3.1, this Construction Waste Management Plan has been prepared to enable contractors and site management to meet specific waste objectives.

This CWMP has been prepared having regard for the specific waste management controls and objectives of the Blacktown City Council Growth Centre Precincts DCP, where development applications are required to demonstrate consideration of the following:

a) *To maximise opportunities for re-use through source separation and on-site storage.*
b) *To minimise waste generation and maximise re-use and recycling*
c) *To minimise waste generation through design, material selection and building practices.*
d) *To ensure efficient storage and collection of waste and quality design of facilities*

The Secretary's Environmental Assessment Requirements (SEAR's) dated 13 February 2020 also required the preparation of a waste strategy to accompany submission of the SSD application.

5 Waste Avoidance and Reduction

5.1 Landcom and Sydney Metro Waste Requirements

Landcom and Sydney Metro waste requirements have been reviewed and Barker Ryan Stewart confirm the construction of the proposed Tallawong Station Precinct South development can meet the following Landcom and Sydney Metro objective:

> *E1. Waste Diversion*
> *Project will divert ≥95% of construction waste from landfill (excluding contamination or hazardous materials which are to be processed safely).*

5.2 Waste Strategy

Contractors will be provided with a waste management module which outlines primary ways to manage waste and divert excess construction materials from landfill. To ensure the project will divert more than 95% of waste from landfill, the construction waste strategy will include:

- Utilising all suitable topsoil (approximately 5%) on site for landscaping purposes.
- All inert fill (approximately 95%) excavated from the site will be transported to approved development sites to be reused where additional inert fill is required.
- All waste identified with contaminants to be disposed at approved waste facilities.
- Information on the importance of early waste separation and in- situ characterisation of waste;
- Methods to enable identification of waste and construction materials;
- Appropriate instructions for documenting volumes of waste and methods of disposal; are to be provided to contractors and all waste transport details must be retained on file by Management for the life of the construction program.
- Site Manager field observations and audits designed to ensure that contractors are adhering to the construction waste strategy;
- Reduce stockpiling of waste where possible as it becomes difficult to characterise specific materials for recycling when certain materials cannot be visually identified. Use of stockpiles promotes double handling which impacts site safety and productivity;
- Specific waste characterisation areas should allow waste to be sorted in a safe environment away from immediate construction danger;
- Procedures to be prepared prior to construction for Site Managers or persons responsibility for site waste to undertake a final inspection of landfill waste to ensure the materials have been characterised correctly;
- Procedure to be prepared for potential reuse of construction materials on site.

5.3 Construction Waste Monitoring and Reporting

Documentation of construction waste generation totals, methods of removal and on site reuse, off site reuse, off site recycling and off-site disposal should be maintained by contractors for the life of the project to ensure waste targets are achieved and documented. Where possible, Site Managers should be responsible for the preparation of monthly reporting to ensure waste objectives are being met.

A Waste Register is to be kept by all contractors documenting the following:

- Type of waste;
- Total tonnage and volume of waste;
- Category of waste (recycling, reuse, landfill);
- Destination for reuse, recycling or landfill; and
- Landfill and waste contractor receipts.

Any non-conformances throughout construction should be identified immediately and Site Managers should undertake any actions required to prevent the issue reoccurring.

5.4 Excavation Waste Reuse

With the exception of some minor contaminants and asbestos identified in the Detailed Site Investigation Report prepared by EI Australia 100% of the excavated material will be reused including approximately 5% on site for landscaping and 95% to other approved development sites requiring inert fill.

The proposal will require the excavation of approximately 380,000m^3 of material to facilitate construction. To ensure that more than 95% of excavation material is diverted from landfill, all inert material excavated from the site will be transported to local development sites requiring extra fill.

Any topsoil will remain on site for use in landscaping with remaining topsoil transported to nearby development sites. Details of nearby development sites will be provided prior to excavation of the material.

5.5 Roles and Responsibilities

Table 3 identifies typical roles and responsibilities associated with contractor waste disposal in large construction sites. Note roles and responsibilities will be assigned by the contractor and the following information is provided as a guide only.

Table 3: Typical Waste Roles and Responsibilities

Role	Typical Responsibility
Site Management or Waste Managers	Responsible for the meeting of all waste objectives within the site area including monitoring, reporting and delegating of tasks where required to ensure at least 95% of waste is to be diverted from landfill.
Construction personnel	Responsible for daily waste characterisation and maintenance to ensure waste objectives are being met. Construction personnel should be educated on the requirement of the waste strategy and any impacts associated with
WHS Managers	Typically, responsible for management of site safety and induction of all workers prior to construction. This may include discussion of the waste management strategy and hierarchy associated with waste disposal on and off the site.
External Waste Contractors	Responsible for the collection and disposal of waste to recycling facilities or landfill. External waste contractors should report to the Site Managers or Waste Managers to ensure the waste strategy is being adopted and documentation of waste leaving the site is prepared.

5.6 Waste Avoidance and Reduction Methods

- All fixtures and fittings will be made to measure wherever possible;
- All materials will be ordered in accordance with a bill of quantities;
- Recycled materials will be utilised on site or on nearby sites where ever possible to reduce transport costs and impacts to the environment;
- Measures will be taken to ensure the construction contractor is aware of the waste management procedures and adheres to appropriate guidelines;
- Salvage materials for recycling and reuse during the construction process; and
- The remaining waste to be transported to a recognised builders recycling yard or waste facility.

- All waste vehicles must ensure that loads, including dirt and general, recycling or metal waste, will be covered prior to leaving the site. Site Management is tasked with the responsibility of ensuring all waste loads are covered.
- The wheels of all vehicles must be hosed down or cleaned of debris prior to exiting the site. This should occur in locations identified for vehicle entry/ exit on the approved Site Management Plans.

5.7 End Destination for Waste Streams

Per requirements of the green star credit system, see below details of the Construction Waste Management contractor that is to be engaged to undertake construction waste removal from the site.

Cheap and Quick Waste Bins Pty Ltd.
25 - 27 Governor Macquarie Drive
Chipping Norton NSW 2170

The waste contractor will utilise the below end destination for all recyclable materials.

KLF Holdings Pty Ltd
16 Grande Avenue
Camelia NSW 2142

Landfill products will be transported to SUEZ at Kemps Creek.

5.8 Waste Classification Measures

The NSW EPA Waste Classification Guidelines provided in Figure 1 should be adhered to during the entire construction life cycle. It is the responsibility of Site Management to initiate waste classification with contractors in accordance with the EPA Guidelines.

Given demolition is not required and construction waste will generally fall within the general waste or recycling categories, suitable areas have been designated for waste storage to eliminate double handling of waste. Stockpiles should be avoided, and Site Management are to be tasked with undertaking initial waste classification to determine the immediate location for all construction waste. All waste areas should have general and recycling waste bins available to ensure that waste will not be transported unnecessarily around the site.

Refer to waste locations in Appendix A for further information.

5.9 Waste Recovery Rate

The Green Star Construction & Demolition Waste Reporting Criteria maintains that a waste processing facility's diversion of waste for recovery is limited to 50% of the facility's total input as follows:

> *This 50 percent cap is based on the GBCA's position that energy recovery from construction and demolition waste streams is not an acceptable substitution for recycling in its own right, but rather a complementary management solution for wastes that would otherwise go to landfill. As a consequence, waste processing facilities that divert waste streams for the production of nonstandard fuels for waste-to-energy purposes should not rely on this waste diversion pathway for the majority of their recycling output.*

It is therefore considered that the maximum waste recovery rate achievable for the proposed development is 50% of recycled waste generation calculations provided in Table 3.

Step 1

Establish if the waste is classified as special waste.

Step 2

If the waste is not classified as special waste, establish whether the waste is classified as liquid waste.

Step 3

If the waste is not classified as special waste or liquid waste, establish whether the waste is of a type that is 'pre-classified'.

To simplify the classification process, a number of commonly generated wastes have been pre-classified as either hazardous, restricted solid, general solid waste (putrescible) or general solid waste (non-putrescible) in the waste classification definition section of Schedule 1 of the ***Protection of the Environment Operations Act 1997*** (POEO Act).

Step 4

If the waste is not classified as special waste, liquid waste or pre-classified (as set out in Step 3), establish if the waste has certain hazardous characteristics and therefore is classified as hazardous waste.

These hazardous characteristics are set out in the definition of 'hazardous waste' in Schedule 1 of the POEO Act, and in Step 4 of Part 1 of the Guidelines.

Step 5

If the waste has not been classified after Steps 1 to 4, it should be chemically assessed to determine whether it is hazardous, restricted solid or general solid waste (putrescible or non-putrescible). If the waste has not been classified after Steps 1 to 4 and is not chemically assessed under Step 5, it must be classified as hazardous waste.

Step 6

If the waste is chemically assessed under Step 5 as general solid waste, a further assessment is available to determine whether the waste is general solid waste putrescible or non-putrescible. The assessment determines whether the waste is capable of significant biological transformation. If the waste is classified as general solid waste under Step 5 and this assessment is not undertaken, it must be classified as general solid waste (putrescible).

Figure 1: Extract from NSW EPA Waste Classification Guidelines

6 Construction

6.1 Waste Generation

Table 4 identifies expected combined waste generation during construction for Site 1 and Site 2 works. Note volume to mass calculations for construction waste have been guided by the Green Star *Reduction of Construction and Demolition Waste* document which provides a *conversion factors* table used to convert measurement of waste types from volume to weight.

Table 4: Expected Construction Waste Generation

TYPE OF WASTE GENERATED	REUSE	RECYCLE	DISPOSAL	MASS	COMMENT
	Estimate Volume (m^3)	Estimate Volume (m^3)	Estimate Volume (m^3)	Estimate Mass (Tonnes)	Specify method of on-site reuse, contractor and recycling outlet and/or waste depot to be used
Excavation material	380,000m^3	-	-	380,000 tonnes	Excavated materials will be reused as fill on this site or other developments.
Timber (Side façade / dressed)	50m^3	65.7m^3	-	185.12 tonnes	Reused on site or transferred to waste recycling facility.
Gyprock / Cladding	55m^3	63.7m^3	-	23.74 tonnes	Reused on site or transferred to waste recycling facility.
Concrete	18.1m^3	10.4m^3	-	65.55 tonnes	Any excess concrete will be retained in the truck and used elsewhere or if required will be transferred to a waste recycling facility.
Masonry (Hebel Block/ cement sheeting / Pavers)	44m^3	55.5m^3	-	129.35 tonnes	Reused on site or transferred to waste recycling facility.
Tiles (roof)	N/A	N/A	N/A	N/A	No roof tiles will be used in the development.
Metal (roofing / framing / façade)	28m^3	36m^3	-	57.6 tonnes	Reused on site or transferred to waste recycling facility.
Glass	N/A	N/A	N/A	N/A	All glass will be made to order.
Furniture	N/A	N/A	N/A	N/A	Not an issue at construction stage.
Fixtures / fittings	19.2m^3	11.5m^3	-	9.21 tonnes	Fixtures will generally be made to order. Any excess will be reused or transferred to waste recycling facility.
Floor coverings	30m^3	48.3m^3	-	23.49 tonnes	Reused on site or transferred to waste recycling facility.

TYPE OF WASTE GENERATED	REUSE	RECYCLE	DISPOSAL	MASS	COMMENT
	Estimate Volume (m^3)	Estimate Volume (m^3)	Estimate Volume (m^3)	Estimate Mass (Tonnes)	Specify method of on-site reuse, contractor and recycling outlet and/or waste depot to be used
Packaging (used pallets / pallet wrap)	90m^3	57.4m^3	9.5m^3	37.07 tonnes	Pallets will be reused by delivery contractors or transferred to a Material Recovery Facility. Wrap and packaging will be a transferred to waste recycling or waste management facility.
Garden organics	24.6m^3	30m^3	-	8.19 tonnes	Organics will be ordered to size in accordance with the quantity survey. Any excess will be returned to provider, reused on site or another development site or transferred to a waste recycling facility.
Containers (cans / plastic / glass)	-	24.5m^3	-	3.4 tonnes	Containers will be a transferred to a waste recycling facility.
Paper / cardboard	-	59.1m^3	-	5.91 tonnes	Transferred to waste recycling facility.
Residual waste		157.5m^3	44m^3	161.2 tonnes	Residual waste will be sorted and transferred to a waste recycling facility or waste management facility as required.
Hazardous / special waste (specify)	N/A	N/A	N/A	N/A	No hazardous materials will be utilised in the construction.
Other (Asphalt)	32m^3	28.9m^3	-	48.72 tonnes	Reused on another development site or transferred to waste recycling facility.
TOTAL	**390.9m^3 (excl excavation amount)**	**648.5m^3**	**53.5m^3**	**758.2 tonnes (excl excavation)**	

6.2 Meeting Waste Targets

Based on the above figures and without taking into account significant reuse of excavation materials, our estimates conclude that approximately 95.1% of construction waste can be recycled or reused and diverted from land fill.

6.3 Waste Confirmation

Final waste calculations during construction will be provided as part of a construction management plan included as part of the construction certificate process.

7 Conclusion

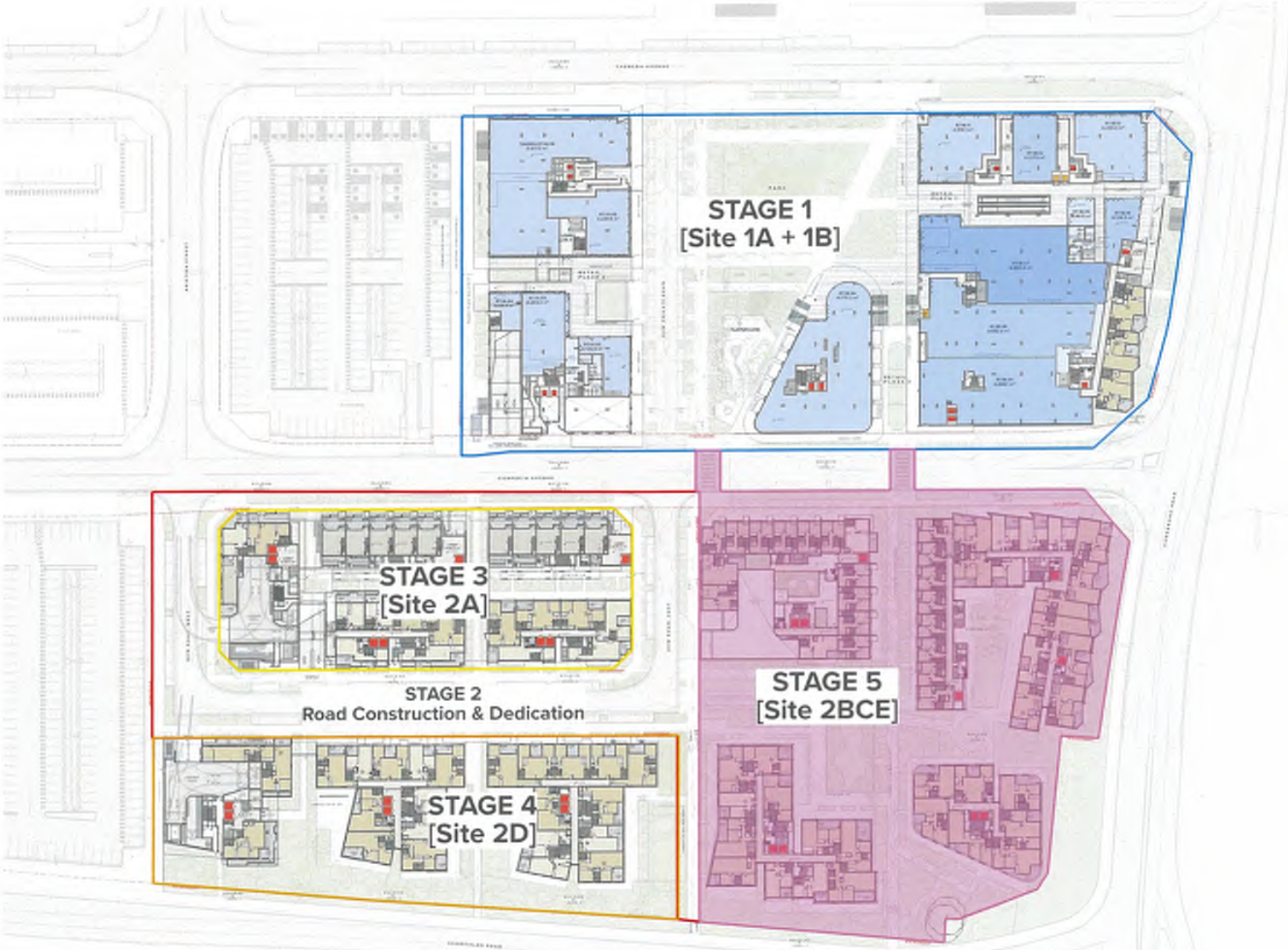
This Construction Waste Management Plan has been prepared to guide waste management processes associated with the proposed mixed use development and the issue of a Construction Certificate for Site 2.

With the exception of some minor contaminants and asbestos identified in the Detailed Site Investigation Report prepared by EI Australia, 100% of the excavated material will be reused including approximately 5% on site for landscaping and 95% to other approved development sites requiring inert fill.

The quantity of waste materials to be generated onsite are estimates based on the information provided. It is estimated that approximately 95.1% of construction waste can be reused or recycled and diverted from landfill in accordance with Landcom objectives.

Site management are responsible for proactive waste protocols during the construction phase to ensure that $\geq$ 95% waste is diverted from landfill.

Appendix A
Staging Plan



STAGE 1 - Site 1A+1B completed

STAGE 2 - Construction & Dedication of public roads + footpaths

STAGE 3 - Site 2A completed

STAGE 4 - Site 2D completed

STAGE 5 - Site 2BCE completed

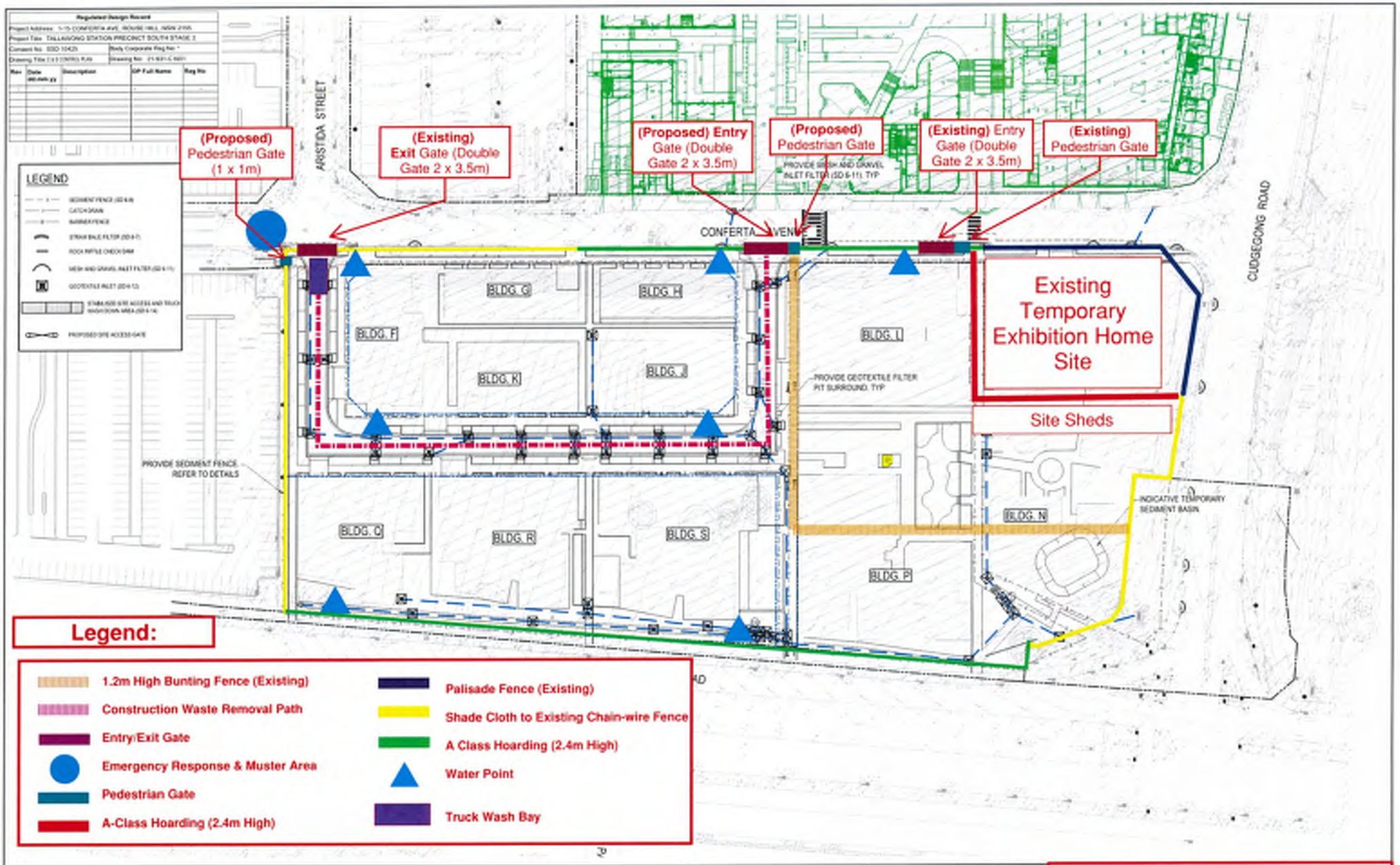
Notes:
1. Indicative staging plan shown.
2. Refer to detailed staging plans prepared by surveyor.

Tallawong Station Precinct South
1-15 & 2-12 Corella Avenue Rouse Hill NSW 2155

Site Information
Staging Diagram 03

TURNER

Appendix B
Site Management Plan



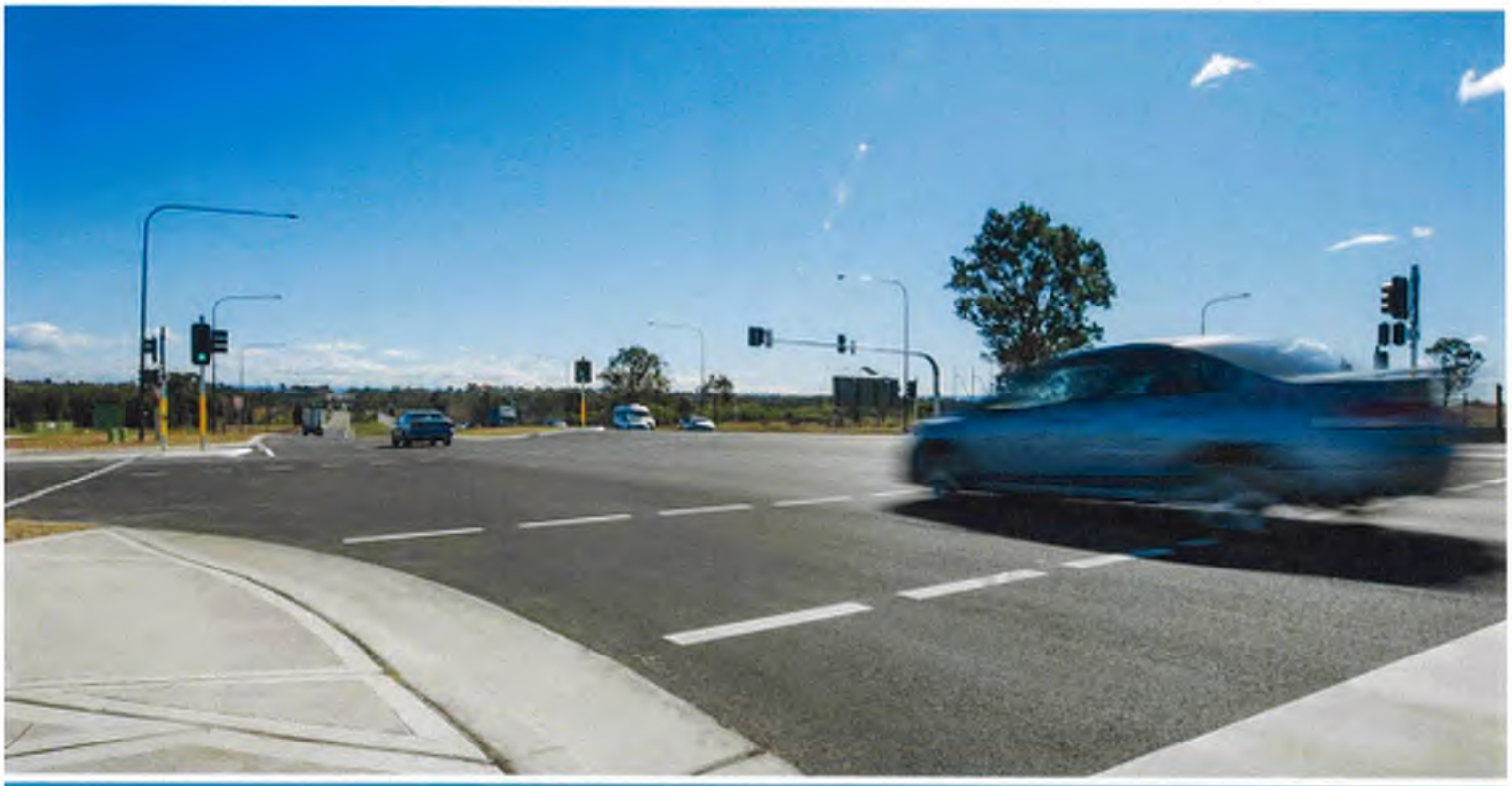
DEICORP BUILT TO DELIVER

DRAFT

SM-03 (Rev A) Site Management Plan (Construction Works) Site 2

Appendix E
Construction Pedestrian and Traffic Management Plan

BARKER RYAN STEWART



Deicorp Projects (Tallawong Station) Pty Ltd

Construction Pedestrian and Traffic Management Plan

Tallawong Station Precinct South – Site 2

28 May 2022

ENGINEERING
PLANNING
SURVEYING
CERTIFICATION

brs.com.au

Project No.	SY190226
Author	JH
Checked	GB
Approved	GB

Rev No.	Status	Date	Comments
1	Draft	13/03/2020	
2	Final	16/04/2020	Deicorp comments
3	Amended Final	20/04/2020	Deicorp comments
4	Amended Final	07/05/2020	Landcom and Sydney Metro comments
5	Amended Final	06/07/ 2021	Updated for CC application
6	Amended Final	16/07/2021	Updated with revised VMP and TCP
7	Amended Final	19/07/2021	Updated with construction hours & TfNSW comments
8	Amended Final	04/08/2021	Updated for Stage 1 – Early Works to address TfNSW comments dated 27 July 2021.
9	Amended Final	04/08/2021	Updated for Stage 1 – Building Works
10	Amended Final	10/08/2021	Updated for combined Construction and Building Works
11	Amended Final	8/09/2021	Building Works TCP amended
12	Amended Final	14/10/2021	Building Works TCP amended
13	Final	30/05/2022	Site 2

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Planning Secretary's Environmental Assessment Requirements

Section 4.12(8) of the *Environmental Planning and Assessment Act 1979*
Schedule 2 of the Environmental Planning and Assessment Regulation 2000

Application Number	SSD-10425
Project Name	Site 2 – Detailed Development Application - Tallawong Station Precinct South
Location	1-15 and 2-12 Conferta Avenue, Rouse Hill within Blacktown City Council
Applicant	Deicorp Projects (Tallawong Station) Pty Ltd
Date of Issue	17/05/2022

Requirement	Relevant Report Section
Construction Pedestrian and Management Plan (including construction traffic) The EIS shall include a Construction Pedestrian and Management Plan, developed in consultation with TfNSW, providing:	
Identification of construction traffic-related impacts and development of mitigation measures.	Section 3
Haulage movement numbers and transport routes between the site and the major road network.	Section 3.6 and Appendix B.
An assessment of road safety at key intersections and locations subject to pedestrian / vehicle / bicycle conflicts.	Road Safety Audit (construction stage) Appendix D.
Detailed travel management strategy for construction staff to minimise their commuter trips.	A Green Travel Plan has been prepared and submitted under separate cover.
Construction car parking strategy.	Section 3.4
Pedestrian and cyclist links / routes being maintained.	Refer to Section 3.6 Table 2
Independent road safety audits on construction-related traffic measures.	Road Safety Audit (construction stage) Appendix D.
Measures to account for any cumulative activities / work zones operating simultaneously.	Refer to Table 3.4
Independent road safety audits undertaken for all stages of further design development. Any issues identified by the audits will need to be closed out to the satisfaction of the relevant road authorities.	Road Safety Audit (construction stage) Appendix D.

TABLE OF CONTENTS

1 Introduction

Barker Ryan Stewart has been engaged by Deicorp Projects (Tallawong Station) Pty Ltd to prepare a Construction Pedestrian and Traffic Management Plan (CPTMP) to detail traffic management procedures and systems for the Site 2 for the proposed mixed-use development at Tallawong Station Precinct South in accordance with the requirements of:

- North-West Growth Centre Development Control Plan;
- TfNSW *"Traffic Control at Worksites Manual 2018"*; and
- AS1742.3 2009 *"Manual of uniform traffic control devices"*

The purpose of this plan is to ensure the safe and controlled movement of traffic at the site during the demolition, excavation and building works to address potential traffic, access, car parking and pedestrian issues generated by the works.

In preparing this CPTMP the following items have been considered/undertaken:

- An inspection of the site and surrounding road network to determine any constraints that may impact on the safe and controlled movement of traffic during demolition, excavation and building works.
- Determination of appropriate traffic/haul routes,
- Provision of a swept path analysis to ensure safe access/egress from the site,
- Traffic control plan (TCP) and Vehicle Movement Plan (VMP),
- A brief outline of the excavation and building works in relation to traffic management, and
- A Road Safety Audit for the construction stage was undertaken for Site 1 and 2 works previously. Recommendations of that audit have also been incorporated into this CPTMP.

2 Project Overview

2.1 Proposed Development

The NSW Department of Planning, Industry and Environment has issued conditions of consent for a State Significant Development (SSD - 10425) for the construction of a mixed-use development at 1-15 and 2-12 Conferta Avenue, Rouse Hill (Tallawong Station South precinct) comprising three levels of basement carparks, 5 residential towers and ground floor retail space as outlined in Table 2.1 below.

The proposal also includes construction of new roads and public open space elements as provided in the Architectural Plans submitted with the EIS.

Table 2.1: Proposed Development

Land Use		Yield
Residential	1 Bedroom	252 units
	2 Bedroom	682 units
	3 Bedroom	53 units
	Total	**987 units**
Retail		6,000m²
Commercial		3,000 m²

The location of the site is shown below in Figure 2.1.

Figure 2.1: Locality Plan Showing the Site of the Full Development

2.2 Overall Building and Construction Works

The overall development includes the excavation of the site and construction of the new buildings and can be broken into the following components.

- Excavation;
- Shoring of the excavation;

- Piling; and
- The construction of the mixed-use development, car parking (and waste collection area), landscaping and associated facilities.

Approved construction hours are as follows:

> *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.*
>
> *No work may be carried out on Sundays or public holidays.*
>
> *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.*
>
> *Notification of such activities must be given to affected residents before undertaking the activities or as soon as is practical afterwards.*
>
> *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.*

2.3 Overall Project Program

The construction of Site 2 will be split into four stages, beginning from Stage 2 (Stage 1 relates to Site 1 of the development).

Stage 2 involves the construction and dedication of public roads and footpaths

Stage 3 includes the construction of Site 2A, the north-west tower.

Stage 4 includes the construction of Site 2D, the south-west tower.

Stage 5 is the concurrent construction of Site 2B, C and E, the remaining towers.

These stages are outlined in Figure 2.2 below.

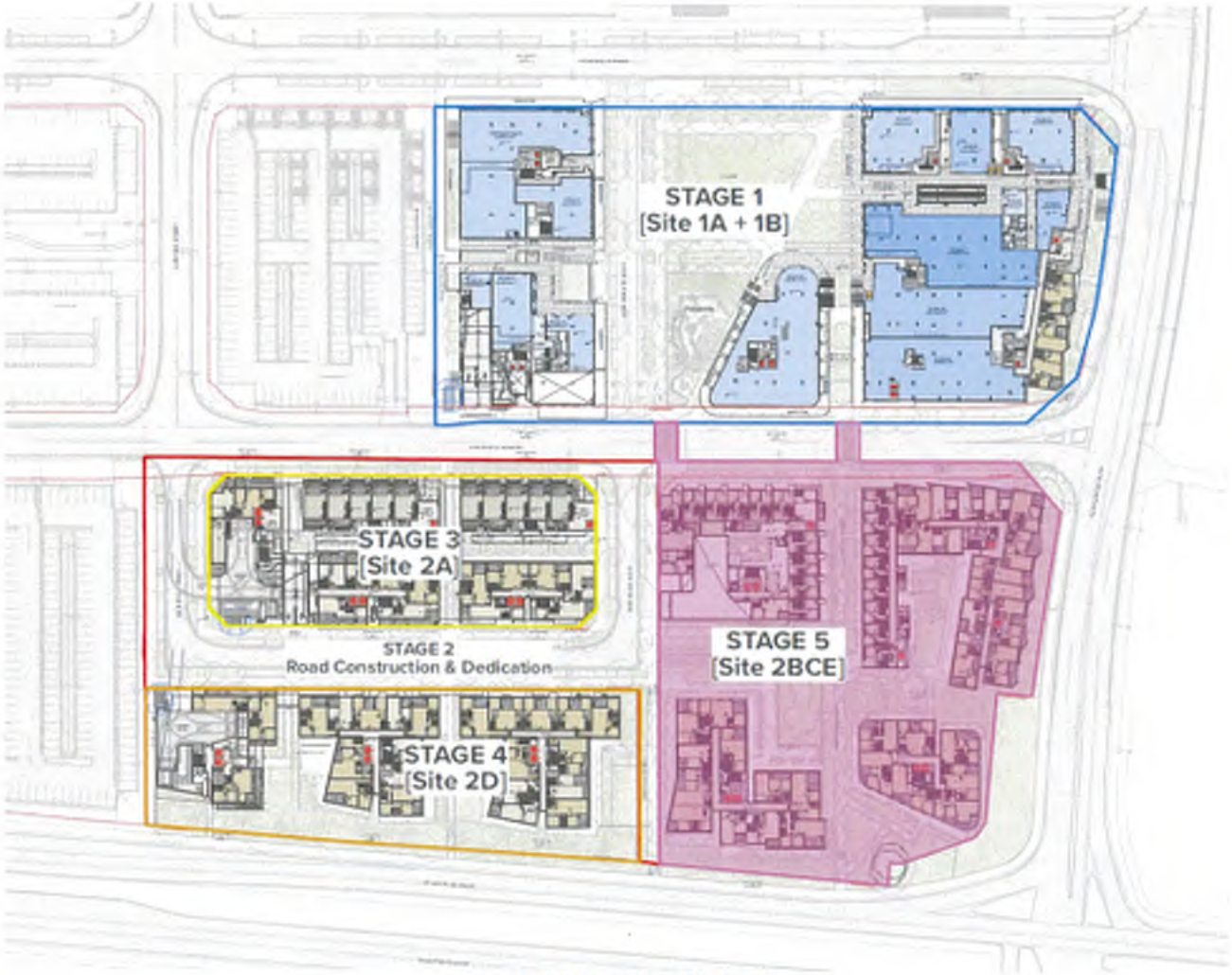


Figure 2.2: Staging Diagram

The project duration for the excavation and building works are outlined below.

STAGE	ESTIMATED START DATE	ESTIMATED END DATE	ESTIMATED DURATION	Estimated Construction Traffic Volumes
Stage 2 Road construction works	09/05/2023	17/06/2023	1 - 2 months	Average 10 truck movements per day; and Maximum 35 car movements per day (1.5 persons per vehicle)
Stage 3 Excavation	30/07/2022	08/02/2023	6 - 7 months	Average 20 truck movements per day; and Maximum 35 car movements per day (1.5 persons per vehicle)
Stage 3 Building Works	25/01/2023	15/04/2024	15 - 16 months	Average 20 truck movements per day; and Maximum 125 car movements per day (1.5 persons per vehicle)
Stage 4 Excavation	06/10/2022	09/05/2023	7 months	Average 20 truck movements per day; and Maximum 35 car movements per day (1.5 persons per vehicle)
Stage 4 Building Works	21/ 04 /2023	13/ 07/ 2024	15 - 16 months	Average 20 truck movements per day; and Maximum 125 car movements per day (1.5 persons per vehicle)
Stage 5 Excavation	30/07/2022	09/05/2023	6 - 7 months	Average 20 truck movements per day; and Maximum 35 car movements per day (1.5 persons per vehicle)
Stage 5 Building Works	25/01/2023	15/04/2024	15 - 16 months	Average 20 truck movements per day; and Maximum 125 car movements per day (1.5 persons per vehicle)

It is noted that the estimations of traffic and truck generation includes the concurrence and overlap occurring.

2.4 Site 2 –Works

This CPTMP addresses the/ traffic and pedestrian management issues associated with the Stages 2, 3, 4 and 5 works as shown in the Site Management Plan provided at **Appendix A.**

2.5 Other Developments

A review of current approved and existing developments along Tallawong Road and Cudgegong Road within the vicinity of the subject site has identified the following:

- The Sydney Metro Trains Facility at the corner of Schofields Road and Tallawong Road. This work involves the expansion of the current facility to accommodate additional trains to meet the operational and maintenance requirements of Sydney Metro City and Southwest.
- Grassland Street, Rouse Hill. Two residential flat buildings comprising 215 apartments.
- 172 Tallawong Road, Rouse Hill. Four residential flat buildings comprising 82 apartments.
- 122 Cudgegong Road, Rouse Hill. Two-storey Place of Worship with capacity for 400 people.
- 116 Cudgegong Road, Rouse Hill. 51 lot residential subdivision.

3 Existing Road Network

Schofields Road

Schofields Road is an urban arterial road that provides a major connection between Rouse Hill town centre to the east and Schofields suburb to the west. It generally consists of two lanes in each direction (3.1m wide) separated by a central concrete median with additional turning lanes at intersections to increase turning capacity. Shared pedestrian / cyclist paths are provided on each side of the road. The posted speed limit is 70km/hr. Intermittent bus lanes are included within intersections.

Two-way peak hour traffic volumes on Schofields Road are currently in the range of 1,900 to 2,000 vehicles per hour and is operating at LoS A.

Cudgegong Road

Cudgegong Road is a local road that provides access from Schofields Road at the southern end to Guntawong Road at the northern end of the road. It generally has one 3.2m wide lane in each direction and it connects with Schofields Road at a major three-way signalised intersection. A shared pedestrian / cyclist path is provided along the western side of the road. The posted speed limit on Cudgegong Road is 50km/hr.

Two-way peak hour traffic volumes on Cudgegong Road are currently in the range of 400 to 500 vehicles per hour and is operating at LoS B.

Tallawong Road

Tallawong Road is a local road that provides a connection between Schofields Road at the south and Guntawong Road to the north. Generally, it has a single 3.1m wide lane of traffic in each direction and forms a signalised intersection with Schofields Road. Shared pedestrian / cyclist paths are provided on each side of the road. The posted speed limit is 50km/hr.

Two-way peak hour traffic volumes on Tallawong Road are currently in the range of 600 to 700 vehicles per hour and is operating at LoS B.

Conferta Avenue

Conferta Avenue is a local road running parallel with Schofields Road along the northern edge of Lot 293 and the southern edge of Lot 294. It connects Cudgegong Road to the east and Tallawong Road to the west and also provides access to the southern section of the commuter carpark. It has a single 3.2m wide lane of traffic in each direction. Each carriageway has a parking lane delineated by an edge line and the posted speed limit is 50km/hr.

Themeda Avenue

Themeda Avenue is a two-way local road consisting of 3.8m wide single lanes with 2.3m on-street parking on both sides of the road. The on-street parking has a 2-Hour time limit outside of morning and afternoon peak periods. It is adjacent to Tallawong metro Station and connects Cudgegong Road to the east and Tallawong Road to the west. Shared pedestrian / cyclist paths are provided on each side of the road. The posted speed limit is 50km/hr.

Aristida Street

Aristida Street is a two-way local road consisting of 3.8m wide lanes. It connects Implexa Parade to the north and Conferta Avenue to the south. It is subject to a speed limit of 50km/hr.

4 Traffic Management

4.1 General

Traffic management for the site shall be configured to ensure that workers can undertake, excavation and building works safely at all times by separating workers and public road users. Contractors are responsible for the excavation work and the Construction Manager is responsible for construction management. The Construction Manager shall establish and maintain the Construction Pedestrian and Traffic Management Plan for this project and shall be responsible for its ongoing effectiveness, including the control of all quality, environmental and safety aspects that may apply to traffic control measures.

The TCP for this project shall be implemented by appropriately qualified and authorised traffic controllers only. Traffic controllers must have completed TfNSW accredited courses for traffic controllers and must wear yellow vest with the words "Authorised Traffic Controller". Reflective white overalls with reflective bands must be worn at night.

All signs and devices shall be placed in accordance with the TCP prior to works starting and in clear view of public road users to inform and guide road users to pass the site. All devices and signs shall then be removed upon the completion of the works.

The road reserves bordering the site must not be obstructed by any materials, vehicles, refuse, skips or the like without prior approval of the consent authority.

4.2 Potential Traffic Impacts

A summary of potential traffic impacts for the site are listed below:

- The existing surrounding residential dwellings;
- Potential impact on local commercial and residential road users including those using Tallawong Station and the associated public car parking areas;
- Other construction sites within the vicinity of the site;
- Duration of the project;
- Short term activities such as floating machinery to the site;
- Access, egress and parking in and near the worksite by employees and visitors;
- Pedestrian movements;
- Heavy vehicles parking in and around worksite;
- Vehicles depositing spoil on public roads;
- Loading and unloading, including construction zones;
- Truck/vehicle turning movements;
- Disruption of established traffic movements or patterns;
- Traffic interference in peak times (morning and afternoon);
- Interference to public transport services;
- Existing traffic volumes on the surrounding road network.

4.3 Vehicle Movement Plan

The new road to be constructed will form the entry/exit for construction vehicles for the Site 2 works (Stages 2, 3, 4 and 5). It is not proposed to have a works zone within Conferta Avenue for the Site 2 works.

The Vehicle Movement Plan at **Appendix B** shows that heavy vehicles will access the site from the east and west using Schofields Road, Cudgegong Road and Conferta Avenue.

Heavy vehicles will exit the site via Conferta Avenue and travel westward towards Tallawong Road, then turn left or right into Schofields Road.

These routes for heavy vehicles will minimise the use of local streets by construction traffic.

Note: Construction vehicles will not be permitted to use Themeda Avenue due to the potential conflicts with vehicles and pedestrians accessing Tallawong Station.

A swept path analysis was undertaken for a 19 metre Articulated Vehicle (AV) and a 12.5 metre Heavy Rigid vehicle (HRV) to check that these vehicles can safely manoeuvre to and from the site through the road network and enter the construction site via Conferta Avenue and leave the site via Conferta Avenue.

The swept path analysis is contained within **Appendix D** of this report.

4.4 Traffic Control Plan

The Traffic Control Plan (TCP) within **Appendix C** shows the proposed traffic control measures to be implemented in the road network including the arrangements for warning and guiding traffic and pedestrians around and/or past the worksite.

In the implementation of the TCP, the following steps should be undertaken:

1. Place all signs, devices and control measures;
2. Complete a Location Risk Assessment (as per Traffic Control at Work Sites Manual) and identify any modifications that may be required;
3. Drive through and around the site to make sure the TCP is effective;
4. Record implementation, risk assessment and any modifications; and
5. Monitor conditions and record observations.

Where required the TCP may be changed/updated as necessary to reflect changes in traffic flow or work practices by an appropriately qualified traffic control designer only.

Minor modifications to the TCP which have been identified in a Location Risk Assessment can be made by a person with a current Prepare Work Zone TMP qualification. Should the TCP be changed, all relevant permits and details are to be forwarded to the PCA/Council as required.

Note that the TCP does not relate to works within the road reserves. These TCP's will be prepared once the Public Infrastructure Engineering Design plans have been approved by the Road Authorities.

4.5 Traffic Management Strategy

Excavation and Building works

Construction vehicles will access the site from Schofields Road, Cudgegong Road and Conferta Avenue. Construction vehicles exiting the site will travel westward along Conferta Avenue and turn left into Tallawong Road for access back onto Schofields Road.

No construction vehicles will be permitted to utilise Themeda Avenue for access to or egress from the site.

The Site Management Plan at **Appendix A** shows the locations for the entry and exit of construction vehicles from and back into Conferta Avenue.

The proposed new road will act as access for all these vehicle movements to service the site. As a result there is no proposed work zones in Conferta Avenue. See Traffic Control Plan in **Appendix C.**

It is estimated that the excavation and building works will generate an average of 20 truck movements per day and a maximum of 35 car movements per day during the excavation and 125 car movements per day during the works (based on an average of 1.5 persons per vehicle). These daily volumes equate approximately 15 to 20 vehicle trips per hour during AM and PM peak periods.

Heavy vehicle movements are to be minimised during the commuter peak periods where possible to minimise potential conflicts with commuter traffic and pedestrian movements to and from the commuter car parks.

In addition, it is recommended that Traffic Controllers stop pedestrian movements briefly across Conferta Avenue between Aristada Street and Tallawong Road while heavy vehicles are exiting the site along Conferta Avenue.

Risk Management

Table 4.1 on the following page summarises the identified potential traffic impacts for this worksite and describes the control measures to be implemented to address each impact.

The local community, road users and other stakeholders shall be kept informed of changed traffic conditions where required by Council.

Notification must be provided to affected property owners prior to the implementation of any temporary traffic control measures.

4.6 Impact of Construction Traffic

The volume of construction traffic that will be generated by building works has been estimated at 15 to 20 vehicles per hour during AM and PM peak periods.

The other developments in the vicinity of the site that will be at various stages of construction during the Site 2 works will generate additional traffic to the road network, particularly Tallawong Road and Cudgegong Road. However, these roads are operating at a high level of service (Los B) with ample spare capacity to cater for additional construction traffic.

These roads would be capable of carrying an additional 500 to 600 vehicles per hour which is well above the cumulative construction traffic volumes that will be generated by the developments in the area.

4.7 Construction Parking Strategy

On-site parking will be provided for construction staff and Deicorp employees as shown on the Site Management Plan at **Appendix A.** Construction staff will also be encouraged to use public transport (Sydney Metro and Buses) to reduce the number of vehicles accessing the site.

Staff and contractor parking will not be permitted within the Tallawong Station commuter car parks or the residential areas to the south of Schofields Road.

4.8 Road Safety Audit (Construction stage)

A Road Safety Audit has been conducted in accordance with the procedures set out in the Austroads Guide to Road Safety Part 6A: Implementing Road Safety Audits (2019) for Site 1 and Site 2 works. A site inspection was conducted on Tuesday 31 March 2020 and the details contained within the Construction Pedestrian and Traffic Management Plan for the project reviewed to identify issues that may affect road user safety and other relevant issues.

The recommendations of the Road safety Audit have been carried over into this CTPMP. The Road Safety Audit (Construction stage) is attached at **Appendix E** for reference.

Table 4.1: Traffic Management Strategy

Potential Impact	Impact Assessment	Control Measure
Impacts on the commercial, retail and residential developments in the vicinity of the site. Duration of project	Heavy vehicle traffic movement through the following local streets: • Tallawong Road • Conferta Avenue • Cudgegong Road • Schofields Road	Heavy Vehicle Movements inbound to the site from Cudgegong Road and Conferta Avenue. All outbound heavy vehicles will exit via Conferta Avenue and Tallawong Road. TCP's will be provided informing road users of heavy vehicles entering the site. It is proposed to close the section of Conferta Avenue across the frontage of the site to reduce conflicts between construction vehicles and private vehicles.
Floating machinery to the site	In/out of the site.	Swept path analysis shows turning movements at critical intersections are satisfactory (See Appendix D). All loading and unloading will be done within the designated area on site.
Construction Parking Strategy.	Possible impact on Tallawong Train Station and the associated public car parks and residents and visitors in the vicinity of the site.	Construction workers will park on-site and use Metro Train services and/ or other local public transport options. Staff and contractor parking is not to occur within the commuter car parks or the residential areas to the south of Schofields Road.
Travel Management Strategy	Reduce the impact on construction parking by minimising commuter trips.	Where possible, workers will be encouraged to use nearby Metro Station services and/or other local public transport services.
Vehicles leaving the site	Depositing spoil on roadways	Truck shaker grids will be installed at the Conferta Avenue entry/exit point for erosion sediment control and all loads are to be covered. Where sediment is tracked onto the road it is to be swept up immediately.
Pedestrian management	Pedestrians walking around construction zone	It is proposed to close the section of Conferta Avenue across the frontage of the site to reduce conflicts between construction vehicles and pedestrians. Pedestrians will also be protected by temporary construction fencing and barriers as required.
Disruption of established traffic movements or patterns, Traffic interference in peak times (morning and afternoon)	Heavy vehicle traffic through the following local streets, particularly in morning and afternoon peaks with residents entering and exiting: • Tallawong Road • Conferta Avenue • Cudgegong Road • Schofields Road	Truck movements will be kept to a minimum during local peak traffic AM/PM periods to ensure that existing traffic flows are not disrupted.
Interference to public transport services.	Traffic movements blocking bus routes	Access to and from the site is off Conferta Avenue and will have traffic control devices and controllers in place to minimise disruption to bus routes during the Site 2 works.

5 Monitoring and Performance

5.1 General

Regular monitoring of the performance of the Construction Pedestrian and Traffic Management Plan (CPTMP) to confirm the effectiveness of methods, equipment and controls shall be undertaken. This shall also include review of location and effectiveness of traffic management and TCP signposting. Observations shall be recorded by the supervisor/contractor's and opportunities for improvement recommended to the Project Manager.

5.2 Consultation and Records

The following records shall be kept as evidence of the design, implementation, and performance of the CPTMP:

1. Qualifications
   - RMS accredited Traffic Control Plan designers
   - RMS accredited Traffic Controllers

2. Principal Contractor's meetings minutes with Principal Contractor(s) from adjoining sites if required.

3. TCP approval

4. Temporary speed zone approval (if applicable)

5. Community consultation

The community would be notified in advance of proposed road and pedestrian network changes through appropriate forms of community notification.

A number of communications tools will be used to notify the community of any upcoming changes to traffic conditions that have the potential to impact them, including:

- Monthly and specific notifications;
- Traffic alert emails;
- Variable Message Signs;
- Static signage; and
- Advertisements.

6. Location Risk assessment and any modifications

7. Confirmation of implementation and start of works

8. Monitoring reports

9. Incident reports and corrective action

6 Conclusion

This Construction Pedestrian and Traffic Management Plan details traffic management procedures and systems for the for the Site 2 works for the proposed mixed-use development at 1-15 and 2-12 Conferta Avenue, Rouse Hill.

Potential traffic impacts have been identified locally with control measures specified to address these impacts.

The recommendations of the Road Safety Audit (Construction stage) have been incorporated into the Traffic Control Plans.

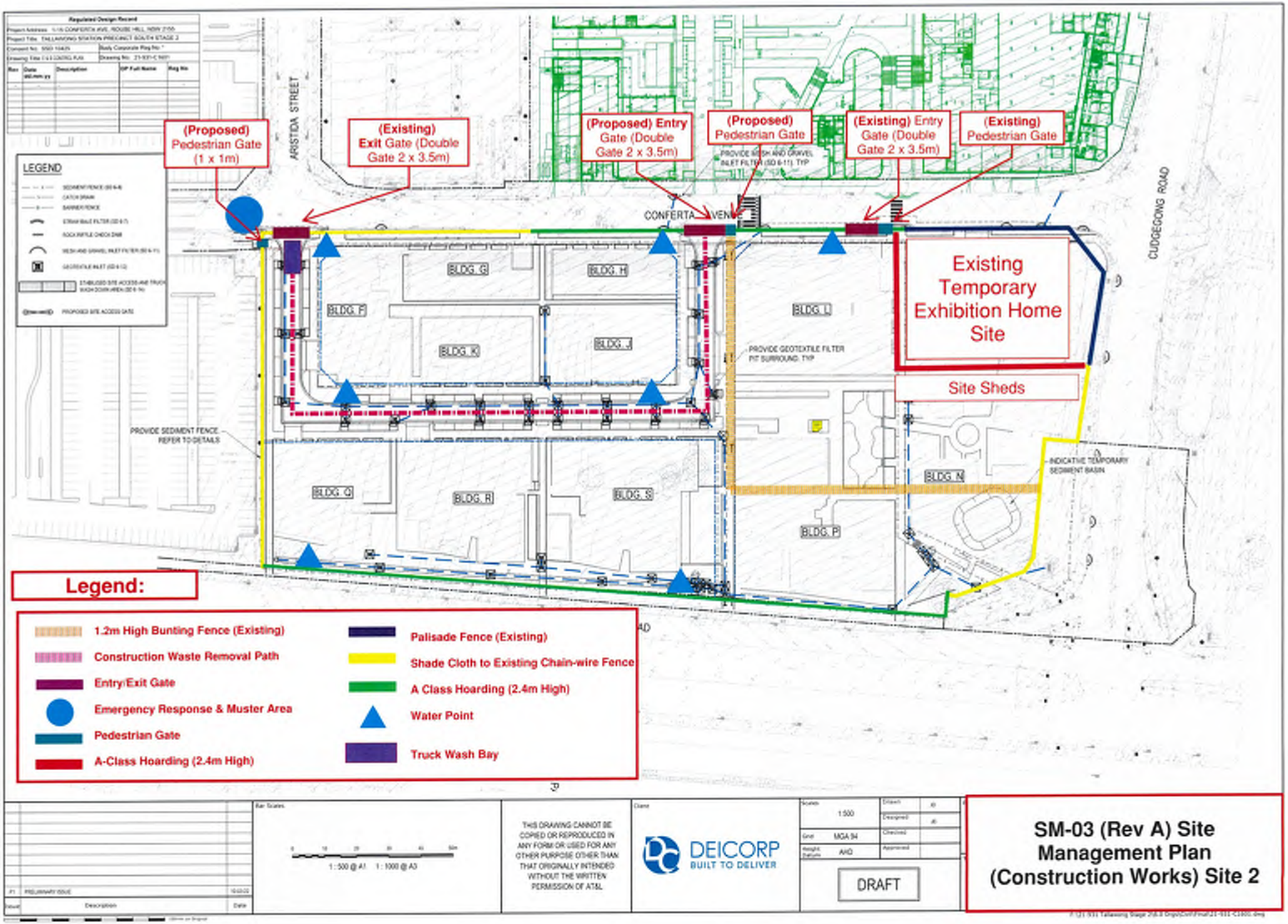
A Traffic Control Plan (TCP) has been prepared showing appropriate traffic control devices to be implemented for the duration of the proposed works.

A Vehicle Movement Plan (VMP) has been prepared showing the proposed truck haulage and delivery routes to and from the site.

A swept path analysis has been undertaken for the site and shows that articulated vehicles (AV) and Heavy Rigid Vehicles (HRV) can safely manoeuvre in and out of the site to/from Conferta Avenue.

This Construction Pedestrian and Traffic Management Plan has been prepared so as to mitigate the potential negative impacts of the proposed Site 2 works on the surrounding road network, public transport infrastructure and pedestrian movements.

Appendix A
Site Management Plan



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DEICORP BUILT TO DELIVER

DRAFT

SM-03 (Rev A) Site Management Plan (Construction Works) Site 2

Appendix B
Vehicle Movement Plan

A1

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60 0 60 120 180 240 300 1:3000
METRES

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BARKER RYAN STEWART
TOTAL PROJECT SOLUTIONS

SYDNEY
GOSFORD COAST
HUNTER

Client: DEICORP

TALLAWONG STATION PRECINCT SOUTH

VEHICLE MOVEMENT PLAN

Designed: AAJ
Drawn: AAJ
Checked: AAJ
Scales: Plan, Plot/2, Vert, X-Sect.
Datum: A.H.D.

Plan No. SY190226TR09
File Ref. SY190226D01A
SHEET 9 OF 9 SHEETS
REV A

Appendix C
Traffic Control Plans

www.invarion.com

SafeWay
Traffic Management Solutions
A: Suite 450, 29 Smith Street, Parramatta 2150 NSW
P: 1800 987 891
F: (02) 9823 0494
M: 0403 323 290
E: dennis.dandolo@safewaytms.com.au
W: www.safewaytms.com.au

Location : Conferta Avenue,Tallawong.
Company : Barker, Ryan Stewart
Council : Blacktown City.
TCP Author : Dennis Dandolo
Prepare a Work Zone TMP # TCT0020663

Signature :

Filename :

USD Reference# : 128/K15
Scale : NTS
Prepared Date : 27.05.2022

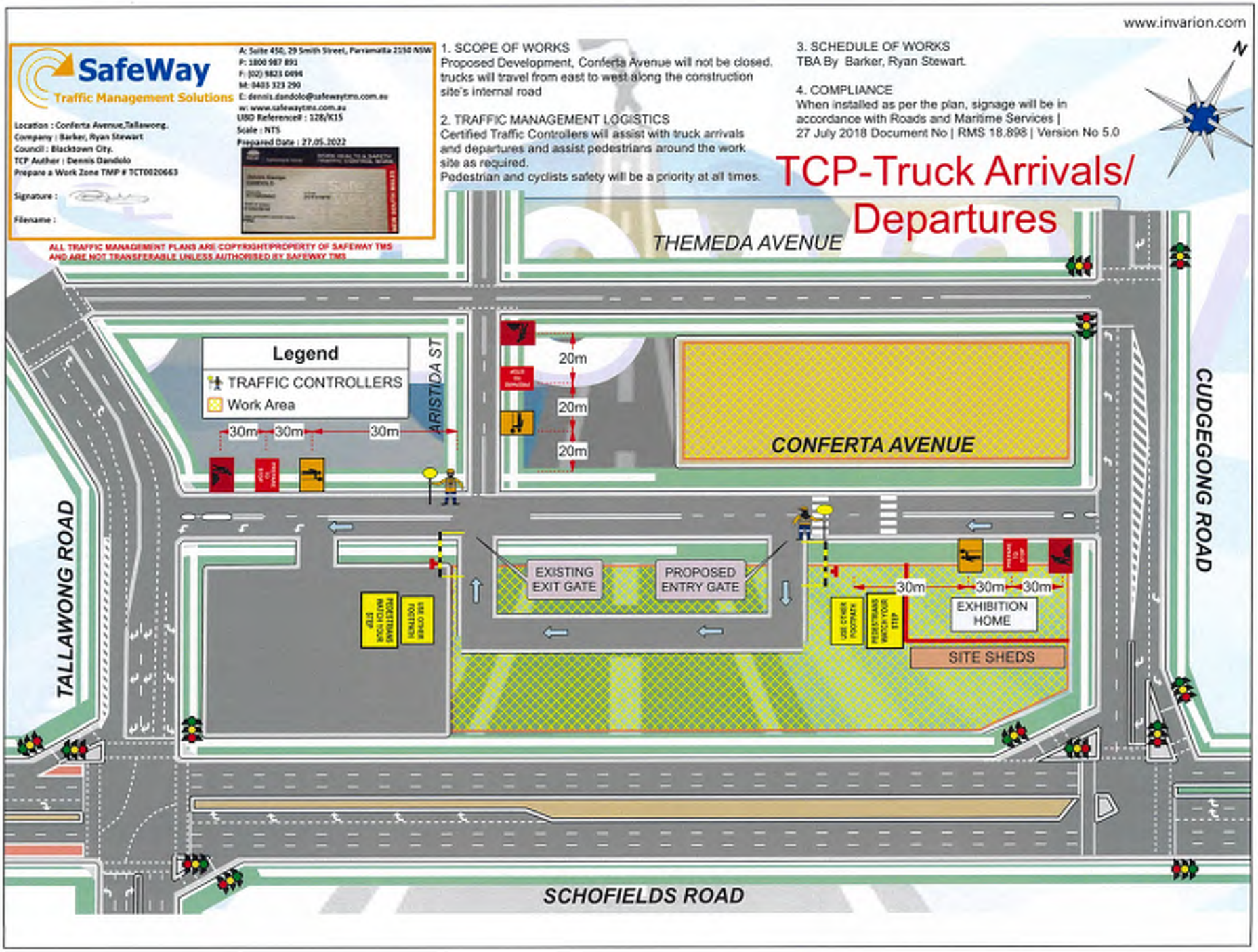
1. SCOPE OF WORKS
Proposed Development, Conferta Avenue will not be closed. trucks will travel from east to west along the construction site's internal road

2. TRAFFIC MANAGEMENT LOGISTICS
Certified Traffic Controllers will assist with truck arrivals and departures and assist pedestrians around the work site as required.
Pedestrian and cyclists safety will be a priority at all times.

3. SCHEDULE OF WORKS
TBA By Barker, Ryan Stewart.

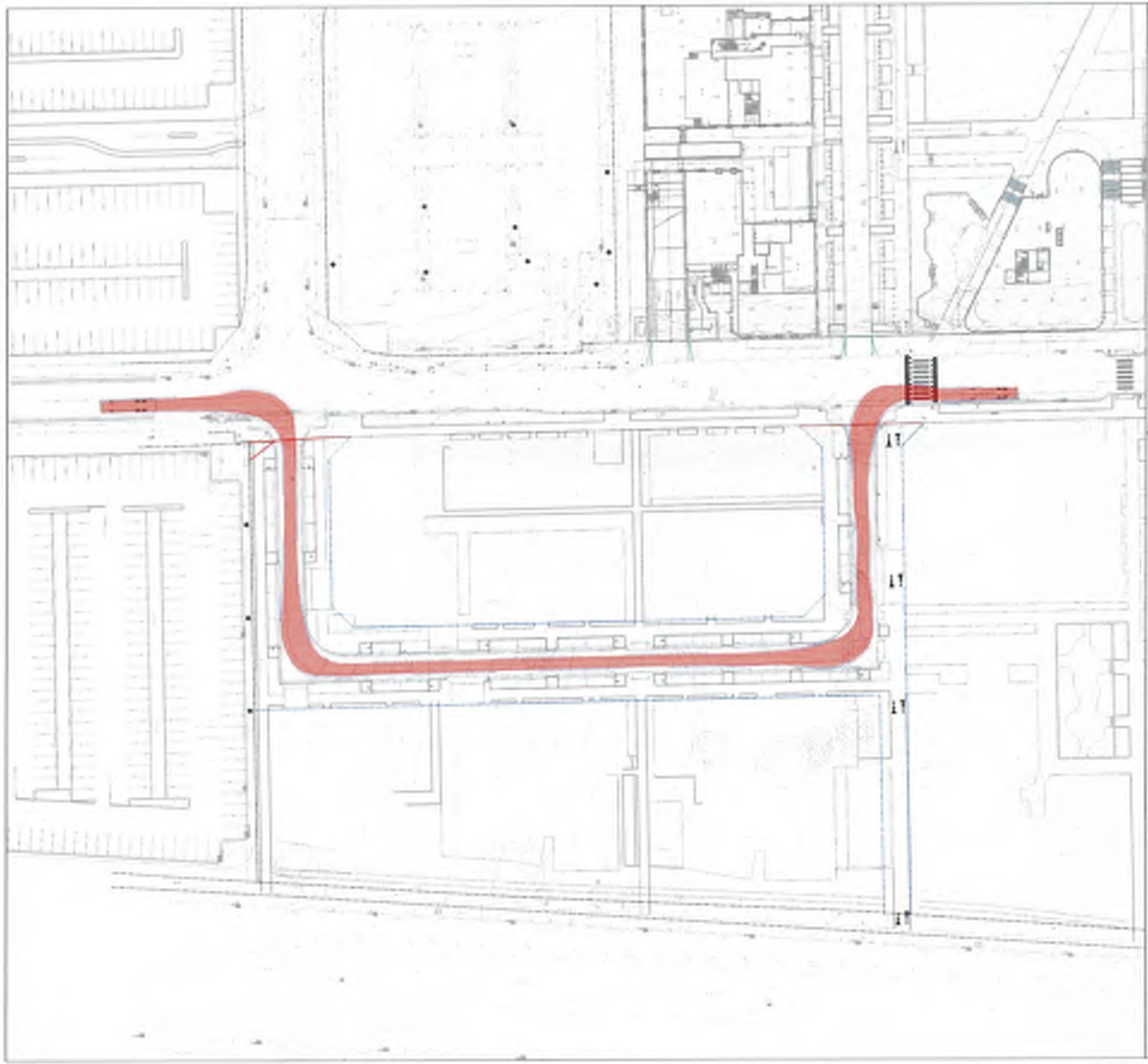
4. COMPLIANCE
When installed as per the plan, signage will be in accordance with Roads and Maritime Services | 27 July 2018 Document No | RMS 18.898 | Version No 5.0

TCP-Truck Arrivals/ Departures



Appendix D
Swept Path Analysis

A3



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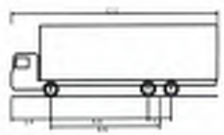
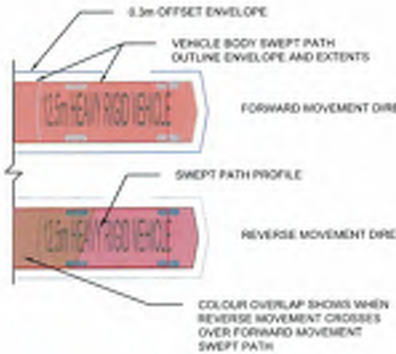


HRV - Heavy Rigid Vehicle	
Overall Length	12.500m
Overall Width	2.500m
Overall Body Height	4.300m
Min Body Ground Clearance	0.417m
Track Width	2.500m
Lock-to-lock time	6.00s
Curb to Curb Turning Radius	12.500m



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METRES

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A	FIRST ISSUE		

BARKER RYAN STEWART

Client: DEICORP Pty Ltd

TALLAWONG STATION PRECINCT SOUTH
TRAFFIC ANALYSIS

HEAVY RIGID VEHICLE LOADING SWEPT

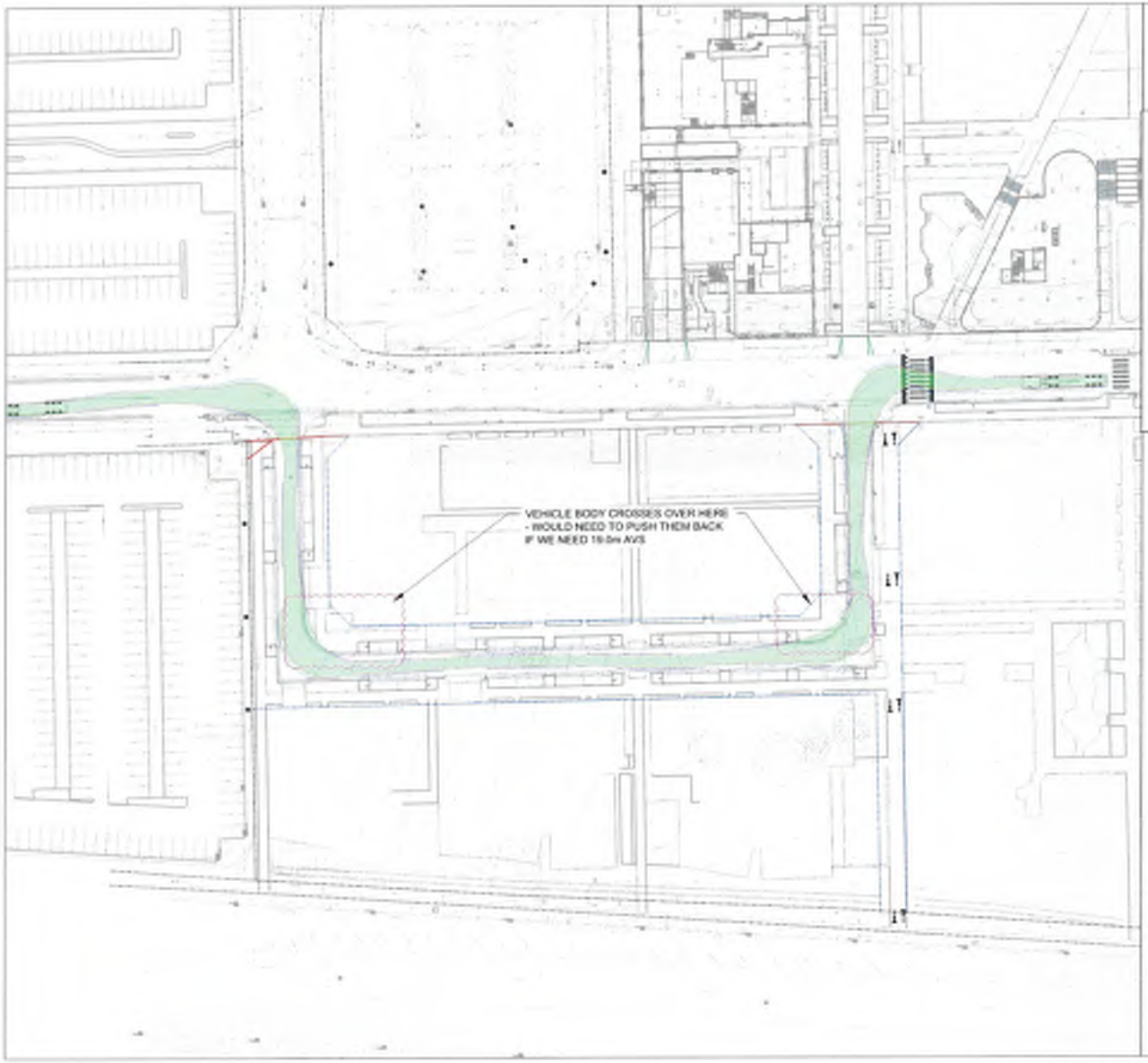
Designed: JH
Drawn: JH
Checked: GB

Scales: Plan 1:500@A3
Horiz -
Vert -
X-Sect -

Datum: A.H.D.

Plan No: SY190226-TR04-6
File Ref: SY190226
REV A

A3



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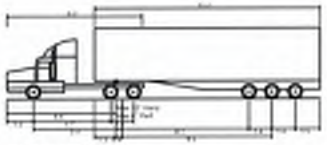
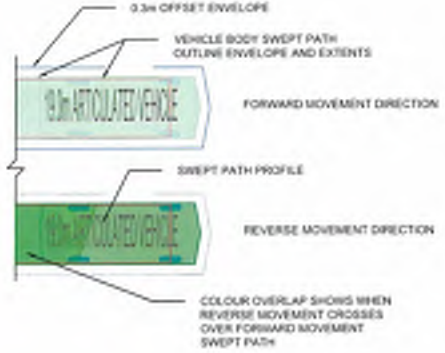


AV - Articulated Vehicle

Overall Length	19.000m
Overall Width	2.500m
Overall Body Height	4.301m
Min Body Ground Clearance	0.415m
Track Width	2.500m
Lock-to-lock time	6.00s
Curb to Curb Turning Radius	12.500m



PLAN
SCALE 1:500

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A	FIRST ISSUE	ddb	21/04/2021

BARKER RYAN STEWART

SYDNEY
CENTRAL COAST
HUNTER
S.E. QLD

Client: DEICORP Pty Ltd

TALLAWONG STATION PRECINCT SOUTH
TRAFFIC ANALYSIS

ARTICULATED VEHICLE LOADING SWEPT

Designed:	JH	Scales: Plan:	1:500@A3
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		Datum:	A.H.D.

Plan No: SY190226-TR04-7
File Ref: SY190226
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HUNTER

Client: DEICORP

TALLAWONG STATION PRECINCT SOUTH

SCHOFIELDS ROAD / CUDGEGONG ROAD - 19.5M ARTICULATED VEHICLE

Designed: AAJ
Drawn: AAJ
Checked: AAJ
Scales: Plan / Horiz. / Vert. / X-Sect.
Datum: A.H.D.

Plan No: SY190226TR01
File Ref: SY190226D01A
SHEET 1 OF 5 SHEETS
REV: A

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Client: DEXCORP

TALLAWONG STATION PRECINCT SOUTH

CUDGEGONG ROAD / CONFERTA AVENUE - 19.5M ARTICULATED VEHICLE

Designed: AAJ
Drawn: AAJ
Checked: AAJ

Scales: Plan: Horiz. Vert. X-Sect.

Datum: A.H.D.

Plan No. SY190226TR02
File Ref. SY190226D01A
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CENTRAL COAST
HUNTER

Client: DEICORP

TALLAWONG STATION PRECINCT SOUTH

CONFERTA AVENUE / TALLAWONG ROAD - 19.5M ARTICULATED VEHICLE

Designed: AAJ
Drawn: AAJ
Checked: AAJ

Scales: Plan
Horiz.
Vert.
X-Sect.

Datum: A.H.D.

Plan No.
SY190226TR03

File Ref.
SY190226D01A

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CENTRAL COAST
HUNTER

Client: DEICORP

TALLAWONG STATION PRECINCT SOUTH

TALLAWONG ROAD / SCHOFIELDS ROAD - 19.5M ARTICULATED VEHICLE

Designed: AAJ
Drawn: AAJ
Checked: AAJ

Scales: Plan 1:200, Vert., X-Sect.

Datum: A.H.D.

Plan No. SY190226TR04

File Ref: SY190226D01A

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Client: DEICORP

TALLAWONG STATION PRECINCT SOUTH

SCHOFIELDS ROAD / CUDGEGONG ROAD - 12.5M HEAVY RIGID VEHICLE

Designed: AAJ
Drawn: AAJ
Checked: AAJ

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Horiz.
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Client: DEICORP

TALLAWONG STATION PRECINCT SOUTH

CUDGEGONG ROAD / CONFERTA AVENUE - 12.5M HEAVY RIGID VEHICLE

Designed: AAJ
Drawn: AAJ
Checked: AAJ

Scales: Plan
Horiz.
Vert.
X-Sect.

Datum: A.H.D.

Plan No. SY190226TR06
File Ref. SY190226SD01A
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Client:
DEICORP

TALLAWONG STATION PRECINCT SOUTH

TALLAWONG ROAD / CONFERTA AVENUE - 12.5M HEAVY RIGID VEHICLE

Designed: AAJ
Drawn: AAJ
Checked: AAJ

Scales: Plan
Horiz.
Vert.
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SY190226TR07
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HUNTER

Client: DEICORP

TALLAWONG STATION PRECINCT SOUTH

TALLAWONG ROAD / SCHOFIELDS ROAD - 12.5M HEAVY RIGID VEHICLE

Designed: AAJ
Drawn: AAJ
Checked: AAJ

Scales: Plan
Horiz
Vert
X-Sect

Datum: A.H.D.

Plan No.
SY190226TR08

File Ref: SY190226D01A

REV
A

SHEET 8 OF 9 SHEETS

Appendix E
Road Safety Audit (Construction stage)

BARKER RYAN STEWART
TOTAL PROJECT SOLUTIONS

PLANNING
PROJECT MANAGEMENT
ENGINEERING
CERTIFICATION

Deicorp Projects (Tallawong Station) Pty Ltd

Road Safety Audit Report
Construction Stage

Tallawong Station Precinct South

May 2020

BARKER RYAN STEWART
TOTAL PROJECT SOLUTIONS

Project No.	SY190226
Author	RD
Checked	GB
Approved	RD

Rev No.	Status	Date	Comments
1	Draft	2/04/2020	
2	Final Draft	7/04/2020	
3	Final	7/05/2020	Updated to include additional safety issues raised by Landcom

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BARKER RYAN STEWART
TOTAL PROJECT SOLUTIONS

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HUNTER
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Beresfield NSW 2322
P (02) 4966 8388 F (02) 4966 1399
E hunter@brs.com.au

brs.com.au

1 Introduction

Barker Ryan Stewart has been engaged by Deicorp Projects (Tallawong Station) Pty Ltd to prepare a concept design road safety audit report for the management of construction traffic for a proposed mixed-use development comprised of residential apartments, retail and commercial space at 1-15 and 2-12 Conferta Avenue, Rouse Hill.

The two sites are currently unoccupied and have been cleared of vegetation. The sites are bisected by Conferta Avenue and bounded by Themeda Avenue and Tallawong Metro Station to the north, Cudgegong Road to the east, Schofields Road to the south, and the Tallawong Station commuter car park to the west.

The site is shown in **Figure 1.1** below.

The purpose of this report is to assess the proposed traffic management measures that will be undertaken during the construction phase of the development and to identify any elements of these measures or the road environment that may present a risk to the safety of road users.

Figure 1.1: Aerial Photo of Site (Source: NSW Government Six Maps)

A road safety audit is a term used internationally to describe an independent review of a road project or existing road to identify any safety or performance concerns. The audit team considers the safety of all road users and qualitatively reports on road safety issues or opportunities for safety improvement. The team also considers other factors that are relevant to the existing site.

A road safety audit is therefore a formal examination of a road project, or any type of project which affects road users (including cyclists, pedestrians, mobility impaired etc.) or an existing road or trafficable area, carried out by an independent competent team who identify and document road safety concerns.

A road safety audit is intended to help deliver a safe road system and is not a review of compliance with standards.

2 Background

A Construction Traffic Management Plan (CTMP) has been prepared for the project that includes a Vehicle Management Plan (VMP) and a Traffic Control Plan (TCP).

The CTMP provides details of the types of construction vehicles that will access the site and the routes they will use to access the site from the main road network. It indicates that the largest vehicles that will access the site are 19 metre articulated vehicles and 12.5 metre heavy rigid vehicles entering the site from Schofields Road, Cudgegong Road and Conferta Avenue and exiting the site via Conferta Avenue, Tallawong Road and Schofields Road.

The TCP prepared as part of the CTMP prescribes "Trucks" warning signs to be installed on all roads surrounding the site to provide advance warning for road users of construction vehicles accessing the site.

2.1 Assessment Process

This road safety audit has been conducted in accordance with the procedures set out in the Austroads Guide to Road Safety Part 6A: Implementing Road Safety Audits (2019). A site inspection was conducted on Tuesday 31 March 2020 and the details contained within the Construction Traffic Management Plan for the project reviewed to identify issues that may affect road user safety and other relevant issues.

Road safety audits are a formal process and the client's responses to the audit findings should be documented by the client in writing. A client is under no obligation to accept all the audit findings, however, the reasons for non-acceptance should be included within the written responses. Any corrective actions in response to the audit should be considered in conjunction with all other project considerations. It is not the role of the audit team to approve the client's responses to the audit.

The findings of the audit are outlined below in **Table 4**.

3 Risk Assessment

A risk rating based on the **likelihood** of a crash occurring as a result of the deficiency together with the potential **consequence** of that crash.

The risk ratings adopted are:

⇒ **Intolerable**
⇒ **High**
⇒ **Medium**
⇒ **Low**

Tables 1 to 3 below show the risk rating process.

Frequency	Description
Frequent	Once or more per week
Probable	Once or more per year (but less than once a week)
Occasional	Once every five to ten years
Improbable	Less often than once every ten years

Table 1: How often is the problem likely to lead to a crash? (Austroads, 2019)

Consequence	Description	Examples
Catastrophic	Likely multiple deaths	- High speed, multi-vehicle crash on a freeway - Car runs into crowded bus stop - Bus and petrol tanker collide - Collapse of a bridge or tunnel
Serious	Likely deaths or serious injury	- High or medium speed vehicle/vehicle collision - High or medium speed collision with a fixed roadside object - Pedestrian or cyclists struck by a car
Minor	Likely minor injury	- Some low speed vehicle collisions - Cyclist falls from bicycle at low speed - Left-turn rear-end crash in a slip lane
Limited	Likely trivial injury or property damage only	- Some low speed vehicle collisions - Pedestrian walks into object (no head injury)

Table 2: What is the likely severity of the resulting crash type? (Austroads, 2009)

	Frequent	Probable	Occasional	Improbable
Catastrophic	Intolerable	Intolerable	Intolerable	High
Serious	Intolerable	Intolerable	High	Medium
Minor	Intolerable	High	Medium	Low
Limited	High	Medium	Low	Low

Table 3: The resulting level of risk (Austroads, 2019)

4 Audit Findings

Table 4: Audit findings

Audit Findings	Suggested Treatments	Risk	Responsible Officer	
			Accept Y/N	Comments
1. The increase in the volume and frequency of heavy vehicle movements increases the risk of crashes with light vehicles, particularly at the Schofields Road / Cudgegong Road intersection where heavy vehicles will turn right across opposing traffic.	Appropriate warning signs should be installed on the northern side of Schofields Road on the eastbound approach to Cudgegong Road to raise driver awareness of heavy vehicle turning movements.	Occasional / Serious = **HIGH**	Y	Warning signs added as suggested
2. Heavy vehicles exiting the site along Conferta Avenue towards Tallawong Road creates a risk of crashes with vehicles accessing the southern portion of the commuter carpark. The likely low travel speed in this area will reduce the severity of potential crashes.	Appropriate warning signs should be installed in Conferta Avenue and Aristada Street to raise driver awareness of heavy vehicle movements.	Occasional / Minor = **MEDIUM**	Y	Warning signs added as suggested
3. Heavy vehicle movements at the Cudegong Road / Conferta Avenue intersection, the Tallawong Road / Conferta Avenue intersection and along Conferta Avenue will increase the risk to pedestrians crossing Conferta Avenue at these locations.	Appropriate warning signs should be installed on all roads surrounding the site to raise the awareness of pedestrians about heavy vehicle movements. In addition, it is recommended that traffic controllers stop pedestrian movements across Conferta Avenue between Aristada Street and Tallawong Road while heavy vehicles are exiting the site along Conferta Avenue. Note: All existing shared paths surrounding the site are required to remain accessible	Occasional / Serious = **HIGH**	Y	Warning signs added as suggested Note regarding pedestrian control added

Audit Findings	Suggested Treatments	Risk	Responsible Officer	
			Accept Y/N	Comments
	to pedestrians and cyclists at all times during the construction period.			
4. Construction vehicles using Themeda Avenue to enter and exit the site will create risks for pedestrians crossing Themeda Avenue to access the metro station and bus stops in Implexa Parade.	Construction contractors should be provided with clear and concise instructions identifying that entry to and exit from the site will only be permitted via Conferta Avenue. In addition, the construction site entry at the Cudgegong Road / Conferta Avenue intersection should be clearly signposted.	Occasional / Serious = **HIGH**	Y	Noted
5. Construction vehicles, particularly concrete trucks waiting to access the site may obstruct traffic flow and / or restrict sight lines in Cudgegong Road, thereby increasing the risk of crashes. The likely low travel speeds in this area will reduce the severity of potential crashes.	The Construction Management Plan for the site should include procedures and processes to safely and efficiently manage the arrival and departure of construction vehicles during concrete pours.	Occasional / Minor = **MEDIUM**	Y	Not required during early works

5 Conclusion

The proposed traffic management measures that will be undertaken during the construction phase of the development have been audited as per the appropriate road safety audit guidelines. The audit findings have been produced for the consideration of all interested parties, including the client, Deicorp Projects (Tallawong Station) Pty Ltd, Transport for NSW and Blacktown City Council.

The audit findings should be responded to by the client for this project including any corrective actions that need to be addressed in the Construction Pedestrian and Traffic Management Plan. It is not the role of the audit team to approve the client's responses to the audit.

Although every endeavour has been made to identify road safety risks associated with the construction stage of the project, the auditors cannot guarantee that every issue that affects road user safety has been identified.

Auditors:

Robert Day
Auditor Level 3 (RSA-02-0368)

Appendix A
Traffic Control Plan

Appendix B
Site Photos

Photo 1 – Schofields Road / Cudgegong Road Intersection

Photo 2 – Cudgegong Road / Conferta Avenue Intersection

Photo 3 – Tallawong Road / Conferta Avenue Intersection

Appendix F
Remediation Action Plan

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Contamination | Remediation | Geotechnical

DEICORP PROJECTS (TALLAWONG STATION) PTY LTD

Remediation Action Plan

Tallawong Station Precinct South, Rouse Hill
NSW

E24445.E06_Rev1
16 April 2020

Document Control

Report Title: Remediation Action Plan

Report No: E24445.E06_Rev1

Copies	Recipient
1 Soft Copy (PDF – Secured, issued by email)	Deicorp Projects (Tallawong Station) Pty Ltd Level 3, 161 Redfern Street, REDFERN NSW 2016
2 Original (Saved to Digital Archives)	EI Australia Suite 6.01, 55 Miller Street, PYRMONT NSW 2009

Author	Technical Reviewer
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Revision	Details	Date	Amended By
0	Original	27 March 2020	-
1	Updated to reflect client comments and updated plans	16 April 2020	NG

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Appendices

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 applied. 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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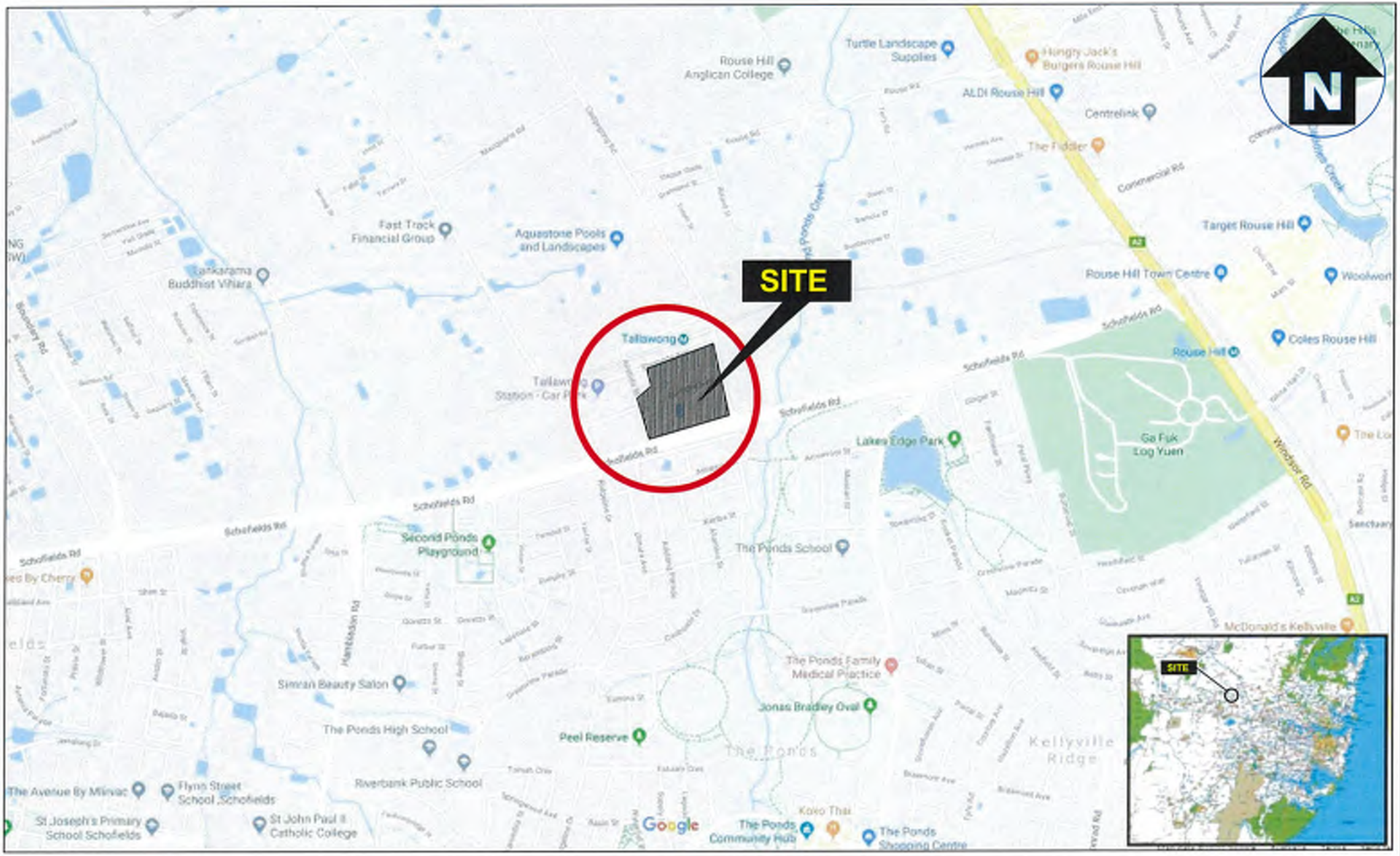
Appendix A - Figures



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

Deicorp Projects (Tallawong Station) Pty Ltd

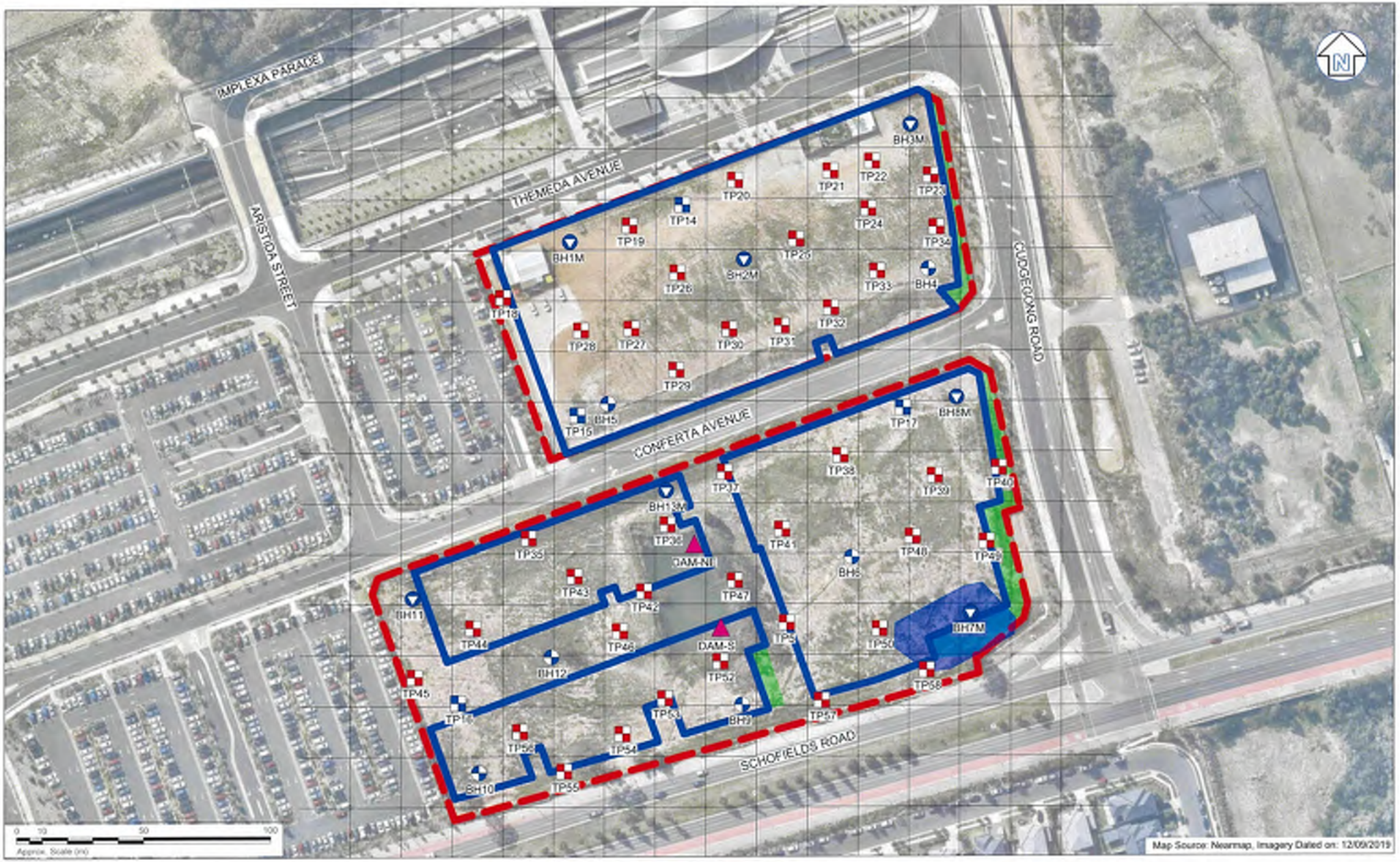
Remediation Action Plan

Tallawong Station Precinct South, Rouse Hill NSW

Site Locality Plan

Figure: 1

Project: E24445 E06_Rev1



LEGEND

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

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Delcorp Projects (Tallawong Station) Pty Ltd
Remediation Action Plan
Tallawong Station Precinct South, Rouse Hill NSW
Sampling Location Plan

Figure: 2

Project: E24445.E06

Appendix B – Proposed Development Plans

Tallawong Station Precinct South

1-15 & 2-12 Cortelia Avenue Rouse Hill NSW 2155

GA Plans Overall

Basement B3 & B2

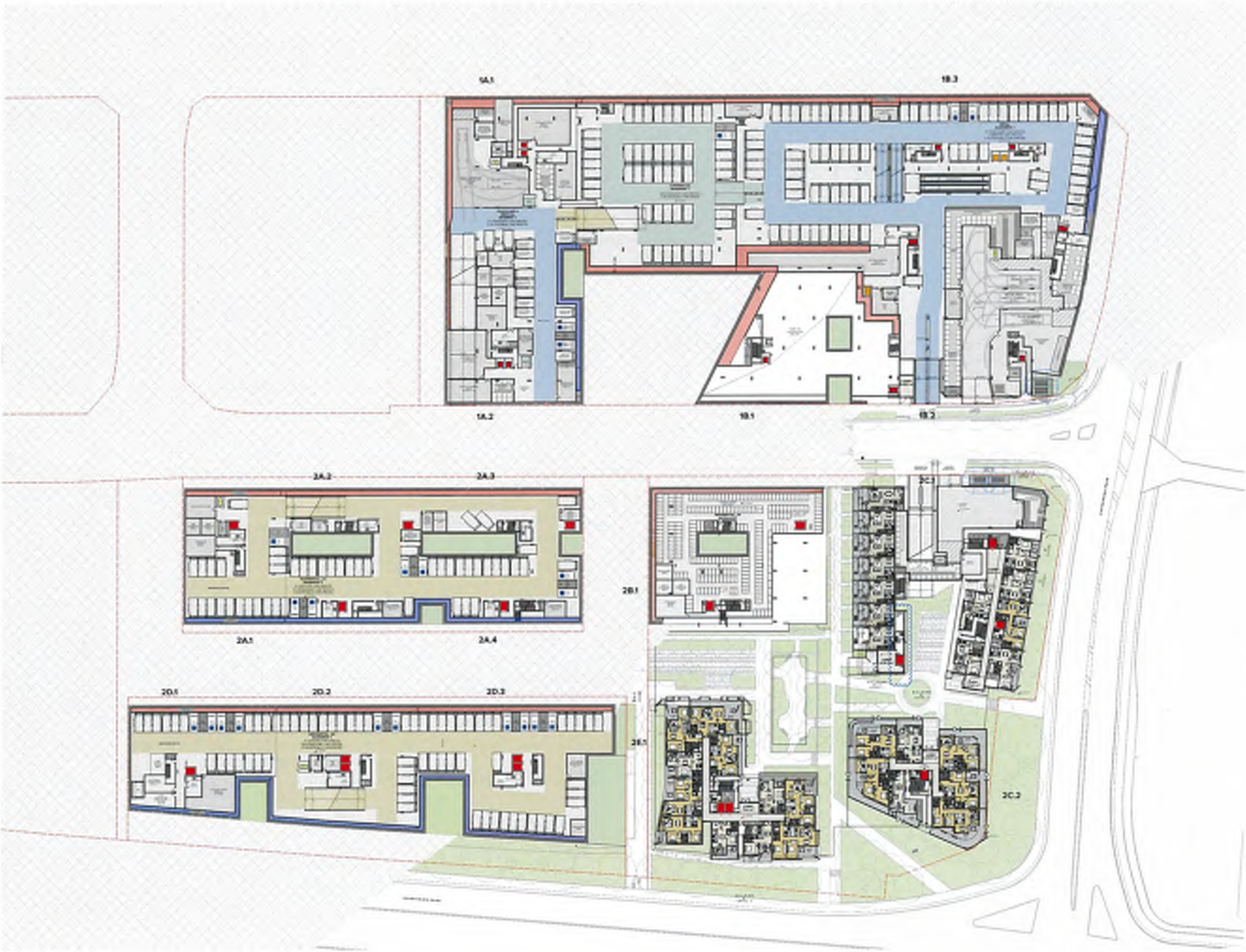
TURNER

Tallawong Station Precinct South
1-15 & 2-12 Confetto Avenue Rouse Hill NSW 2155

GA Plans Overall
Basement 02 & 01

Scale	Project No.	Revision	Size
1:500 @A1, 1:1000 @A3	18095	TURNER	
Status	Drawing No.		
For Coordination	DA-110-007	V	

TURNER



Tallawong Station Precinct South
1-10 & 2-12 Conferta Avenue Rouse Hill NSW 2155

GA Plans Overall
Basement 01, Mezz. & Level 1

1:500 @A1, 1:1000 @A3 | 18000 | TURNER
For Coordination | DA-110-008 | Y

TURNER

WIP 06/04/20

Tallawong Station Precinct South
1-15 & 2-12 Conferta Avenue Rouse Hill NSW 2155

GA Plans Overall
Mezzanines, Level 01 & 02

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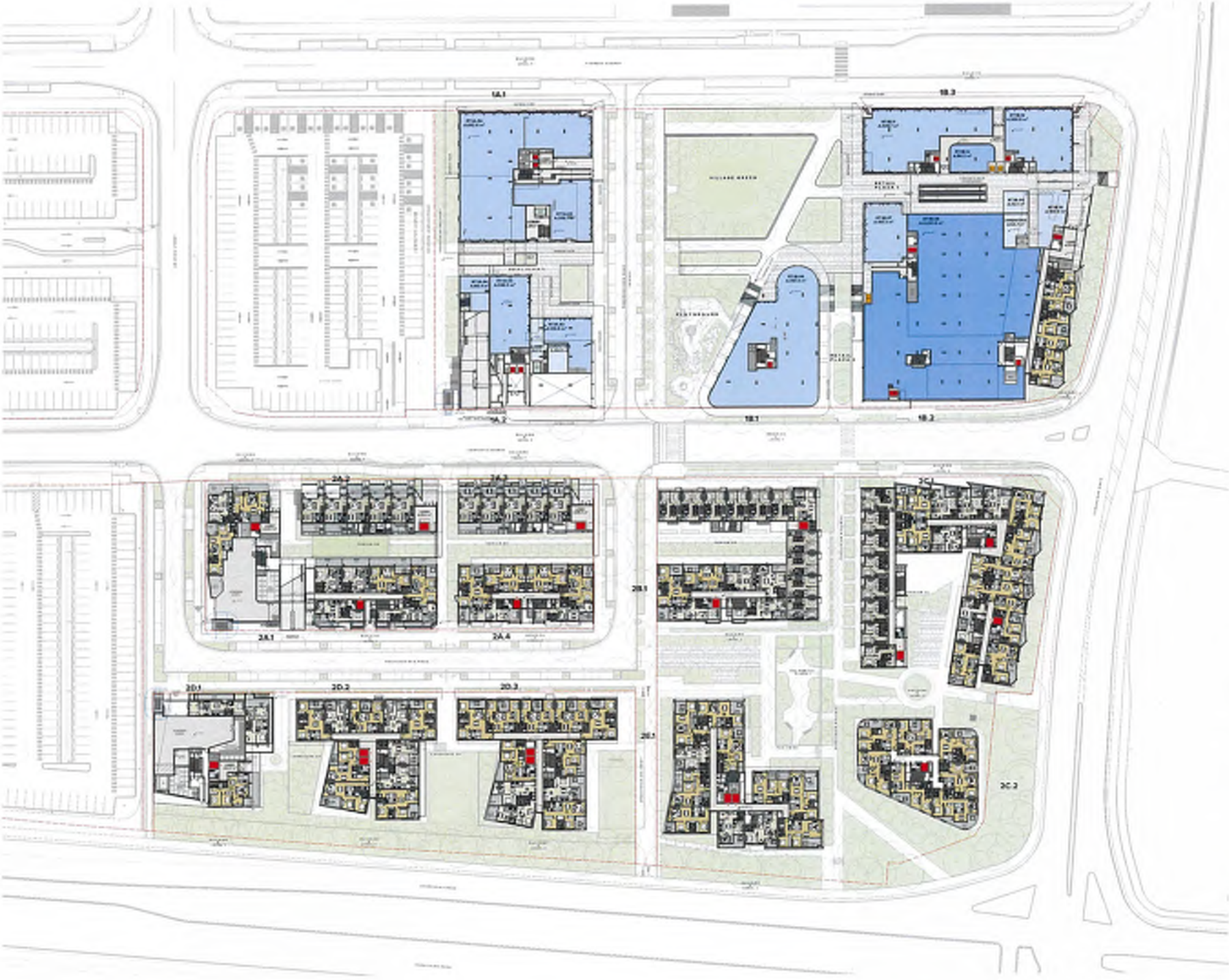
For Coordination | DA-110-010 | V

TURNER



WIP 06/04/20

Tallawong Station Precinct South

SA Plans Overall

Level 01,02 & 03

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18085

DA-110-020

V

TURNER

Tallawong Station Precinct South
1-15 & 2-12 Conferta Avenue Rouse Hill NSW 2155

GA Plans Overall
Level 01,02,20 & 04

18000

For Coordination

DA-110-020

J

TURNER

WIP 06/04/20

Tallawong Station Precinct South
1-15 & 2-12 Conferta Avenue Rouse Hill NSW 2155

GA Plans Overall
Level 02,03,04 & 05

Project No. 18095

Drawing No. 04-110-040

Revision J

For Examination

TURNER

Tallawong Station Precinct South
1-15 & 2-12 Conferta Avenue Rouse Hill NSW 2155

GA Plans Overall
Level 03,04,05 & 06

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For Coordination | DA-110-050 | 2

TURNER

Tallawong Station Precinct South
1-11 & 2-12 Conferta Avenue Rouse Hill NSW 2155

GA Plans Overall
Level 04,05,06 & 07

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For Coordination | DA-110-060 | 2

TURNER

Tallawong Station Precinct South
1-15 & 2-12 Confetta Avenue Rouse Hill NSW 2155

GA Plans Overall
Level 00,04,07 & 08

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For Examination	DA-110-070	J	

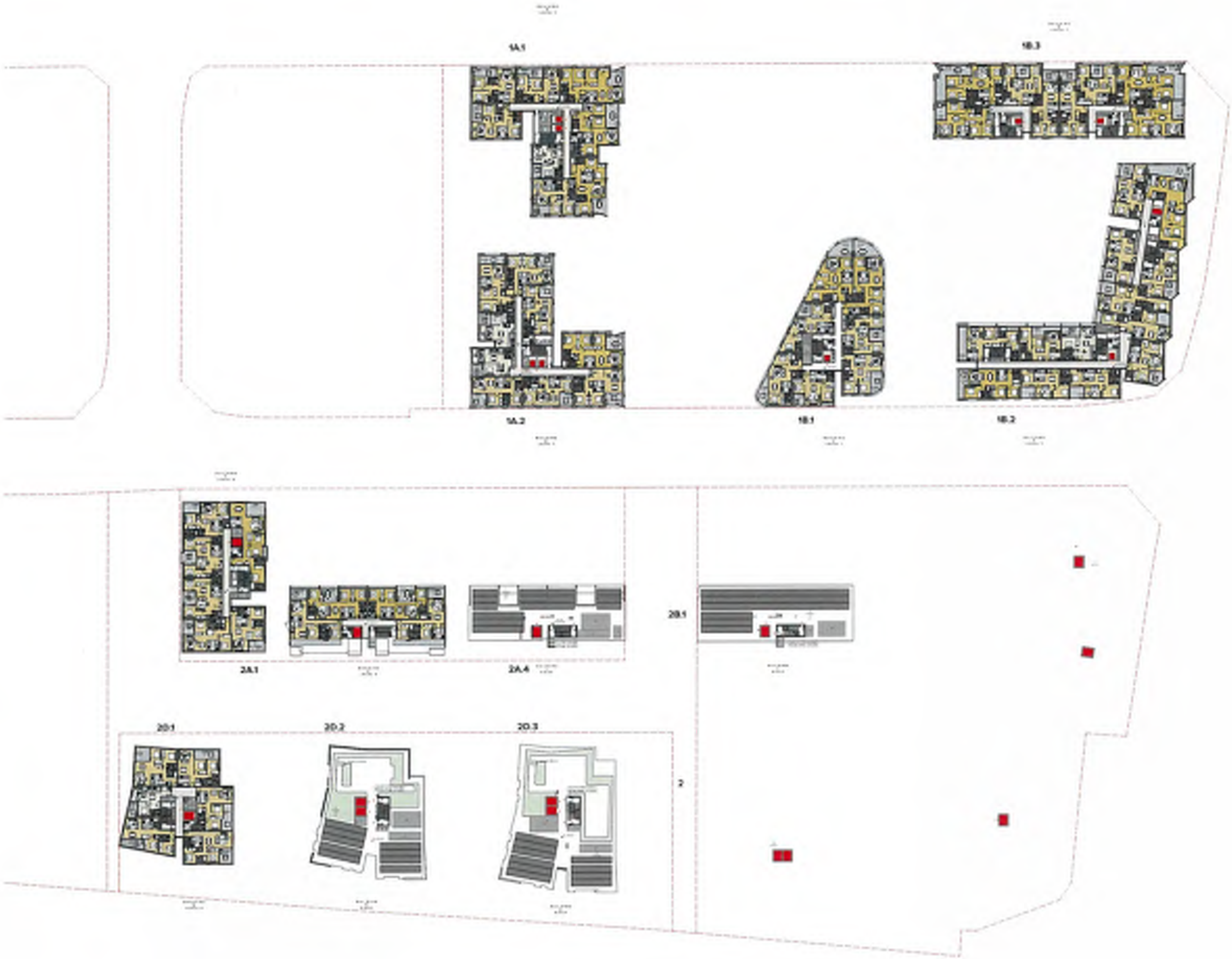
TURNER

Tallawong Station Precinct South
1-11 & 2-12 Conferta Avenue Rouse Hill NSW 2155

GA Plans Overall
Level 06,07,08 & Roof

18085
TURNER
DA-110-080
2

TURNER



Tallawong Station Precinct South
1-11 & 2-12 Conferta Avenue Rouse Hill NSW 2155

GA Plans Overall
Level 07,08 & Roof

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TURNER

Tallawong Station Precinct South
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GA Plans Overall
Level 00 & Roof

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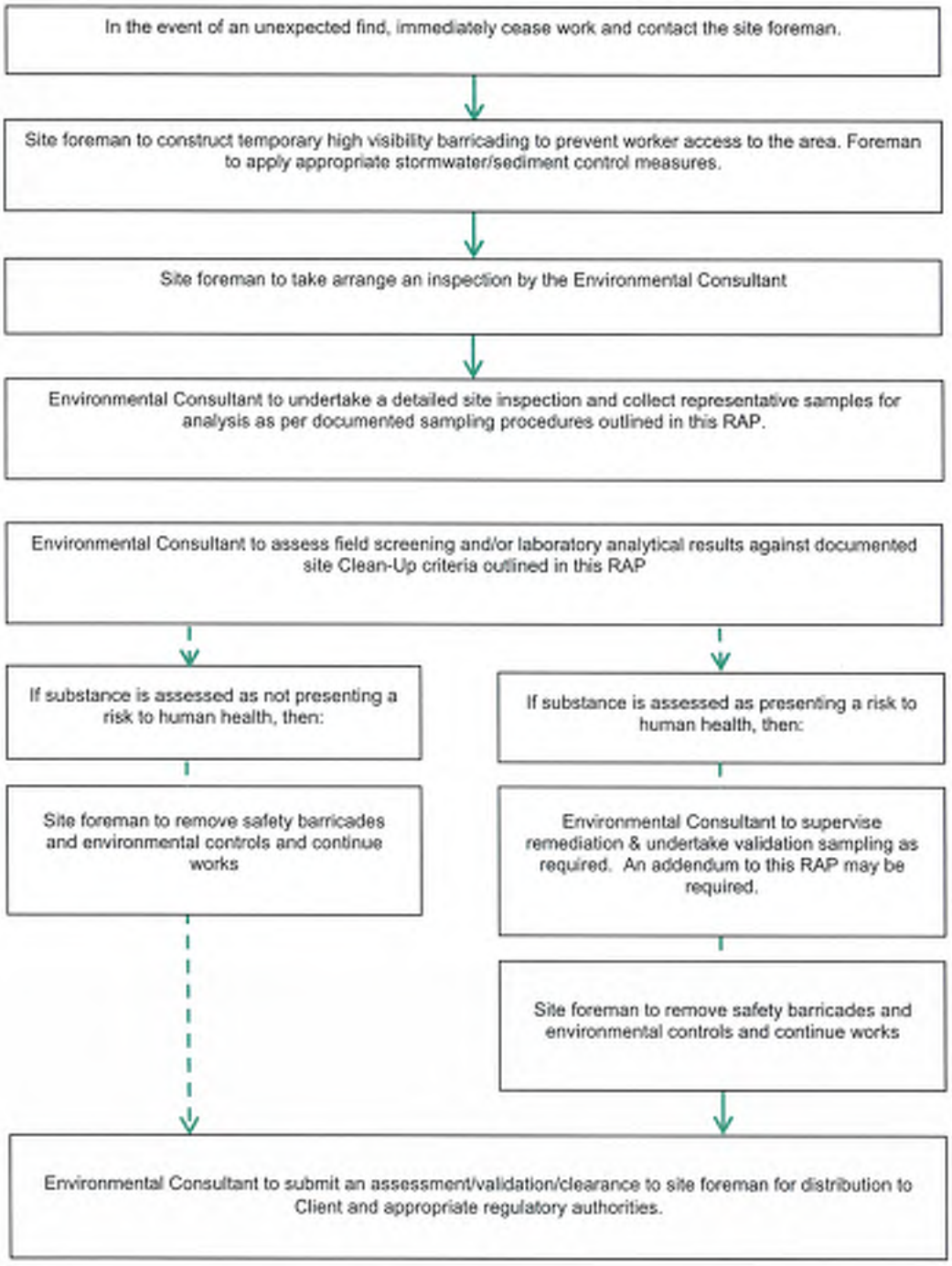
Appendix C – Unexpected Finds Protocol

Unexpected Finds Protocol



eiaustralia

Appendix G
Noise and Vibration Management Plan

MATTHEW PALAVIDIS
VICTOR FATTORETTO
MATTHEW SHIELDS

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

TABLE OF CONTENTS

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.

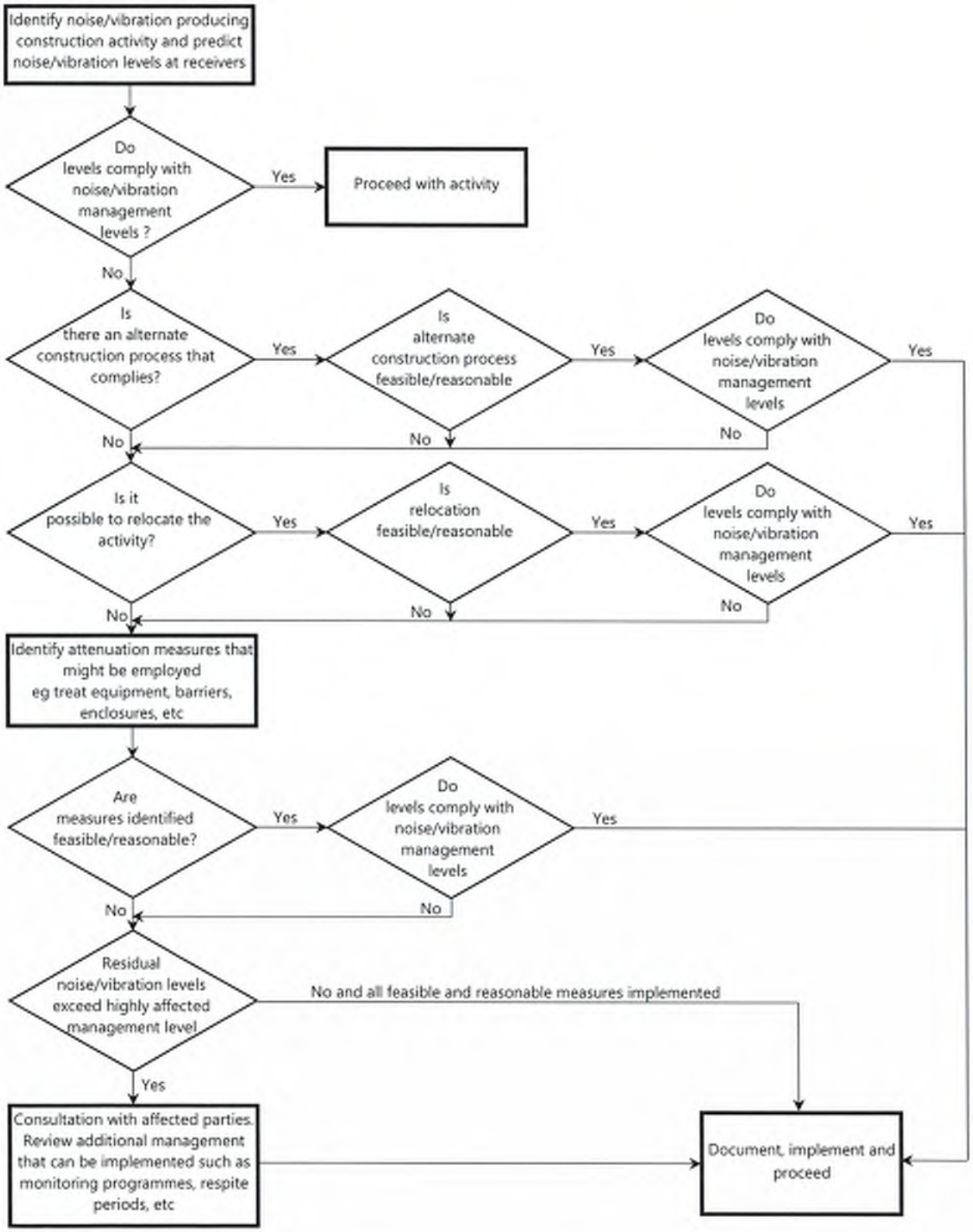
The use of saw cutting equipment to break the ridged connection between areas of rock being excavated and vibration sensitive structure is also an effective way to significantly reduce the transfer of vibration.

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

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Contamination | Remediation | Geotechnical

DEICORP PTY LTD

Dewatering Management Plan

Tallawong Station Precinct South, Rouse Hill NSW - Site 2

E24445.E16.2_Rev1

5 August 2021

DOCUMENT CONTROL

Report Title:	Dewatering Management Plan; Tallawong Station Precinct South, Rouse Hill NSW - Site 2
Report No:	E24445.E16.2_Rev1

Copies	Recipient
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Revision	Details	Date	Amended By
0	Original	29 March 2021	-
1	Updated GTA information	5 August 2021	LW/MD

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SCHEDULE OF TABLES

APPENDICES

1. INTRODUCTION

1.1 Background

Deicorp Pty Ltd (the client) engaged EI Australia (EI) to prepare a Dewatering Management Plan (DMP) for Tallawong Station Precinct South, Rouse Hill NSW (the site).

The site is located within the local government area of Blacktown City Council (**Figure 1**, **Appendix A**), covering an area of approximately 4.4 hectares (**Figure 2**, **Appendix A**). The overall site consists of two vacant lots, divided by Conferta Avenue into a northern half (Site 1, Lot 294 in Deposited Plan (DP) 1213279) and a southern half (Site 2, Lot 293 in DP 1213279). It was understood that Site 2 (covering an area of approximately 2.7 hectares) is the subject of this DMP.

EI understands that redevelopment of the site is a State Significant Development (SSD), a Secretary's Environment Assessment Requirements (SEARs) was prepared for the site. The redevelopment is proposed for mixed residential and commercial land use activities, including multi-levels of basement car park. The basement structure will be constructed at a depth which will intercept the local groundwater table and temporary dewatering is required.

This DMP outlines the site-specific measures for the management of groundwater discharge required during construction of the basement, to achieve compliance with any requirements of Blacktown City Council and the NSW Office of Water (WaterNSW) in relation to the proposed dewatering activities. EI understands this DMP is required to address the recommendations provided by the Department of Planning, Industry and Environment (DPIE) Water and the Natural Resources Access Regulator (NRAR) (Ref. OUT20/408, *Tallawong Precinct Station South Stage 2 Response to Submissions*, dated 5 March 2021) and will be submitted to WaterNSW as part of a temporary dewatering licence application.

1.2 Proposed Development

Based on the supplied plans (**Appendix B**), the proposed development of the overall site involves the construction of up to 16 mixed-use apartment towers, with two to three basement levels and interconnected roadways and landscaped areas including a private park.

Site 2 will consist of three separate, two to three levels of basement car park, with the lowest basement proposed to have a finished floor level (FFL) of 44.5m Australian Height Datum (AHD). A bulk excavation level (BEL) of 44.2m AHD has been assumed, which includes allowance for the construction of the basement slab. Locally deeper excavations may be required for footings, lift overrun pits, crane pads and service trenches.

1.3 DMP Objectives

The objectives of this DMP are to:

- Describe the dewatering methodology, groundwater treatment requirements, monitoring and reporting procedures to be employed during temporary dewatering activities occurring for the construction phase of the proposed basement;
- Provide effective management and contingency procedures, to ensure that the discharge of extracted groundwater does not pose unacceptable risks to the receiving environment, in compliance with the *Protection of the Environment Operations Act 1997*; and
- Meeting the regulatory obligations under the *Water Management Act 2000*, relevant water sharing plans and the NSW Aquifer Interference Policy.

1.4 Scope of Work

With reference to the DMP objectives, the following works were undertaken:

- A desktop study including:
  - Review of the development proposal;
  - Review of geological, landscape and acid sulfate soil (ASS) risk maps for the area;
  - A search of registered groundwater bores licensed by Water NSW located within a 500m radius of the site;
  - Review of previous environmental reports, to identify potential on- and off-site sources of contamination that may impact on dewatering discharge water quality; and
  - Review of relevant existing reports and laboratory analytical data obtained during previous groundwater monitoring events (GME) to characterise groundwater quality prior to dewatering.
- Preparation of this Dewatering Management Plan (DMP).

1.5 Regulatory Framework

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

Table 1-1 Regulatory Framework

NSW Legislation and Regulatory Instruments	Requirements
Contaminated Land Management Act 1997 (CLM Act)	Promotes the effective management of contaminated land in NSW by setting out the roles and responsibilities of the EPA and the rules they use.
Environmental Planning and Assessment Act 1979 (EP&A Act)	The EP&A Act stipulates the regulations and gives rise to state environmental planning policy (SEPP) to assist regulators with the protection of human and environmental health.
Protection of the Environment Operations Act 1997 (POEO Act)	The objective of the POEO Act is to achieve the protection, restoration and enhancement of the quality of the environment.
Water Management Act 2000 and *Water Act 1912* (WM Act)	Protects the health of rivers, streams and groundwater systems and gives rise to Water Sharing Plans and quality objectives for catchments within the state of NSW. Manages aquifer interference activities which involve: • The penetration of an aquifer • The interference of water in an aquifer • The obstruction of water flow or taking of water from an aquifer when carrying out prescribed activities; and • The disposal of water taken from an aquifer.
NSW Office of Water (2012) *NSW Aquifer Interference Policy*	Details the scope of aquifer interference activities and provides specific guidance on the licensing and approval requirements for activities that interfere with aquifers.
State Environmental Protection Policies (SEPPs)	• State Environmental Planning Policy No.55 - *Remediation of Land* (1998); and • SEPP *(Sydney Regional Growth Centres) 2006.*

NSW Legislation and Regulatory Instruments	Requirements
National Protection (Assessment of Site Contamination) Measures, 1999, Amendment 2013 (NEPM)	Outlines methodology for contaminated land assessment and provides risk-based criteria for ecological and human health receptors of site contamination.
Blacktown City Council Plans and Policies	Provides controls and guidelines for development in the area. ▪ The *Blacktown City Council Growth Centre Precincts Development Control Plan (2010);* ▪ The *Blacktown Development Control Plan* (2015); and ▪ The *Blacktown Local Environmental Plan* (2015).
Relevant Guidelines (but not limited to)	▪ ANZG (2018) *Guidelines for Fresh and Marine Water Quality;* ▪ NHMRC (2011) *Australian Drinking Water Guidelines;* ▪ NHMRC (2008) *Guidelines for Managing Risks in Recreational Water;* ▪ NSW DEC (2007) *Guidelines for the Assessment and Management of Groundwater Contamination* (March 2007); ▪ NSW DPIE (2021) *Minimum Requirements for building site groundwater investigations and reporting*, January 2021 (DPIE, 2021); ▪ NSW EPA (1995) *Sample Design Guidelines*; and ▪ EPA (2020) *Guidelines for Consultants Reporting on Contaminated Land.*

2. SITE DESCRIPTION

2.1 Property Identification, Location and Physical Setting

The site identification details and associated information are summarised in **Table 2-1**. Site locality and layout plans are provided in **Appendix A**.

Table 2-1 Site Identification, Location and Zoning

Attribute	Description
Street Address	Tallawong Station Precinct South, Rouse Hill NSW - Site 2
Lot and Deposited Plan	Site 2 - Lot 293 in DP 1213279
Site Area	Site 2 - approximately 2.7 hectares
Site Coordinates	Northern-eastern corner of site (GDA2020-MGA56): • Easting: 306020.839; • Northing: 6269941.115. (Source: http://maps.six.nsw.gov.au)
Local Government Authority	Blacktown City Council
Parish	Gidley
County	Cumberland
Current Zoning	R3: Medium Density Residential SP2: Infrastructure (south-eastern corner of the site) (*State Environmental Planning Policy (Sydney Regional Growth Centres) Amendment (Area 20 Precinct), 2015*)
Surrounding Land Use	Site 2 is bounded by Conferta Avenue (north), Cudgegong Road (east), Schofields Road (south) and an open car park (west).
Typical Soil Profile	Based on previous environmental investigations, the soil profile was described as a layer of anthropogenic filling overlying residual clays then weathered shale.

2.2 Regional Setting

The topography, hydrogeology, geology and soil landscape information is given in **Table 2-2**.

Table 2-2 Regional Setting Information

Attribute	Description
Topography	Site 2 slopes towards the south east. Elevations range from approx. 58m AHD in the north-western corner to approx. 50m AHD in the south-eastern corner.
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 middle portion of Site 2 or to municipal stormwater pits on Schofields Road and then flow to the nearest drainage line.
Regional Geology	Site 2 lies on the boundary of two formations within the Wianamatta Group, comprising the Bringelly Shale (Rwb) and Ashfield Shale (Rwa) *1:100,000 scale Geological Series Sheet 9130* (Penrith).
Soil Landscape	The Soil Conservation Service of NSW *Soil Landscapes of the Penrith 1:100,000 Sheet* (Bannerman SM and Hazelton PA, 1990) indicates that the site overlies a Blacktown (*bl*) residual soil landscape. This landscape type is characterised by gently undulating rises on Wianamatta Group shales.

Attribute	Description
Acid Sulfate Soils	The *Acid Sulfate Soil (ASS) Risk Maps* (1:25,000 scale; Murphy, 1997) and *Blacktown Local Environmental Plan 2015* indicate the site is not located in an ASS classed area. EI (2020a) conducted an acid sulfate soil assessment during the Detailed Site Investigation (DSI) of the site, which indicated no ASS were present.
Nearest Surface Water Feature	Second Ponds Creek, located approximately 182m east of the site.
Hydrogeology & Groundwater Use	Groundwater was interpreted to flow easterly towards Second Ponds Creek (EI, 2020d). An online search for groundwater bores registered with WaterNSW showed that there are no registered bores within a 500m radius of the site.

3. GROUNDWATER CONDITIONS

3.1 Previous Investigations

Contaminated land investigations were completed by EI during 2020, as part of the consenting activities of the site. The findings of these works provided details regarding the local groundwater conditions at the site, which were reported as:

- EI (2020a) *Detailed Site Investigation, Tallawong Station Precinct South, Rouse Hill NSW*. Report No. E24445.E02_Rev2, dated 1 May 2020 (the DSI);
- EI (2020d) *Additional Groundwater Investigation, Tallawong Station Precinct South, Rouse Hill NSW*. Report No. E24445.E17_Rev0, dated 1 October 2020 (the AGI); and
- EI (2021) *Groundwater Take Assessment, Tallawong Station Precinct South, Rouse Hill NSW*. Report No. E24445.G12_Rev1, dated 30 September 2021 (the GTA).

Relevant details on groundwater quality were extracted from the DSI (EI, 2020a). Site specific dewatering requirements, including standing water levels, inflow and discharge volumes, management measures and shoring were reported in the EI (2021) GTA, attached as **Appendix C**.

Other site reports not reviewed for the DMP works include:

- EI (2020b) *Remediation Action Plan, Tallawong Station Precinct South, Rouse Hill NSW*. Report No. E24445.E06_Rev1, dated 16 April 2020; and
- EI (2020c) *Construction Environmental Management Plan, Tallawong Station Precinct South, Rouse Hill NSW*. Report No. E24445.E13_Rev0, dated 27 July 2020.

3.2 Groundwater Depth and Flow Direction

The EI (2021) GTA indicates the groundwater was recorded at depths ranging from RL of 48.9-54.6m AHD, during a pump out test in 2020. To account for groundwater level variation which may occur in the future, a design groundwater level of RL 52.4m AHD was adopted for Site 2.

Groundwater beneath Site 2 was interpreted to flow easterly towards Second Ponds Creek (EI, 2020d).

3.3 Groundwater Quality

The EI (2020a) DSI investigated the quality of groundwater within Site 2. Groundwater samples were analysed for the potential contaminants of concern, and the results were compared to the adopted criteria (**Section 5.2**). The reported results were generally within the adopted criteria, with the exception of:

- Heavy metals (copper, nickel, zinc and manganese) exceeded the adopted criteria; and
- F2 TRH fraction exceeded the adopted criteria at BH7M and BH13M.

An additional GME was recommended following excavation and removal of potential on-site contamination sources. This can be completed prior to dewatering to further characterise pre-dewatering groundwater quality. The methodology for these works are detailed in **Section 5** and the adopted criteria recommended for the initial (and on-going) assessment of discharge water quality are listed in **Table 5-1**, **Section 5.2**.

4. DEWATERING METHODOLOGY

4.1 Excavation and Shoring

As stated in **Section 1.2**, the proposed development of Site 2 includes the construction of three separate, two to three levels of basement facilities. A BEL of approximately 44.2m AHD has been assumed. Locally deeper excavations may be required for footings, service trenches, crane pads, and lift overrun pits.

With reference to the GTA (EI, 2021) (**Appendix C**), the following shoring system was assumed:

- Soldier pile wall: Piles will be socketed 1m into at least Class II/III bedrock.
- Vertical sandstone excavation below the soldier pile wall.

Groundwater was assumed to be freely draining between the soldier piles and through the defects of the vertical sandstone excavation.

4.2 Estimated Groundwater Volumes

The EI (2021) GTA estimated the total take volume for the basement construction activities proposed for Site 2, based on the following assumptions:

- The subsurface conditions were horizontal along the site. Permeability values presented in **Table 1** (EI, 2021) were adopted for each unit.
- The soldier pile shoring walls are assumed to allow seepage ingress and free to drain.
- The vertical sandstone excavations were modelled as freely draining.
- For the simplicity of this model, temporary dewatering will be undertaken within the basement retaining wall perimeter to the BEL, being a depth of approximately 44.2m AHD.
- External design groundwater level of 52.4m AHD was assumed to be constant at 75m away from the shoring wall.
- A "No-Flow" boundary is defined along the symmetric line (the centre of the excavation), at 50m from the perimeter shoring walls.
- The shoring walls surrounding the basement excavation have a maximum length of about 680m.
- The model has assumed 150 days for the construction of the basement.

Based on these assumptions, the total take volume for dewatering of Site 2 was calculated as:

- **0.35 mega litres** (**ML**) over 150 days during construction and **0.86 ML** over 12 months (365 days) during operation.

4.3 Dewatering Level

The EI (2021) GTA reports that dewatering would be required to achieve draw down of the groundwater table to the depth of the BEL, at approximately 44.2m AHD, to enable the basement to be constructed in 'dry' conditions. The dewatering level would require confirmation and further analysis once the basement is completed.

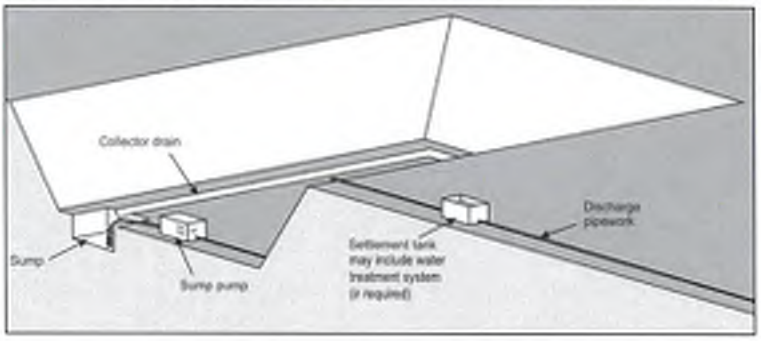
Groundwater elevations would require continuous monitoring. This should occur from the date of consent until at least two months after the cessation of pumping and/or until groundwater levels recover to pre-dewatering elevations. Standing water levels (SWL) of the underlying groundwater should be recorded from within specified monitoring wells installed outside the

shored area (on all sides), to confirm drawdown and recovery levels. Monitoring of drawdown is required to validate the accuracy of the seepage model, and pumping rates should be adjusted where needed. EI recommend the use of automatic groundwater level loggers, to be installed within the selected groundwater monitoring wells for the continual monitoring of SWL across the site. EI note that the existing groundwater monitoring wells are located within the basement footprint, and will be removed as part of the bulk excavation works. The installation of additional groundwater monitoring wells would be required; however the construction design and positioning of these monitoring wells should be discussed with a qualified environmental consultant prior to completing the works.

4.4 Dewatering Method

At the time of preparing this plan, EI had not received details of the proposed dewatering system design (including number and depth of well points, alignment, pumping rates and discharge points). Dewatering at sites with similar geological conditions is generally undertaken sump and pump system as illustrated in **Figure 4-1**.

Figure 4-1 Hypothetical layout of a *Sump and Pump* seepage collection System



During construction, it is recommended that, any pumped-out groundwater be discharged initially into a vessel (basin, or equivalent). The preferred vessel type will require capacity to accommodate the rate of groundwater seepage, which was estimated by EI (2021) to be 2.35 m^3/day (**Appendix C**). This would allow for the treatment of groundwater within the vessel prior to discharge (if necessary). EI assumed that all water removed from the site would be discharged to the municipal stormwater system, which drains into Second Ponds Creek. The pumping system may operate on a full time or intermittent basis (as required) to achieve the required groundwater levels for construction and shoring of the basement.

Based on the GTA (EI, 2021), the groundwater volumes expected per year appeared to be manageable using a drained basement system of its lifetime, considering the size of the proposed basement. "Tanking" of the basement is not warranted and a drained basement is possible for the development.

The Principal Contractor/Site Manager, Dewatering Contractor and Water Treatment Specialist must agree on a dewatering strategy to confirm that dewatering treatment systems and water retention tanks can be positioned appropriately within approved areas of the site, prior to the commencement of excavation works.

4.5 Drawdown Impacts

In specific cases, dewatering may induce ground subsidence on neighbouring properties, associated with the increased vertical effective stress of the underlying landform. Due to the underlying Ashfield and Bringelly Shales, it is considered that there is a low risk that dewatering would generate significant drawdown and settlement in the shales.

Any potential settlement calculations should be verified by an experienced geotechnical engineer.

5. WATER QUALITY MANAGEMENT

5.1 Responsibility

The Principal Contractor or Site Manager, appointed by the client for the construction works, will be responsible for implementing the management procedures for water quality as described by this DMP.

5.2 Adopted Criteria for Discharging Water

In accordance with the NSW Water Quality and River Flow Objectives, extracted waters from site dewatering operations must be tested to ensure compliance with the Australian and New Zealand Government, *Guidelines for Fresh and Marine Water Quality* (ANZG, 2018) trigger values for the 95% species protection of Fresh Water (and 99% Trigger Values for bio-accumulative contaminants). Where the ANZG (2018) guidelines do not provide values, relevant default criteria may be applied in accordance with the *National Environmental Protection (Assessment of Site Contamination) Measure* 1999, as amended in 2013 (NEPC, 2013).

The groundwater acceptance criteria for discharging waters were selected in accordance with the guidelines endorsed from time to time by Section 105 of the *Contaminated Land Management Act* (1997), and complies with the requirements of the NSW *Protection of the Environment Operations Act 1997*. The criteria adopted are presented in **Table 5-1** and must be adhered to during the dewatering program.

Table 5-1 Discharge Water Criteria

Analyte	Discharge Water Criterion (µg/L) [1]
Physico-Chemical Parameters	
pH	6.5 to 8.0 [3]
Turbidity (NTU)	1-50 [4]
Electrical Conductivity (µS/cm)	125 - 2,200 [4]
Total Dissolved Solids (mg/L)	<1200 [5]
Hardness (mg/L as $CaCO_3$)	<60 – 500 [5]
Metals	
Aluminium (pH>6.5)	55
Arsenic [III]	24
Arsenic [V]	13
Cadmium	0.2
Chromium [III]	27.4
Chromium [VI]	1.0
Copper	1.4
Lead	3.4
Mercury (total)	0.06
Nickel	11
Zinc	8

Analyte	Discharge Water Criterion (µg/L) [1]
Total Recoverable Hydrocarbons (TRH)	
F1 (C_6-C_{10} minus BTEX)	50 [6]
F2 (>C_{10}-C_{16} minus naphthalene)	60 [6]
F3 (>C_{16}-C_{34})	500 [6]
F4 (>C_{34}-C_{40})	500 [6]
Monocyclic Aromatic Hydrocarbons (BTEX)	
Benzene	950
Toluene	180 [2]
Ethylbenzene	80 [2]
o - xylene	350
p - xylene	200
m - xylene	75 [2]
Polycyclic Aromatic Hydrocarbons (PAH)	
Total PAH	1 [6]
Other Parameters	
Phenol (total)	320
Cyanide (total)	7

Note 1 Discharge water quality criteria are the ANZG (2018) *95% Fresh Water Trigger Values* (with the *99% Trigger Values* applied for the bio-accumulative parameters - mercury), unless otherwise indicated.

Note 2 Low reliability toxicity data, refer to ANZECC / ARMCANZ (2000).

Note 3 From Table 3.3.2 in ANZECC/ARMCANZ (2000) *Default trigger values for physical and chemical stressors.*

Note 4 In the absence of an ANZG (2018) criterion, an alternative criterion from ANZECC / ARMCANZ (2000) is applied (turbidity and electrical conductivity valies sourced from Table 3.3.3 *Default trigger values for physical and chemical stressors*, with the marine criterion for EC applied, in the absence of a fresh water criterion).

Note 5 Based on NHMRC (2018) *Drinking Water Guidelines.*

Note 6 In lack of a published criterion, the laboratory PQL will be adopted, as per DEC (2007). The PQL of SGS Australia Pty Ltd is given here.

5.3 Groundwater Quality Monitoring

5.3.1 Visual Monitoring

Visual inspections of the dewatering measures and equipment should occur regularly (daily where possible) by the Principal Contractor or Site Manager to ensure:

- The effective operation of all dewatering treatment equipment;
- Short circuiting of water around baffles and filter media within sediment retention tanks;
- No hydrocarbon sheens are visible and no hydrocarbon odours are emitted from the groundwater or sediment;
- No green blue or extremely clear water indicating high levels of dissolved aluminium is present;
- No sediment or suspended load is allow to bypass the baffles and sediment tanks; and
- Appropriate quantities of chemical product are available for use within the dosing system (if required).

The Site Manager must keep a record of all visual observations, as well as flow rates to enable the determination of groundwater extraction/discharge volumes following the completion of dewatering activities.

5.3.2 Discharge Water Quality Monitoring

To assess the ongoing suitability of the extracted water for discharge to the municipal stormwater system, monitoring of the water quality will be required. Sampling of groundwater should be completed prior to commencement of dewatering activities to establish a baseline, and should continue for the duration of the dewatering activities occurring at the site. The monitoring should be completed by a suitably qualified environmental scientist or equivalent, and samples should be analysed by a NATA accredited laboratory, for the parameters listed in **Table 5-1**.

All laboratory analytical results for the groundwater samples must be retained, and kept onsite by the appointed contractor, to be made available upon request by Council and/or Water NSW. The contractor should seek advice from the environmental consultant prior to deviating from any of the above monitoring requirements. The Site Manager should seek advice from the environmental consultant prior to deviating from the agreed monitoring program, to ensure the quality of discharged groundwater is not compromised. Once the Site Manager and consultant have been appointed, their names and contact information are to be clearly displayed in the site office.

The following activities are to be implemented for the site:

- **Initial Assessment - Post Remediation and Pre-Dewatering Groundwater Monitoring Event**: Following excavation confirming that the potential on-site contaminant source has been removed, an additional round of groundwater sampling would be required to further characterise pre-dewatering groundwater quality, which may coincide with the installation of the dewatering system. The collected groundwater sample(s) should be tested for the target quality parameters listed in **Table 5-1** as a minimum, to establish baseline (initial) groundwater quality conditions. A review of the proposed discharge water quality requirements will then be conducted. **NOTE:** Should deviations from the adopted criteria be considered technically justifiable, approval from Council and/or WaterNSW must be sought to allow any alternative discharge criteria to be applied.
- **Trial-Run Period:** Prior to the discharge of any extracted groundwater to the stormwater network, a trial run will be required. The trial run shall be completed as follows:
  - The initial groundwater volumes pumped from the site would be diverted back into the excavation, to infiltrate site strata and re-enter the underlying groundwater aquifer, thus allowing a reduction in suspended sediments, which are expected in the initial pump-out waters;
  - Samples of the treated groundwater will be collected and laboratory analysed for the water quality parameters listed in **Table 5-1**; and
  - After confirmation that the water quality complies with criteria, the extracted groundwater will be directed to the stormwater discharge point.

  A bi-weekly (twice per week) sampling frequency should occur during the trial-run of the onsite water treatment system. As a minimum, the trial run sampling program should comprise two samples, collected prior to, and post treatment of the extracted groundwater. The analytical results of these samples will be compared to each other, to assess the performance of the water treatment system, and the results of each sampling event will be recorded, to establish the trend of water quality change.

  Bi-weekly sampling should be maintained for a minimum of two weeks following commencement of the dewatering treatment, unless stated otherwise by the environmental

consultant. Sampling for trial run purposes will cease once the target parameters in treated water stabilise (i.e. consecutive tests are within ± 10% of the observed results) and contaminant concentrations are within the adopted discharge criteria for three consecutive sampling events. The Trial-Run period may be extended if stabilisation is not observed, or if the treated water does not satisfy the adopted criteria (**Table 5-1**).

The contractor should seek advice from an appropriately qualified consultant regarding the termination of the Trial-Run Period. During the Trial-Run period, all collected groundwater seepage (including treated water) should be retained on-site and stored in appropriate bulk containers, or allowed to infiltrate back to the aquifer. No collected groundwater should be discharged to the stormwater system until it is proven to meet the adopted criteria.

- **Discharge Monitoring Period (Weekly to Fortnightly):** After the Trial-Run Period, and subject to statutory authority approval, treated water may be discharged directly to the stormwater system. A weekly sampling frequency will be adopted for four weeks. The sampling program will involve the collection of one system discharge (i.e. treated) sample (as a minimum), to be analysed for the target parameters stated in **Table 5-1**, to confirm the system is functioning as intended.

  After four weeks, the weekly sampling frequency may be extended to fortnightly monitoring for a month and then monthly for the remaining duration of dewatering, provided the analytical monitoring results indicate the treated water quality consistently meets the adopted criteria. If this is not achieved and contingency measures have been implemented, weekly monitoring will re-commence, until consistency in the discharged water results is re-established.

  Dewatering contingency measures are detailed within **Section 6.5**, **Table 6-1**, and should be implemented where groundwater results exceed the adopted criteria for any one monitoring event. Any changes to the sampling frequency are to be determined by the appointed environmental consultant.

5.3.3 Reporting of Water Quality Results

Dewatering management procedures and monitoring results will be reviewed by the appointed environmental consultant to ensure that the treatment procedures are effective, and that the discharge waters are in compliance with the adopted criteria (**Table 5-1**). Discharge water quality reporting will be required as follows:

- A summary report will be prepared upon completion of the initial assessment (**Section 5.3.2**). The report will be submitted to the Site Manager, Dewatering Contractor and Council upon request.
- Interim Monitoring Reports will be prepared upon receipt of laboratory data for each round of water quality monitoring for the discharged waters. The interim reports will detail the sampling methods and procedures, and will provide a comparison of historic and current results obtained from the site, against the adopted criteria and shall corrective actions and recommendations based on the results, where required.
- Following completion of dewatering activities, a Dewatering Completion Report will be prepared by the appointed environmental consultant, and must include copies of all analytical results and interim monitoring reports issued during the dewatering period. A clear statement will be made regarding the overall quality of groundwater discharged to the stormwater system in comparison to the acceptable quality standards. The final report will be submitted to Council and Water NSW.

Reporting of Other Information

The Site Manager must keep records of complaints, water treatment chemicals and treatment methods employed and cumulative discharge volume records as measured from the installed calibrated flow meter. In addition, any periods of dewatering stoppage should also be recorded.

These records must be available on-site at all times and should be provided to the appointed water quality expert for monitoring report purposes.

5.3.4 Discharge Flow and Volume Monitoring

The cumulative volume of water discharged to stormwater must be monitored by calibrated flow meter (or equivalent alternative means) to comply with regulatory requirements. This will require a regular (preferably) daily record to be maintained, to document the total volume discharged, and reporting of the cumulative volume discharged in the interim monitoring report.

Flow monitoring will be undertaken by a suitably trained site employee under the supervision of the Project Manager and tabulated records should be maintained on site and made available to the environmental consultant for inclusion in the routine monitoring event reports.

These records will be used to calculate the actual groundwater volume discharged from the site and will be included in the final Dewatering Completion Report (**Section 5.3.3**) to be issued to Council and WaterNSW after the completion of dewatering activities.

5.4 Groundwater Treatment

All extracted groundwater that exceeds the adopted criteria values will require treatment on-site using approved technologies prior to discharge. Engagement of a suitably qualified and experienced water treatment specialist is necessary, to design and install any treatment measures that may be required, which should include (but not necessarily be limited to):

- A treatment tank with minimum capacity capable of containing the expected inflow for the basement (as described in **Section 4.4**);
- Groundwater filtration to reduce fine particulates;
- Automated in-line chemical dosing systems for the addition of buffering solutions and coagulants for the management of water pH and other parameters, which may be required from time to time, as described in **Section 6.5** *Dewatering Contingencies*;
- Groundwater treatment to reduce concentrations of the metals (if required) to below the adopted criteria detailed in **Table 5-1**;
- Spare retention tank(s) to provide additional residence time and sedimentation, in the case that non-compliant water quality is identified during routine monitoring, triggering temporary redirection of discharge while adjustments to the water treatment system are being implemented; and
- A means of monitoring flow rate to enable the accurate determination of total discharge volume (addressed in more detail in **Section 5.3.4**).

Selection of the preferred water treatment system shall be made by the appointed dewatering contractor with guidance from the water treatment specialist. The water treatment system should be installed, tested and operational prior to the commencement of dewatering, to ensure that only treated water that meets the adopted quality criteria is discharged to storm water.

System Maintenance

The groundwater treatment system(s) must be regularly maintained by the dewatering contractor. Maintenance must include:

- Regular cleaning and or replacement of the geo-fabric filters within the retention tanks; and
- Regular removal of sediment from the retention tanks by an appropriately-licensed waste contractor.

6. SITE MANAGEMENT CONTROLS

6.1 Deviations from this Plan

The Principal Contractor or Site Manager should seek advice from the environmental consultant whenever deviation from the agreed monitoring program is considered. To ensure the monitoring data set and the early warning objectives of the DMP are not compromised, variations will only be considered where technical justification exists, and any deviations that may be accepted will be documented within the corresponding reports, and must include all justifications for the variation accepted.

6.2 Contact Details for Key Personnel

Once the site manager, dewatering contractor, water treatment specialist, environmental consultant (water quality expert) and geotechnical engineer have been appointed, their names and contact information must be clearly displayed on site, within the site office. An example format is as follows:

Site Manager/Principal Contractor	Name: Company:	Mobile phone: Email:
Dewatering Contractor	Name: Company:	Mobile phone: Email:
Water Treatment Specialist	Name: Company:	Mobile phone: Email:
Environmental Consultant (Water Quality Expert)	Name: Company:	Mobile phone: Email:
Geotechnical Engineer	Name: Company:	Mobile phone: Email:

6.3 Summary of Specific Activities

The appointed contractor and/or Site Manager will be responsible for ensuring that the following activities (requirements) are undertaken during the dewatering program:

- Maintain erosion and sediment control measures in a functioning condition, until all construction activities are completed;
- Perform daily visual inspection of stormwater diversions and sediment / erosion control devices, as specified in **Section 5.3.1**;
- Implement appropriate remedial measures where any controls or devices are not functioning effectively or are inappropriate;
- Collate records and comments on the condition of existing erosion and run-off controls (drains, silt fences, catch drains etc.), dewatering procedures and test results, and any site instructions issued to sub-contractors to undertake remedial works;
- Maintain general rainfall records describing each day as dry, light rain, heavy rain and the approximate duration of the rain event (to be filed on site);
- Confirm water quality parameters meet the relevant discharge limits, by disclosing supporting documentation upon request;

- Reporting any incidents of poor drainage or uncontrolled discharge; and
- Recording all daily inspection reports, environmental incidents and cumulative discharge volumes, as read from the installed flow meter (described in **Section 5.3.4**), which may be reviewed during any dewatering audit that may occur at the site.

6.4 Vibration, Noise, and Odour Management

The following vibration, noise and odour risks may occur during dewatering:

- Excessive vibration and noise levels associated with site plant / dewatering equipment; and
- Odours released from collected groundwater, which may pose a risk to human health and/or the aesthetic condition of the environment.

It is the responsibility of the Site Manager to ensure appropriate management of vibration, noise and odour during dewatering operations. Appropriate management methodologies include the following:

- Undertaking dilapidation surveys of neighbouring buildings, in accordance with potential for impacts in final design type.
- All sub-contractors to be managed to ensure they work only within defined hours set by the DA conditions.
- All reasonable steps shall be taken to muffle and acoustically baffle all plant and equipment. Noise and vibration levels generated by site works must be within the limits set by the DA conditions, the site specific environmental management plan and the *Protection of Environmental Operation Act 1997*.
- Give consideration to the noise emission of plant / equipment prior to its selection / mobilisation to site, and schedule the use of noisy equipment at the least-sensitive time of day.
- Situate noisy equipment at the greatest distance from the noise-sensitive area, or orient the equipment so that noise emissions are directed away from sensitive areas, to achieve the maximum attenuation of noise. Where there are several noisy pieces of equipment, schedule operations to minimise cumulative impacts.
- Keep equipment well maintained.
- Ensure engine shrouds (acoustic linings) are installed (where feasible).

6.5 Dewatering Contingencies

Contingent actions for scenarios that may arise during dewatering are detailed in **Table 6-1**.

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

Anticipated Problem	Corrective Actions
	temporary system should be utilised following correspondence with Council / WaterNSW and the environmental consultant.
Excessive noise	Identify the source and isolate if possible. Modify the actions of the source or erect temporary noise barriers if required.
Impacts on the stability of adjacent structures	Contractor to seek advice from qualified professional (such as a geotechnical engineer and/or structural consultant) in regards to the additional assessment and monitoring that may be required.
Complaint management	Notify client, project manager(s) and environmental consultant (if required) following complaint, and report complaint as per management procedures. Implement control measures to address reason of complaint (if possible) and notify complainant of outcome.

7. DEWATERING MANAGEMENT SUMMARY

The requirements of this Dewatering Management Plan are summarised in **Table 7-1**.

Table 7-1 Dewatering Management Summary

Item	Requirement / Procedure
Objective of DMP	Ensure that the proposed dewatering operations do not impact on the quality of the receiving surface waters (i.e. at the point of groundwater discharge). Where necessary, groundwater will be treated to achieve an acceptable water quality prior to discharge: ▪ *See **Section 3** for groundwater conditions.* ▪ *See **Section 5.2** for groundwater quality discharge requirements.* ▪ *See **Sections 4.4** and **5.4** for groundwater treatment options.* Provide comment on groundwater level changes that occur during dewatering: ▪ *See **Section 4** for summary of groundwater take assessment and dewatering drawdown impacts.* ▪ *Refer to **Appendix C** for groundwater take assessment model.*
Person Responsible for Implementation of DMP	The principal contractor / site manager will be responsible for ensuring the implementation of appropriate treatment of extracted groundwater, as outlined in this document.
Operation Policy	To ensure that all extracted groundwater is effectively treated prior to discharge to the stormwater network.
Pre-Dewatering Groundwater Assessment	As set out in **Section 5.3.2**, a representative sample(s) must be collected prior to any dewatering. It will be tested for the identified potential contaminants, to provide baseline groundwater quality data and review the proposed discharge water quality requirements.
Discharge Performance Criteria	All groundwater designated for discharge into the local stormwater network is to meet (at the very least) the criteria outlined within **Table 5-1**.
Implementation Strategy	All extracted groundwater will be monitored and treated (where necessary). On-going testing to be performed, to confirm water quality meets the adopted criteria prior to release into the stormwater network. Additional treatment / waste disposal to be undertaken if the criteria values are not met.
Monitoring Requirements	As specified in **Section 5.3.2**: 1. Initial Assessment = Prior to dewatering 2. Trial-Run Period = Twice per week* 3. Discharge Monitoring Period = Weekly for a month to fortnightly for a month then monthly* **provided the analytical results indicate treated water quality meets the adopted criteria, or risks are considered to be significantly low. Should analytical results exceed the adopted discharge criteria, contingencies listed in **Section 6.5** must be followed.*
Auditing	The appointed environmental consultant (water quality expert) will undertake weekly audits during the Trial-Run Period (if required), and monthly audits during the Monitoring Period, to ensure that all discharges to the stormwater network comply with the criteria specified in **Section 5.2**.

Item	Requirement / Procedure
Reporting	The contractor responsible for dewatering will keep records of all monitoring and laboratory test results, as well as quantities of treatment agents applied during the dewatering process. All records should be made available for inspection onsite during the construction phase.
Corrective Actions	As specified in the contingency measures, outlined in **Section 6.5**.

8. STATEMENT OF LIMITATIONS

This plan has been prepared for the exclusive use of Deicorp Pty Ltd, whom is the only intended beneficiary of EI's work. The scope of work completed for the purpose of this plan is limited to that agreed with Deicorp Pty Ltd.

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 drafting similar plans 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 must be read in conjunction with the whole of this plan, including its appendices.

EI's professional opinions are reasonable and based on its 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 or observations. In some cases, further testing and analysis may be required, which may result in a further report with different conclusions.

Should you have any queries regarding this plan, please do not hesitate to contact EI.

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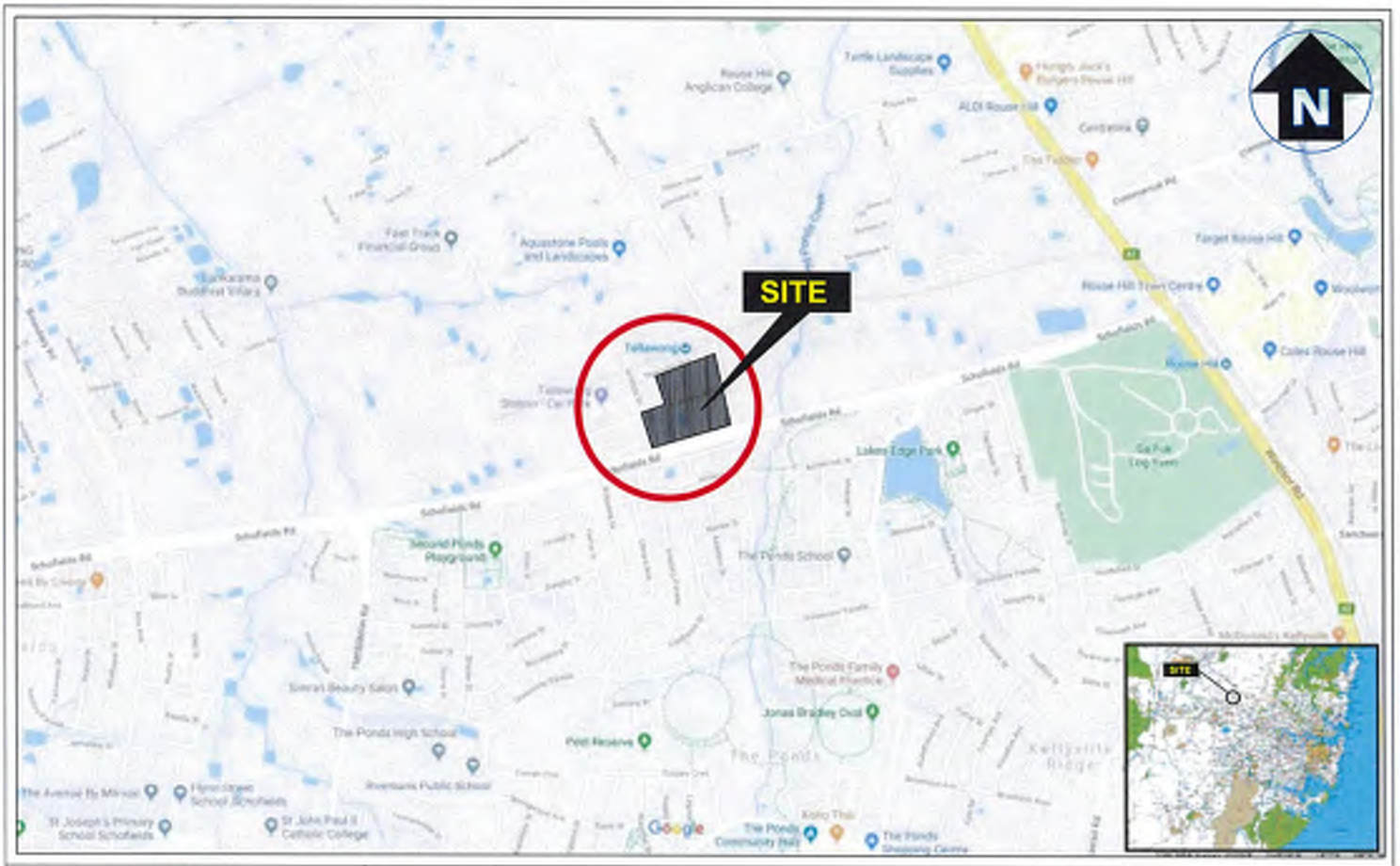
ABBREVIATIONS

AGI	Additional Groundwater Investigation
AHD	Australian Height Datum
ANZG	Australian and New Zealand Governments
ASS	Acid Sulfate Soils
BEL	Bulk Excavation Level
BTEX	Benzene, Toluene, Ethyl benzene, Xylene
DA	Development Application
DMP	Dewatering Management Plan
DP	Deposited Plan
DPIE	Department of Planning, Industry and Environment
DSI	Detailed Site Investigation
DWC	Discharge Water Criteria
EC	Electrical Conductivity
FFL	Finished Floor Level
GME	Groundwater Monitoring Event
GTA	Groundwater Take Assessment
km	Kilometres
LEP	Local Environmental Plan
LGA	Local Government Area
LOR	Limit of Reporting (limit of reporting for respective analytical method)
m	metres
ML	Megalitres
mg/L	Milligrams per litre
µg/L	Micrograms per litre
µS/cm	Microsiemens per Centimetre
NA	Not Applicable
NATA	National Association of Testing Authorities
NC	No Criterion
NRAR	Natural Resources Access Regulator
NTU	Nepholemetric Turbidity Units
OCP	Organochlorine Pesticides
OPP	Organophosphate Pesticides
PAH	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyls
pH	Potential Hydrogen (a measure of the acidity or basicity of an aqueous solution)
PID	Photo-Ionisation Detector
PQL	Practical Quantitation Limit (quantitative limit for respective analytical method)
RL	Reduced Level
TDS	Total Dissolved Solids
TSS	Total Suspended Solids
TPH	Total Petroleum Hydrocarbons (superseded term equivalent to TRH)
TRH	Total Recoverable Hydrocarbons (non-specific analysis of organic compounds)
UST	Underground Storage Tank

Appendix A - Figures



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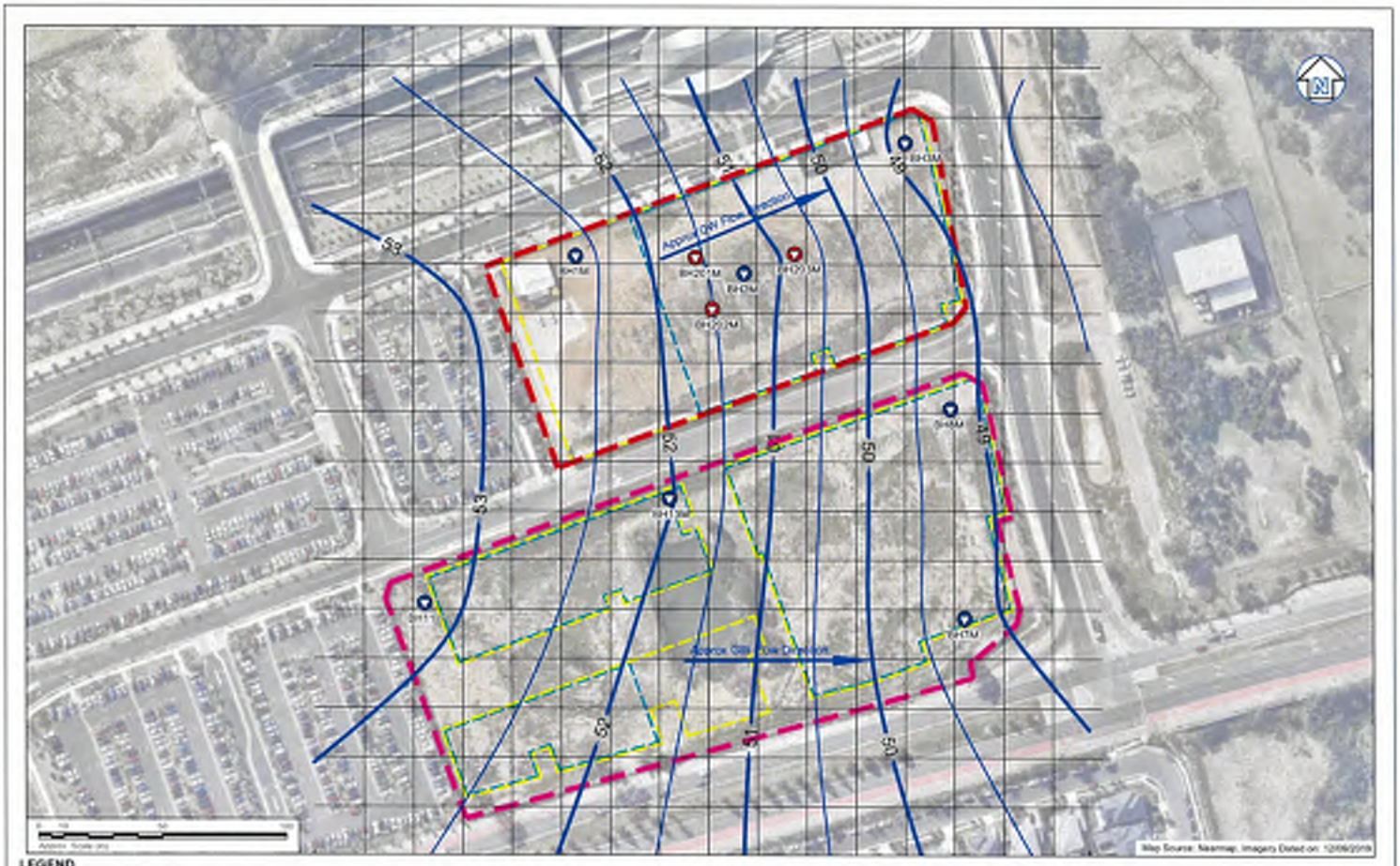
Drawn:	AM.H.
Approved:	N.G.
Date:	26-03-21
Scale:	Not To Scale

Deicorp Pty Ltd
Dewatering Management Plan
Tallawong Station Precinct South, Rouse Hill NSW
Site Locality Plan

Figure: 1

Project: E24445.E15



LEGEND

- Approximate Site 1 boundary (E24445.E16.1 - DMP)
- Approximate Site 2 boundary (E24445.E16.2 - DMP)
- Approximate basement 1 and 2 boundary
- Approximate basement 2 and 3 boundary
- Approximate monitoring well location by EI (AGI, 2020)
- Approximate monitoring well location by EI (DSI, 2020)
- Approximate groundwater flow direction
- Approximate groundwater level (RL mAHD)
- Contour interval 0.5 m

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Drawn:	AM.H.	**Delcorp Pty Ltd** Dewatering Management Plan Tallawong Station Precinct South, Rouse Hill NSW - Site 2 Site Layout Plan
Approved:	N.G.	
Date:	26-03-21	

Figure: 2

Project: E24445.E16.2

Appendix B - Proposed Development Plans

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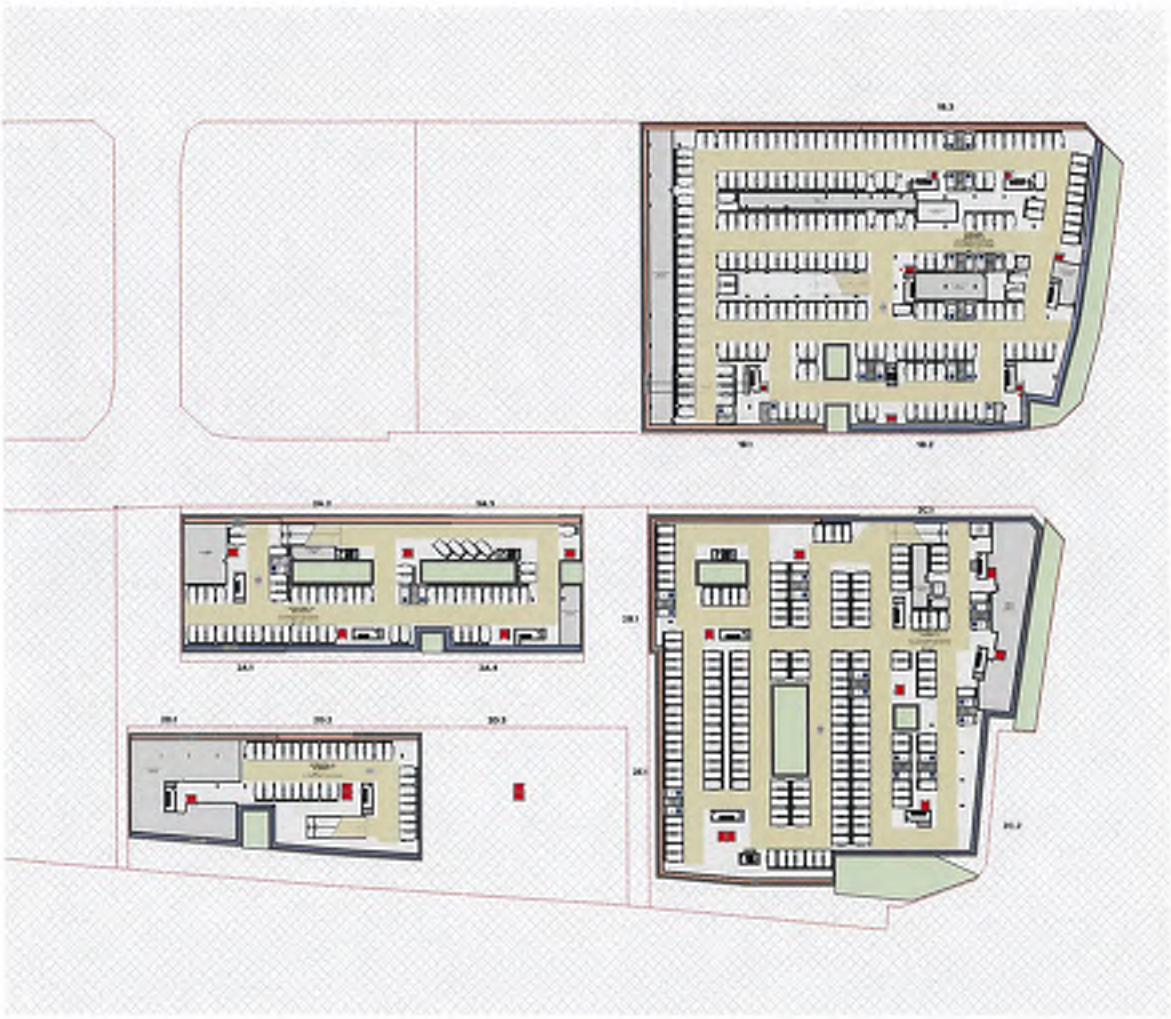

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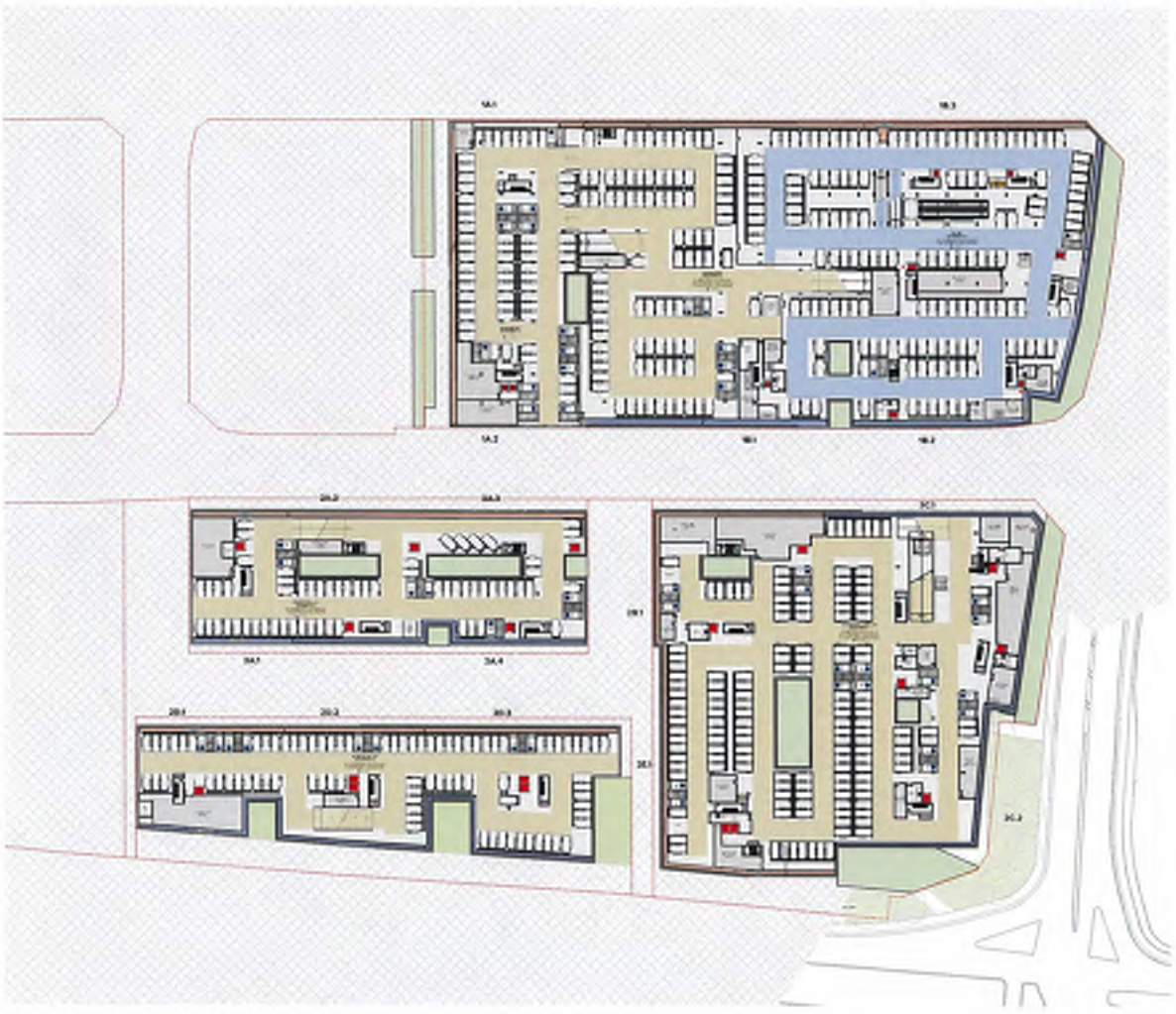

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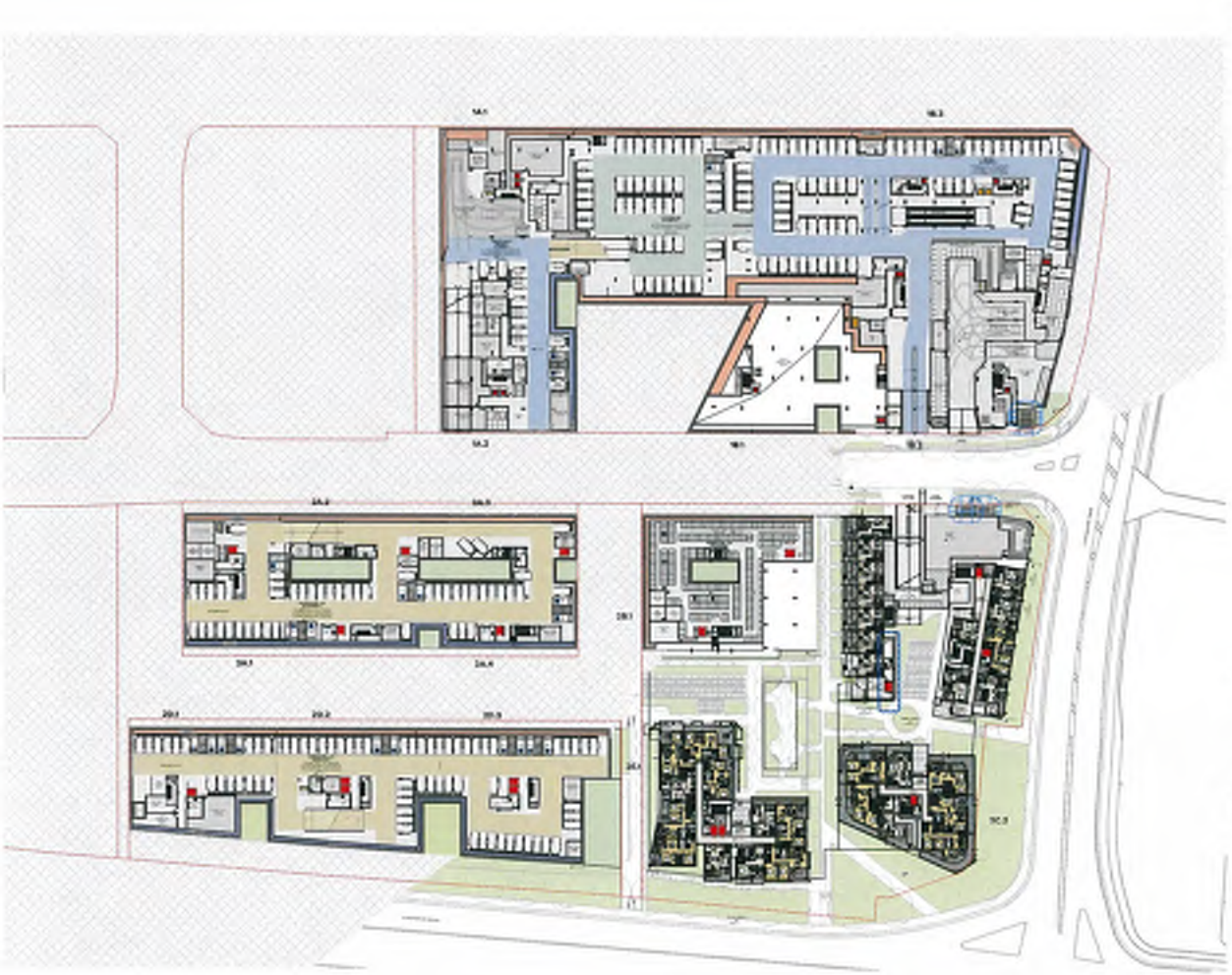

TURNER

Appendix C - Groundwater Take Assessment

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30 July 2021
E24445.G12_Rev1

Mr. Greg Colbran
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REDFERN NSW 2016

Groundwater Take Assessment
Tallawong Station Precinct South, Rouse Hill, NSW

1. INTRODUCTION

1.1. BACKGROUND

At the request of Mr. Greg Colbran of Deicorp Pty Ltd (the Client), EI Australia (EI) has prepared this Groundwater Take Assessment (GTA) for Tallawong Station Precinct South, Rouse Hill, NSW (the site).

EI had previously prepared a Geotechnical Investigation (GI) report for the site, referenced E24445.G03_Rev1, dated 15 April 2020. An Additional Groundwater Investigation (AGI), referenced E24445.E17_0, dated 1 October 2020 was also completed. This GTA report should be read in conjunction with the GI and AGI reports.

1.2. PROPOSED DEVELOPMENT

The following documents were used to assist in the preparation of this analysis:

- Architectural Drawings by TURNER, Project No.: 18095, Drawing Nos.: DA-110-06, DA-110-010, DA-110-008, DA-110-010 and DA-110-020, Revision V, dated 8 April 2020 and Drawing Nos DA-110-030, DA-110-040, DA-110-050, DA-110-060, DA-110-070, DA-110-080, DA-110-090 and DA-110-100, Revision J, dated 8 April 2020.
- Site Survey Plan, prepared by Daw & Walton Consulting Surveyors, Project No: 4900-20, Sheets 1-7, Revision 03, dated 3 April 2020. The datum in the survey plan is in Australian Height Datum (AHD), hence all Reduced Levels (RL) mentioned in this report are henceforth in AHD.

Based on the provided documents, EI understands that the proposed mixed use development involves the construction of up to 16 buildings of varying heights, to a maximum of eight storeys, with up to two to three basement levels and interconnected roadways and landscaped areas including a private park. Four separate basements are shared by the buildings.

The lowest basement levels are proposed to have finished floor levels (FFL) ranging between RL 44.500m and 49.500m. Bulk Excavation Levels (BEL) ranging between RL 44.20m and 49.20m have been assumed, which includes allowance for the construction of the basement slab. To achieve the BEL, excavation depths ranging from 5.10m Below Existing Ground Level (BEGL) to 13.3m (BEGL) have been estimated. Locally deeper excavations may be required for footings, lift overrun pits, crane pads, and service trenches.

1.3. ASSESSMENT OBJECTIVES

The objective of this GTA is to provide an estimation of the groundwater take volumes that require pumping out during the construction and operational stage of the development, estimation of the groundwater drawdown as a result of the dewatering, and its associated ground settlements (if any).

2. SITE MODEL

2.1. SUBSURFACE CONDITIONS PERMEABILITY

For the purpose of the groundwater take assessment, the average subsurface conditions outlined our geotechnical investigation report (E24445.G03_Rev1, dated 5 June 2020) have been adopted. A summary of the permeability values which were adopted for the assessment of groundwater take volumes are presented in **Table 3** below.

Table 1 Summary of Subsurface Conditions and Adopted Design Parameters

Material [1]	Model 1 (Site 1, North)		Model 2 (Site 2, South)		Adopted Permeability (m/s)
	Depth to Top of Unit (m BEGL) [2]	Approximate RL of Top of Unit (m AHD) [2]	Depth to Top of Unit (m BEGL) [2]	Approximate RL of Top of Unit (m AHD) [2]	
Fill [3]	0	56.9	0	54.4	1×10^{-6}
Residual Soil [3]	3.7	52.7	1.4	52.9	1×10^{-9}
Class V/IV Shale [4]	4.6	52.4	3.5	51.1	H: 1×10^{-7} V: 1×10^{-9}
Class III/II Shale	7.4	49.5	6.3	48.1	H: 1×10^{-8} V: 1×10^{-9}

Notes:

1 For more detailed descriptions of subsurface conditions reference should be made to the Geotechnical Investigation Report.
2 Depths and levels presented in **Table 1** above are generalised using the most conservative levels from the Geotechnical Investigation across the excavation area for the purpose of groundwater seepage modelling.
3 Permeability values have been correlated for material encountered during the GTA using Look (2014).
4 Permeability value of Bedrock was calculated based on the average result of the pump out test carried out by EI.

The permeability the Shale/Laminite bedrock was calculated based on the pump-out test rests completed within monitoring wells. The monitoring wells and pump out test results are summarised in **Table 2** below.

2.2. GROUNDWATER OBSERVATIONS AND PUMP OUT TESTS

As part of the GI and AGI scope, EI had installed 10 monitoring wells (BH1M, BH2M, BH3M, BH7M, BH8M, BH11M, BH13M, BH201M, BH202M and BH203M) for groundwater monitoring. EI carried out a Pump out Test on 23 September 2020 within six of the monitoring wells installed by EI. Groundwater was observed to be at depths of between 1.6m and 8.6m BEGL (RL 48.9m and 54.6m) which were typically along the residual soil/rock interface.

Table 2 Monitoring Well Details and Pump Out Test Results

Monitoring Well/ Test ID	Total Well Depth (m BEGL)	Screen Length (m)	Screened Section	Date of Test	Approximate RL of Groundwater Level (m AHD)	Adopted Permeability (m/s)
BH7M	8.0	6	Shale/Laminite	23-Sept-2020	48.9	9.5×10^{-8}
BH8M	7.0	3	Shale	23-Sept-2020	49.4	1.4×10^{-7}
BH11M	11.6	6	Shale/Laminite	23-Sept-2020	52.8	8.3×10^{-9}
BH13M	7.0	3	Shale	23-Sept-2020	54.6	1.2×10^{-8}
BH201M	9.6	3	Shale	23-Sept-2020	50.6	8.1×10^{-9}
BH203M	9.1	3	Shale	23-Sept-2020	50.2	9.5×10^{-9}

To account for any groundwater level fluctuations due to seasonal variation, design groundwater should be considered 1m above the average recorded groundwater levels for each basement. We have conservatively assumed that design groundwater level for Model 1 and Model 2 to be at RL 51.4m and RL 52.4m AHD with the absence of long-term monitoring.

2.3. SHORING SYSTEM

At the time of this assessment, no detailed structural designs were available. Hence, the following shoring system was assumed for the model based on the recommendations of the GI:

- Solider pile wall: Piles will be socketed 1m into at least Class II/III bedrock.
- Vertical sandstone excavation below the soldier pile wall

Groundwater is assumed to be freely draining between the soldier piles and through the defects of the vertical sandstone excavation.

This assessment does not assess the overall stability and embedment depth of the shoring system. Once final designs are made available, this assessment should be revised accordingly.

3. GROUNDWATER TAKE ASSESSMENT

3.1. GROUNDWATER SEEPAGE VOLUMES DURING CONSTRUCTION PHASE

Groundwater seepage analysis for flow through and beneath the shoring wall during construction has been undertaken using SEEP/W, a finite element groundwater seepage analysis software. SEEP/W estimates the seepage rate of water entering the excavation from beneath the shoring wall. This model estimates the volume of water which will be required to be dewatered during the construction of the basement and until the dewatering is turned off.

For the purpose of this modelling, it has been assumed that:

- Two models were undertaken to estimate the flows into the basements:
  - **Model 1**: The area for the two to three-level basement underneath Buildings 1A.1 and 1B.3 (Site 1), located in the northern half of the site, and
  - **Model 2**: The area for a three, two to three-level basement underneath Buildings 2A.2, 2A.3, 2B.1, 2C.1, 2C.2, 2D.1, 2D.2, 2D.3 and 2E.1 (Site 2), located in the southern half of the site. The three basements were modelled as one large basement for the purpose of this assessment.
- The subsurface conditions were horizontal along the site. The permeability values presented in **Table 1** above were adopted for each unit.
- The soldier pile shoring walls are assumed to be permeable and free to drain.
- The vertical sandstone excavations were modelled as freely draining.
- For the simplicity of this model, temporary dewatering will be undertaken within the basements retaining wall perimeter to BEL, or about RL 44.7m (Model 1) and RL 44.2m (Model 2).
- External design groundwater levels of RL 51.4m (Model 1) and RL 52.4m (Model 2) were assumed to be constant at 75m away from the shoring wall.
- A "No-Flow" boundary is defined along the symmetric line (the centre of the excavation), at 45m (Model 1) and 50m (Model 2) from the perimeter shoring wall.
- The shoring walls surrounding the basement excavation has a maximum length of about 510m (Model 1) and 680m (Model 2).
- The basement will be constructed in 150 days.

The SEEP/W model is presented in **Appendix A. Table 3** below provides the estimated groundwater inflow rate into the basement.

Table 3 Summary of Analysis Results

Model	Inflow per m length of perimeter wall (m^3/sec)	Inflow per m length of perimeter wall (m^3/day)	Inflow into excavation (m^3/day)	Total Inflow during construction (ML/150 days)
Site 1	3.0×10^{-8}	0.003	1.32	0.20
Site 2	4.0×10^{-8}	0.003	2.35	0.35

3.2. ASSESSMENT OF GROUNDWATER TAKE DURING OPERATIONAL PHASE

A drained basement using sub-soil drainage and a sump-and-pump system was assumed. Based on the SEEP/W results, the estimated volume of groundwater removed beneath the basement during the operational phase of the development is expected to be approximately 0.48ML per year for Stage 1 and 0.86ML per year for Stage 2.

4. CONCLUSIONS AND COMMENTS

Based on the findings of this report and within the limitations of available data, EI concludes that:

- Construction and operational phase groundwater take will be approximately:
  - Stage 1: 0.20ML / 150 days during construction and 0.48ML / year during operation
  - Stage 2: 0.35ML / 150 days during construction and 0.86ML / year during operation
- The above estimate is based on the following assumptions:
  - The soldier pile shoring walls are assumed to be permeable and free to drain, and the vertical sandstone excavation was modelled as freely draining.
  - Temporary dewatering will be undertaken within the basement retaining wall perimeter to BEL, or about RL 44.7m (Model A1) and RL 44.2m (Model A2).
  - The basement walls and slab are designed as drained for the developments lifetime.
  - Construction of the basement will take 150 days.
  - This assessment does not take into consideration any excavation that may be required for footings, service trenches, lift pits, or crane pads. This additional excavation, if required, is not expected to affect the retention or the dewatering system.
- In our opinion, the drawdown as a result of the dewatering will have negligible, if any, adverse impact on the neighbouring properties.
- Based on our assessment, considering the size of the proposed basements the groundwater volumes expected per year appear to be manageable using a drained basement system for its lifetime. Hence in our opinion "tanking" of the basement is not warranted and a drained basement is possible for the development.
- Should any design or construction conditions differ from that adopted in this report; this GTA should be reviewed and updated as required.

5. LIMITATIONS

The advice and parameters presented in this Groundwater Take Assessment are for preliminary assessment of the expected groundwater take based upon the proposed development and encountered site conditions of the previous GA. This report is not a dewatering management plan. This assessment does not assess the overall stability of the assumed shoring system. The shoring system will need to be designed to satisfy stability, piping, founding and groundwater cut-off considerations by the structural engineer. A suitably qualified dewatering contractor should be engaged to confirm dewatering requirements.

Your attention is drawn to the document "Important Information", attached as **Appendix B** at the end of this letter report. The statements presented in this document are intended to advise you of what your realistic expectations of this report should be. The document is not intended to reduce the level of responsibility accepted by EI, but rather to ensure that all parties who may rely on this report are aware of the responsibilities each assumes in so doing.

This letter report was prepared by EI for the sole use of Deicorp Pty Ltd for the particular project and purpose described. No responsibility is accepted for the use of any part of this letter report in any other content or for any other purpose.

EI has used a degree of care, skill and diligence normally exercised by consulting engineers in similar circumstances and locality and has relied on the accuracy of information provided by Deicorp Pty Ltd. No other warranty expressed or implied is made or intended.

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6. CLOSURE

Please do not hesitate to contact the undersigned should you have any questions.

For and on behalf of:
EI AUSTRALIA

Authors

Stephanie Liew
Geotechnical Engineer

Technical Reviewer

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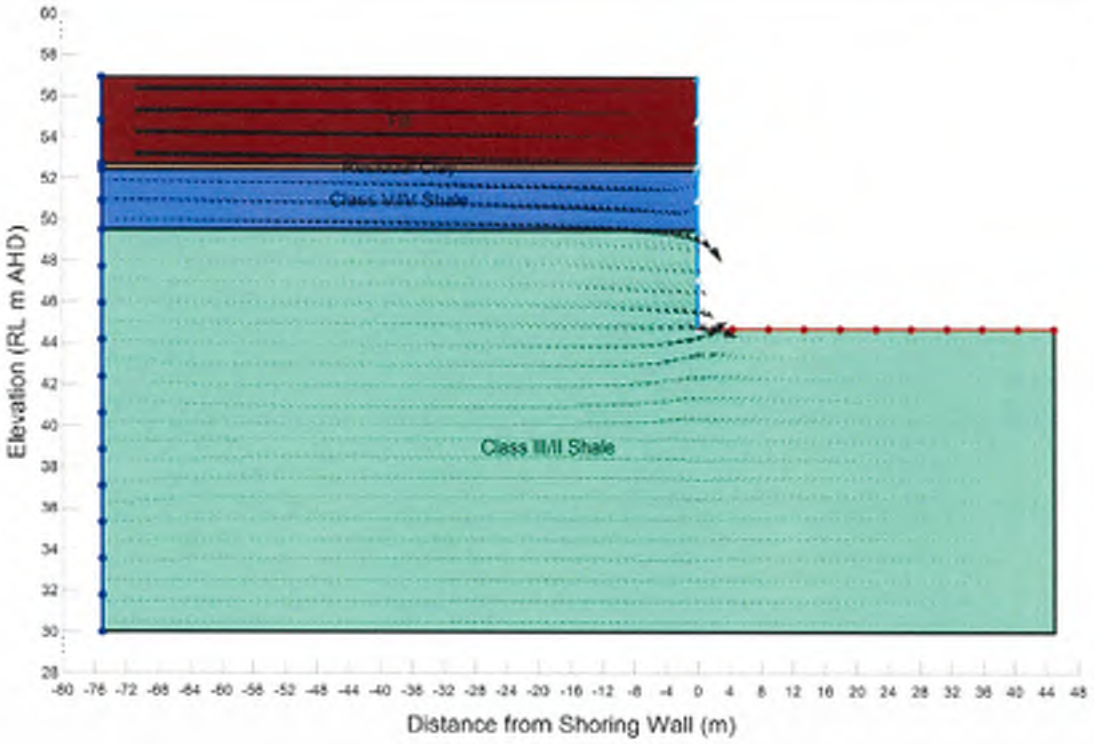
Attachments: Appendix A – Seep/W Model Results
Appendix B – Important Information

APPENDIX A

Seep/W Model



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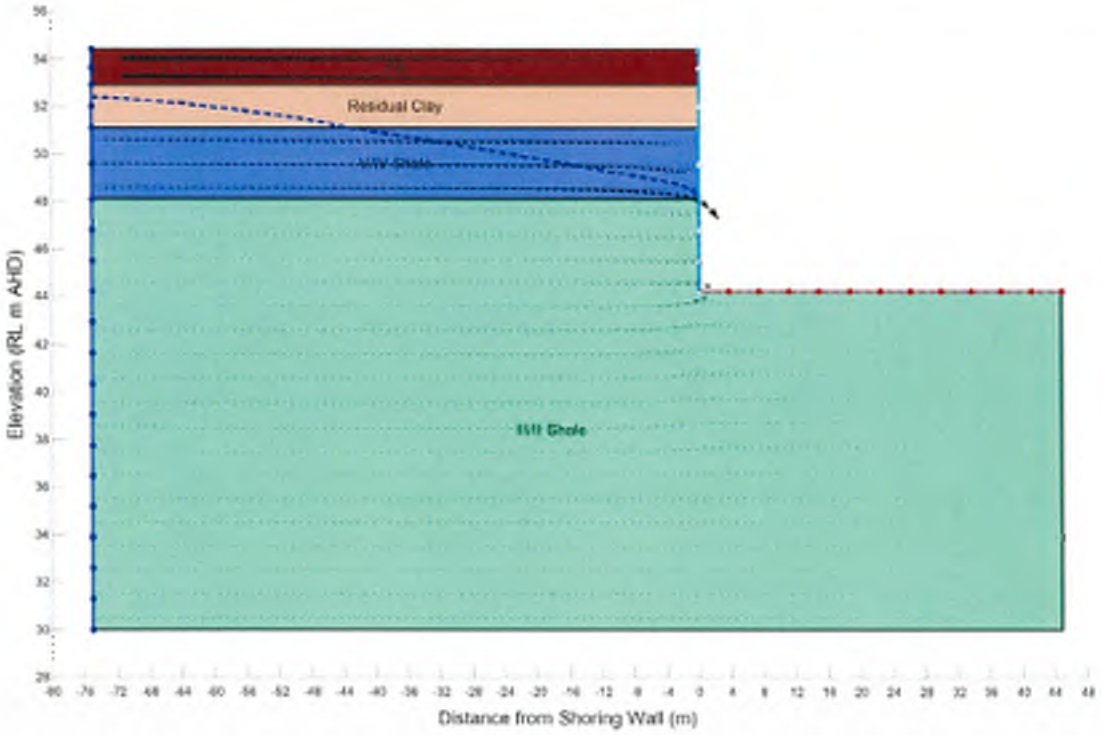
Date:	30/07/21
Approx Scale:	As Shown

Deicorp Pty Ltd
Groundwater Take Assessment
Tallawong Precinct South, Rouse Hill, NSW
SEEP/W Model and Results - Site 1

Appendix:
A1



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Deicorp Pty Ltd
Groundwater Take Assessment
Tallawong Precinct South, Rouse Hill, NSW
SEEP/W Model and Results - Site 2

Appendix:
A2

APPENDIX B

Important Information

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Important Information

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SCOPE OF SERVICES

The geotechnical report ("the report") has been prepared in accordance with the scope of services as set out in the contract, or as otherwise agreed, between the Client And EI Australia ("EI"). The scope of work may have been limited by a range of factors such as time, budget, access and/or site disturbance constraints.

RELIANCE ON DATA

EI has relied on data provided by the Client and other individuals and organizations, to prepare the report. Such data may include surveys, analyses, designs, maps and plans. EI has not verified the accuracy or completeness of the data except as stated in the report. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations ("conclusions") are based in whole or part on the data, EI will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to EI.

GEOTECHNICAL ENGINEERING

Geotechnical engineering is based extensively on judgment and opinion. It is far less exact than other engineering disciplines. Geotechnical engineering reports are prepared for a specific client, for a specific project and to meet specific needs, and may not be adequate for other clients or other purposes (e.g. a report prepared for a consulting civil engineer may not be adequate for a construction contractor). The report should not be used for other than its intended purpose without seeking additional geotechnical advice. Also, unless further geotechnical advice is obtained, the report cannot be used where the nature and/or details of the proposed development are changed.

LIMITATIONS OF SITE INVESTIGATION

The investigation programme undertaken is a professional estimate of the scope of investigation required to provide a general profile of subsurface conditions. The data derived from the site investigation programme and subsequent laboratory testing are extrapolated across the site to form an inferred geological model, and an engineering opinion is rendered about overall subsurface conditions and their likely behaviour with regard to the proposed development. Despite investigation, the actual conditions at the site might differ from those inferred to exist, since no subsurface exploration program, no matter how comprehensive, can reveal all subsurface details and anomalies. The engineering logs are the subjective interpretation of subsurface conditions at a particular location and time, made by trained personnel. The actual interface between materials may be more gradual or abrupt than a report indicates.

SUBSURFACE CONDITIONS ARE TIME DEPENDENT

Subsurface conditions can be modified by changing natural forces or man-made influences. The report is based on conditions that existed at the time of subsurface exploration. Construction operations adjacent to the site, and natural events such as floods, or ground water fluctuations, may also affect subsurface conditions, and thus the continuing adequacy of a geotechnical report. EI should be kept appraised of any such events, and should be consulted to determine if any additional tests are necessary.

VERIFICATION OF SITE CONDITIONS

Where ground conditions encountered at the site differ significantly from those anticipated in the report, either due to natural variability of subsurface conditions or construction activities, it is a condition of the report that EI be notified of any variations and be provided with an opportunity to review the recommendations of this report. Recognition of change of soil and rock conditions requires experience and it is recommended that a suitably experienced geotechnical engineer be engaged to visit the site with sufficient frequency to detect if conditions have changed significantly.

REPRODUCTION OF REPORTS

 Where information from the accompanying report is to be included in contract documents or engineering specification for the project, the entire report should be included in order to minimize the likelihood of misinterpretation from logs.

REPORT FOR BENEFIT OF CLIENT

The report has been prepared for the benefit of the Client and no other party. EI assumes no responsibility and will not be liable to any other person or organisation for or in relation to any matter dealt with or conclusions expressed in the report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with or conclusions expressed in the report (including without limitation matters arising from any negligent act or omission of EI or for any loss or damage suffered by any other party relying upon the matters dealt with or conclusions expressed in the report). Other parties should not rely upon the report or the accuracy or completeness of any conclusions and should make their own inquiries and obtain independent advice in relation to such matters.

OTHER LIMITATIONS

EI will not be liable to update or revise the report to take into account any events or emergent circumstances or fact occurring or becoming apparent after the date of the report.