RAIL RISK MANAGEMENT PLAN

SYDNEY METRO
CITY & SOUTWEST RAIL CORRIDOR

HIGHRISE DEVELOPMENT

THE FIVEWAYS TRIANGLE CROWS NEST
391-423 PACIFIC HIGHWAY
3-15 FALCON STREET
8 ALEXANDER STREET

April 2025

Site:	The Fiveways Triangle Crows Nest Sydney NSW
Developer:	Deicorp Projects (Crows Nest) Pty Ltd
Builder:	Deicorp Pty Ltd
Report Ref:	GKA CRO 001
Date:	26 May 2025

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Proprietary Information Statement

This Rail Risk Management Plan (RRMP) has been prepared by Deicorp Pty Ltd (Deicorp) to satisfy the Sydney Metro Underground Corridor Protection Technical Guidelines (April 2021). The RRMP has also been prepared to address the conditions of approval under the *State Environmental Planning Policy (Major Infrastructure Corridors) 2020* and the *State Environmental Planning Policy (Transport and Infrastructure) 2021*.

The document has been produced to identify and manage the rail safety risks that are likely to arise from the demolition, excavation and construction activities at the development site The Fiveways Triangle bounded by 391-423 Pacific Highway, 3-15 Falcon Street and 8 Alexander Street Crows Nest Sydney NSW, adjacent to the Sydney Metro City & Southwest rail tunnels.

Authorisation and Revision History

Authorisation Record

Role	Name	Organisation	Signature	Date
Approved by:	George Kruk	GKA Management		26.05.25

Document Control

Revision	Date of Approval	Summary of Change
0	20.06.23	Issued for project planning approval
1	16.02.24	Inclusion of new engineering reports and drawings
2	27.02.25	Inclusion of updated engineering reports and risk workshop details
3	05.03.25	Inclusion of updated monitoring plan and acoustic report
4	11.04.25	Inclusion of updated contact details, engineering reports and rail safety project hazard log
5	26.05.25	Amended to incorporate five level basement modification

Issue Record

Copy No	Name	Position	Company	Date
1	Andrew Coleman	Construction & Development Executive	Deicorp	
2	Peter Bourke	Corridor Protection Planner	Sydney Metro	

Document Control

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The Document Owner is the Deicorp Construction & Development Executive. The Document Owner is the only person who has authority to make changes to the document and risk logs included in appendices to the document.

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1.0 Executive Summary

The purpose of this Rail Risk Management Plan (RRMP) is to set out the process employed to manage safety risks that are likely to arise from the demolition, excavation and construction at the development site known as The Fiveways Triangle Crows Nest Sydney NSW, adjacent to the Sydney Metro City & Southwest rail tunnels.

The risk management process follows the requirements documented in AS/NZ 31000:2009 Risk management – Principles and guidelines which are mirrored in TfNSW risk procedures and risk standard. The analysis, evaluation and treatment of risks was also undertaken in accordance with criteria documented in the TfNSW risk procedures and risk standard.

A variety of sources have been utilised to gather information for the compilation of the RRMP including engineering reports produced for the project. A total of twenty (20) events resulting in ten (10) different hazards arising from thirty four (34) possible causes have been identified. The hazards are typical in nature to those that may arise from this type of work. Safety controls have been documented for all identified hazards. Additional controls may be added after consultation with Sydney Metro.

After the application of safety controls all risks were assessed as being within a broadly acceptable region and reduced so far as is reasonably practical.

The RRMP addresses those risks that may arise from work activities associated with the development. The RRMP does not specifically address other risks, such as project risks, unless they have been specifically identified as flowing from the works or associated monitoring activities.

2.0 Project Background

The site is bounded by 391-423 Pacific Highway, 3-15 Falcon Street and 8 Alexander Street Crows Nest Sydney NSW and is approximately 240m from the Crows Nest Metro Station (see Figure 2-1).

Figure 2-1 Site Location

The Sydney Metro easement cuts across a corner of the site (see Figure 2-2).

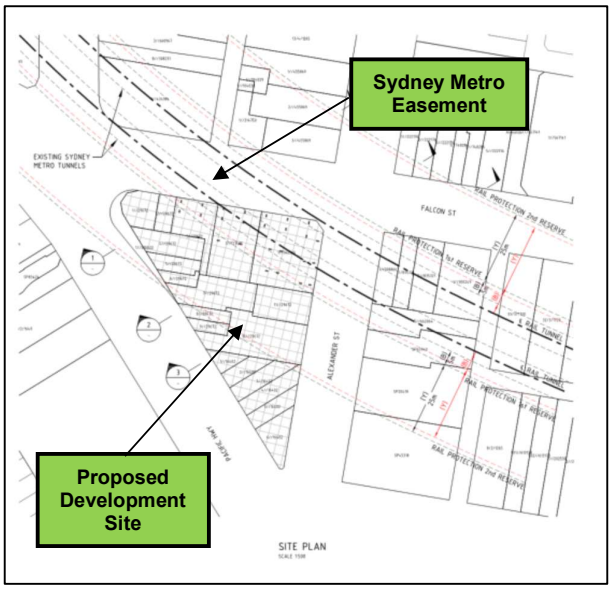


Figure 2-2 Sydney Metro Easement

The Sydney Metro City & Southwest is a $12.5 billion investment by the NSW Government in city shaping infrastructure. The site is located some 240 metres from Crows Nest Metro Station. The site is further connected to other parts of areas by bus services with bus stops located on or opposite each of the site's boundaries providing frequent connections to the north-south and east-west.

The site consists of nineteen parcels of land which are owned by Deicorp (Crows Nest) Pty Ltd. The site has an area of 3,201m2 and has frontages to Falcon Street (70m), Alexander Street (85m) and the Pacific Highway (110m). The site generally falls in a south easterly direction from its north western corner down to its south eastern corner.

The site contains a mix of one to four storey buildings. The buildings are generally constructed to their boundaries and do not have vehicular access. The Alexander Street frontage is an exception to this pattern with the buildings having staggered alignments and multiple driveway crossings. Several of the premises are vacant and have been for some time. A view of the site is shown in Figure 2-3.

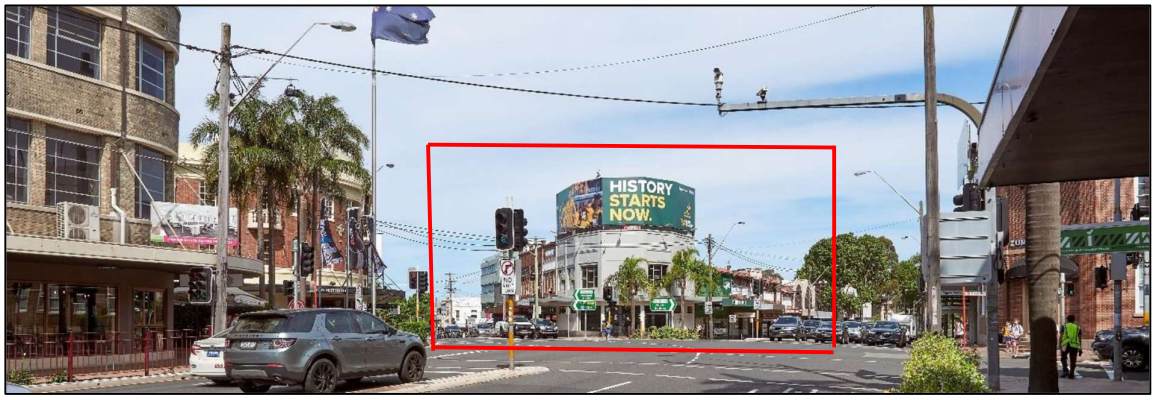


Figure 2-3 View of Existing Site

The proposed development has 21 storeys and a mezzanine level 79.5m in height. The development consists of a residential tower over a retail and commercial podium with 5 basement levels. The development will incorporate 191 apartments. A typical cross section through the development basement area indicating the location of the Sydney Metro mainline tunnels is shown in Figure 2-4.

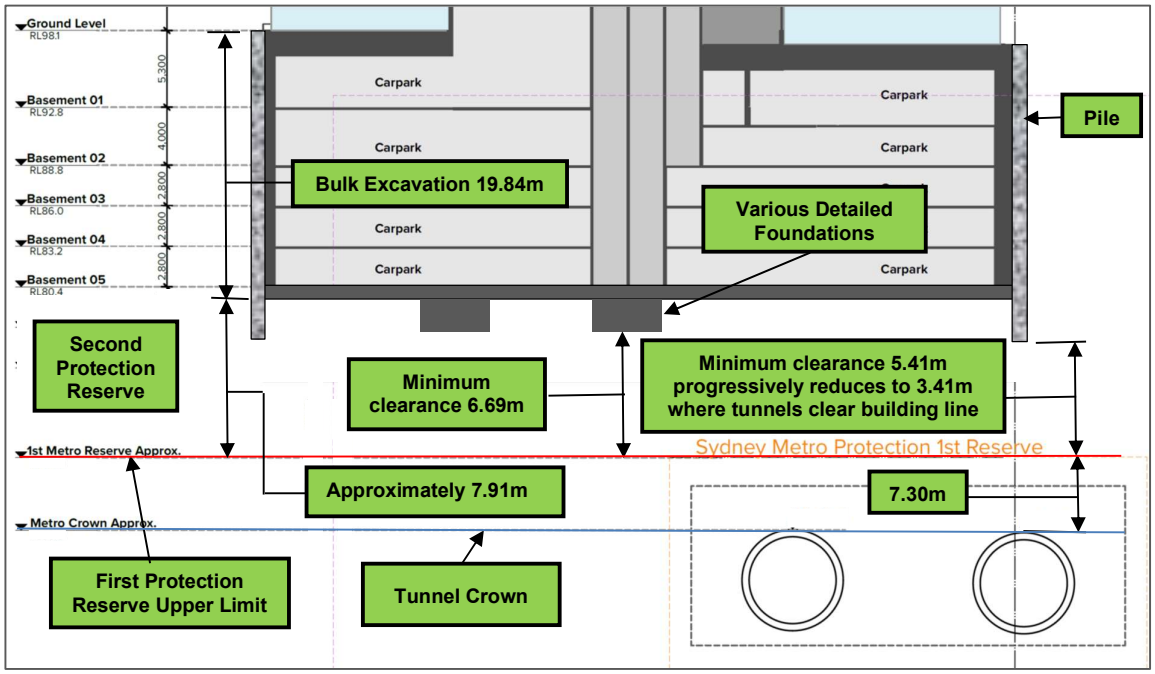


Figure 2-4 Typical Cross Section Through Basement

The Transport for NSW (TfNSW) Asset Management Branch (AMB) is an independent unit established within TfNSW and is the network design and standards authority for NSW rail assets. The AMB develops, maintains, controls, and publishes a suite of standards and other documentation for transport assets of the Transport Asset Holding Entity (TAHE).

The Sydney Metro Underground Corridor Protection Technical Guidelines (iCentral SM-20-00081444) Version 2.0 dated April 2021 (Sydney Metro Technical Guidelines) have been adopted as the governing standard for the risk assessment. The Sydney Metro Technical Guidelines are based and build on the AMB Development Near Rail Tunnels Standard (T HR CI 12051 ST).

The Sydney Metro Technical Guidelines also support the requirements of the rail authority under relevant planning instruments including the *State Environmental Planning Policy (Major Infrastructure Corridors) 2020* and the *State Environmental Planning Policy (Transport and Infrastructure) 2021*.

3.0 Context

Sydney Metro is a fully automated rapid transit system. The network is controlled by the Sydney Metro agency under the umbrella of Transport for New South Wales (TfNSW) and is integrated with the broader transport network. The TAHE is the asset owner.

Sydney Metro City & Southwest Line is a 30 km section of the metro network. The project will extend the Metro North West Line from Chatswood on the North Shore, to Bankstown in the city's south-west through the Sydney central business district. Metro Trains Sydney which currently operates the North West Line will also operate the City & Southwest Line.

The 15.5km underground section from Chatswood to Sydenham has been completed and trackwork has been installed. Systems Connect (an unincorporated joint venture between CPB Contractors and UGL) has been awarded the contract to fit out the Metro mainline tunnels. Commissioning and train testing has commenced ahead of passenger services starting late in 2024.

It is essential that that the structural integrity of the metro tunnels remains intact during the course of project activities generally, and throughout the life of the building. It is also essential that train operations (when commenced) continue uninterrupted. Further, it is of paramount importance that the safety of the travelling public, the operator's employees and project personnel (including contractors and consultants) is ensured.

The Delve Underground Technical Memorandum Delve (6466-DLV-MEM-001-G) Revision G dated 22 October 2024 (DU Technical Memorandum) documents calculated.induced changes in deflection. The greatest deflection is noted as 3.65mm which is below the 10mm limit specified in clause 9.1.2 of the Sydney Metro Technical Guidelines.

Any access to the tunnels for the purpose of dilapidation surveys, installation of monitoring equipment and ongoing monitoring inspections will need to be under the authority of Sydney Metro or possibly Metro Trains Sydney and the provisions of the Rail Safety Act will apply.

4.0 Constraints

Constraints are matters (contractual, regulatory, physical or social) that define the environment and conditions under which the works must be undertaken. This project is subject to the following constraints:

- *Transport Administration Act 1988*;
- *Environmental Planning and Assessment Act 1979*;
- *State Environmental Planning Policy (Major Infrastructure Corridors) 2020;*
- *State Environmental Planning Policy (Transport and Infrastructure) 2021;*
- *Sydney Metro Underground Corridor Protection Technical Guidelines (iCentral SM-20-00081444) Version 2.0 dated April 2021;*
- *Work Health and Safety Act 2011;* and
- *Work Health and Safety Regulation 2017*.

The additional following constraints apply for work within the metro rail corridor:

- *Rail Safety (Adoption of National Law) Act 2012*;
- *Rail Safety (Adoption of National Law) Regulation 2018*; and
- *Metro Trains Sydney Rules and Procedures*.

This RRMP documents safety controls that will be implemented to ensure that the impact of site activities on the City & Southwest metro line is managed in accordance with the identified constraints.

5.0 Project Management

The Sydney Metro Technical Guidelines at section 7.3 state that a rail related risk assessment report must be prepared and submitted for consideration and approval by Sydney Metro. The risk assessment report is documented in the RRMP.

Deicorp entities are the developer and builder for the development. The primary rail safety objectives identified by Deicorp are:

- establish and implement a robust safety management system;
- ensure the safety of the travelling public, the operator's employees and project personnel;
- minimise impact on rail infrastructure; and
- allow rail operations to continue without interruption.

Sydney Metro and Metro Trains Sydney are viewed as the primary stakeholders in relation to rail infrastructure integrity and operations. To the extent that the public will rely on these organisations to provide a safe and reliable train passenger service they are also considered to be a stakeholder.

The continuing integrity and safety of the rail infrastructure and operations will be ensured through the implementation of safety controls documented in various engineering assessments referenced in this RRMP.

Deicorp has engaged several consultants who are subject matter experts in their relevant field to provide project management services, evaluate site conditions and to document monitoring criteria in order to ensure rail safety and integrity are maintained.

Consultants have produced reports that document the expected impact from demolition, excavation and construction works on the Sydney Metro mainline tunnels and adjacent cross passage. Potential future impact from electrolysis has also been addressed. Monitoring plans have been produced and will be finalised after discussions with Sydney Metro.

All consultant reports and monitoring plans have been submitted to Sydney Metro. Requirements documented in consultant reports and monitoring plans have been incorporated into the Rail Safety Project Hazard Log (PHL) by Deicorp including the outcome of the engineering assessments. A copy of the Rail Safety PHL is included at Appendix B of the RRMP.

Inspection and test plans will be developed by Deicorp based on the associated work methodologies and used to provide a link between planning, contractual requirements, verification activities and records.

Various Work Method Statements will be produced by Deicorp and its subcontractors, and personnel will be inducted into the content to ensure that documented risk controls are captured and implemented. Copies of Work Method Statements that relate to activities with potential to impact on infrastructure or operations will be provided to Sydney Metro as they are developed, if requested.

Individual contractors will produce their own Safe Work Method Statements (SWMSs) as required by clause 299 of the WHS Regulation 2017 (Regulation). Personnel will be inducted into the content of the SWMS(s) applicable to their work activity by a safety delegate appointed by the company that produced the SWMS.

Deicorp will be appointed as principal contractor and will review contractor SWMSs as required by clause 302 of the Regulation to ensure (among other things) that the SWMSs address specific hazards identified in the Rail Safety PHL.

All personnel working on site will be inducted to the site. The induction will include general awareness of the Sydney Metro rail corridor and relevant hazards identified in the Rail Safety PHL. Access to Sydney Metro infrastructure will be by arrangement with the Sydney Metro.

6.0 Stakeholder Engagement

The approval of the planning proposal is being managed by the Department of Planning and Environment. It is anticipated that any approval will require the Applicant to comply with the Sydney Metro Underground Corridor Protection Technical Guidelines. Deicorp Pty Ltd (being the Applicant) is consulting with Sydney Metro.

The contact for Sydney Metro is listed in Table 1.

Table 1 Sydney Metro Contact

Name	Email	Phone
Mr Peter Bourke Corridor Protection Planner	peter.bourke @transport.nsw.gov.au	0408 448 734

7.0 Risk Management Process

The following documents have been referenced in conjunction with the risk management process:

- AS/NZ ISO 31000:2009 Risk management – Principles and guidelines (ISO Risk Standard);
- AS/NZ ISO 45001:2018 Occupational health and safety management systems – Requirements with guidance for use (ISO OHS Standard);
- Sydney Metro Underground Corridor Protection Technical Guidelines Version 2 dated April 2021 (iCentral SM-20-00081444) (Sydney Metro Technical Guidelines);
- TfNSW System Safety Standard for New or Altered Assets (T MU MD 20001 ST);
- SafeWork Australia Safe Design of Structures Code of Practice;
- TfNSW Quantified Safety Risk Assessment (T MU MD 20003 GU) (TfNSW Risk Standard); and
- TfNSW Risk Criteria for Use by Organisations Providing Engineering Services (T MU MD 20002 ST) (TfNSW Risk Standard).

Section 7.3 of the Sydney Metro Technical Guidelines requires risk assessments to be undertaken in accordance with the TfNSW Risk Standard. The criteria used to evaluate the significance of risk have been adopted from the TfNSW Risk Standard as those criteria reflect TfNSW values and objectives including risk tolerances and responses. The TfNSW Risk Criteria Tables and Risk Ranking Table are included at Appendix B of the RRMP.

This risk management process follows the process documented in the ISO Risk Standard which is mirrored in the TfNSW risk procedures and risk standard. The linkage between the elements of the risk management process is documented in the ISO Risk Standard as shown in Figure 7-1.

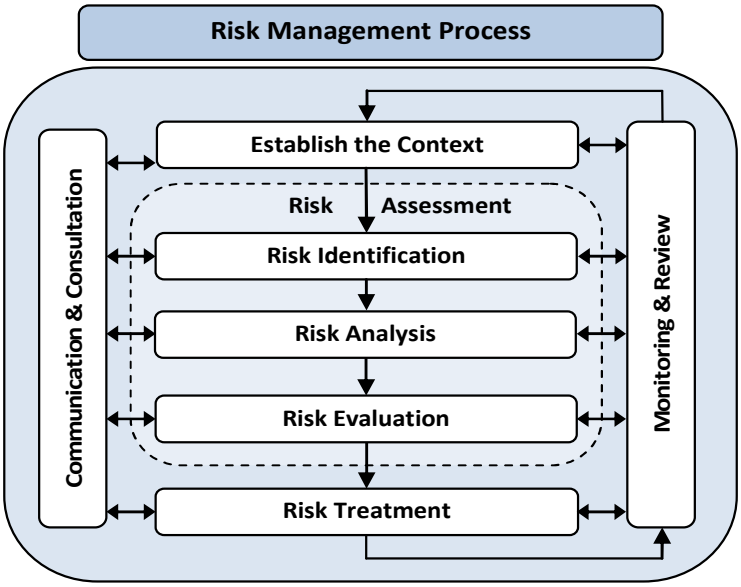


Figure 7-1 Risk Management Process Overview

The risk management process includes the following elements:

- **Communication and consultation**

  Communicate and consult with internal and external stakeholders as appropriate at each stage of the risk management process and concerning the process as a whole.

- **Establishment of context**

  Establish the external, internal and risk management context in which the process will take place. Document criteria against which risk will be evaluated and define the structure of the analysis.

- **Identification of risks**

  Identify where, when, why and how events could prevent, degrade, delay or enhance the achievement of objectives.

- **Analysis of risks**

  Identify and evaluate existing controls. Determine consequences and likelihood and hence the level of risk. Consider the range of potential consequences and how these could occur as part of the analysis.

- **Evaluation of risks**

  Compare estimated levels of risk against the pre-established criteria and consider the balance between potential benefits and adverse outcomes. Make decisions about the extent and nature of treatments required and about priorities based on this comparison.

- **Treatment of risks**

  Develop and implement specific cost-effective strategies and action plans for increasing potential benefits and reducing potential costs.

- **Monitoring and review**

  Monitor risks and the effectiveness of treatment during all steps of the risk management process and ensure changing circumstances do not alter priorities.

8.0 Main Rail Safety Events and Hazards

The ISO Risk Standard defines an event as an *"occurrence or change of a particular set of circumstances"*.

The ISO OHS Standard defines a hazard as *"a source or situation with a potential for harm in terms of human injury or ill-health, damage to property, damage to the environment, or a combination of these"*.

Main events and hazards (together with associated causes) have been documented in the Rail Safety PHL. The purpose of the log is to ensure that all safety risks identified through the course of the project are documented and controlled.

The Rail Safety PHL:

- documents events that give rise to hazards;
- identifies potential hazards in relation to those events;
- identifies causes associated with individual hazards;
- documents an assessment of risk;
- documents risk controls; and
- identifies responsible parties.

Rail safety events and associated primary hazards identified for this project are documented in Table 1.

Table 1 Rail Safety Events and Primary Hazards

Event	Hazard
Demolition, excavation and construction on site	Structural damage to rail tunnels and / or damage to rail infrastructure
	Formation of joining crack patterns (or crack patterns and tunnel lining construction joint) resulting in isolated concrete blocks
	Drainage pumps cannot handle additional inflow of groundwater resulting in flooding of tunnels
	Groundwater flows onto electrical equipment resulting in failure of equipment
Encountered ground conditions worse than parameters modelled in geotechnical assessment	Structural damage to rail tunnels and / or damage to rail infrastructure
Construction loads applied to rail tunnels	Compression of gaskets beyond design limits with potential spalling and ingress of groundwater
Agreed work method and procedures not followed	Compression of gaskets beyond design limits with potential spalling and ingress of groundwater

Event	Hazard
Incorrect vibration limits established for work activities	Compression of gaskets beyond design limits with potential spalling and ingress of groundwater
Vibration exceeds specified limits	Compression of gaskets beyond design limits with potential spalling and ingress of groundwater
Malfunctioning vibration monitoring equipment	Compression of gaskets beyond design limits with potential spalling and ingress of groundwater
Vibration intervention limits not communicated on site	Compression of gaskets beyond design limits with potential spalling and ingress of groundwater
Incorrect vibration levels monitored	Compression of gaskets beyond design limits with potential spalling and ingress of groundwater
Track alignment outside maintenance standards	Rail network operates in degraded state
Damage to or dislodgement of services in rail tunnels	Rail network operates in degraded state
Failure of excavation support system	Compression of gaskets beyond design limits with potential spalling and ingress of groundwater
Shoring piles and / or ground support systems not installed at design locations, angles and / or length	Damage to rai tunnel lining and passing train struck by drilling equipment
Flooding of excavation	Water penetration through gaskets between mainline rail tunnel precast concrete panel joints and / or cracks in cross passage
Dewatering of excavation	Rail network operates in degraded state
Access to rail tunnels	Personnel struck by rail mounted vehicle / electrocution / slip trip fall
Strike of Sydney Metro services located in adjacent streets	Rail network operates in degraded state
Project cancelled during course of excavation works	Rail network operates in degraded state
Stray electrical traction currents emanating from the rail corridor	Corrosion of underground metallic items around the site
Building maintenance	Rail network operates in degraded state

A total of twenty (20) events resulting in ten (10) different hazards arising from thirty four (34) possible causes have been identified. Some events such as vandalism were considered but deemed not applicable due to the physical separation of the site and the rail tunnels. These events have not been included in the Rail Safety PHL.

The hazards are typical in nature to those that may arise from this type of works. Safety controls have been documented for all identified hazards. Additional controls may be added after consultation with Sydney Metro.

As the project progresses additional rail safety hazards may be identified. These additional hazards will be added to the Rail Safety PHL. Deicorp will monitor the Rail Safety PHL during the course of demolition, excavation and construction activities. Individual hazards will be monitored as they progress to final closure at project completion.

9.0 Rail Safety Risk Tolerability

The ISO Risk Standard defines risk as the *'effect of uncertainty on objectives'*. Risk is often characterised by reference to potential events. The ISO Risk Standard defines an event as an '*occurrence or change of a particular set of circumstances'*.

Risk is the combination of the frequency, or probability, and the consequence of a specified hazardous event. Risk management in the context of the RRMP is the culture, processes and structures that are directed towards the effective management of negative safety impact.

Clause 36 of the WHS Regulation 2017 documents a hierarchy of risk control measures where it is not possible to eliminate risk, namely:

- substituting (wholly or partly) the hazard giving rise to the risk with something that gives rise to a lesser risk;
- isolating the hazard from any person exposed to it;
- implementing engineering controls;
- implementing administrative controls; and
- suitable personal protective equipment.

A legislative obligation is contained within both the Work Health and Safety Act 2011 and the NSW Rail Safety (Adoption of National Law) Act 2012 (RSA) to manage safety risk, So Far As Is Reasonably practicable (SFAIRP). The RSA imposes an obligation on rail organisations and associated industry participants to ensure the safety of their railway operations.

Section 5.1 of the TfNSW Quantified Safety Risk Assessment states in part:

In practice, the application of SFAIRP requires a judgement to be made while following a risk management approach of the safety risks of an activity against the resources needed to eliminate or reduce those safety risks in terms of time, cost, or effort. No hard and fast legal definition exists of what is required to reduce risks SFAIRP and so the test of 'reasonably practicable' is applied.

The SFAIRP approach puts the onus on the duty holder to determine whether the costs or business impacts of additional measures to control the risk (over and above those risk controls already in place) would be grossly disproportionate to the risk reduction benefit that they would achieve.

SFAIRP duties of care do not require safety at any cost. The level of safety the duty holder must provide hinges on what is 'reasonably practicable' given the situation and context. There are three main methods for assessing reasonably practicable, namely:

- comparison with good practice;
- expert judgement; and
- through cost benefit analysis.

10.0 Risk Assessment

The TfNSW Risk Criteria for Use by Organisations Providing Engineering Services references a table of Risk Assessment Consequences Criteria (Table 1), a table of Risk Assessment Likelihood Criteria (Table 2) and a Risk Matrix Likelihood and Consequence (Table 3) which have been included at Appendix A of the RRMP. By assigning criteria to particular risks, the resulting risk ranking can be derived from the risk matrix.

The rail safety risks associated with project activities are deemed to be indirect safety risks from the perspective of Sydney Metro in that the risks can be influenced, but not fully controlled. TfNSW Risk Criteria for Use by Organisations Providing Engineering Services documents risk tolerances and responses which have been replicated in Table 2.

Table 2 Risk Tolerances and Responses

Risk rating	Response	Risk frequency
Very High 'A'	Very high risks are generally intolerable and should be avoided except in extraordinary circumstances. An alternate solution shall be found and all necessary steps shall be taken to reduce the risk below this level without delay.	Monthly update of the risk register by the risk owner.
High 'B'	High risks are undesirable. They can only be tolerated if it is not reasonably practicable to reduce the risk further. High risks are considered to be on the verge of being unacceptable and must be given immediate priority.	Monthly update of the risk register by the risk owner.
Medium 'C'	Medium risks are generally tolerable if it is not reasonably practicable to reduce risk further. Additional treatment measures should be sought if significant benefit can be demonstrated and / or there is an additional treatment measure available which is recognised as good practice in other like environments.	Two monthly update of risk register by the risk owner
Low 'D'	Low risks are considered to be broadly acceptable. If options for further risks reduction exist and costs are proportionate to the benefit, then implementation of such measure should be considered.	Quarterly update of the risk register by the risk owner

The risks associated with causes for associated hazards have been classified and documented in the Rail Safety PHL using the consequence and likelihood risk tables and the risk matrix evaluation table included at Appendix A of the RRMP. A copy of the Rail Safety PHL is included at Appendix B of the RRMP.

Engineering reports and drawings produced by consultants were considered in the development of the Rail Safety PHL and are referenced in the Rail Safety PHL. The reports and drawings are listed in section 15 of the RRMP and the drawings are included at Appendix D of the RRMP. A summary of the initial risk ranking documented in the Rail Safety PHL is shown in Table 3.

Table 3 Initial Safety Risk Ranking Summary

	Risk Classification			
	A	**B**	**C**	**D**
Risk Summary (37)	0	0	1	36

A total of thirty seven (37) risks were classified. The C class risk relates to penetration of the rail tunnel liner during drilling for the installation of ground anchors and / or rock bolts and drilling equipment striking a passing train. The likelihood for this risk was classified as 'Almost Unprecedented' which is the lowest TfNSW category.

In accordance with the target actions documented in Table 3 the activities were reviewed to determine if the risk could be reduced further and whether all reasonable and practicable controls had been considered and / or applied.

The hierarchy of control principle was applied to all identified hazards and associated risks. Additional controls were identified for thirteen (13) hazards however the additional controls did not reduce the risk ranking.

In summary, the works do not introduce any unmanageable risks based on information available at the time of issuing the RRMP. The risks that will be introduced are located primarily within the Low range with the drilling penetration risk located in the Medium range.

The risk ranking is subject to the implementation of nominated safety controls (including additional controls to be agreed with Sydney Metro) and acceptance of documentation submitted to Sydney Metro.

The Rail Safety PHL is a live document. Through the implementation of controls that comply with industry standards and good practice, and ongoing discussions with consultants and Sydney Metro, risks can be managed SFAIRP.

Risk reviews will be undertaken by Deicorp as a minimum on a quarterly basis for Low range risks and at intervals of two months for Medium range risks or at such other frequency as is required by the inclusion of additional higher risk classifications.

11.0 Startup Risk Workshop

A rail risk workshop was conducted to confirm that relevant safety controls have been identified, implemented and communicated. The workshop was held remotely utilising the MS Teams platform on 14 January 2025 between 10:00am and 12:00pm. The workshop was facilitated by George Kruk the Managing Director of GKA Management.

Participants were selected on the basis of being able to contribute to the process with experts including representatives from the site management team, the project geotechnical engineer, the project building and tunnel structural engineers and the project acoustic engineer. The list of participants is included at Appendix E of the RRMP.

Reference material was distributed to participants prior to the workshop. The documentation consisted of the latest engineering reports and project drawings. A project briefing and risk assessment briefing were provided to the workshop participants. The purpose of the briefings was to:

- Outline the reason for conducting the workshop;
- Provide an overview of the scope of works and the issues being examined;
- Describe the objectives and target outcomes of the workshop;
- Introduce reference material; and
- Develop an action plan to close out identified issues.

A brainstorming process was undertaken to review hazardous events, causes and outcome controls associated with the works. Outcome controls were reviewed to determine:

- If the existing control measures are relevant to the outcomes being considered;
- If any controls are rendered redundant as a result of the issues being examined; and
- If any new controls are required to address either changes to existing controls or the introduction of new outcomes.

No new events or hazards were identified during the brainstorming process. However, it was noted that there were some conflicts in the safety controls nominated in different engineering reports. Subsequent to the risk workshop Sydney Metro requested that additional safety controls be documented for installation of shoring piles and excavating below bulk excavation level where the shoring system is installed over the Sydney Metro tunnels

Relevant sections of the Rail Safety PHL have been updated accordingly together with references to current engineering reports and project drawings. The current version of the Rail Safety PHL is included at Appendix B of the RRMP.

The key issues that were identified are documented in Table 4.

Table 4 Risk Workshop Action Plan

Item	Responsible Party
Confirm close out of issues documented in Sydney Metro design comments register	Deicorp
Cross reference monitoring proposals in engineering reports to ensure consistency	Deicorp
Include location of rail corridor and emergency stop work protocol in the project induction	Deicorp
Two way radios to be used as communication mechanism for emergency stop work notification on site	Deicorp
Undertake dilapidation inspection	Douglas Partners
Install vibration monitoring equipment and complete baseline surveys	Acoustic Logic
Advise acoustic engineer of contact details for project personnel to be included in SMS text for vibration exceedances	Deicorp
Advise acoustic engineer of contact details for project personnel to be included in SMS text for vibration exceedances	Earthworx
Liaise with Sydney Metro to determine contact details of personnel to be included in SMS text for vibration exceedances and advise acoustic engineer	Deicorp

Item	Responsible Party
Install movement monitoring equipment and complete baseline surveys	Geodata
Review Hold Points nominated in monitoring plans and establish process for management of Hold Points	Deicorp
Review inspection frequency for excavation to determine if depth based criteria or time based criteria (eg. weekly) should be used	Delve Underground
Discuss need for track monitoring with Sydney Metro	Deicorp
At each survey array locate additional survey prisms at track level as initial indicators of track movement	Delve Underground
Communicate monitoring frequencies and intervention limits to consultants designated roles in the monitoring programme	Deicorp
Establish communication protocol for submission of monitoring reports to Sydney Metro	Deicorp
Establish emergency response communication protocol with Sydney Metro	Deicorp
Determine need for additional boreholes to assess groundwater levels	Deicorp
Finalise location of tower crane and liaise with geotechnical engineer to confirm that additional load does not affect the tunnel liner	Deicorp
Provide latest building loads to geotechnical engineer for review of modelling results	abc Consultants
Document additional safety controls for installation of shoring piles and excavating below bulk excavation level where the shoring system is installed over the Sydney Metro tunnels	GKA Management
Update RRMP and Rail Safety PHL	GKA Management

12.0 Issues Register

As a risk eventuates it becomes an issue that needs to be managed. The means of managing issues will be through the Issues Register. A copy of the Issues Register is included at Appendix C of the RRMP.

13.0 Response to Risk Control Strategies

Various risk controls have been documented in the Rail Safety PHL. Resources (materials and personnel) will be allocated by Deicorp at relevant stages of the works so that the nominated safety controls can be implemented.

The Rail Safety PHL includes an Action Statement schedule. The schedule documents actions with regard to individual matters that need to be addressed, nominates a timeframe for implementation, identifies the action owner and documents the status.

14.0 Risk Monitoring Strategy

The day to day management of hazards and risks will be through project meetings. Separate project meetings will be held with Sydney Metro as requested. Should an intervention limit be exceeded meetings will be held with Sydney Metro to review the current risk controls and determine whether any additional risk controls need to be implemented.

In the event of a stop work intervention limit being exceeded it may be appropriate to hold a specific risk workshop to address the circumstances giving rise to the stop work intervention limit being breached.

15.0 Surveillance and Review

Reviews of risks in the Rail Safety PHL will be undertaken by Deicorp depending on the ranking of each risk. In addition, reviews will be undertaken when:

- a warning or stop work limit is breached;
- there is evidence the risk assessment is no longer valid;
- events indicate the assessment of risk may not have been adequate; and
- significant changes are proposed in the work to be carried out.

Activities on site will be continuously monitored by Deicorp to ensure that documented procedures are being followed, risk controls maintained and action plans implemented.

Periodic surveillance / audit will be undertaken by Deicorp senior management to independently confirm compliance with risk controls on site and separately the overall effective implementation of the RRMP.

16.0 References

Legislation

1. Transport Administration Act 1988
2. Environmental Planning and Assessment Act 1979
3. Rail Safety (Adoption of National Law) Act 2012
4. Rail Safety (Adoption of National Law) Regulation 2018
6. Work Health and Safety Act 2011
7. Work Health and Safety Regulation 2017
8. State Environmental Planning Policy (Major Infrastructure Corridors) 2020
9. State Environmental Planning Policy (Transport and Infrastructure) 2021

Standards and Guides

1. AS/NZ ISO 31000:2009 Risk management – Principles and guidelines
2. AS/NZ ISO 45001:2018 Occupational health and safety management systems – Requirements with guidance for use
3. Sydney Metro Underground Corridor Protection Technical Guidelines Version 2 dated April 2021 (iCentral SM-20-00081444)
4. TfNSW System Safety Standard for New or Altered Assets (T MU MD 20001 ST)

5. SafeWork Australia Safe Design of Structures Code of Practice
6. TfNSW Quantified Safety Risk Assessment (T MU MD 20003 GU)
7. TfNSW Risk Criteria for Use by Organisations Providing Engineering Services (T MU MD 20002 ST)

Project Reports

1. Corrosion Control Engineering Electrolysis Risk Desktop Study dated 9 May 2022
2. Douglas Partners Report on Geotechnical Investigation Revision 1 dated 14 September 2023
3. Barker Ryan Stewart Construction Environmental Management Plan dated 11 March 2024
4. SureSearch Underground Services Utility Locating - Report & Service Docket - NEW 09/22 dated 1 September 2023
5. Douglas Partners Report on Dewatering Management Plan Revision 0 dated 6 October 2023
6. Delve Underground Technical Memorandum Instrumentation and Monitoring Strategy Revision B 25 August 2024
7. Mott MacDonald Stormwater Civil Concept Plans Revision P5 dated 27 August 2024
8. Earthworx Group Pty Ltd High Risk Work – Safe Work Method Statement 001 Excavation and Shoring Works dated 19 December 2024
9. Acoustic Logic 391-423 Pacific Highway Crows Nest NSW Metro Tunnel Construction Vibration Monitoring Plan Revision 5 dated 11 April 2025
10. Deicorp Safe Work Method Statement 1.0 Rev A (Crows Nest) Site Establishment & Erection of Hoardings dated April 2025
11. Deicorp Safe Work Method Statement 1.0 Rev A (Crows Nest) Early Works and Site Clearing dated April 2025
12. Deicorp Safe Work Method Statement 1.0 Rev A (Crows Nest) Piling Excavation Shoring Walls & Rock Anchors dated April 2025
13. Deicorp Safe Work Method Statement 1.0 Rev A (Crows Nest) Construction Activities dated April 2025
14. Deicorp High Risk Construction Work - Safe Work Method Statement dated April 2025
15. abc Consultants Shoring Wall Monitoring Plan (23012-009) dated 7 April 2025
16. Delve Underground Technical Memorandum Structural Impact Assessment Revision H dated 8 April 2025
17. Douglas Partners Sydney Metro Tunnel Geotechnical Monitoring Plan (8664545,03 R.003 Rev 3) dated 9 May 2025
18. Douglas Partners Report on Numerical Analysis Sydney Metro (86645.03.R.002.Rev2) Revision 2 dated 13 May 2025
19. Acoustic Logic 391-423 Pacific Highway Crows Nest Sydney Metro Operational Impact Assessment (20241259.6/1405A/R)/PF) dated 14 May 2025
20. abc Consultants Structural Assessment Report (23012) Revision A dated 19 May 2025
21. Geodata Koda Australia Monitoring Implementation Plan

Drawings

1. abc Consultants Site Retention Notes Drawing No. S00-005 Revision 1
2. abc Consultants Site Retention Plan Drawing No. S01-001 Revision 5
3. abc Consultants Site Retention Plan with Metro Tunnels Drawing No. S01-101 Revision 2
4. abc Consultants Site Section with Metro Tunnels Drawing No. S01-102 Revision 1

5. abc Consultants Typical Foundation Details Drawing No. S02-011 Revision P5
6. Turner Siteworks Bulk Excavation Plan Drawing No. A-013-001 Revision 4
7. Turner Siteworks Piling Setout Plan Drawing No A-013-002 Revision 5
8. Turner Siteworks Detailed Excavation Plan Drawing No. A-018-010 Revision A
9. Stantec Plan Showing Relationship of Proposed Boreholes to Sydney Metro Tunnels at Five Ways Crows Nest Drawing No. 3050-01019-001-001 Revision 03 Sheet 1 to Sheet 4
10. Stantec Plan Showing Relationship of Proposed Basements to Sydney Metro Tunnels at Five Ways Crows Nest Drawing No. 3050-01119-001-004 Revision 01 Sheet 1 and Sheet 2
11. Delve Underground Cover Page and Index Sheet Drawing No. DLV-6466-IM00-000 Revision 2 dated 28 February 2025
12. Delve Underground Proposed Minimum Monitoring Requirements Drawing No. DLV-6466-IM01-001 Revision 4 dated 4 April 2025
13. Delve Underground Typical Running Tunnel Monitoring Arrangement Drawing No. DLV-6466-IM01-011 Revision 4 dated 4 April 2025
14. Delve Underground Typical Cross Passage Monitoring Arrangement Drawing No. DLV-6466-IM01-012 Revision 4 dated 4 April 2025
15. Delve Underground Typical Excavation Wall Monitoring Details Drawing No. DLV-6466-IM02-001 Revision 4 dated 4 April 2025
16. Delve Underground Monitoring Frequencies and Trigger Levels Drawing No. DLV-6466-IM03-001 Revision 4 dated 4 April 2025
17. Delve Underground Monitoring Trigger Action Response Drawing No. DLV-6466-IM03-002 Revision 3 dated 4 April 2025

Appendix A

Transport for New South Wales
Risk Criteria Tables and Risk Matrix Table

Table 1 – Risk assessment consequence criteria

Descriptor / Impact area	Insignificant (rating – C6)	Minor (rating – C5)	Moderate (rating – C4)	Major (rating – C3)	Severe (rating – C2)	Catastrophic (rating – C1)
Health and safety (injury and disease)	Illness, first aid or injury not requiring medical treatment.	Illness or minor injuries requiring medical treatment.	Single recoverable lost time injury or illness, alternate or restricted duties injury or short-term occupational illness.	1-10 major injuries requiring hospitalisation and numerous days lost, or medium-term occupational illness.	Single fatality or 10-20 major injuries/permanent disabilities/chronic diseases, or both.	Multiple fatalities or >20 major injuries/permanent disabilities/chronic diseases, or both.
Environment	No appreciable changes to environment or highly localised event or both.	Change from normal conditions within environmental regulatory limits and environmental effects are within site boundaries.	Short term or well-contained environmental effects or both. Minor remedial actions probably required.	Impacts external ecosystem and considerable remediation is required.	Long term environmental impairment in neighbouring or valued ecosystems. Extensive remediation required.	Irreversible large scale environmental impact with loss of valued ecosystems.
Customer experience and operational reliability	Short duration disruptions affecting part of one transport mode.	Minor disruptions affecting several parts of one transport mode.	Serious disruptions affecting operation of one complete transport mode.	Major disruptions affecting operations of one transport mode with network-wide effects on one or more modes of transport.	Short duration shutdowns or substantial disruptions affecting multiple transport modes with sector wide cascading effects.	Extensive shutdowns or extended disruptions with economy wide effects.

Table 2 – Risk assessment – Likelihood criteria

Descriptor / Impact area	Almost unprecedented (rating – L6)	Very unlikely (rating – L5)	Unlikely (rating – L4)	Likely (rating – L3)	Very likely (rating – L2)	Almost certain (rating – L1)
Qualitative Expectation	Not expected to ever occur during time of activity or project.	Not expected to occur during the time of activity or project.	More likely not to occur than occur during time of activity or project.	More likely to occur than not occur during time of activity or project.	Expected to occur occasionally during time of activity or project.	Expected to occur frequently during time of activity or project.
Quantitative Frequency	Less than once every 100 years.	Once every 10 to 100 years.	Once every 1 to 10 years.	Once each year.	1-10 times every year.	10 times or more every year.

Note: When assessing risks associated with new or altered assets the term 'activity' in the above table should be considered to represent the intended operational life of the asset.

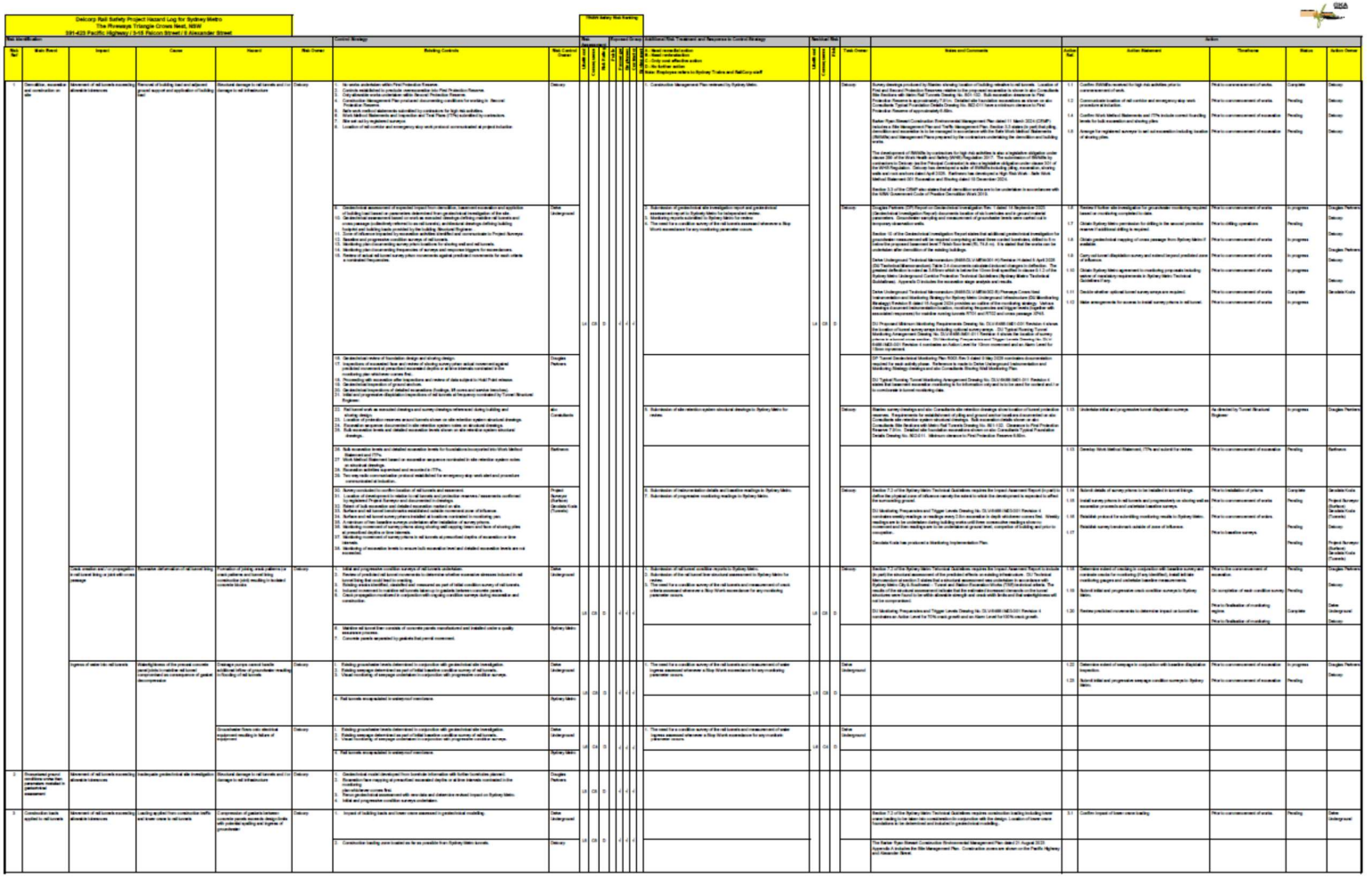
Table 3 – Risk matrix evaluation table

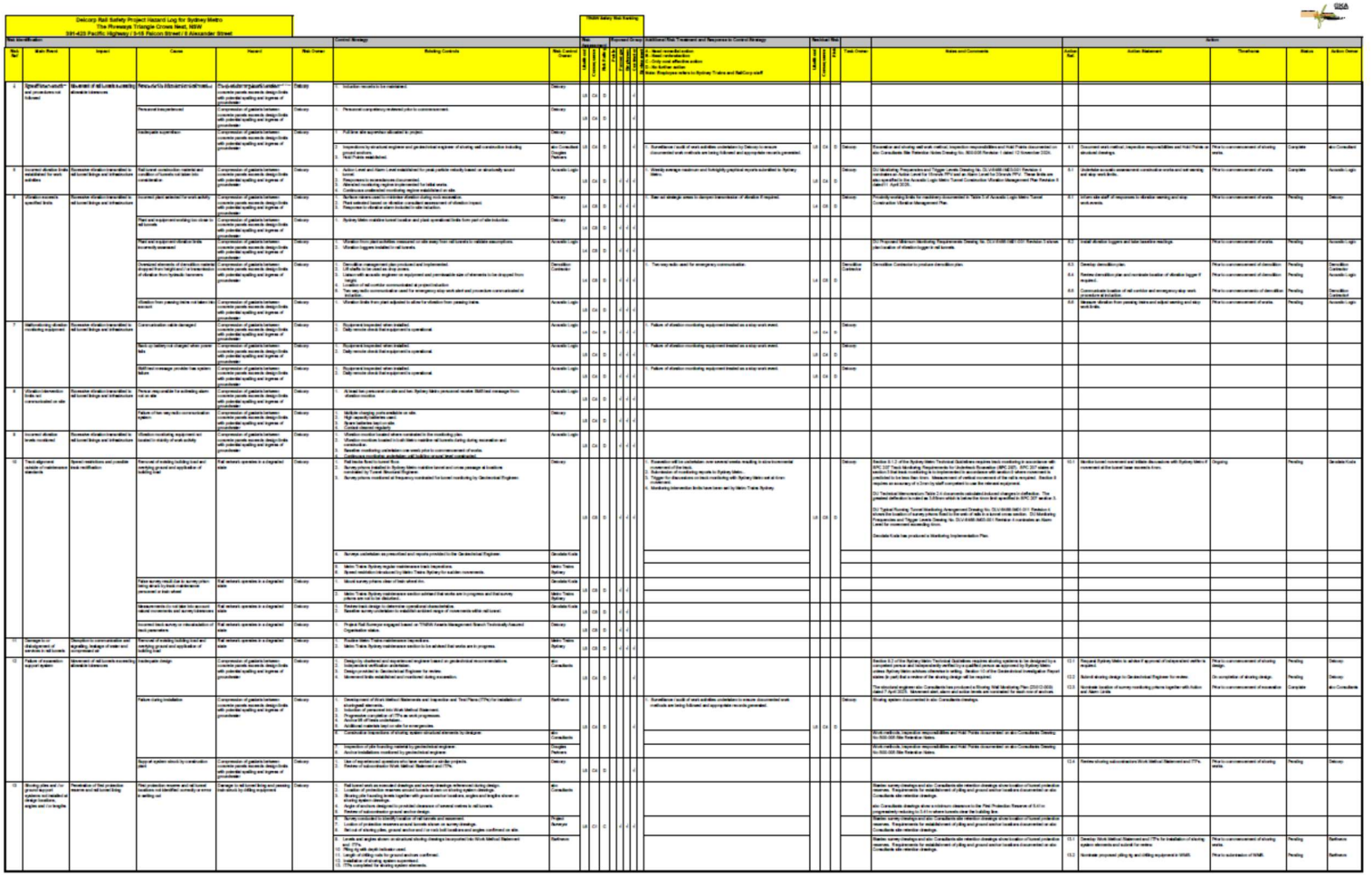
Likelihood	Insignificant consequence C6	Minor consequence C5	Moderate consequence C4	Major consequence C3	Severe consequence C2	Catastrophic consequence C1
Almost certain - L1	C	B	B	A	A	A
Very likely - L2	C	C	B	B	A	A
Likely - L3	D	C	C	B	B	A
Unlikely - L4	D	D	C	C	B	B
Very unlikely - L5	D	D	D	C	C	B
Almost unprecedented - L6	D	D	D	D	C	C

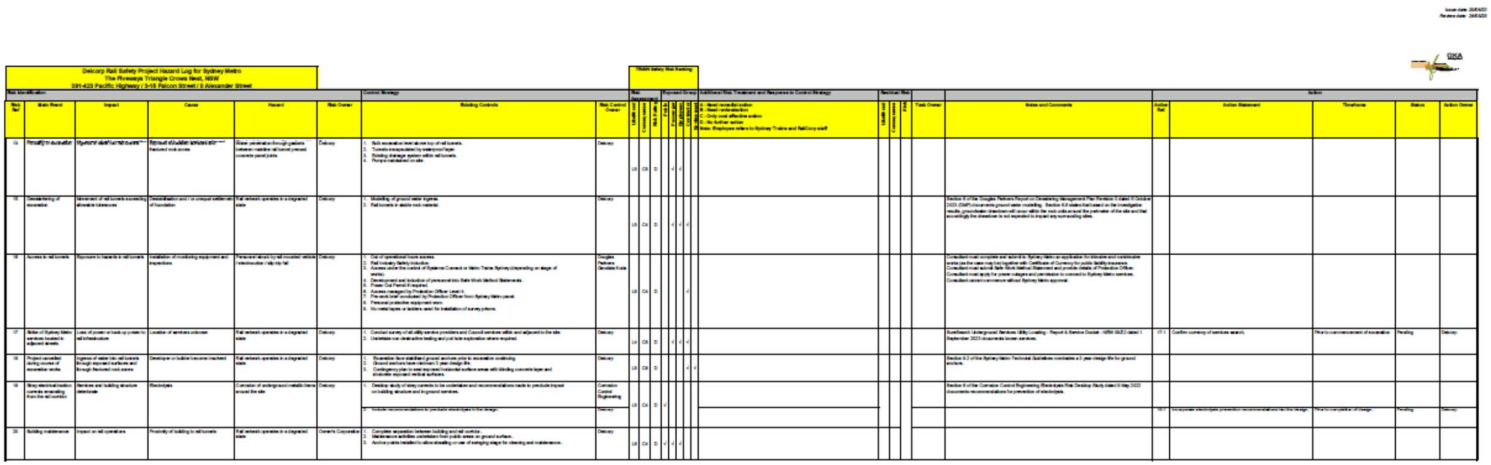
Risk Ratings - A – Very high, B – High, C – Medium, D – Low

Appendix B

Rail Safety Project Hazard Log







Appendix C

Issues Register

Issues Register

REF NO	ISSUE	ACTION PLAN	FORECAST DATE	ACTUAL DATE	RESPONSIBLE PERSON	COMMENTS	CLOSE OUT RECORD

Appendix D

Project Drawings

Regulated Design Record				
Project Address:	391/423 PACIFIC HIGHWAY CROWS NEST NSW 2065			
Project Title:	FIVEWAYS CROWS NEST			
Consent No:	SSD-66826207	Body Corporate Reg No:	DEP0000250	
Drawing Title: SITE RETENTION NOTES			Drawing No: S00-005	
Rev	Date dd.mm.yy	Description	DP Full Name	Reg No
1	31.10.24	APPROVED FOR CONSTRUCTION	RYAN CAMPBELL	DEP0000027

BORED PILES

1. REFER TO THE GEOTECHNICAL REPORT E24770.G03_REV 1 BY EI AUSTRALIA (DATED 31 OCTOBER 2024) FOR A DESCRIPTION OF THE ANTICIPATED SITE CONDITIONS. THE PILING CONTRACTOR IS TO STUDY THE REPORT AND MAKE HIS OWN EVALUATION OF THE SITE CONDITIONS. ANY ADDITIONAL COSTS INCURRED SHALL BE BORNE BY THE PILING CONTRACTOR.
2. THE BORED PILES ARE PROPORTIONED FOR THE SCHEDULED LOADS WITH ALLOWABLE SOCKET SKIN FRICTION AND END BEARING CAPACITY AS INDICATED IN THE REPORT. THE DEPTHS AND LENGTHS NOMINATED IN THE SCHEDULE ARE INDICATIVE ONLY. THEY MAY NEED TO BE VARIED DEPENDING ON THE SITE CONDITIONS ENCOUNTERED. THE PILING CONTRACTOR NEEDS TO INCORPORATE ANY DESIGN CHANGES REQUIRED AND ADVISE PROJECT ENGINEER WHO WILL ASSESS ANY DESIGN CHANGES RESULTING FROM THESE CHANGES THAT MAY BE REQUIRED BEFORE WORK RE-COMMENCE.
3. ALL WORKMANSHIP AND MATERIAL SHALL BE IN ACCORDANCE WITH AS 2159.
4. THE BORED PILES SHALL BE LOCATED CONCENTRIC WITH THE COLUMNS AND WALLS UNLESS NOTED OTHERWISE.
5. DRILL AND INSTALL THE BORED PILES IN THE LOCATIONS SHOWN ON THE DRAWINGS AND THE ABOVE REQUIREMENTS.
6. THE PILING CONTRACTOR SHALL ALLOW FOR THE COST OF INTEGRITY TESTING OF 10% ALL BORED PILES IN ACCORDANCE WITH AS2159 CLAUSE 8.8. ALL PILE INTEGRITY TESTING IS TO BE WITNESSED BY THE PROJECT GEOTECHNICAL ENGINEER .
7. BEFORE ANY CONCRETE IS POURED, ALL ROCK SOCKETS SHALL BE DEWATERED AND INSPECTED BY A GEOTECHNICAL ENGINEER, WHO SHALL BE EMPLOYED BY THE BUILDER, TO VERIFY THE SOIL PARAMETERS. THE SOCKET BASE AND WALLS MUST BE CLEAN AND FREE FROM CLAY.
8. IF THE CONCRETE NEEDS TO BE TREMIED, SUPER PLASTICIZER MUST BE ADDED TO THE MIX AND THE CONCRETE GRADE INCREASED BY 30% . REFER TO THE SPECIFICATIONS FOR THE INSPECTION OF THE HOLE PRIOR TO CONCRETING.
9. ANY ALTERNATIVE DESIGN SHALL MEET THE ABOVE REQUIREMENTS AND THE SCHEDULED LOADS. THE PILING CONTRACTOR SHALL OBTAIN CERTIFICATION FOR THE CALCULATIONS OF THE ALTERNATIVE SYSTEM. THE DETAILS AND CALCULATIONS SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE PERFORMANCE OF THE ALTERNATIVE BORED PILES.
10. PILING CONTRACTOR TO ALLOW FOR CASING OF ALL PILES IN LOOSE MATERIAL.
11. SPLICING TO LONGITUDINAL PILE REINFORCEMENT IS TO BE AVOIDED WHERE POSSIBLE I.E. FOR PILE CAGE LENGTHS LESS THAN 12m. SPLICES OF CAGE REINFORCEMENT ARE TO ENSURE MINIMUM SPACING BETWEEN TIES ARE MAINTAINED. LOCATION OF SPLICED CAGES ARE TO BE APPROVED BY THE STRUCTURAL ENGINEER.

BULK EARTHWORKS AND SHORING NOTES

GEOTECHNICAL REPORT
REFER TO GEOTECHNICAL REPORT E24770.G03_REV 1 BY EI AUSTRALIA (DATED 31 OCTOBER 2024) AND THE CONTRACTOR IS TO ENSURE GEOTECH REPORT RECOMMENDATIONS ARE ADHERED TO.

SPECIFICATION
THESE NOTES ARE TO BE READ IN CONJUNCTION WITH THE HEAD SPECIFICATION.

EROSION AND SEDIMENT CONTROL
PROVIDE GRAVEL SHAKEDOWN AREA FOR 10 METRES AT BOUNDARY OF SITE AND OTHER SEDIMENT CONTROL MEASURES GENERALLY CONSISTENT WITH THE REQUIREMENTS OF THE PUBLICATION SOIL AND WATER MANAGEMENT FOR URBAN DEVELOPMENT NSW DEPARTMENT OF HOUSING 1993, (ISDN 0 7305 9423 0), FOR THE DURATION OF THE WORKS. NOTE THAT ALL WORKS ON SITE ARE TO COMPLY WITH COUNCIL SOIL AND EROSION CONTROL REQUIREMENTS. ALLOW TO SUBMIT DETAILS TO COUNCIL FOR APPROVAL IF REQUIRED. ENSURE STREETS ARE KEPT CLEAN OF ALL DEBRIS.

DUST CONTROL
THE CONTRACTOR IS TO ENSURE THAT THE DUST PREVENTION METHODS HE ADOPTS ARE SUFFICIENT TO MEET THE REQUIREMENTS OF THE COUNCIL. IT IS THE CONTRACTORS' RESPONSIBILITY TO ACQUAINT HIMSELF WITH THE REQUIREMENTS.

SITE SETOUT
REFER TO THE ARCHITECTS DRAWINGS FOR THE ACCURATE SETOUT OF ALL BUILDINGS, DRIVEWAYS, PARKING AREAS ETC. NOTE BULK EARTHWORKS PLAN IS INDICATIVE ONLY. CALCULATE AND CUT BATTERS FROM ARCHITECT'S PLANS AND SURVEY. CROSSOVER PROFILES TO COUNCIL REQUIREMENTS.

GENERALLY
PROCEED WITH BULK EARTHWORKS AND SHORING TO PROVIDE A STABLE SUBGRADE AND WORK SPACE FOR THE CONSTRUCTION OF THE PROPOSED DEVELOPMENT. STRIP AND DISPOSE OF TOPSOIL, REDUCE SITE TO LEVELS INDICATED AND DISPOSE OF ALL UNWANTED MATERIAL LEGALLY.

SUPERVISION
A GEOTECHNICAL ENGINEER IS TO PROVIDE SUPERVISION (AS3798) FOR ALL EARTHWORKS DURING THE COURSE OF CONSTRUCTION. AT THE COMPLETION OF THE BULK EXCAVATION CONTRACT, THE GEOTECHNICAL ENGINEER IS TO PROVIDE CERTIFICATION THAT THE WORKS HAVE BEEN CARRIED OUT IN ACCORDANCE WITH BULK EARTHWORKS SPECIFICATION.

DRAINAGE DURING CONSTRUCTION
PROVIDE ADEQUATE DRAINAGE DURING CONSTRUCTION TO ENSURE MINIMUM DISRUPTION FROM RAIN.

SERVICES
DURING EXCAVATION COORDINATE WITH ALL SERVICES INCLUDING SEWER, GAS AND POWER.

BULK EARTHWORKS PROCEDURE AND SPECIFICATION
- THE SITE IS TO BE STRIPPED OF TOPSOIL AND UNCONSOLIDATED EXISTING FILL.
- AT THE COMPLETION OF THE BULK EARTHWORKS, THE CONTRACTOR SHALL PROVIDE TEMPORARY OR PERMANENT DRAINAGE TO ENSURE NO SURFACE WATER IS RETAINED ON THE SITE, OR THAT SURFACE WATER FLOW DETRIMENTALLY SCOURS THE PREPARED BASE.

GEOTECHNICAL ENGINEER NOTES
- EXCAVATION TO BE CARRIED OUT UNDER GEOTECHNICAL ENGINEER'S SUPERVISION
- GEOTECHNICAL ENGINEER (GE) TO COMMENT ON SUITABILITY OF THE SUBCONTRACTOR'S METHOD OF EXCAVATION AS REMOVAL PROCEEDS.

HYDRAULICS ENGINEER
- DURING EXCAVATION COORDINATE WITH ALL HYDRAULIC ENGINEERS REQUIREMENTS FOR SEWER, GAS AND STORMWATER LINES.

AS-BUILT DRAWING
- PROVIDE AN AS-BUILT DRAWING PREPARED BY A REGISTERED SURVEYOR TO CONFIRM BULK EARTHWORKS IS COMPLETED TO REQUIRED DIMENSIONS AND LEVELS.

DILAPIDATION REPORT
- THE APPROVED SHORING WALL CONTRACTOR SHALL PREPARE A DILAPIDATION REPORT OF STREET, FOOTPATH, ROAD FEATURES AND ALL REQUESTED RAILCORP ASSETS PRIOR TO INSTALLATION OF SHORING WALL.

COMPACTION NOTES
- COMPACTION BEHIND INTERNAL FORMED RETAINING WALL BY EXCAVATION CONTRACTOR USING HAND HELD RAMMERS TO ACHIEVE 98% MODIFIED DENSITY.
- COMPACT IN MAXIMUM 300mm THICK LAYERS AT OPTIMUM MOISTURE CONTENT OF ±3%.

CONTRACTOR TO ALLOW FOR 15% INCREASE IN ANCHOR QUANTITIES OR SIZES TO ACCOMMODATE REQUIREMENTS BY GEOTECHNICAL CONSULTANT DURING EXCAVATION WORKS

BOND LENGTH AND DIAMETER OF ANCHOR HOLE TO BE CONFIRMED BY SHORING WALL CONTRACTOR. THE ANCHOR LENGTHS SHOWN ON THE STRUCTURAL DRAWINGS ARE INDICATIVE ONLY

SHORING DESIGN CRITERIA

STRUCTURE IMPORTANCE LEVEL:	3
DESIGN WORKING LIFE:	50 YEARS OR MORE
WIND ANNUAL PROBABILITY OF EXCEEDANCE:	1/1000
EARTHQUAKE ANNUAL PROBABILITY OF EXCEEDANCE:	1/1000
EARTHQUAKE DESIGN CATEGORY:	EDC II
CONCRETE EXPOSURE CLASSIFICATION:	B1
SURCHARGE:	REFER LOADING PLANS
GEOTECHNICAL REDUCTION FACTOR:	$\phi_g = 0.56$

GEOTECHNICAL DESIGN PARAMETERS

ALLOWABLE END BEARING CAPACITY CLASS II SANDSTONE	6000 kPa
ALLOWABLE SHAFT ADHESION CLASS II SANDSTONE	600 kPa

PERMANENT SHORING WALLS HAVE BEEN DESIGNED IN ACCORDANCE WITH AS3600, AS1170, AS2159 WITH A DURABILITY DESIGN LIFE OF 50 YEARS

CONCRETE GRADE

ELEMENT CONCRETE QUALITY	STRENGTH f'c	MAX SIZE AGG. mm	SLUMP mm	CEMENT TYPE	ADMIXTURE
SHORING PILES	50	20	80	GP	-
SHOTCRETE	32	10	150 - 200	GP	-
CAPPING BEAM	50	20	80	GP	-

NOTE: ALL CEMENTITIOUS MATERIAL MUST CONFIRM TO TfNSW SPECIFICATION 3211

COVERS			
ELEMENT	TOP	BTM	SIDES
PILES	60mm	60mm	60mm
CAPPING BEAM	50mm	50mm	50mm
SHOTCRETE	50mm	50mm	50mm

TOLERANCE

1. BORES SHALL BE CENTERED WITHIN 25mm OF THE 'DESIGN' CENTRE AS INDICATED ON THE PLANS.
2. MAXIMUM "OUT OF PLUMB" OF BORES SHALL BE 75mm OR 1:500, WHICHEVER IS LESS
3. GROUND ANCHORS

MONITORING

1. MONITORING OF THE ADJACENT BUILDINGS AND TOP AND MIDDLE OF THE SOLDIERS SHALL BE CARRIED OUT IN ACCORDANCE WITH GEOTECHNICAL AND VIBRATION MONITORING PLANS PREPARED BY GEOTECHNICAL ENGINEER.
2. MONITORING OF SURVEY POINTS SHALL BE BY A LICENSED SURVEYOR AND BE INITIALLY AT MAXIMUM THREE WEEK INTERVALS & FOR EVERY BASEMENT LEVEL EXCAVATED.
3. IF ANY MOVEMENTS ABOVE THE LIMITS NOMINATED BY THE GEOTECHNICAL ENGINEER ARE DETECTED, ALL WORKS SHALL BE CEASED, THE ENGINEER SHALL BE IMMEDIATELY NOTIFIED. THE PROJECT MANAGER SHALL NOTIFY THE ADJOINING PROPERTY OWNERS.
4. RECORDS SHALL BE KEPT OF ALL MONITORING AND BE AVAILABLE FOR INSPECTION AT ANY TIME.

GEOTECHNICAL ENGINEER TO APPROVE ALL PILE SPACINGS ON SITE AND TO CONFIRM RETAINED MATERIALS ABILITY TO ARCH BETWEEN PILES TEMPORARILY.

CONSTRUCTION SEQUENCE FOR EXTERNALLY ANCHORED SOLDIER WALLS:

THE PROPOSED BASEMENT EXCAVATION WILL PROCEED IN THE FOLLOWING SEQUENCE:

1. SETOUT THE LOCATION OF THE PILES AND CAPPING BEAMS AS NOTED ON PLANS, ELEVATION AND SECTIONS.
2. HOLD POINT THE GEOTECHNICAL ENGINEER (WHO SHALL BE EMPLOYED BY THE BUILDER) IS REQUIRED TO CERTIFY THAT THE SOIL CONDITIONS COMPLY WITH THE DESIGN ASSUMPTIONS DETAILED IN THE GEOTECHNICAL INVESTIGATION REPORT. THE GEOTECHNICAL ENGINEER IS TO DETERMINE THE LEVEL OF SUPERVISION REQUIRED TO BE ABLE TO PROVIDE THIS CERTIFICATE. SUPERVISION OF THE MATERIAL REMOVED AS PILES ARE DRILLED MAY BE REQUIRED.
3. DRILL REQUIRED BORE HOLES TO THE DIAMETER SPECIFIED AND DEPTH SHOWN ON PLANS, ELEVATIONS AND SECTIONS. ENSURE THE SOCKET IS FULLY CLEANED AND ALL LOOSE MATERIAL IS REMOVED.
4. HOLD POINT THE STRUCTURAL ENGINEER IS TO WITNESS THE REINFORCEMENT CAGES PRIOR TO PLACEMENT IN THE BORED PILES. PLACEMENT OF THE CAGES WITHIN THE PILES FOR PILES GREATER THAN 6M DEEP IS TO BE WITNESSED ON SITE
5. PLACE REINFORCEMENT CAGES IN HOLES ENSURING THAT CAGES ARE ORIENTATED SO DRILLING THROUGH SOLDIER PILES FOR ANCHORS / ROCK BOLTS WILL CLEAR ANY VERTICAL REINFORCEMENT IN PILES. END CAPS ARE TO BE PLACED AT THE BASE OF THE REINFORCEMENT CAGE AND ROLLER CHAIRS PLACED AT 2M INTERVALS ALONG THE LENGTH OF THE PILE (A MINIMUM OF 3 PER SECTION) TO ENSURE MINIMUM COVER TO THE CAGE IS MAINTAINED.
6. USING A TREMIE PIPE OR SIMILAR FROM THE BASE OF THE BORED HOLE TO ENSURE NO SEPARATION OF CONCRETE AGGREGATE, PLACE CONCRETE FROM THE BASE OF THE PILE TO UNDERSIDE OF CAPPING BEAM. VIBRATE CONCRETE PROGRESSIVELY FROM THE BASE OF THE PILE AS THE PILE IS FILLED.
7. INSTALL CAPPING BEAM REINFORCEMENT IN ACCORDANCE WITH DETAILS ON THESE DRAWINGS.
8. HOLD POINT THE STRUCTURAL ENGINEER IS TO WITNESS THE REINFORCEMENT OF THE CAPPING BEAM.
9. PLACE CAPPING BEAM CONCRETE AND ALLOW TO CURE FOR A MINIMUM OF 7 DAYS.
10. HOLD POINT PROJECT SURVEYOR IS TO ESTABLISH A DATUM OF THE CAPPING BEAM LOCATION PRIOR TO ANY EXCAVATION PAST THE CAPPING BEAM. REFER TO MONITORING NOTES. MONITORING OF THE WALL IS TO CONTINUE ON A REGULAR BASIS AS DETAILED IN THE MONITORING NOTES.
11. EXCAVATE AGAINST THE PILES TO MAXIMUM 500MM BELOW THE TOP LEVEL OF ROCK ANCHORS / BOLTS OR TO A MAXIMUM OF 2.0M WHICHEVER IS THE LESSER.
12. DRILL AND EPOXY SHOTCRETE DOWELS INTO SHORING PILES AS NOMINATED ON DRAWINGS. PLACE REINFORCEMENT TO THE SHOTCRETE WALL.
13. HOLD POINT THE STRUCTURAL ENGINEER IS TO WITNESS THE REINFORCEMENT OF THE SHOTCRETE PANELS AND ENSURE MINIMUM DEPTH IS ACHIEVED TO THE PANEL.
14. PLACE CONCRETE TO SHOTCRETE WALL. SHOTCRETE PANELS ARE TO BE FORMED AND POURED OR SPRAYED. IF SHOTCRETE WALLS ARE SPRAYED, THE PANELS ARE TO BE OVERSPRAYED AND THEN SCREEDED BACK TO THE DESIGN THICKNESS. SHOTCTRETE IS TO BE SELF-COMPACTING IN ACCORDANCE WITH AS3600
15. IF THE EXCAVATION IS AT THE LEVEL OF THE SHORING ANCHOR; SCAN PILE FOR REINFORCEMENT PRIOR TO CORING ANCHOR HOLE, A MAXIMUM HORIZONTAL DEVIATION OF 5º TO CLEAR ANY REINFORCEMENT IS PERMITTED, OTHERWISE CONTACT THE STRUCTURAL ENGINEER FOR FURTHER ADVICE. DRILL ANCHOR BORE HOLES, INSTALL ROCK ANCHORS / BOLTS WITH ASSOCIATED CENTRALISERS AND GROUT TUBES, PLACE GROUT WITHIN THE BORE HOLE. (REFER ROCK ANCHORS – POST TENSIONED STRAND NOTES).
16. HOLD POINT THE GEOTECHNICAL ENGINEER IS TO WITNESS THE WEDGE LIFT OFF AND ACHOR LIFT OFF TESTS AS REQURIED.
17. ONCE THE GROUT HAS ACHIEVED DESIGN STRENGTH AND AFTER A MINIMUM 3 DAYS, THE ROCK ANCHORS / BOLTS MAY BE STRESSED.
18. PROVIDED THE SHOTCRETE PANELS HAVE REACHED 25MPA STRENGTH AND THE SHORING ANCHORS ARE FULLY STRESSED EXCAVATION MAY CONTINUE TO THE NEXT STAGE. REPEAT STEPS 10 TO 17 THE FINAL ANCHOR IS INSTALLED AT THE TOE OF THE PILE.
19. CONTINUE EXCAVATION INTO THE UNSUPPORTED CLASS II / III SANDSTONE IN ACCORDANCE WITH THE GEOTECHNICAL ENGINEERING REPORT AND ADVICE.
20. MINIMUM 3 MONTHS AFTER GROUND FLOOR / LEVEL 1 SLAB HAS BEEN CAST, REBATES AT EACH SLAB / PILE INTERFACE SHALL BE CLEANED OUT AND GROUTED UP WITH AN APPROVED NON-SHRINK GROUT (MONOLITH OR EQUAL). WHEN F'C GROUT IS AT LEAST 40 MPA. TYPICAL ANCHORS / ROCK BOLTS SHALL BE DESTRESSED, ANCHOR HEADS REMOVED AND PILES MADE GOOD.

ROCK ANCHORS - POST-TENSIONED STRAND

1. IN ADDITION TO ANY NOTES PROVIDED BELOW AND DETAILS SHOWN ON THESE DRAWINGS, ALL ROCK ANCHORS ARE TO BE INSTALLED IN ACCORDANCE WITH AS4678 AND TRANSPORT FOR NSW QA SPECIFICATION B114
2. ANCHORS SHALL CONSIST OF LOW RELAXATION STRESS-RELIEVED SUPERGRADE STEEL STRAND TO AS4672.1 AND AS4672.2 AND ANCHORAGES AND WEDGES SHALL CONFORM TO AS1314.
3. ALL STEEL ELEMENTS, INCLUDING BEARING PLATES AND WASHERS, MUST BE FABRICATED FROM GRADE 250 STEEL IN ACCORDANCE WITH AS3678. NUTS FOR THE ROCK BOLTS MUST BE GRADE C COMPLYING WITH AS1112.3 AND PROPERTY CLASS 5 COMPLYING WITH AS4291.2 OR EQUIVALENT TO SUIT THE END THREAD OF THE BOLT.
4. THE USE OF COUPLERS TO THE ANCHOR STRANDS IS NOT PERMITTED.
5. PRIOR TO ANY DRILLING OPERATIONS, THE BUILDER SHALL ACQUAINT THEMSELVES WITH ALL ADJACENT UNDERGROUND SERVICES AND ENSURE THAT NONE OF THESE ARE DISRUPTED BY ROCK ANCHORS. ALL APPROPRIATE APPROVALS, PERMITS AND AGREEMENTS SHALL BE OBTAINED BEFORE COmmENCEMENT OF THE WORK.
6. BORE HOLES FOR THE ROCK BOLTS MUST BE DRILLED USING ROTARY OR ROTARY PERCUSSION DRILLING EQUIPMENT. DRILLING FLUIDS AND CORE DRILLING ARE NOT PERMITTED. BORE HOLES MUST BE INSTALLED WITH A MAXIMUM DEVIATION FROM THE DESIGN INCLINATION IN ANY DIRECTION OF 2º AND A MAXIMUM DEVIATION FROM THE ENTRY POINT OF +/- 25mm.
7. CENTRALISERS MUST BE PROVIDED ALONG THE LENGTH OF THE STRAND AT 1000mm CENTRES WITHIN THE BOND LENGTH, 2000mm CENTRES WITHIN THE FREE LENGTH AND 300mm FROM EACH END TO ENSURE THE STRAND IS CENTRALISED TO THE CENTRE OF THE BOREHOLE. THE CENTRALISERS MUST BE; NON-CORRODIBLE, FIRMLY FIXED TO THE BOLT AND A SHAPE THAT PERMITS THE FREE FLOW OF GROUT TO FULLY ENCAPSULATE THE BOLT.
8. GROUT TUBES MUST EXTEND TO THE BASE OF THE LOWEST PORTION OF THE BORE HOLE AND BE SECURELY FIXED TO THE STRANDS. TUBING MUST BE OF ADEQUATE STRENGTH TO RESIST ANY DAMAGE DURING INSTALLATION AND GROUTING AND BE OF SUFFICIENT SIZE TO ALLOW PUMPING OF GROUT.
9. MATERIAL PROPERTIES OF THE GROUT MUST CONFORM TO TABLE B114.2 OF TFNSW QA SPECIFICATION R64. GROUTS MUST GENERALLY HAVE A HIGH BLEED RESISTANCE, LOW SHRINKAGE AND HIGH FLUIDITY. THE GROUT SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF S20MPA AT THREE (3) DAYS. GROUT CYLINDERS SHALL BE TAKEN ON THE BASIS OF ONE SAMPLE (TWO CYLINDERS) FOR EVERY TEN ANCHORS AND TESTED ON THE DAY OF STRESSING. THE GROUT SHALL BE MIXED IN A HIGH SPEED IMPELLER TYPE MACHINE.
10. THE STRANDS SHALL PULLED TAUT AND MARKED AT THE FACE OF THE WEDGE PRIOR TO UNDERTAKING THE TENSIONING PROCEDURE. MEASUREMENTS FROM THE FACE OF THE WEDGE TO THE MARKING SHALL BE TAKEN AT 25%, 50%, 75%, 100% AND 125% AS THE STRAND IS PROGRESSIVELY TENSIONED TO THE PROOF LOAD. RESULTS OF THE MEASUREMENTS SHALL BE PROVIDED TO THE ENGINEER FOR COMPARISON AGAINST THEORETICAL EXTENSIONS.
11. EACH ANCHOR SHALL BE PROOF LOADED I.E. STRESSED TO 125% OF THE WORKING LOAD, HELD FOR FIVE MINUTES, AND SLOWLY EASED BACK. THE ANCHOR SHALL BE THEN STRESSED TO WORKING LOAD AND LOCKED OFF. ANY ANCHOR WHICH FAILS TO HOLD THE LOAD SHALL BE REMOVED AND REPLACED WITH ANOTHER ANCHOR. SUCH WORK SHALL BE CARRIED OUT IN THE PRESENCE OF AN ENGINEER.
12. STRANDS WHICH EXTEND EXCESSIVELY BEYOND THE FACE OF THE PILE MAY BE CUT TO A MINIMUM LENGTH OF 300mm + THE EXTENSION LENGTH FROM THE PILE FACE.
13. ALL ANCHORS TO BE TESTED USING THE INDUSTRY STANDARD 'WEDGE LIFT-OFF' TEST METHODOLOGY AND IN ADDITION 10% OF ALL ANCHORS TO BE ADDITIONALLY TESTED USING THE 'ANCHOR LIFT-OFF' TESTING METHODOLOGY IMMEDIATELY FOLLOWING LOCK-OFF OF THE ANCHORS.
14. ALL ROCK ANCHORS TO BE INSPECTED BY GEOTECHNICAL ENGINEER DURING INSTALLATION TO CONFIRM CORRECT INSTALLATION AND ANCHOR LOADS ACHIEVED.
15. MINIMUM DESIGN LIFE OF ALL TEMPORARY ROCK ANCHORS TO BE 2 YEARS OR AS NOMINATED BY BUILDER.
16. THE BUILDER SHALL KEEP ON SITE AN ADEQUATE SUPPLY OF ANCHOR CABLES, GROUT ETC. FOR EMERGENCY USE.
17. THE BUILDER SHALL REGULARLY MONITOR THE STRESS IN THE ANCHORS REGULARLY BY MEANS OF A LIFT OFF TEST TO ENSURE NO MAJOR LOSSES ARE OCCURRING. IF STRESS LOSSES ARE DETECTED THEY SHALL BE IMMEDIATELY BROUGHT TO THE ATTENTION OF THE ENGINEER.

ROCK ANCHORS - SOLID BAR

1. IN ADDITION TO ANY NOTES PROVIDED BELOW AND DETAILS SHOWN ON THESE DRAWINGS, ALL ROCK BOLTS ARE TO BE INSTALLED IN ACCORDANCE WITH AS 4678 AND TRANSPORT FOR NSW QA SPECIFICATION R64.
2. ROCKS BOLTS MUST BE STEEL REINFORCEMENT BARS GRADE 500N DEFORMED BAR TO AS4671. THE BOLTS MUST BE THREADED AT ONE END TO SUIT ISO COARSE PITCH THREAD TO AS1275.
3. ALL STEEL COMPONENTS OF THE ROCK BOLT SYSTEM, INCLUDING THE BOLT, BEARING PLATES, WASHERS AND NUTS MUST BE HOT-DIP GALVANISED TO AS/NZS4680 WITH A MINIMUM AVERAGE COATING WEIGHT OF 600 G/M2/.
4. ALL STEEL ELEMENTS, INCLUDING BEARING PLATES AND WASHERS, MUST BE FABRICATED FROM GRADE 250 STEEL IN ACCORDANCE WITH AS3678. NUTS FOR THE ROCK BOLTS MUST BE GRADE C COMPLYING WITH AS1112.3 AND PROPERTY CLASS 5 COMPLYING WITH AS 4291.2 OR EQUIVALENT TO SUIT THE END THREAD OF THE BOLT.
5. THE USE OF COUPLERS TO THE ROCK BOLTS IS NOT PERMITTED.
6. PRIOR TO ANY DRILLING OPERATIONS, THE BUILDER SHALL ACQUAINT THEMSELVES WITH ALL ADJACENT UNDERGROUND SERVICES AND ENSURE THAT NONE OF THESE ARE DISRUPTED BY ROCK ANCHORS. ALL APPROPRIATE APPROVALS, PERMITS AND AGREEMENTS SHALL BE OBTAINED BEFORE COMMENCEMENT OF THE WORK.
7. BORE HOLES FOR THE ROCK BOLTS MUST BE DRILLED USING ROTARY OR ROTARY PERCUSSION DRILLING EQUIPMENT. DRILLING FLUIDS AND CORE DRILLING ARE NOT PERMITTED. BORE HOLES MUST BE INSTALLED WITH A MAXIMUM DEVIATION FROM THE DESIGN INCLINATION IN ANY DIRECTION OF 2º AND A MAXIMUM DEVIATION FROM THE ENTRY POINT OF +/- 25mm.
8. CENTRALISERS MUST BE PROVIDED ALONG THE LENGTH OF THE BOLT AT 2000mm CENTRES AND 300mm FROM EACH END TO ENSURE THE BOLT IS CENTRALISED TO THE CENTRE OF THE BOREHOLE. THE CENTRALISERS MUST BE; NON-CORRODIBLE, FIRMLY FIXED TO THE BOLT AND A SHAPE THAT PERMITS THE FREE FLOW OF GROUT TO FULLY ENCAPSULATE THE BOLT.
9. GROUT TUBES MUST EXTEND TO THE BASE OF THE LOWEST PORTION OF THE BORE HOLE AND BE SECURELY FIXED TO THE ROCK BOLT. TUBING MUST BE OF ADEQUATE STRENGTH TO RESIST ANY DAMAGE DURING INSTALLATION AND GROUTING AND BE OF SUFFICIENT SIZE TO ALLOW PUMPING OF GROUT.
10. MATERIAL PROPERTIES OF THE GROUT MUST CONFORM TO TABLE R64.1 OF TFNSW QA SPECIFICATION R64. GROUTS MUST GENERALLY HAVE A HIGH BLEED RESISTANCE, LOW SHRINKAGE AND HIGH FLUIDITY. THE GROUT SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF S20MPA AT THREE (3) DAYS. GROUT CYLINDERS SHALL BE TAKEN ON THE BASIS OF ONE SAMPLE (TWO CYLINDERS) FOR EVERY TEN ANCHORS AND TESTED ON THE DAY OF STRESSING. THE GROUT SHALL BE MIXED IN A HIGH SPEED IMPELLER TYPE MACHINE.
11. A MINIMUM OF 1% OF THE ROCK BOLTS MUST BE TESTED IN ACCORDANCE WITH THE "SUITABILITY TEST". AND A MINIMUM OF 3% OF THE ROCK BOLTS MUST BE TESTED IN ACCORDANCE WITH THE 'ACCEPTANCE TEST' AS DEFINED IN TRANSPORT FOR NSW QA SPECIFICATION R64.
12. RE-BOLTING OF THE ROCK BOLTS AT THE DISCRETION OF THE GEOTECHNICAL AND STRUCTURAL ENGINEERS MAY BE REQUIRED WHERE THE BOLT BECOMES OVERSTRESSED DURING EXCAVATION OR EXCESSIVE DEFORMATION OF ANY INCLINED ROCK BEDS EXISTS.

CONSTRUCTION DESIGN

NOTE: DO NOT SCALE OFF DRAWINGS. REFER TO ARCHITECTURAL PLANS. VERIFY DIMENSIONS ON SITE.

REV	DATE	REVISION DESCRIPTION	BY
1	31.10.24	APPROVED FOR CONSTRUCTION	SF
P04	10.07.24	ISSUED FOR PRELIMINARY INFORMATION	PKP
P3	05.09.23	ISSUED FOR PRELIMINARY INFORMATION	RCL
P2	09.06.23	ISSUED FOR PRELIMINARY INFORMATION	RCL
P1	22.05.23	ISSUED FOR PRELIMINARY INFORMATION	RCL

DEICORP

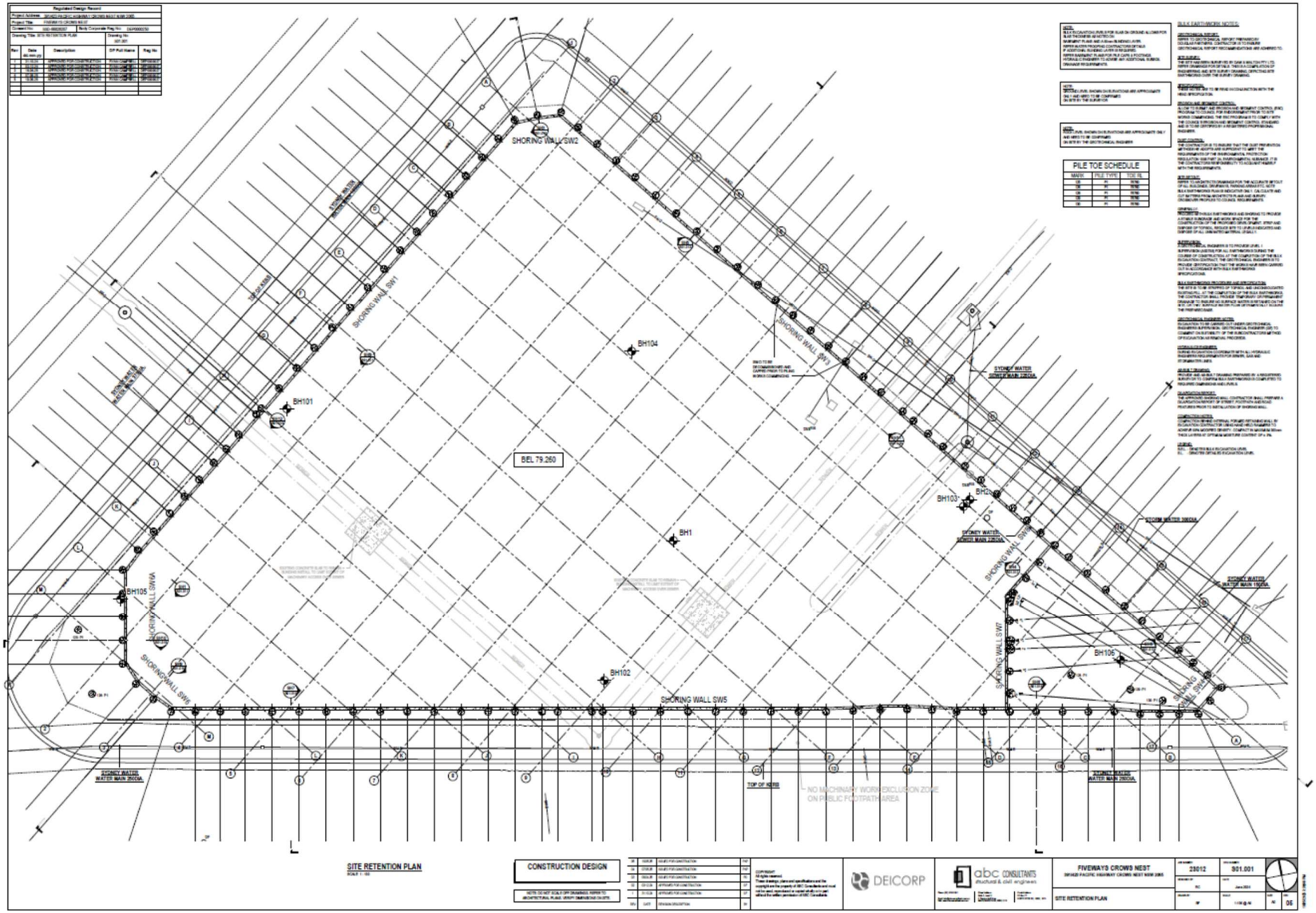
abc CONSULTANTS structural & civil engineers

FIVEWAYS CROWS NEST
391/423 PACIFIC HIGHWAY CROWS NEST NSW 2065

SITE RETENTION NOTES

JOB NUMBER	DWG NUMBER	DESIGNED BY	DRAWN BY	SCALE	SIZE	REV
23012	S00-005	RC	SF	N/A @ A0	A0	1

31/10/2024 1:20:29 PM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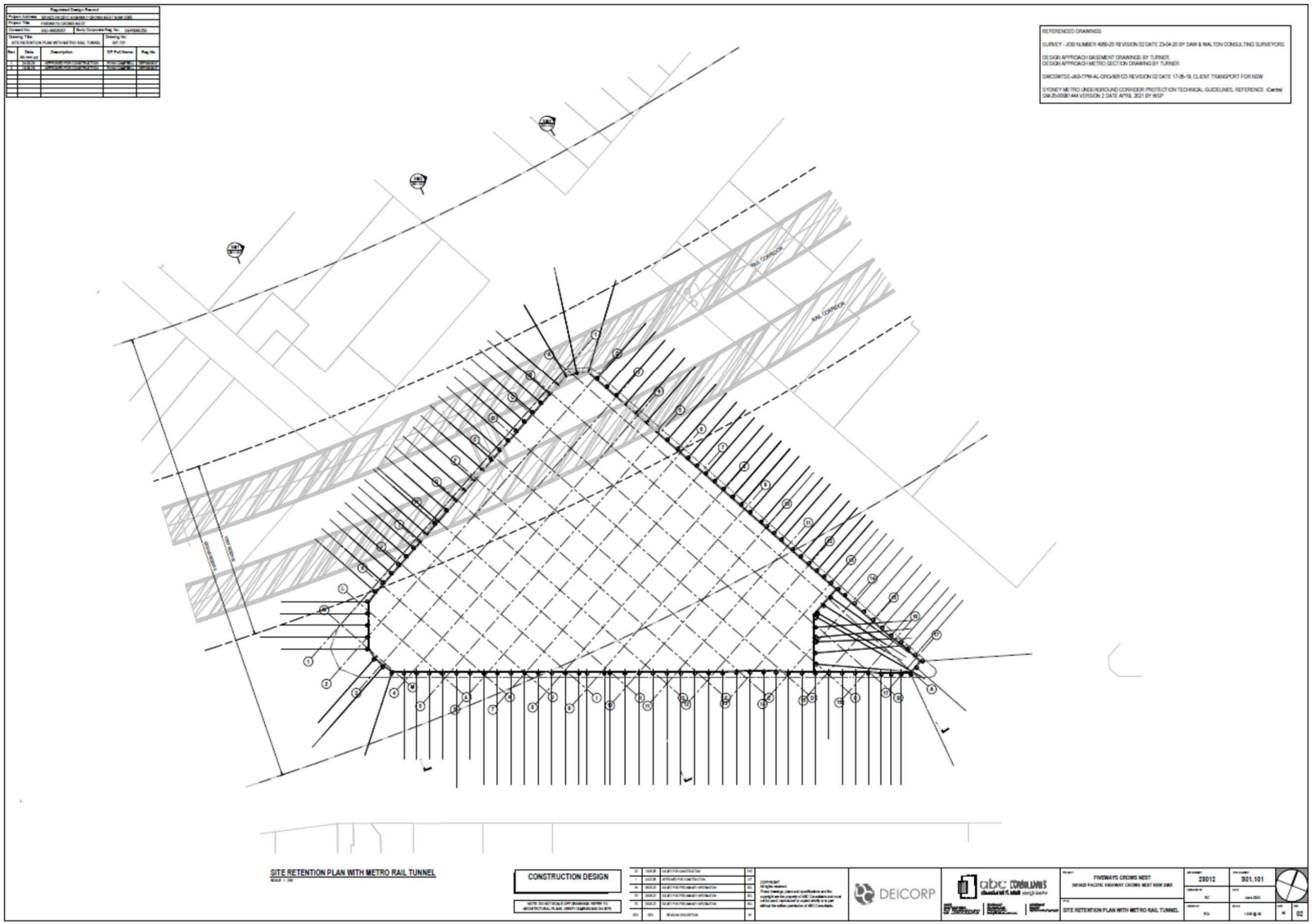
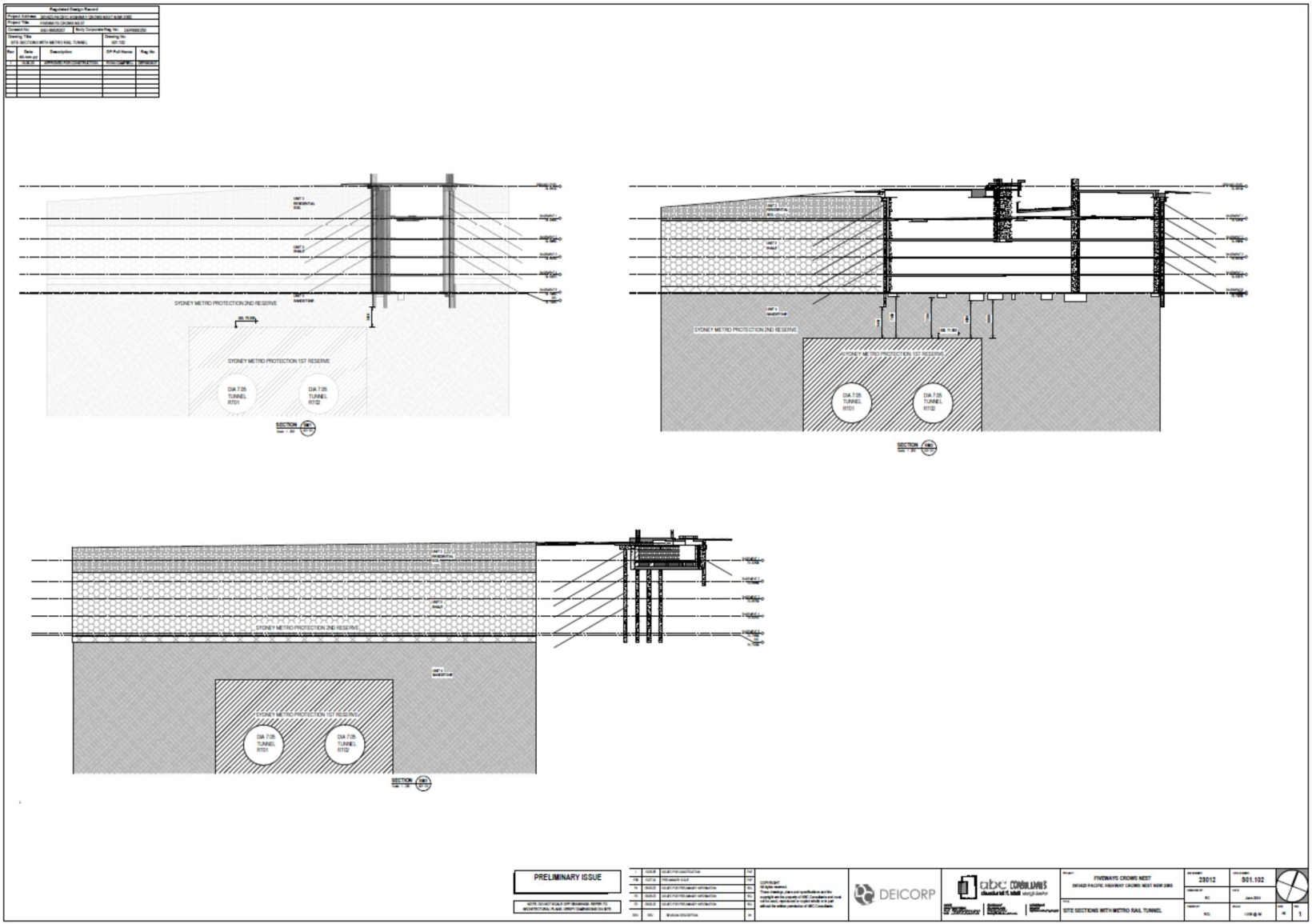
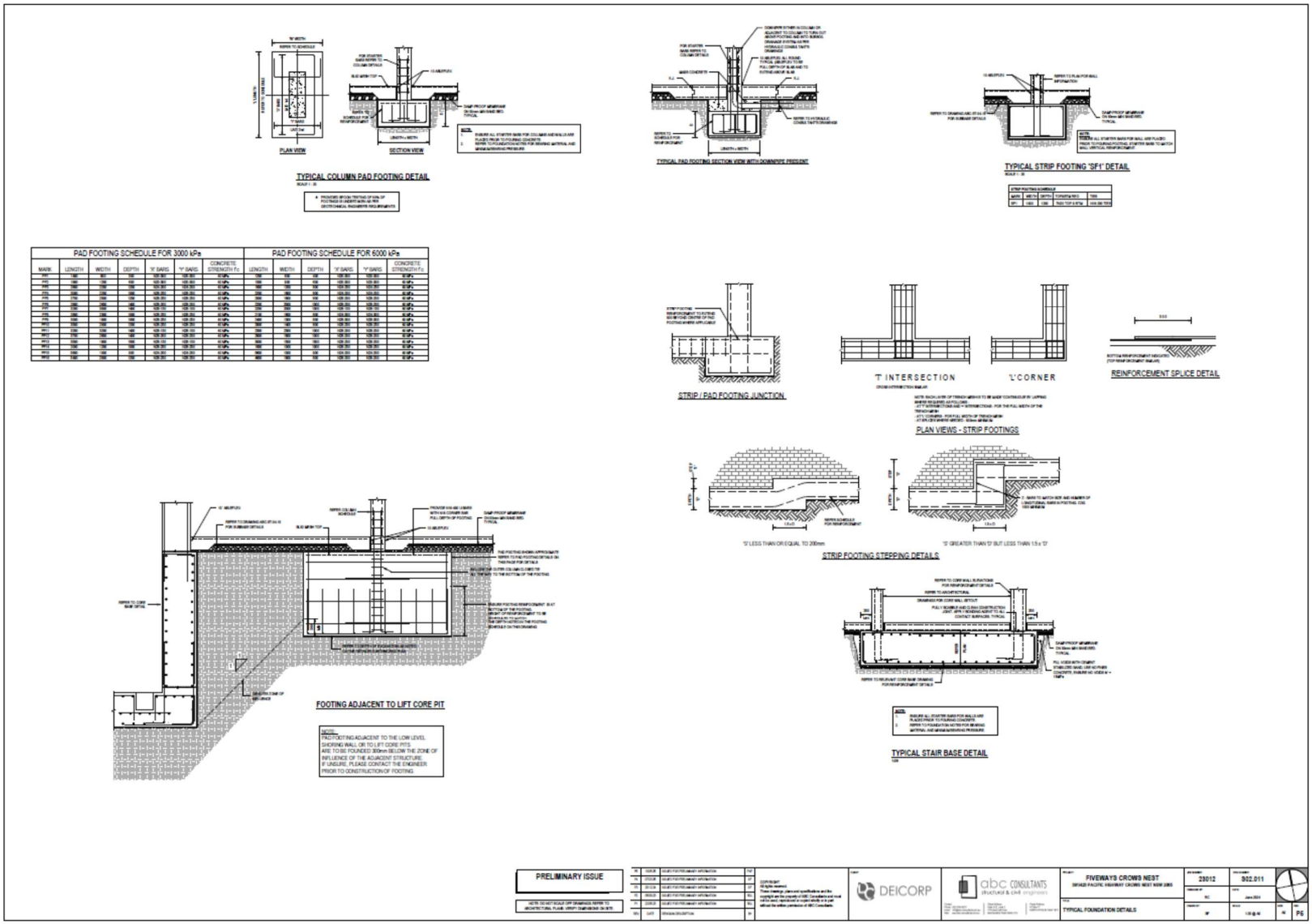
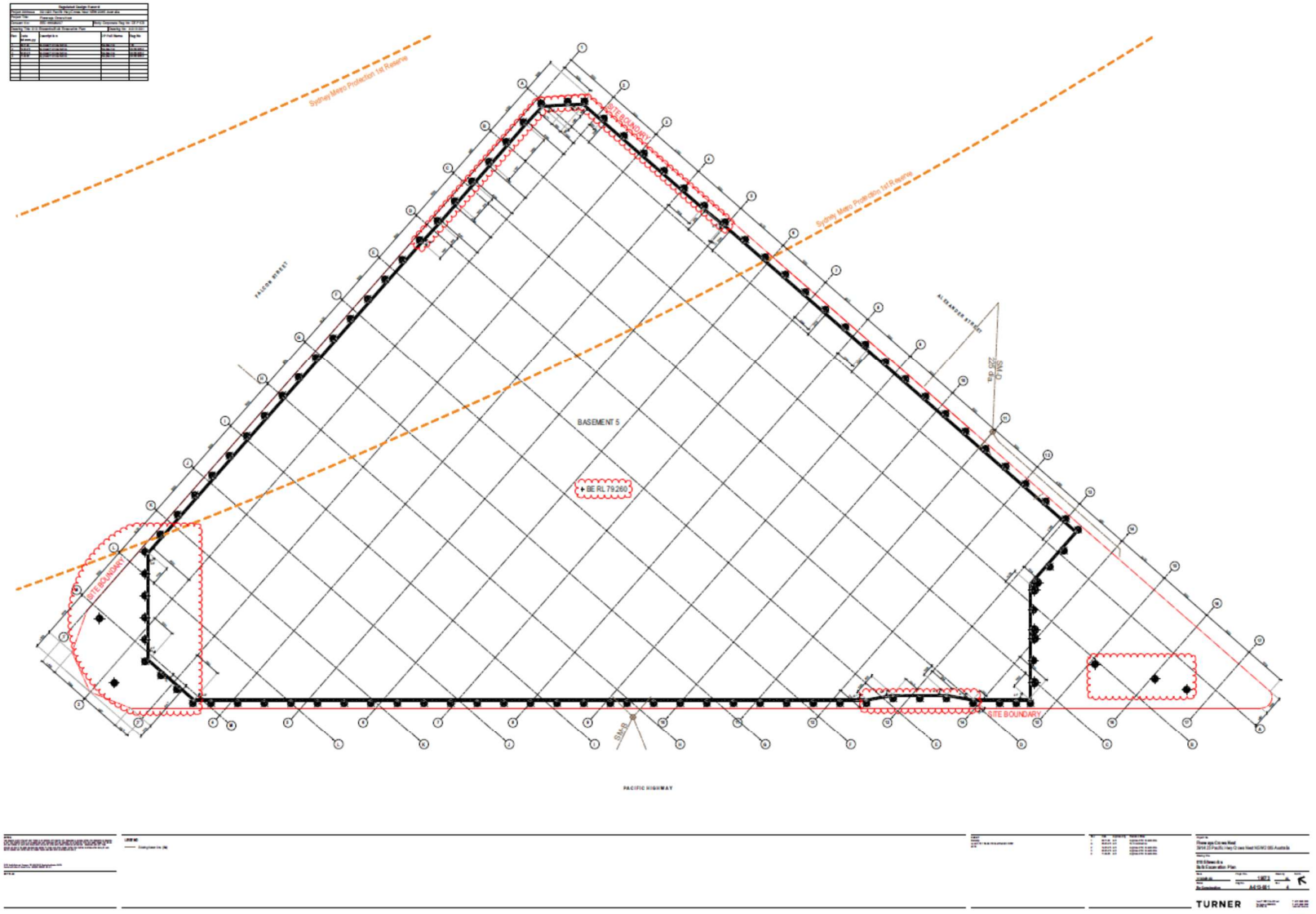
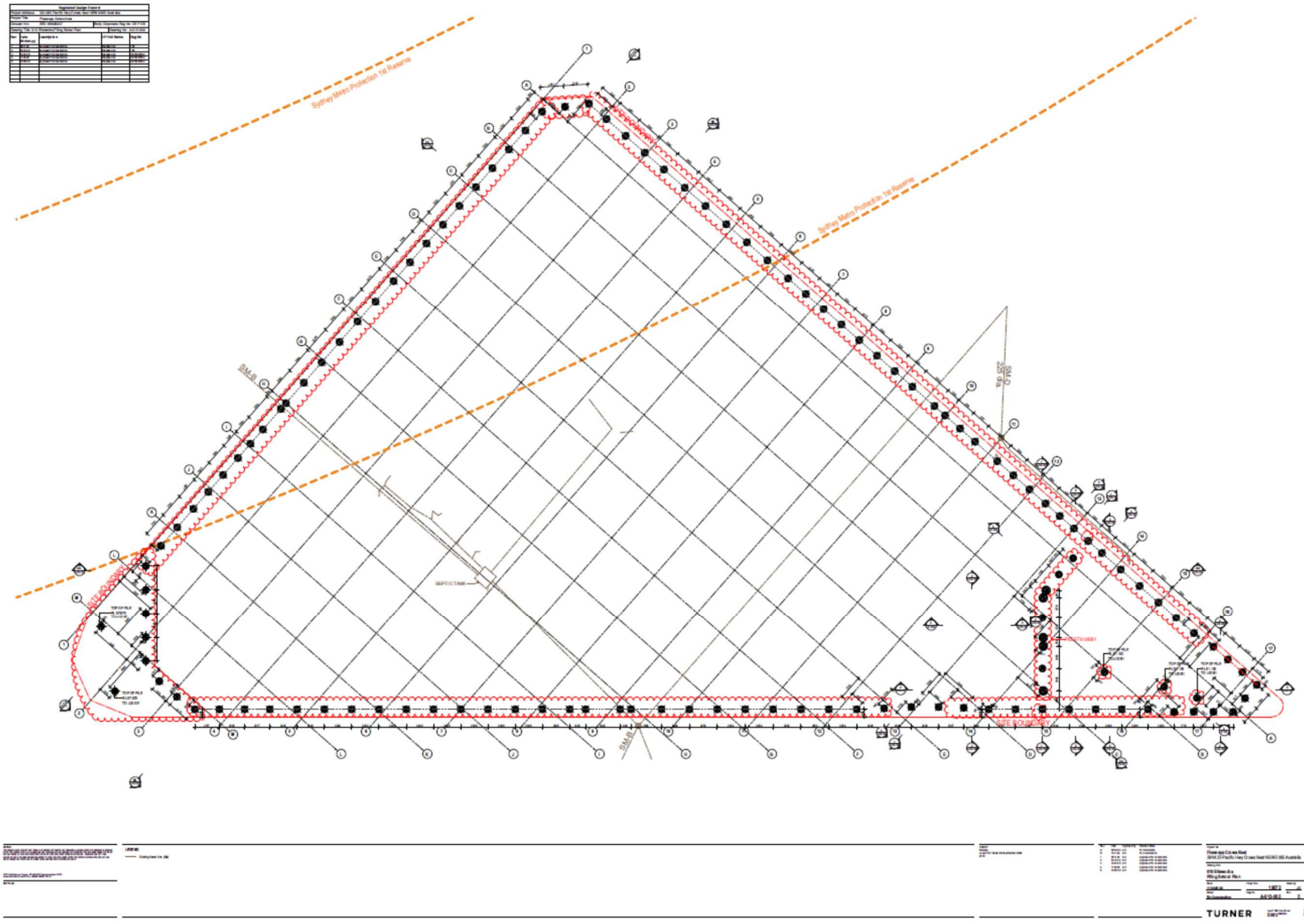
SHORING WALL SW1
SHORING WALL SW3
SHORING WALL SW4
SHORING WALL SW5
SHORING WALL SW6
BH101
BH102
BH103
BH104
BH105
BH106
BH1
BH2
BEL 79.260
PILE TOE SCHEDULE
SITE RETENTION PLAN
CONSTRUCTION DESIGN
DEICORP
abc CONSULTANTS
FIVEWAYS CROWS NEST
SITE RETENTION PLAN

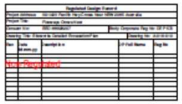

SITE RETENTION PLAN WITH METRO RAIL TUNNEL
CONSTRUCTION DESIGN
DEICORP
FIVEWAYS CROWS NEST
28012
901.101

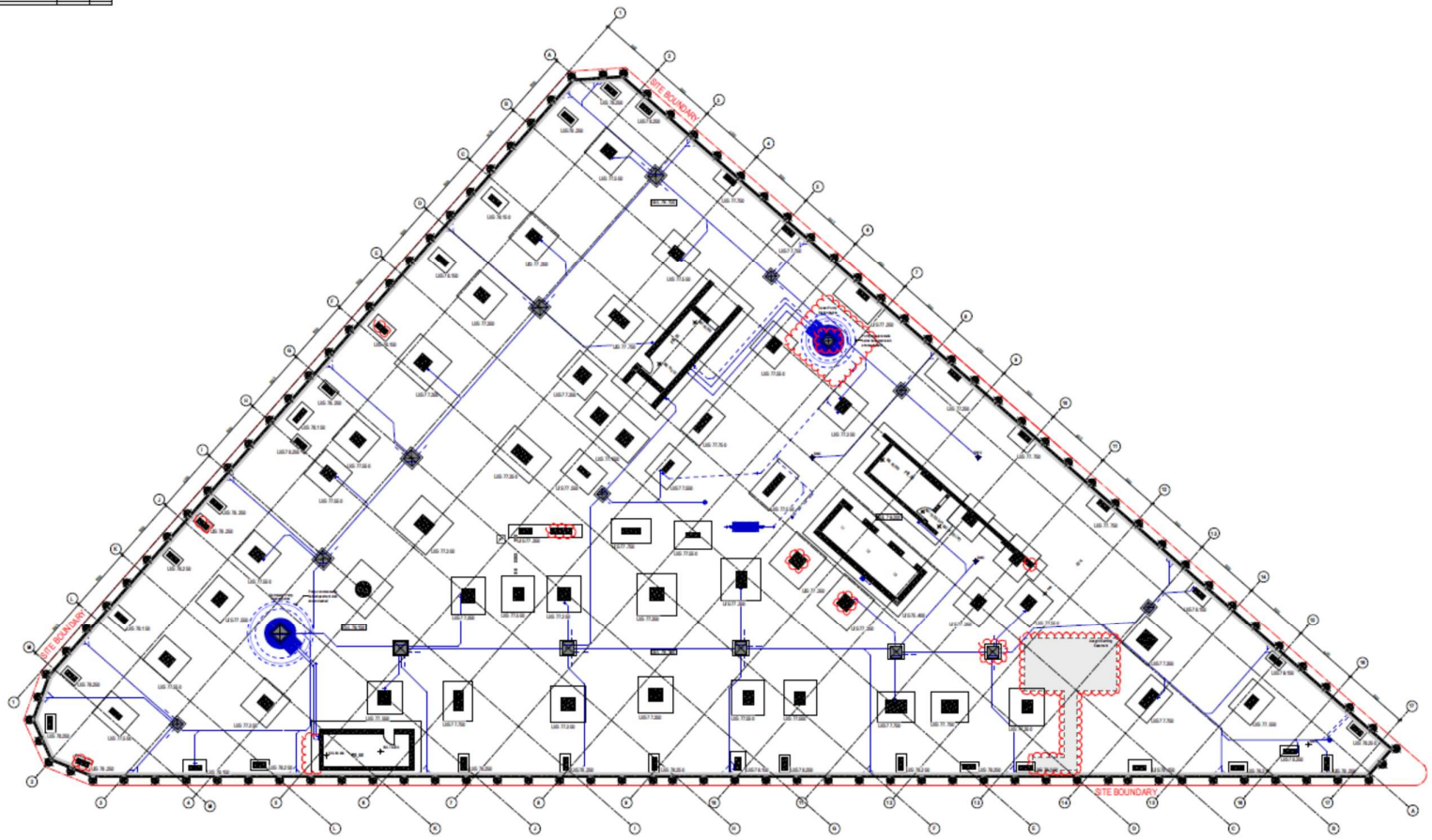

SYDNEY METRO PROTECTION 2ND RESERVE
SYDNEY METRO PROTECTION 1ST RESERVE
DIA 7.05 TUNNEL RT01
DIA 7.05 TUNNEL RT02
SECTION
PRELIMINARY ISSUE
DEICORP
FIVEWAYS CROWS NEST
SITE SECTIONS WITH METRO RAIL TUNNEL


PLAN VIEW
SECTION VIEW
TYPICAL COLUMN PAD FOOTING DETAIL
TYPICAL PAD FOOTING SECTION VIEW WITH DOWNSLOPE PRESENT
TYPICAL STRIP FOOTING 'SF1' DETAIL
PAD FOOTING SCHEDULE FOR 3000 kPa
PAD FOOTING SCHEDULE FOR 6000 kPa
STRIP / PAD FOOTING JUNCTION
'T' INTERSECTION
'L' CORNER
REINFORCEMENT SPLICE DETAIL
PLAN VIEWS - STRIP FOOTINGS
'S' LESS THAN OR EQUAL TO 200mm
'S' GREATER THAN 'D' BUT LESS THAN 1.5 x 'D'
STRIP FOOTING STEPPING DETAIL
FOOTING ADJACENT TO LIFT CORE PIT
TYPICAL STAIR BASE DETAIL
PRELIMINARY ISSUE
DEICORP
abc CONSULTANTS
FIVEWAYS CROWS NEST
TYPICAL FOUNDATION DETAILS

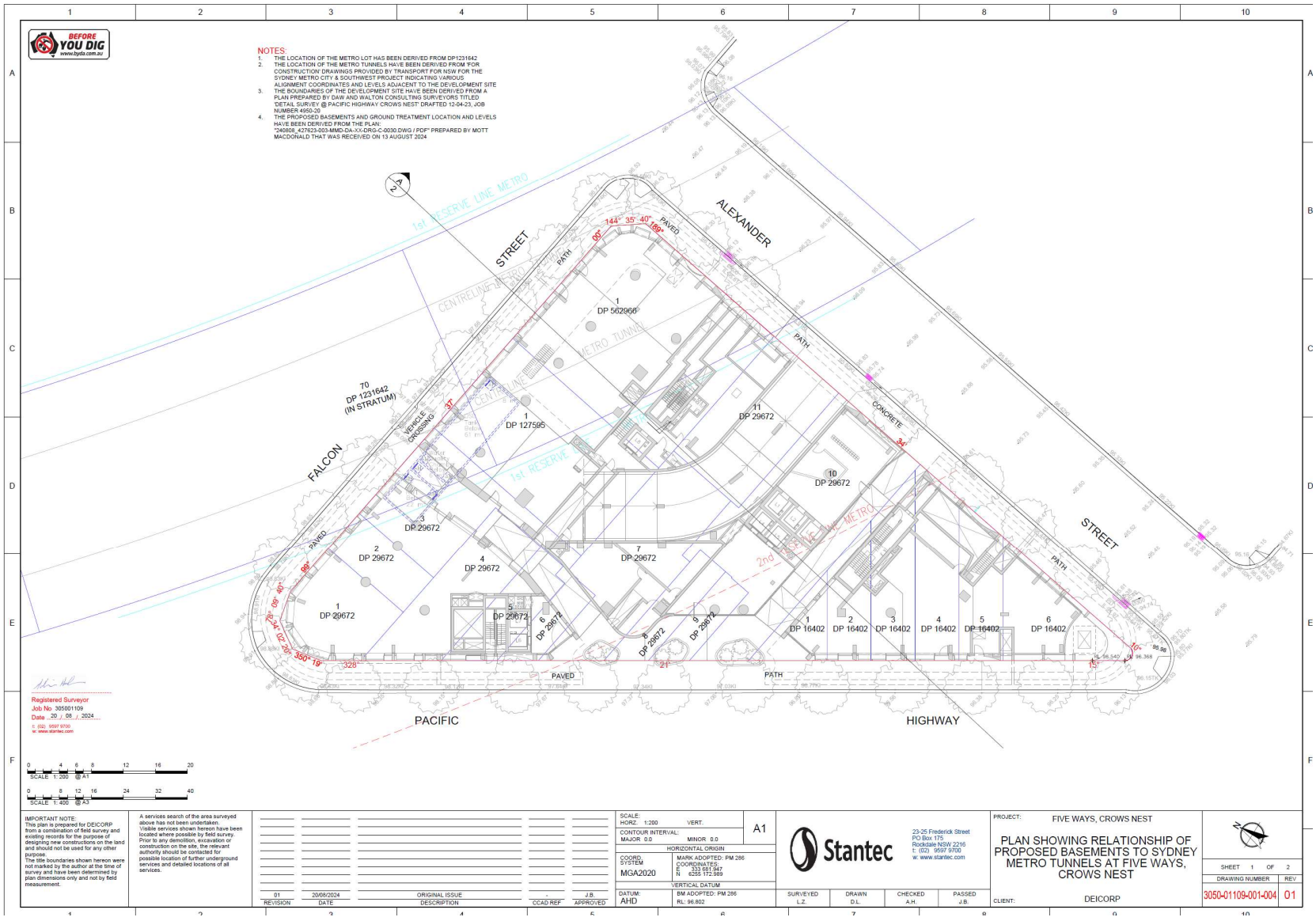

Sydney Metro Protection Ist Reserve
SITE BOUNDARY
Sydney Metro Protection Ist Reserve
BASEMENT 5
BE RL 79.260
SITE BOUNDARY
SITE BOUNDARY
PACIFIC HIGHWAY
TURNER


Sydney Metro Protection 1st Reserve
Sydney Metro Protection 1st Reserve
SEPTIC TANK
TURNER




SITE BOUNDARY
SITE BOUNDARY
SITE BOUNDARY


TURNER


BEFORE YOU DIG
www.byda.com.au
NOTES:
1. THE LOCATION OF THE METRO LOT HAS BEEN DERIVED FROM DP1231642
2. THE LOCATION OF THE METRO TUNNELS HAVE BEEN DERIVED FROM FOR CONSTRUCTION DRAWINGS PROVIDED BY TRANSPORT FOR NSW FOR THE SYDNEY METRO CITY & SOUTHWEST PROJECT INDICATING VARIOUS ALIGNMENT COORDINATES AND LEVELS ADJACENT TO THE DEVELOPMENT SITE
3. THE BOUNDARIES OF THE DEVELOPMENT SITE HAVE BEEN DERIVED FROM A PLAN PREPARED BY DAW AND WALTON CONSULTING SURVEYORS TITLED 'DETAIL SURVEY @ PACIFIC HIGHWAY CROWS NEST' DRAFTED 12-04-23, JOB NUMBER 4950-20
4. THE PROPOSED BASEMENTS AND GROUND TREATMENT LOCATION AND LEVELS HAVE BEEN DERIVED FROM THE PLAN: "240808_427623-003-MMD-DA-XX-DRG-C-0030.DWG / PDF" PREPARED BY MOTT MACDONALD THAT WAS RECEIVED ON 13 AUGUST 2024
ALEXANDER STREET
FALCON STREET
PACIFIC HIGHWAY
1st RESERVE LINE METRO
2nd RESERVE LINE METRO
CENTRELINE METRO TUNNEL
METRO TUNNEL
1 DP 562966
70 DP 1231642 (IN STRATUM)
1 DP 127595
11 DP 29672
10 DP 29672
7 DP 29672
3 DP 29672
2 DP 29672
4 DP 29672
1 DP 29672
5 DP 29672
6 DP 29672
8 DP 29672
9 DP 29672
1 DP 16402
2 DP 16402
3 DP 16402
4 DP 16402
5 DP 16402
6 DP 16402
VEHICLE CROSSING
PAVED
PATH
CONCRETE
Registered Surveyor
Job No 305001109
Date 20 / 08 / 2024
t: (02) 9597 9700
w: www.stantec.com
SCALE 1: 200 @ A1
SCALE 1: 400 @ A3
IMPORTANT NOTE:
This plan is prepared for DEICORP from a combination of field survey and existing records for the purpose of designing new constructions on the land and should not be used for any other purpose.
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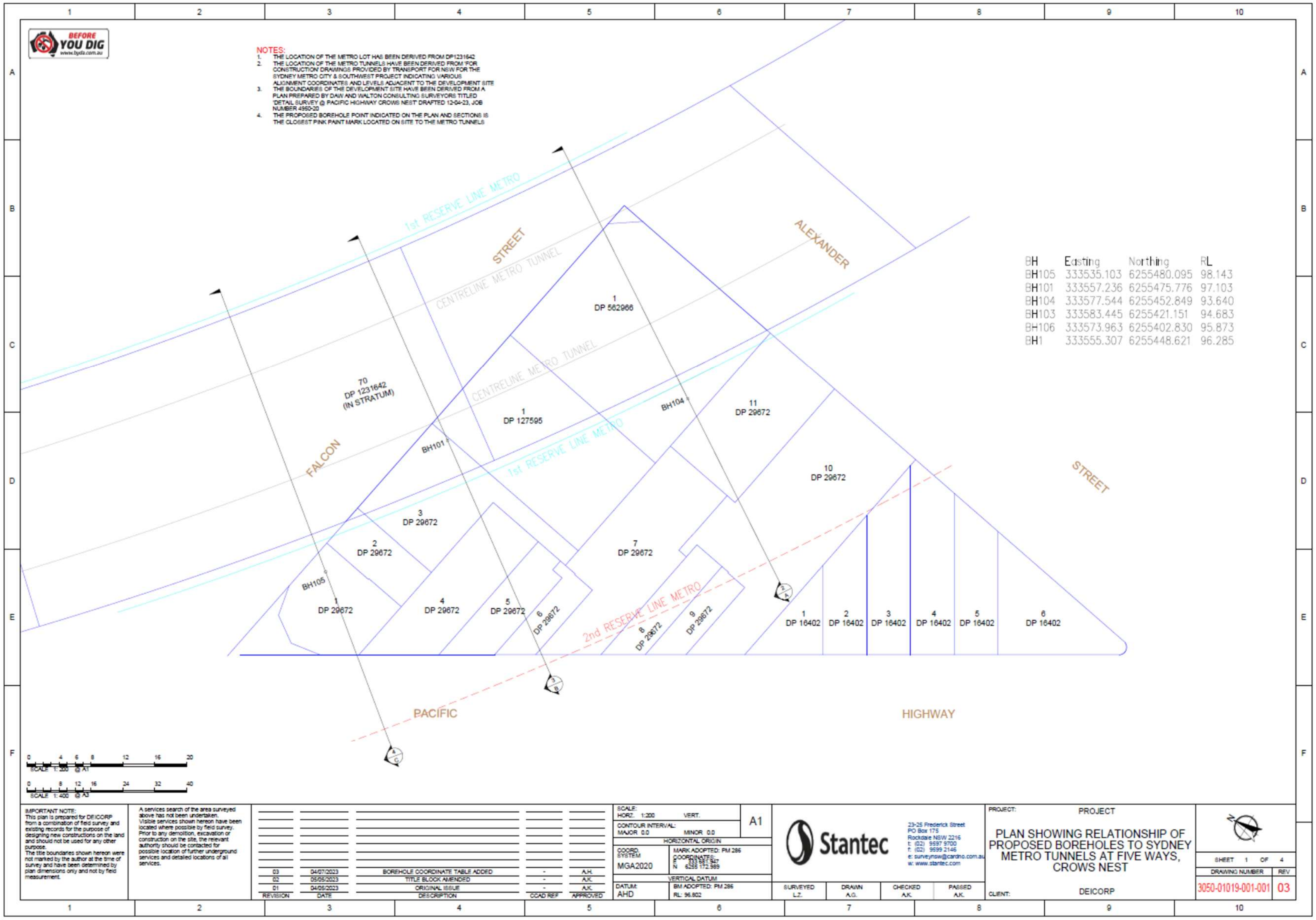
A services search of the area surveyed above has not been undertaken. Visible services shown hereon have been located where possible by field survey. Prior to any demolition, excavation or construction on the site, the relevant authority should be contacted for possible location of further underground services and detailed locations of all services.
01 REVISION
20/08/2024 DATE
ORIGINAL ISSUE DESCRIPTION
CCAD REF
J.B. APPROVED
SCALE: HORZ. 1:200 VERT.
CONTOUR INTERVAL: MAJOR 0.0 MINOR 0.0
A1
HORIZONTAL ORIGIN
COORD. SYSTEM MGA2020
MARK ADOPTED: PM 266 COORDINATES: E 333 681.947 N 6255 172.989
VERTICAL DATUM
DATUM: AHD
BM ADOPTED: PM 266 RL: 96.802
Stantec
23-25 Frederick Street PO Box 175 Rockdale NSW 2216 t: (02) 9597 9700 w: www.stantec.com
SURVEYED L.Z.
DRAWN D.L.
CHECKED A.H.
PASSED J.B.
PROJECT: FIVE WAYS, CROWS NEST
PLAN SHOWING RELATIONSHIP OF PROPOSED BASEMENTS TO SYDNEY METRO TUNNELS AT FIVE WAYS, CROWS NEST
CLIENT: DEICORP
SHEET 1 OF 2
DRAWING NUMBER 3050-01109-001-004
REV 01


NOTES:
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3. THE BOUNDARIES OF THE DEVELOPMENT SITE HAVE BEEN DERIVED FROM A PLAN PREPARED BY DAW AND WALTON CONSULTING SURVEYORS TITLED 'DETAIL SURVEY @ PACIFIC HIGHWAY CROWS NEST' DRAFTED 12-04-23, JOB NUMBER 4950-20
4. THE PROPOSED BOREHOLE POINT INDICATED ON THE PLAN AND SECTIONS IS THE CLOSEST PINK PAINT MARK LOCATED ON SITE TO THE METRO TUNNELS
1st RESERVE LINE METRO
CENTRELINE METRO TUNNEL
2nd RESERVE LINE METRO
FALCON
STREET
ALEXANDER
STREET
PACIFIC
HIGHWAY
70 DP 1231642 (IN STRATUM)
1 DP 562966
1 DP 127595
11 DP 29672
10 DP 29672
7 DP 29672
3 DP 29672
2 DP 29672
1 DP 29672
4 DP 29672
5 DP 29672
6 DP 29672
8 DP 29672
9 DP 29672
1 DP 16402
2 DP 16402
3 DP 16402
4 DP 16402
5 DP 16402
6 DP 16402
BH105
BH101
BH104
BH Easting Northing RL
BH105 333535.103 6255480.095 98.143
BH101 333557.236 6255475.776 97.103
BH104 333577.544 6255452.849 93.640
BH103 333583.445 6255421.151 94.683
BH106 333573.963 6255402.830 95.873
BH1 333555.307 6255448.621 96.285
SCALE 1:200 @ A1
SCALE 1:400 @ A3
IMPORTANT NOTE:
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Visible services shown hereon have been located where possible by field survey.
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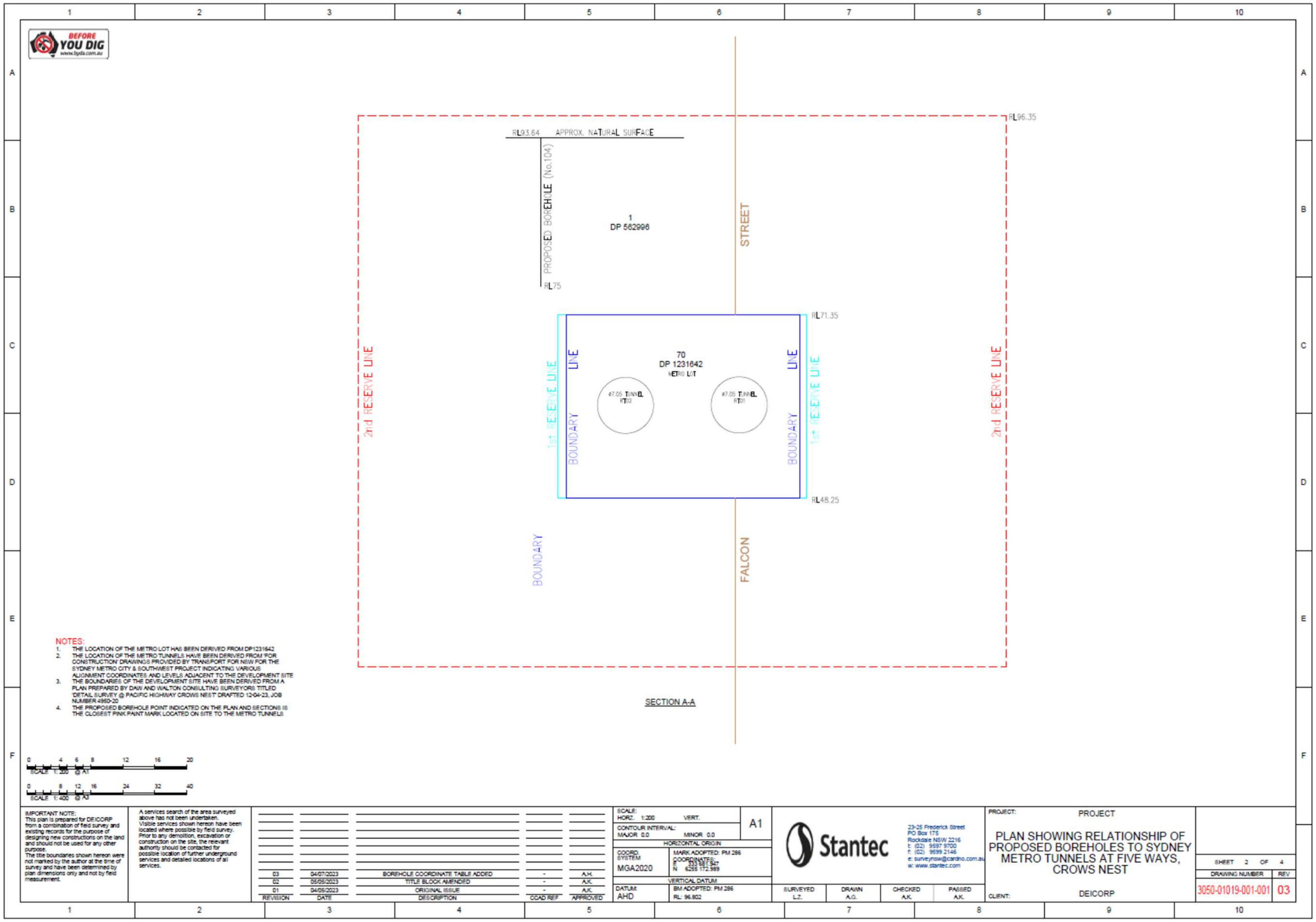
03 04/07/2023 BOREHOLE COORDINATE TABLE ADDED - A.H.
02 05/05/2023 TITLE BLOCK AMENDED - A.K.
01 04/05/2023 ORIGINAL ISSUE - A.K.
REVISION DATE DESCRIPTION CCAD REF APPROVED
SCALE: HORZ. 1:200 VERT.
CONTOUR INTERVAL: MAJOR 0.0 MINOR 0.0
A1
HORIZONTAL ORIGIN
COORD. SYSTEM MGA2020
MARK ADOPTED: PM 286
VERTICAL DATUM
DATUM: AHD
BM ADOPTED: PM 286
RL: 96.802
Stantec
23-25 Frederick Street
PO Box 175
Rockdale NSW 2216
t: (02) 9597 9700
f: (02) 9699 2146
e: surveynsw@cardno.com.au
w: www.stantec.com
SURVEYED L.Z.
DRAWN A.G.
CHECKED A.K.
PASSED A.K.
PROJECT:
PROJECT
PLAN SHOWING RELATIONSHIP OF PROPOSED BOREHOLES TO SYDNEY METRO TUNNELS AT FIVE WAYS, CROWS NEST
CLIENT: DEICORP
SHEET 1 OF 4
DRAWING NUMBER 3050-01019-001-001
REV 03


BEFORE YOU DIG
www.byda.com.au
RL93.64
APPROX. NATURAL SURFACE
PROPOSED BOREHOLE (No.104)
RL75
1
DP 562996
STREET
RL96.35
RL71.35
70
DP 1231642
METRO LOT
2nd RESERVE LINE
1st RESERVE LINE
BOUNDARY
LINE
RL48.25
BOUNDARY
FALCON
SECTION A-A
NOTES:
1. THE LOCATION OF THE METRO LOT HAS BEEN DERIVED FROM DP1231642
2. THE LOCATION OF THE METRO TUNNELS HAVE BEEN DERIVED FROM 'FOR CONSTRUCTION' DRAWINGS PROVIDED BY TRANSPORT FOR NSW FOR THE SYDNEY METRO CITY & SOUTHWEST PROJECT INDICATING VARIOUS ALIGNMENT COORDINATES AND LEVELS ADJACENT TO THE DEVELOPMENT SITE
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4. THE PROPOSED BOREHOLE POINT INDICATED ON THE PLAN AND SECTIONS IS THE CLOSEST PINK PAINT MARK LOCATED ON SITE TO THE METRO TUNNELS
SCALE 1:200 @ A1
SCALE 1:400 @ A3
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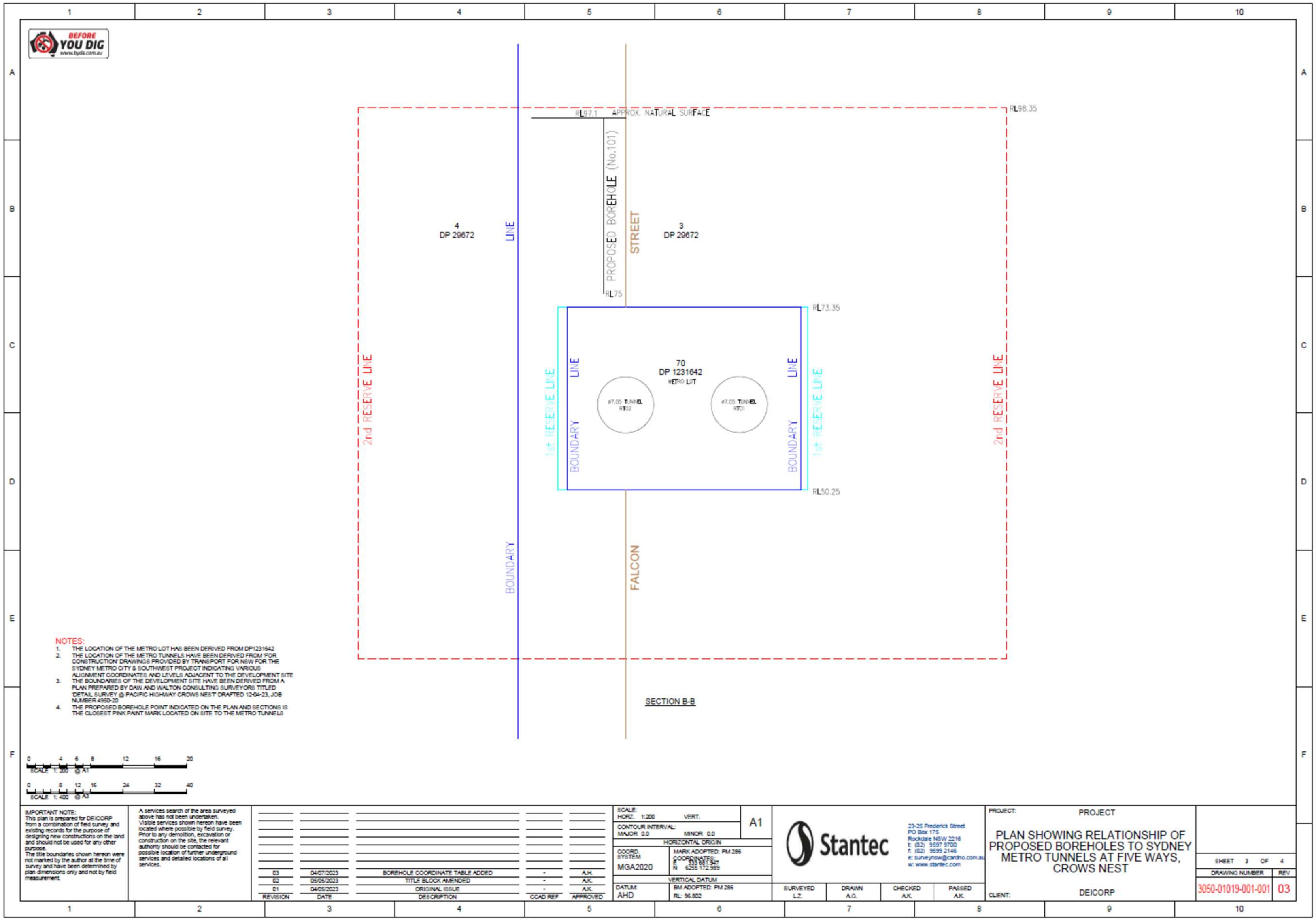
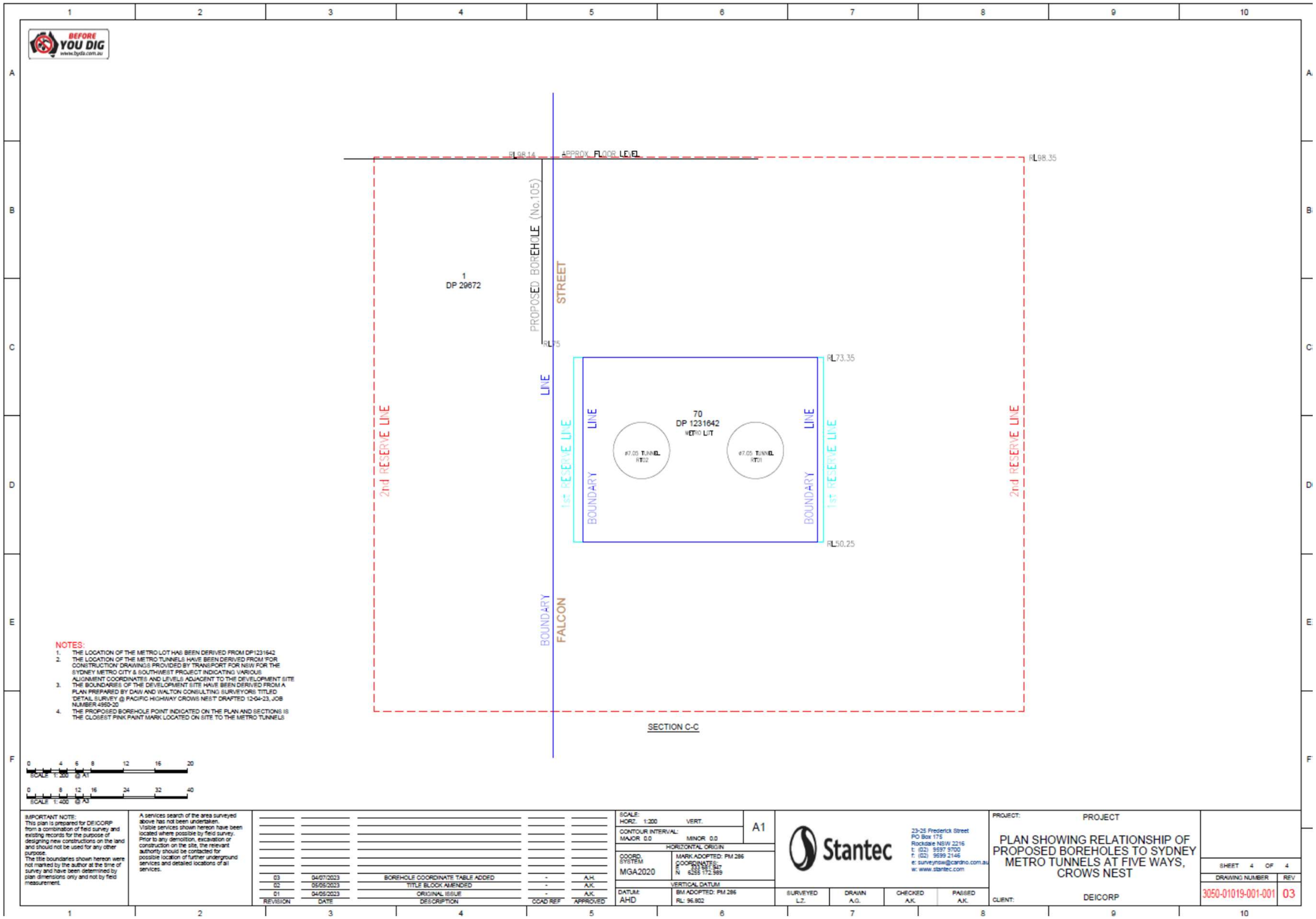
03 04/07/2023 BOREHOLE COORDINATE TABLE ADDED - A.H.
02 05/05/2023 TITLE BLOCK AMENDED - A.K.
01 04/05/2023 ORIGINAL ISSUE - A.K.
REVISION DATE DESCRIPTION CCAD REF APPROVED
SCALE: HORZ. 1:200 VERT.
CONTOUR INTERVAL: MAJOR 0.0 MINOR 0.0
A1
HORIZONTAL ORIGIN
COORD. SYSTEM MGA2020
MARK ADOPTED: PM 286
VERTICAL DATUM
DATUM: AHD
BM ADOPTED: PM 286
RL: 96.802
Stantec
23-25 Frederick Street
PO Box 175
Rockdale NSW 2216
t: (02) 9597 9700
f: (02) 9599 2146
e: surveynsw@cardno.com.au
w: www.stantec.com
SURVEYED L.Z.
DRAWN A.G.
CHECKED A.K.
PASSED A.K.
PROJECT: PROJECT
PLAN SHOWING RELATIONSHIP OF PROPOSED BOREHOLES TO SYDNEY METRO TUNNELS AT FIVE WAYS, CROWS NEST
CLIENT: DEICORP
SHEET 2 OF 4
DRAWING NUMBER 3050-01019-001-001
REV 03


BEFORE YOU DIG
RL97.1
APPROX. NATURAL SURFACE
RL98.35
PROPOSED BOREHOLE (No.101)
4
DP 29672
3
DP 29672
STREET
FALCON
BOUNDARY LINE
RL75
RL73.35
70
DP 1231642
METRO LOT
ø7.05 TUNNEL
2nd RESERVE LINE
1st RESERVE LINE
RL50.25
SECTION B-B
NOTES:
1. THE LOCATION OF THE METRO LOT HAS BEEN DERIVED FROM DP1231642
2. THE LOCATION OF THE METRO TUNNELS HAVE BEEN DERIVED FROM 'FOR CONSTRUCTION' DRAWINGS PROVIDED BY TRANSPORT FOR NSW FOR THE SYDNEY METRO CITY & SOUTHWEST PROJECT INDICATING VARIOUS ALIGNMENT COORDINATES AND LEVELS ADJACENT TO THE DEVELOPMENT SITE
3. THE BOUNDARIES OF THE DEVELOPMENT SITE HAVE BEEN DERIVED FROM A PLAN PREPARED BY DAW AND WALTON CONSULTING SURVEYORS TITLED 'DETAIL SURVEY @ PACIFIC HIGHWAY CROWS NEST' DRAFTED 12-04-23, JOB NUMBER 4960-20
4. THE PROPOSED BOREHOLE POINT INDICATED ON THE PLAN AND SECTIONS IS THE CLOSEST PINK PAINT MARK LOCATED ON SITE TO THE METRO TUNNELS
SCALE 1: 200 @ A1
SCALE 1: 400 @ A3
03 04/07/2023 BOREHOLE COORDINATE TABLE ADDED - A.H.
02 05/05/2023 TITLE BLOCK AMENDED - A.K.
01 04/05/2023 ORIGINAL ISSUE - A.K.
REVISION DATE DESCRIPTION CCAD REF APPROVED
SCALE: HORZ. 1:200 VERT.
CONTOUR INTERVAL: MAJOR 0.0 MINOR 0.0
A1
HORIZONTAL ORIGIN
COORD. SYSTEM MGA2020
MARK ADOPTED: PM 286
VERTICAL DATUM
DATUM: AHD
BM ADOPTED: PM 286
RL: 96.802
Stantec
23-25 Frederick Street
PO Box 175
Rockdale NSW 2216
t: (02) 9597 9700
f: (02) 9599 2146
e: surveynsw@cardno.com.au
w: www.stantec.com
SURVEYED L.Z.
DRAWN A.G.
CHECKED A.K.
PASSED A.K.
PROJECT: PROJECT
PLAN SHOWING RELATIONSHIP OF PROPOSED BOREHOLES TO SYDNEY METRO TUNNELS AT FIVE WAYS, CROWS NEST
CLIENT: DEICORP
SHEET 3 OF 4
DRAWING NUMBER 3050-01019-001-001
REV 03


BEFORE YOU DIG
PROPOSED BOREHOLE (No.105)
STREET
APPROX. FLOOR LEVEL
RL98.35
1
DP 29672
RL73.35
70
DP 1231642
METRO LOT
2nd RESERVE LINE
1st RESERVE LINE
BOUNDARY LINE
FALCON
RL50.25
SECTION C-C
NOTES:
1. THE LOCATION OF THE METRO LOT HAS BEEN DERIVED FROM DP1231642
2. THE LOCATION OF THE METRO TUNNELS HAVE BEEN DERIVED FROM 'FOR CONSTRUCTION' DRAWINGS PROVIDED BY TRANSPORT FOR NSW FOR THE SYDNEY METRO CITY & SOUTHWEST PROJECT INDICATING VARIOUS ALIGNMENT COORDINATES AND LEVELS ADJACENT TO THE DEVELOPMENT SITE
3. THE BOUNDARIES OF THE DEVELOPMENT SITE HAVE BEEN DERIVED FROM A PLAN PREPARED BY DAW AND WALTON CONSULTING SURVEYORS TITLED 'DETAIL SURVEY @ PACIFIC HIGHWAY CROWS NEST' DRAFTED 12-04-23, JOB NUMBER 4950-20
4. THE PROPOSED BOREHOLE POINT INDICATED ON THE PLAN AND SECTIONS IS THE CLOSEST PINK PAINT MARK LOCATED ON SITE TO THE METRO TUNNELS
SCALE 1:200 @ A1
SCALE 1:400 @ A3
Stantec
PROJECT:
PLAN SHOWING RELATIONSHIP OF PROPOSED BOREHOLES TO SYDNEY METRO TUNNELS AT FIVE WAYS, CROWS NEST
CLIENT: DEICORP
SHEET 4 OF 4
DRAWING NUMBER 3050-01019-001-001
REV 03

Appendix E

Risk workshop attendance

Name	Organisation	Role	Email Address
Andrew Coleman	Deicorp	Construction & Development Executive	acoleman@deicorp.com.au
Mitchell Correia	Deicorp	Construction Manager	mcorreia@deicorp.com.au
Punit Shah	Deicorp	Senior Contract Administrator	pshah@deicorp.com.au
Andre Alba	Deicorp	Contract Administrator	aalba@deicorp.com.au
George Kruk	GKA Management	Managing Director and Workshop Facilitator	george@gkamanagement.com.au
George Wei	Acoustic Logic	Director and Acoustic Engineer	gwei@acousticlogic.com.au
Ryan Campbell	ABC Consulting	Building Structural Engineer	ryan@abc-consultants.com.au
Shanon Ramsay	Delve Underground	Tunnel Structural Engineer	ramsay@delveunderground.com
Mark Trim	Delve Underground	Tunnel Structural Engineer	trim@delveunderground.com
Charles Marais	Douglas Partners	Geotechnical Engineer	charles.marais@douglaspartners.com.au
Ernesto Vega	Douglas Partners	Geotechnical Engineer	ernesto.vega@douglaspartners.com.au
Anthony Maroun	Earthworx	Managing Director	anthony@eartworx.com.au
Joseph Ishac	Earthworx	Project Manager	joseph@eartworx.com.au