

Peter Trung  
Project Engineer  
Dasco  
Level 2, 9 George Street  
North Strathfield NSW 2137

18 November 2024



## Re: 242-224 Beecroft Road, Risk Assessment for impacts to Sydney Metro A2.0

Dear Peter,

### Introduction

This Risk Assessment has been developed on behalf of DASCO in relation to their development of a Class 2 Residential Development at 242-244 Beecroft Road Epping. Part of the development falls within the Second Reserve area of the Sydney Metro tunnel and is in close proximity to a First Reserve area.

As such the development works must be considered with regards to the “Sydney Metro Underground Corridor Protection Technical Guidelines – April 2021”.

This Risk Assessment has been prepared by ARCH Artifex Pty Ltd who are accredited as a Technically Assured Organisation (TAO#146) by TfNSW. ARCH’s TAO authorisation included (AS2) Systems assurance including safety engineering and assurance. The author of this assessment has been assessed as competent to undertake risk assessments in accordance with the ARCH Competence Management Procedure.

This letter (Version A2.0) has been updated to reflect the changes to the development and the addition of a third basement level.

### The Development

DASCO are developing the site at 242-244 Beecroft Road, Epping as a mixed-use residential dwelling.

The site has an approved concept State Significant Development Application which supports a maximum residential gross floor area of 38,613m<sup>2</sup> and will provide up to 374 dwellings over 5 buildings.

The development will include an excavation for a three-story basement which will require piling, excavation, and construction works in the ‘Second Reserve’ area adjacent to the Metro tunnels north of Epping Station. No works will be undertaken in the First Reserve.

The closest point of the excavation to the tunnel will be over 17m horizontally from the tunnel and over 9m from the edge of the first reserve zone. The lowest point of the piling at this point will be above the tunnel.

The site boundary is directly adjacent to Beecroft Road which is a TfNSW (RMS) managed road, and which is also subject to planning condition approval.



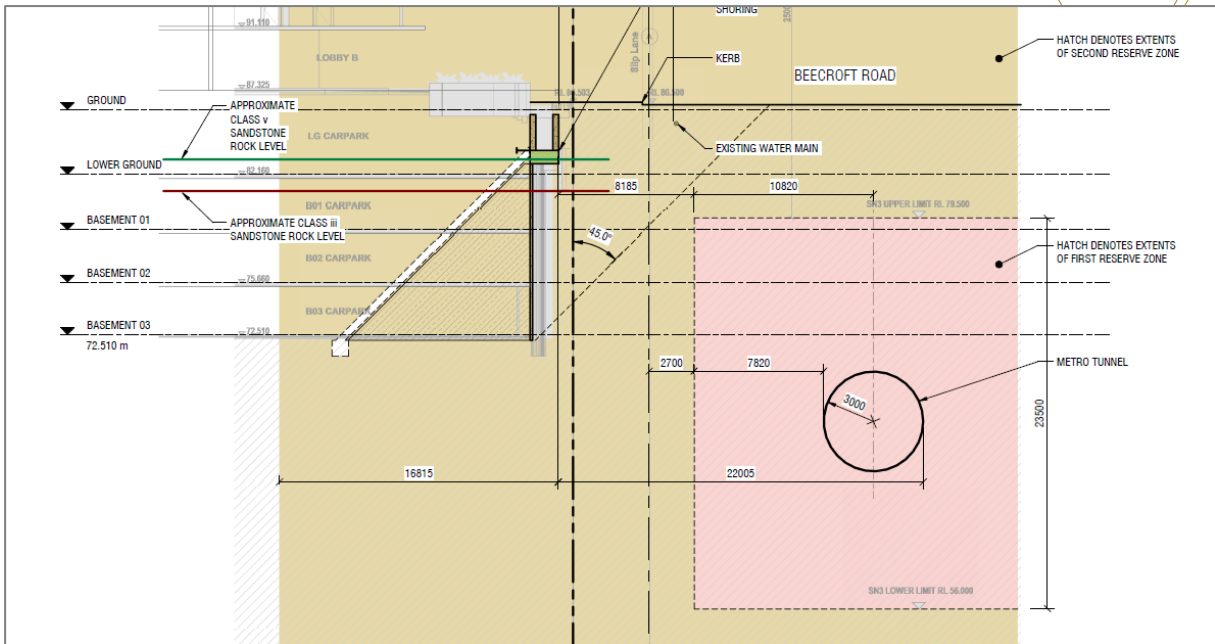


Figure 1 - Section showing the excavation and proximity to the Tunnel and Reserves.

## Second Reserve Considerations

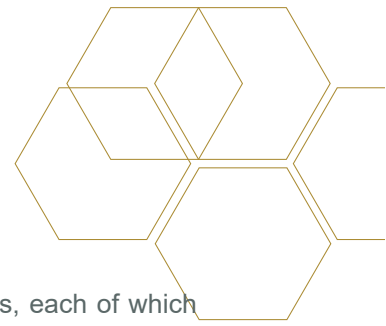
The second reserve zone surrounds the first reserve and covers the areas where proposed developments have the potential to adversely impact on the performance of the support elements of underground infrastructure, metro operations or the feasibility of planned metro infrastructure. Any proposed developments that take place within the second reserve require an engineering assessment of the works to demonstrate that induced effects on the underground rail infrastructure are acceptable to Sydney Metro, in accordance with the performance requirements outlined in Section 9 of this document.

The following factors must be considered for developments in the second reserve:

- potential stress and displacement influence zones associated with external developments that consider the expected zone of negligible ground stress changes due to construction;
- extent of shear displacement of horizontal rock defect or bedding and joints during construction;
- potential groundwater drawdown influence zone; and
- vibration influence zone.

The following activities will be undertaken in accordance with the Second Reserve construction restrictions below.

Type of Construction	Second Reserve
Excavations for basements	Excavations >2m Allowed, assessment required
Pile Foundations	Allowed subject to load restrictions, assessment required
Ground Anchors	Allowed, assessment required



## Safety Risks

The risk assessment (Appendix 1) considered the following four hazardous scenarios, each of which could result in unplanned ground movements which have the potential to impact the safety and structural integrity of the tunnels and associated infrastructure by development related loads, induced ground displacement or structural lining movement.

- Piling
- Excavation of the basement levels
- Construction of the basement levels (to ground)
- Use of ground anchors in the Second Reserve

The safety risks relate to the construction activities of the basement levels only. Once the structure has been reached ground level the potential impacts on the tunnels become negligible.

The base of the built structure will be situated on Class III sandstone, or better, so the risk of structural movement of the construction building is negligible and not considered in the risk assessment.

The proposed works are not considered to have any significant impacts on the tunnels due to changes in ground water movement or through electrolysis.

## Safety Controls

The following risk management control will be implemented by the DASCO team and their suppliers. A summary of each control is provided and how this helps to manage the risk. Each control will be categorised by type (as per the hierarchy of controls) and effectiveness.

### Competent Designers

The design organisations have used appropriately skilled and experienced designers to undertake the planning and design activities in accordance with the applicable standards.

Control Type: Administrative - Control Effectiveness: Highly Effective.

### Geotechnical Investigations

A geotechnical investigation and interpretive report have been prepared for DASCO by PSM consult to inform the design of the building and associated foundation works.

Control Type: Engineering - Control Effectiveness: Highly Effective.

### Engineering Impact Assessment

Finite Element Analysis has been undertaken and provided to Sydney Metro.

Control Type: Administrative - Control Effectiveness: Highly Effective.

### Monitoring and Vibrations

EI Australia has prepared a Monitoring plan for Sydney Metro for the project. The monitoring plan has control measures for monitoring:

- Movement, including type and frequency of monitoring, trigger levels
- Vibration monitoring for piling and excavation including trigger levels

The monitoring plan includes a list of key stakeholders should intervention be required.

A second monitoring plan is being prepared specific to Becroft Road for TfNSW (RMS) to satisfy condition B74 of the DA.

Control Type: Engineering - Control Effectiveness: Highly Effective.





### Shoring System Design

Soldier piles and connecting pile cap will be installed prior to any excavations. DASCO have engaged JSBC consulting to prepare a shoring design for the development.

Control Type: Engineering - Control Effectiveness: Highly Effective.

### No Anchoring in the First Reserve

The construction methodology will be to use props within the site so that no anchoring or other penetrations enter the First Reserve area.

Control Type: Elimination - Control Effectiveness: Highly Effective.

### Construction Methodology

DASCO have developed a construction methodology that minimises the impacts of the piling and excavation works, includes appropriate hold and check points, and ensure the safety of the construction activities SFAIRP.

DASCO will ensure that all contractors will be made aware of the Sydney Metro Reserves and Tunnel Locations prior to commencing work as this information will be available in the Site Induction. All Work Method Statements will include hold points at various stages to ensure the works proceeding have been reviewed and approved by the competent designers.

The Position of the underground Metro Infrastructure and protection reserves will be set out by a Surveyor to ensure the location is clear for all the contractors and exclusions zones will be in place.

Control Type: Administrative - Control Effectiveness: Moderately Effective.

### Crane Locations

The locations of the tower cranes used for the construction will be outside of the Second Reserve area.

Control Type: Elimination - Control Effectiveness: Highly Effective.

### SWMS

We have reviewed the excavation SWMS provides by DASCO, the SWMS outline the hazards relating to excavations adjacent to the shoring and controls relating to monitoring stopping work if the trigger levels noted in the Sydney Metro Monitoring plan are reached.

The specific controls relating to the monitoring of the excavation should also be included in the training and instructions provided to workers engaged in this task. This is a requirement of the DASCO excavation permit provide for reference.

Control Type: Administrative - Control Effectiveness: Moderately Effective.

### Surveys

Detailed site surveys have been undertaken to understand the location of the Metro Tunnel including the reserves to better inform the design process. Ongoing surveys and monitoring will be undertaken throughout the construction process.

Control Type: Administrative - Control Effectiveness: Highly Effective.

### ITPs

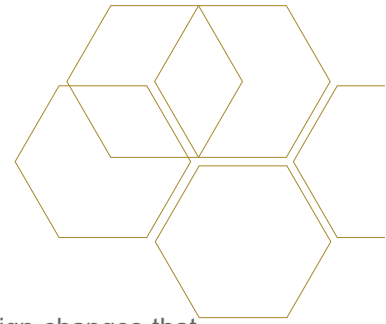
Inspection and test plans will be in place for key assets and construction stage activities and will require the designer to verify works before they can proceed to ensure the design is tightly followed.

Control Type: Administrative - Control Effectiveness: Highly Effective.

### Emergency response plans

An emergency response plan will be developed to respond to trigger level events, including informing TfNSW (RMS) And Sydney Metro.





Control Type: Administrative - Control Effectiveness: Moderately Effective.

Design change process

In accordance with the Conditions of the development application, any post AFC design changes that impacts Sydney Metro will be subject to a design change process that will involve approval by Sydney Metro.

Control Type: Administrative - Control Effectiveness: Highly Effective.

Monthly progress meeting with Metro

In accordance with the Sydney Metro Consultation regime, there will be regular meetings between DASCO and Sydney Metro as this will be an opportunity for DASCO to provide updates for the upcoming works and for any other matters that needs to be discussed during construction.

Control Type: Administrative - Control Effectiveness: Moderately Effective.

**Safety Claim**

The risk assessment has shown that the safety risks associated with the excavation and construction of the basement are very low.

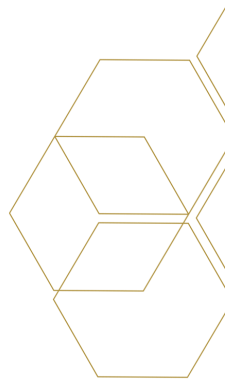
There are multiple layers of highly effective controls in place to manage the safety risks.

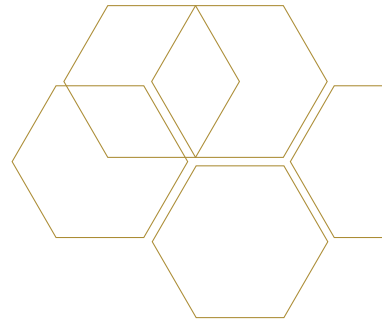
The safety risks are considered to be managed So Far As Is Reasonably Practicable (SFAIRP).

Please do not hesitate to contact me if you require any additional information.

Yours sincerely,

A Petrie  
Director Systems & Safety Assurance

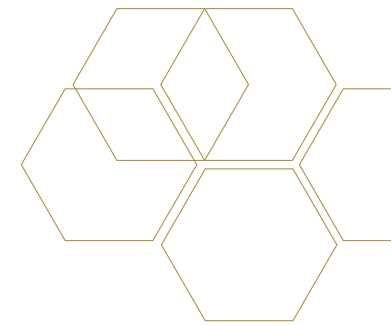




## References

ID	Document Title	Reference	Version
1	Geotechnical Investigation Report	PSM4547-006R	27 May 2022
2	Monitoring Plan for Sydney Metro	E25677.G10	4 September 2024
3	Finite Element Analysis for Sydney Metro 242-244 Beecroft Road, Epping NSW	E25677.G06	12 July 2024
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## Appendix 1

Hazard Log including Risk Assessment based upon the TS 04982 TfNSW Risk Criteria for External Organisations

Hazard	Cause	Consequence	Controls	Severity	Likelihood	Risk	Safety Claim
Piling impacts the structural integrity of the tunnels	Piling activities	<ul style="list-style-type: none"> <li>• Damage to tunnel linings</li> <li>• Infringement of the KE</li> <li>• Speed restrictions</li> </ul>	Multiple (see report)	C4 Moderate	L5 Very Unlikely	D Low	Reasonably practical controls have been implemented
Excavation impacts the structural integrity of the tunnels	Excavation and installation of temporary supports	<ul style="list-style-type: none"> <li>• Damage to tunnel linings</li> <li>• Infringement of the KE</li> <li>• Speed restrictions</li> </ul>	Multiple (see report)	C4 Moderate	L5 Very Unlikely	D Low	Reasonably practical controls have been implemented
Basement Construction impacts the structural integrity of the tunnels	Installation of permanent structures and removal of temporary support and	<ul style="list-style-type: none"> <li>• Damage to tunnel linings</li> <li>• Infringement of the KE</li> <li>• Speed restrictions</li> </ul>	Multiple (see report)	C4 Moderate	L5 Very Unlikely	D Low	Reasonably practical controls have been implemented
Anchors in the Second Reserve impacts the structural integrity of the tunnels	Stressing and de-stressing of anchors	<ul style="list-style-type: none"> <li>• Damage to tunnel linings</li> <li>• Infringement of the KE</li> <li>• Speed restrictions</li> </ul>	Multiple (see report)	C4 Moderate	L5 Very Unlikely	D Low	Reasonably practical controls have been implemented
Clash with tunnel lining when installing instruments within the first reserve as stated in condition B.56	Installation of monitoring equipment	<ul style="list-style-type: none"> <li>• Damage to tunnel linings</li> <li>• Infringement of the KE</li> <li>• Speed restrictions</li> </ul>	Multiple (see report)	C4 Moderate	L5 Very Unlikely	D Low	Reasonably practical controls have been implemented





Hazard	Cause	Consequence	Controls	Severity	Likelihood	Risk	Safety Claim
Ground condition encountered during construction worse than parameters adopted in the impact assessment	Unexpected ground conditions	<ul style="list-style-type: none"> <li>• Damage to tunnel linings</li> <li>• Infringement of the KE</li> <li>• Speed restrictions</li> </ul>	Multiple (see report)	C4 Moderate	L5 Very Unlikely	D Low	Reasonably practical controls have been implemented
The measured movement and vibration exceeds the trigger levels specified.	Excessive vibration from construction activities	<ul style="list-style-type: none"> <li>• Damage to tunnel linings</li> <li>• Infringement of the KE</li> <li>• Speed restrictions</li> </ul>	Multiple (see report)	C4 Moderate	L5 Very Unlikely	D Low	Reasonably practical controls have been implemented

It is not considered likely that any of these impacts would result in a direct safety incident, however there may be operational impact as a result while the line is suspended for any investigations or to make it safe.