EES Inquiry - Melbourne Metro Rail Project

Expert Witness Statement of Amelia Russo

1. Name and address

Amelia Russo
Meinhardt
c/o Level 11, 501 Swanston St
Melbourne VIC 3000

2. Qualifications, experience and areas of expertise

(a) I have a Bachelor Degree in Chemical Engineering from the University of Melbourne, and currently hold the position of Associate Director, Environmental Services at Meinhardt.

(b) I have over nine years' experience as a consultant in environmental management.

(c) My areas of expertise include environmental risk assessments, environmental audits, environmental approvals, environmental licensing and compliance and environmental management systems.

(d) My Curriculum Vitae is included in Attachment A.

3. Scope

3.1. Instructions

(a) I have been asked by Maddocks acting for RMIT University (RMIT) to prepare this witness statement and to:

i. Provide an overview of the peer review of the Environment Effects Statement (EES) for the Melbourne Metro Rail Project (Melbourne Metro) conducted by Meinhardt on behalf of RMIT

ii. Outline my involvement in the peer review

3.2. Reports Reviewed

(a) In preparing this statement I have reviewed the following documents:

i. *Melbourne Metro Rail – EES Peer Review, RMIT University*, Meinhardt, June 2016

ii. *Environment Effects Statement, RMIT University Submission, Melbourne Metro Rail Project,* RMIT University, 5 July 2016

(b) As part of the peer review, I also reviewed the following components of the EES:

i. Summary Report

ii. Chapters 1 to 6, and Chapter 23

iii. Technical Appendix B, Environmental Risk Register

3.3. Inputs from Others

(a) The findings presented in this statement are largely based upon reviews conducted by others, being specialist consultants within and external to Meinhardt, as indicated in section 4.1 (c) and section 4.2.

(b) It should be noted that the findings of specialist consultants external to Meinhardt do not necessarily represent the opinions of Meinhardt.

(c) My role in the peer review is outlined in section 4.1 (d).

---

4. Findings

4.1. Background to Meinhardt's Engagement by RMIT

(a) Meinhardt was engaged by RMIT in May 2016 to undertake a peer review of the Melbourne Metro EES.

(b) The purpose of the peer review was to review the scope and content of the EES to understand possible impacts on RMIT.

(c) Meinhardt coordinated a number of specialist consultants to review technical components of the EES, including:

i. Business and Economic Impacts – Essential Economics

ii. Ground Movement and Land Stability – CMW Geosciences

iii. Building Structures – Meinhardt

iv. Environmental Management Framework – Meinhardt

v. Groundwater – Meinhardt

vi. Contaminated Land and Spoil Management – Meinhardt

vii. Land Use Planning – Meinhardt

viii. Noise and Vibration – Cogent Acoustics

ix. Services Infrastructure – Meinhardt

x. Social and Community – Public Place

xi. Surface Water – Meinhardt

xii. Traffic and Transport – Ratio

(d) My role in the project was to assist in coordination of specialist inputs, and to conduct a peer review of the Environmental Management Framework presented in Chapter 23 of the EES.

(e) Particular expertise within Meinhardt relating to other peer reviews listed above is outlined in the respective peer review reports (see Attachment C).

(f) Particular expertise of the specialist consultants engaged by Meinhardt is outlined in the respective peer review reports (see Attachment C).

(g) In general, the approach to each specialist review comprised:

i. A review of existing site operations and requirements of RMIT during and after construction of the Melbourne Metro.

ii. A review of relevant chapters and technical appendices of the EES with respect to the impacts to RMIT and the requirements of RMIT, in particular:

- a review of the risks identified by the EES
- a review of the impact assessment presented in the EES

iii. Based upon the above, a review of the proposed Environmental Performance Requirements (EPRs) and comment on whether they are sufficient to address potential risks and impacts relevant to RMIT.

The review process is outlined in Attachment B.

(h) Each specialist consultant prepared a report outlining the findings of their review. Meinhardt consolidated these reports and prepared a summary document to outline key findings of the peer review.

(i) The peer review report was completed on 22 June 2016.

(j) The peer review report, including Meinhardt's summary document and supporting specialist peer reviews is included in Attachment C.

(k) I understand that RMIT prepared their submission to the EES with consideration to the peer review report.

4.2. Key Findings of EES Peer Review

The key findings of the peer review are summarised following.

(a) Business and Economic Impacts

The peer review conducted by Essential Economics found that:

i. The CBD North Station Precinct boundary is contestable on the grounds that it is arguably too conservative to account for other parts of the RMIT campus with the potential to be adversely impacted.

ii. The method for calculating Gross Value Added (GVA) for non-commercial entities such as RMIT is acknowledged to be difficult. The lack of detail about how GVA has been calculated for these entities cast doubt over subsequent conclusions, such as impact assessments and risk analyses (based on consequences directly linked to GVA changes).

iii. The effect of vibration and noise on sensitive research equipment is an important issue. This impact may include cancelling or deferring important research, and associated costs do not seem to be adequately considered in the EES.

iv. Consideration of other potential impacts are inadequate, including the possibility of a reduction in student demand and the extent to which commercial operations (event hosting and functions, access to research facilities etc.) may be impacted.

(b) Ground Movement and Land Stability

The peer review conducted by CMW Geosciences found that:

i. Although extensive investigation and analysis has already been completed, the project is still at the conceptual (or preliminary at best) stage. The impact and risk assessments carried out appear appropriate at this stage but there is much more investigation, analysis and design required before construction commences.

ii. The assessment of ground movement is preliminary with a Potential Zone of Influence identified in plan. Numerous RMIT structures bordering Swanston Street, Franklin Street, A'Beckett Street Little La Trobe Street and La Trobe Street are partially or wholly within the Potential Zone of Influence. Given the preliminary nature of the settlement estimates, the estimates of impact (building damage) from ground movement are also preliminary, based on a limited sample of structures within the Potential Zone of influence.

iii. The EPRs for ground movement are qualitative only, describing a mitigation process but falling short of targets for ground movement. The peer review recommended that RMIT be engaged in the development of criteria for ground movement at the design stage.

iv. In terms of vibration, encountering hard rock requiring blasting is identified as risk at CBD North Station. The use of blasting should be resisted unless the residual risk of damage can be reduced to an acceptable level.

(c) Building Structures

i. Meinhardt's review of potential impact to RMIT building structures associated with Melbourne Metro involved peer review of the following aspects of the EES:

- Noise and Vibration
- Groundwater
- Ground Movement and Land Stability

ii. With regard to Noise and Vibration the peer review found that:

- Mitigation measures outlined in the EES fail to reduce the residual risks of some items to low or very low. Consequently Meinhardt recommended that RMIT request additions and alterations to the various EPRs applicable to Noise and Vibration.
- The EPRs do not protect RMIT from air borne construction noise as there are no applicable Guideline Noise Levels.
- The EPRs do not protect RMIT from ground borne construction noise as there are no applicable Guideline Noise Levels for education facilities.

iii. With regard to Groundwater the peer review found that:

- The EES adequately identifies the key issues associated with Groundwater impacts that could potentially impact on RMIT building structures.
- Mitigation measures outlined in the EES reduce the residual risks of groundwater to low or very low. Consequently Meinhardt did not propose any amendments to the EPRs for Groundwater in relation to impact on RMIT's building structures.

iv. With regard to Ground Movement and Land Stability the peer review found that:

- The EES adequately identifies the key issues associated with Ground Movement and Land Stability impacts that could potentially impact on RMIT building structures.
- The EES has not considered individual impacts of settlement on all structures, utilities and infrastructure with the CBD North precinct.
- Meinhardt recommended some modifications to the EPRs for Ground Movement and Land Stability.

v. The peer review also found that enabling works have been determined to not have significant effects on the environment and are therefore not subject to the requirements of this EES, even though these works will impact on RMIT.

(d) Environmental Management Framework

The peer review conducted by Meinhardt found that:

i. Due to the nature of the project delivery approach, detailed environmental management documentation will not be prepared until contractor(s) have been appointed and the detailed design and construction methodology has been developed. As such, the EPRs are the key element of the EES for RMIT to review and assess whether adequate controls will be put in place to address the key risks and impacts of concern to the University.

ii. The EPRs are not adequate to ensure that RMIT will be actively involved in the development of the Construction Environmental Management Plan (CEMP), Operations Environmental Management Plan (OEMP) and associated documentation. As such, Meinhardt recommended that all EPRs which require the development of the CEMP, OEMP and specific sub-plans should list RMIT as a key stakeholder that must be consulted during development and implementation of these plans.

(e) Groundwater

The peer review conducted by Meinhardt found that:

i. Groundwater drawdown (lowering of groundwater levels) associated with the CBD North station construction was identified as the primary pathway for potential impacts to RMIT. At the proposed CBD North station location the EES has estimated that groundwater levels will need to be lowered approximately 22m to keep the excavation dry during construction.

ii. The key potential risk identified for RMIT is the movement of existing contaminated groundwater plumes located near RMIT, to beneath RMIT properties. The potential impacts associated with the movement of contaminated groundwater include the preclusion of groundwater beneficial uses and potential vapour intrusion to existing structures.

iii. The EES deemed the residual risk of movement of groundwater contaminant plumes onto third party properties as medium for the CBD North station.

(f) Contaminated Land and Spoil Management

The peer review conducted by Meinhardt found that:

i. The key potential risks and impacts identified for RMIT are associated with spoil management, on-site stockpiling, the location of temporary stockpile areas (TSAs), health and safety, and the disturbance of ground gases and contamination migration pathways. Specific risks include:

- Increased volumes and / or incorrect classification of ‘spoil’ leading to inappropriate re-use and the need for TSAs;
- Inappropriate handling, stockpiling and/or treatment of contaminated ‘spoil’, which may lead to adverse impacts on the environment, human health and social impacts;
- Disturbance of ground gases and migration pathways, which may cause contamination to migrate from impacted strata to un-impacted strata or may enable entrained gasses and vapours to be released; and
- Risks associated with exposure to hazardous substances for employees, visitors and the general public.

(g) Land Use Planning

The peer review conducted by Meinhardt found that:

i. Application of the proposed planning framework and construction timeframe will impact future development projects and opportunities within RMIT.

ii. RMIT will be impacted by the proposed planning framework, both during construction and following construction. Key impacts may be summarised as:

- A Design and Development Overlay (DDO) will be applied along the alignment of the proposed tunnel and to land adjacent (including RMIT land). A number of RMIT buildings would be included within the Overlay. The Overlay would trigger new requirements to obtain planning permits on RMIT land.
- An Incorporated Document will be introduced and will have statutory weight within the Melbourne Planning Scheme. The Incorporated Document would approve development and land use which is yet to be identified and as such adequate considerations cannot reasonably be expected to occur. It is of concern that a number of planning permit exemptions which would enable an applicant (contractor) to undertake buildings and works without a planning permit and without notifying RMIT. Meinhardt queried what statutory rights RMIT would have to review and provide input into future proposals and planning processes, in order to protects its interests.

iii. RMIT land will be required for the project. This will involve acquisition or temporary occupation. The following assets are likely to be affected:

- Building 37 and Building 100 – Transfer of strata rights
- Building 38 – Acquisition
- A'Beckett Urban Square (part of) – Occupied for construction purposes (approx. 5 years)

iv. There appears to be very little understanding within the EES regarding the use of RMIT buildings and land. RMIT has a number of sensitive land uses and activities in close proximity to the proposed tunnel alignment. This poses a risk to RMIT's business continuity and may have significant cost implications for RMIT as well as third parties who rely upon or derive benefit from RMIT activities. Statutory and non-statutory measures are required to ensure that sensitive land uses and activities within RMIT buildings are protected, or measures to properly mitigate impacts are ensured.

(h) Noise and Vibration

The peer review conducted by Cogent Acoustics found that:

i. Airborne construction noise will present significant impacts to RMIT. Noise levels in excess of 80 dB(A) are predicted outside Buildings 9, 14, 36 and 83 for approximately three years of the construction period. The recommended EPRs provide no fixed limit to the level of noise that can be generated by the works outside RMIT facilities at any time of day. It is strongly recommended that RMIT should seek additional limits on airborne construction noise emissions to limit noise levels emitted to RMIT buildings.

ii. The likely ground-borne construction noise levels inside RMIT buildings have not been fully investigated in the EES. Based on predictions performed for nearby residential buildings, ground-borne construction noise is considered to be a high risk to RMIT, particularly for the buildings closest to the proposed station cavern. The EPR relating to ground-borne construction noise (EPR NV11) does not provide any protection to RMIT from the potential effects of ground borne construction

noise, as it applies to residential dwellings only. The peer review recommended that RMIT seek criteria to be included in the EPRs that would protect teaching spaces and other noise sensitive areas within RMIT buildings when in use.

iii. The construction vibration assessment presented in the EES predicts that there will be some short to medium term amenity impacts to RMIT at various stages of construction, and likely vibration impacts to vibration sensitive equipment contained in RMIT Building 14. Mitigation of the vibration impacts will be possible to a limited degree, but temporary rescheduling or relocation of sensitive equipment may be necessary. It is recommended that RMIT should ensure a mechanism is put in place to guarantee that any costs associated with temporary rescheduling or relocation of equipment are not borne by RMIT or are adequately compensated.

iv. Noise due to the operation of fixed infrastructure such as the ventilation structures is unlikely to significantly impact RMIT, however, the relevant EPR (EPR NV16) for this source of noise does not apply to directly to RMIT, so does not guarantee that RMIT will be adequately protected. It is recommended that RMIT should seek a direct limitation to the ventilation plant noise levels at the façades of the RMIT buildings adjacent to the ventilation structures.

v. Noise and vibration due to the operation of trains when the project is complete is not predicted to present any significant adverse effects for RMIT. The EPRs proposed in relation to operational noise and vibration are considered to adequately protect RMIT's interests, subject to possible modifications to EPR NV17 to provide additional assurance around ground-borne noise levels.

(i) Services Infrastructure

The peer review conducted by Meinhardt found that:

i. Early works diversion of sewer services from Building 37 in A'Beckett Street will require re-routing of this piping within the building to connect to the sewer main in Literature Lane. This work will need to be investigated and agreed with the authority to ensure it does not create undue disruption and will not limit the future development potential of the building.

ii. There will be a requirement for RMIT to undertake significant communications network re-routing of their own in-street communications network including identification of all assets potentially affected by the communications diversions undertaken by Telstra, Optus and other carriers. This will require significant time and resources for RMIT.

iii. Diversion of HV power, water and sewer service by the authorities may cause disruption to service to RMIT buildings. RMIT has critical operations which can be significantly impacted by frequent or unscheduled service interruptions. In addition, where temporary diversions limit the ability of RMIT to undertake development projects to meet their campus growth master plan, this will have an operational, reputational and financial impact on RMIT.

iv. The inclusion of services plant areas forming part of the MMR project may present impact on amenity to existing RMIT buildings due to loss of parking, reduced access, increased noise, increased EMI emissions, and negative visual impact on the streetscape.

(j) Social and Community

The peer review conducted by Public Place found that:

i. The Social and Community Impact Assessment (SIA) identifies most physical and social changes with the potential to cause negative impacts for RMIT, its staff and students. The potential displacement of users of RMIT's Urban Square is a notable exception.

ii. However, the SIA does not provide sufficient detail to enable the reader to fully understand the nature and magnitude of the potential physical and social changes associated with the Concept Design, or what impact these would have for RMIT, its staff and students. As a result, it is unclear how the risk ratings presented in Section 6 of the SIA reflect risks for RMIT, its staff and students either pre or post mitigation.

iii. The proposed EPRs and mitigation measures are not sufficient to adequately address potential impacts of the Concept Design for RMIT, its staff and students:

- The EPRs and mitigation measures are not always appropriately targeted. For example, the EPRs relating to amenity impacts do not refer to the management of construction noise or vibrations, even though the EES indicates that the vibration Guideline Targets would be exceeded for some vibration-sensitive equipment at RMIT.
- Some EPRs are framed in terms of minimising physical change rather than ensuring that associated impacts are contained within a tolerable range.
- The proposed EPRs do not address the potential displacement of recreational users from RMIT's Urban Square.
- The proposed EPRs do not address the potential impact of the Concept Design on pedestrian safety, connectivity and legibility in the CBD North Precinct post construction.

(k) Surface Water

The peer review conducted by Meinhardt found that:

i. The detailed design for Melbourne Metro should include hydrologic, hydraulic and surface flow modelling to ensure and demonstrate that there is no detrimental effect to RMIT.

ii. Detailed drainage design and supporting documents should be provided to RMIT before works are commenced.

iii. Drainage works should not commence until RMIT acceptance of the Melbourne Metro drainage design has been given.

iv. The MMRA and/or its contractor should undertake dilapidation reports of RMIT works and services in the vicinity of the works, inclusive of CCTV inspection of RMIT drainage and sewerage, prior to works.

(l) Traffic and Transport

The peer review conducted by Ratio found that:

i. The risk assessment undertaken in the Transport Impact Assessment (TIA) identifies two risks which are relevant to RMIT. The identified risks are worded broadly and generally relate to congestion and reduced connectivity as a result of the construction works for all transport modes. Ratio Consultant's assessment also identifies that there are additional risks which have not been identified in the TIA.

ii. Ratio Consultants have recommended a number of EPRs in addition to those already recommended by the MMRA to reasonably protect the interests of RMIT, and ensure the University can continue to operate satisfactorily.

iii. Key considerations for traffic and transport include:

- Vehicle Access: RMIT is serviced by a number of loading / waste collection areas which are critical to the day-to-day operations of the University. Any impacts to vehicle access to these areas must be maintained during both the construction and legacy stages of Melbourne Metro. RMIT must be consulted to find suitable alternative arrangements, if impacts are not avoidable.
- Pedestrian Access: RMIT is serviced by a number of pedestrian access points which are critical for access and circulation of the University. These areas must be maintained during both the construction and legacy stages. Key pedestrian crossing points and thoroughfares, particularly across Swanston Street must be maintained to a safe standard throughout the construction stage Melbourne Metro.
- Public Transport: Students and staff of RMIT rely heavily on the surrounding public transport network as their primary transport mode for access to the Campus. Public transport must be maintained during the construction and legacy stages of Melbourne Metro. Regular monitoring of the surrounding public transport services must be undertaken to ensure that this critical transport mode continues to provide safe and efficient access to the Campus.

4.3. Recommendations Arising from EES Peer Review

(a) Based upon the findings of the peer review, each specialist consultant provided comment on the adequacy of the relevant EPRs and made recommendations for improvement of the EPRs, where applicable.

(b) A summary of the recommended amendments to the EPRs is included in Attachment D. This also includes suggested additional EPRs, and comments on additional risks or identified data gaps that require further assessment.

(c) I understand that RMIT gave consideration to the recommended amendments to the EPRs in preparing its submission.

4.4. Summary of Opinions

(a) It is my opinion that the proposed Environmental Management Framework (EMF) for Melbourne Metro is a robust framework, comprising a comprehensive set of documentation and controls. The level of independent review and verification to be undertaken provides some surety to key stakeholders that the EMF will be implemented and controlled. However, as identified by the peer review and RMIT's submission, a number of amendments to the EPRs are required to ensure that potential impacts to RMIT are adequately managed.

(b) Depending on the detailed design that is developed, and the extent to which it varies from the concept design presented in the EES, there may be additional risks relevant to RMIT which have not been considered in the current impact assessments and corresponding EPRs. As such, I believe that it will be critical for RMIT to be consulted in the ongoing preparation and implementation of environmental management documents required by the EMF to ensure that site-specific risks, issues and opportunities during the construction process can be adequately considered and addressed.

(c) While the peer review made comments regarding the planning scheme amendment documents, and RMIT's ongoing involvement in planning decision making, I understand that RMIT is calling planning evidence from Hugh Smyth.

(d) While the peer review made comments and recommendations regarding the potential impacts associated with noise and vibration, I understand that RMIT is calling on acoustic and vibration evidence from Peter Fearnside.

(e) It is my opinion that all suggested amendments and comments presented in Attachment D should be considered by the Panel for incorporation into the Melbourne Metro EMF. Where additional risks or data gaps have been identified, either by the peer review or RMIT's submission, and/or there is a need for additional EPRs, further inputs from relevant specialists would be required.

5. Declaration

I have made all the inquiries that I believe are desirable and appropriate and no matters of significance which I regard as relevant have to my knowledge been withheld from the Panel.

11th August 2016

Attachments:

Attachment A – Curriculum Vitae

Attachment B – Overview of Peer Review Process

Attachment C – Peer Review Report

Attachment D – Summary of Recommended Amendments to the EPRs

Attachment A – Curriculum Vitae

Amelia RUSSO

Associate Director – Environmental Services

Amelia is a Chemical Engineer with over nine years' experience as a consultant in environmental management. For the past five years Amelia has focused on waste management and environmental compliance, particularly in relation to landfills and contaminated land.

She also has experience in environmental approvals, having coordinated works approval applications for a range of industrial facilities, and had a key role in delivery of the Environment Effects Statement for the Victorian Desalination Project.

Her experience in assisting with the preparation of numerous statutory environmental audits has required a thorough understanding of environmental policy, legislation and current best practice for environmental management.

Qualifications

- Bachelor of Engineering (Chemical) (Hons.), University of Melbourne, 2006

Professional Experience

2015-present	Associate Director – Environmental Services	Meinhardt
2010-2015	Team Leader, Waste Management & Environmental Compliance	GHD Pty Ltd
2009-2010	Waste Management Consultant	GHD Pty Ltd
2006-2009	Graduate Chemical Engineer	GHD Pty Ltd

Specialist Skills

- Environmental risk assessment
- Environmental audits
- Environmental approvals
- Environmental licensing and compliance
- Environmental management systems
- Waste management
- Landfill gas assessment
- Stakeholder consultation
- Project management

Key Projects

Environmental Approvals

- Preparation of works approval applications for a proposed in-vessel composting facility in Bulla, a proposed thermal desorption facility to remediate contaminated soils and a new wastewater treatment plant in Murrabit.
- Key role in coordination of specialist environmental studies and preparation of works approval application for the Victorian Desalination Project Environment Effects Statement.

Environmental Licensing and Compliance

- Licence compliance assessment for 65 operational landfills in Victoria.
- Provision of advice in relation to post-closure management of a number of landfills in Victoria.
- Advice with regard to implementation of environmental audit recommendations for a number of landfills in Victoria.

Amelia RUSSO

Associate Director – Environmental Services

Contaminated Land Assessment

- Assessment of soil contamination, including perfluorinated compounds (PFCs), for stockpiled material within an airport site.
- Coordination of desktop (Phase I) and detailed (Phase II) environmental assessments for proposed development sites.

Airports Environmental Management

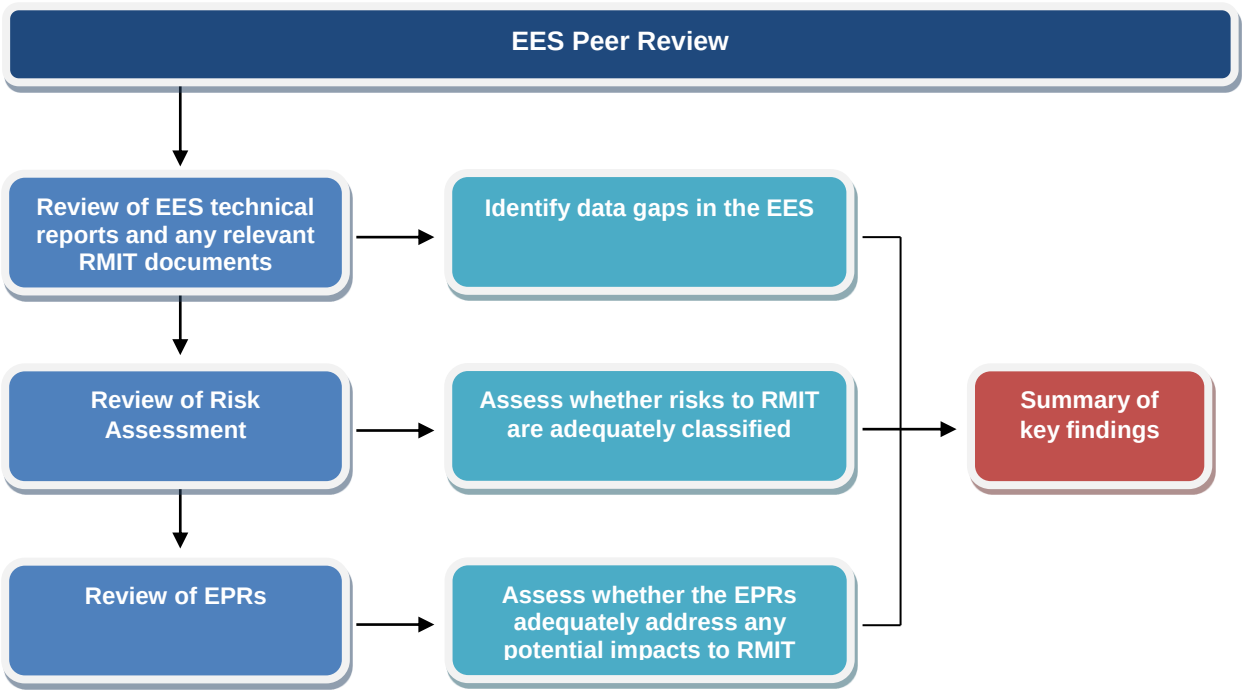
- Project Director for various projects at Essendon and Moorabbin airports including environmental site assessments, assessment of PFC contamination, regular environmental monitoring, implementation of environmental strategy actions, preparation and of environmental management plans and auditing of construction environmental management plan implementation.

Environmental Auditing

- Review of EPA Victoria's system for the appointment and management of environmental auditors.
- Auditor's assistant and project manager for the preparation of landfill operational audits for Clayton Regional landfill, Stawell landfill and Violet Town landfill.
- Auditor's assistant and project manager for landfill construction verification audits, including Cell 2 (Stages 2 and 3) at the Hi-Quality landfill in Bulla, a new leachate pond at the Smythesdale landfill, Cell 1 Johns Land at the Dooen landfill, Cell 3 at the Koonwarra landfill and capping of the Trafalgar landfill.

Attachment B – Overview of Peer Review Process

Overview of the Melbourne Metro EES Peer Review Process for RMIT



Attachment C – Peer Review Report

Melbourne Metro Rail – EES Peer Review
RMIT University

June 2016

Prepared For:

RMIT University
124 La Trobe Street
Melbourne Vic 3000

Meinhardt

Level 12, 501 Swanston Street
Melbourne, Vic 3000

P. 03 8676 1200 | F. 03 8676 1201
www.meinhardtgroup.com

	Summary Report
Appendix 1	Business and Economic Impacts
Appendix 2	Geological and Subterranean
Appendix 3	Building Structures
Appendix 4	Environmental Health and Safety
Appendix 5	Groundwater
Appendix 6	Land Use Planning
Appendix 7	Noise and Vibration
Appendix 8	Services Infrastructure
Appendix 9	Social and Community
Appendix 10	Traffic and Transport

Summary Report

Melbourne Metro Rail – EES Peer Review
RMIT University

June 2016

Prepared For:

RMIT University
124 La Trobe Street
Melbourne Vic 3000

Meinhardt

Level 12, 501 Swanston Street
Melbourne, Vic 3000

P. 03 8676 1200 | F. 03 8676 1201
www.meinhardtgroup.com

REV	DATE	WRITTEN BY	REVIEWED BY	APPROVED BY
A	20/06/2016	A.Burnett	T.Harrington	T.Harrington
B	21/06/2016	A.Burnett	T.Harrington	T.Harrington

TABLE OF CONTENTS

TABLE OF FIGURES

1 Introduction

Meinhardt was engaged by Royal Melbourne Institute of Technology (RMIT) to undertake a peer review of specialist technical reports released through an Environmental Effects Statement (EES) pertaining to the proposed Melbourne Metro Rail Project (Melbourne Metro) project.

This Summary Report provides an overview of the process and project as a whole, as well as identifying the Key Findings of the Peer Review, which can be found within Section 3 of this report.

It is intended that this peer review will assist RMIT with both the preparation of its submission to the EES as well as further discussions with Government.

1.1 The Melbourne Metro Rail Project

The Melbourne Metro will introduce five new underground stations, with two new city stations directly connected to Flinders Street and Melbourne Central. The new Metro Tunnel will let more trains run in and out of the city by giving the Cranbourne, Pakenham and Sunbury lines their own tunnel through the CBD.

The Melbourne Metropolitan Rail Authority (MMRA) identifies that building Melbourne Metro presents a number of challenges, including:

- managing disruption to residents, businesses and events
- mitigating the impacts on road traffic, pedestrians, cyclists and existing public transport and freight services
- navigating existing underground infrastructure including utilities, the City Loop and CityLink tunnels
- excavating through a range of geological conditions including rock, clay and silt
- tunnelling under two significant waterways, the Yarra River and Moonee Ponds Creek
- managing the logistical task of removing large amounts of excavated material.

Site investigations are currently underway to inform the alignment, design and assist in identifying the preferred construction methodology.

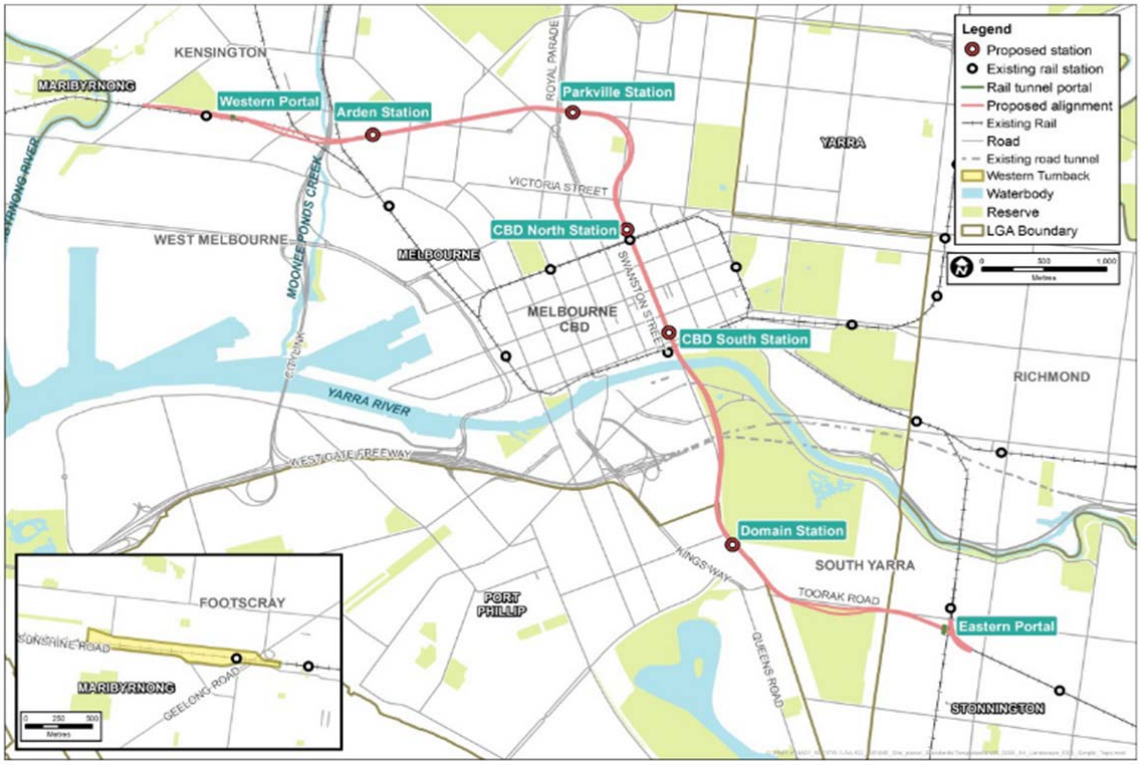


Figure 1: Melbourne Metro Rail Project

Source: Melbourne Metro EES

1.2 City North Precinct

CBD North station will be located directly under Swanston Street, generally between La Trobe Street and Franklin Street. The station will include a direct underground connection to Melbourne Central Station, allowing commuters to interchange between Metro Tunnel and City Loop services.

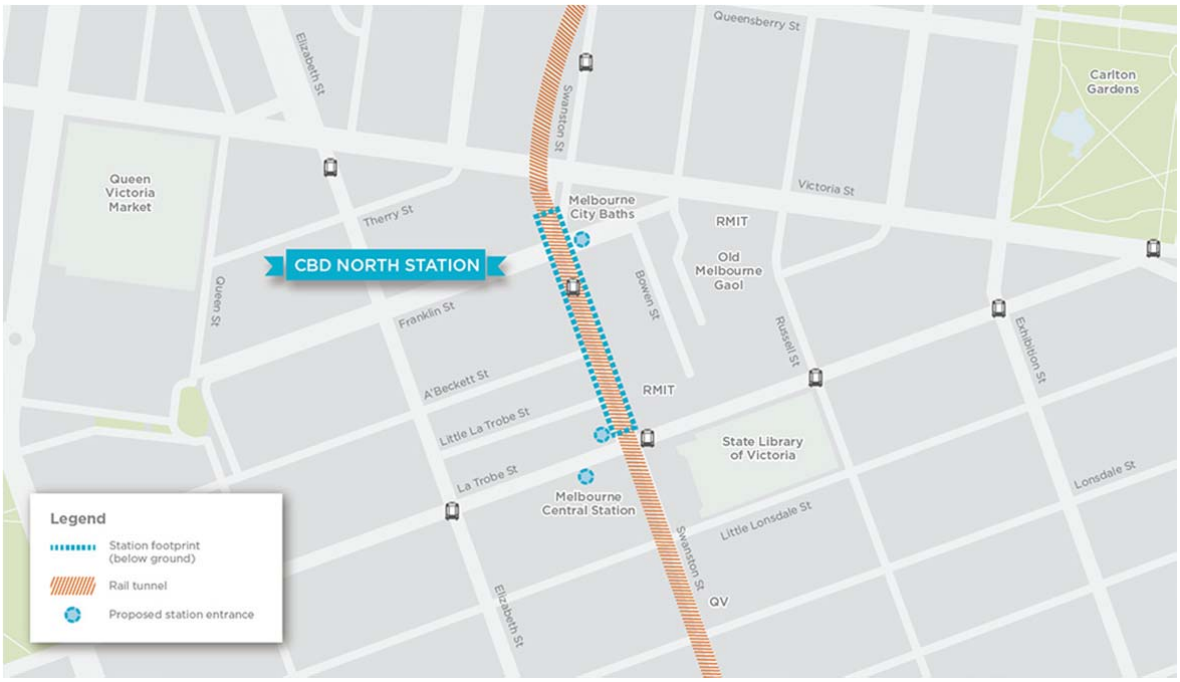


Figure 2: CBD North Station

Source: Melbourne Metro EES

It is proposed that CBD North station will have three main entrances:

- The southern entrance is to be located at the corner of La Trobe and Swanston streets, with an underground pedestrian connection to Melbourne Central station.
- The northern entrance is to be located near the corner of Swanston and Franklin streets.
- There will be a direct underground connection to Melbourne Central Station from CBD North.

CBD North station will include ventilation shafts to circulate air from the station concourses, platforms and tunnels for the comfort of passengers. They will also include exhaust systems that, in the event of an emergency, will quickly remove fumes from the station and tunnels. The Metro Tunnel will be used exclusively by electric trains.

The exact location of ventilation structures and station utilities will be finalised in consultation with local stakeholders as part of the project's planning and detailed design phases.

1.3 The EES Process

Due to the scale of the project and potential for environmental Melbourne Metro is to be assessed through an EES process, pursuant to the provisions of the *Environment Effects Act* 1978.

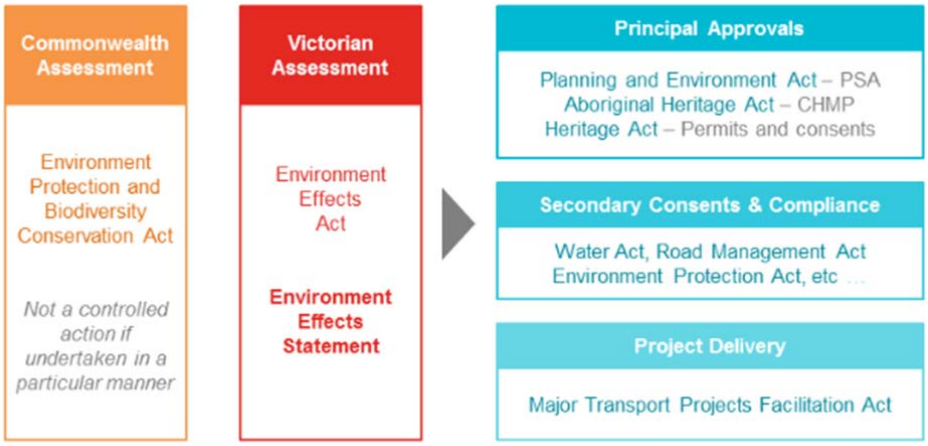


Figure 3: Key Project Legislation and Approvals

Source: Melbourne Metro EES

The EES Scoping Requirements were released in November 2015, following public consultation. It is understood that RMIT made no submissions to the scoping requirements. The Scoping Requirements provided the basis for the specialist studies which were undertaken as part of the EES assessment of the project's potential environmental and social risks. In total, 18 disciplines were combined to develop the EES.

The EES provides an assessment of the environmental, social and planning impacts associated with the project. The Melbourne Metro Rail Authority (MMRA) has prepared the EES. The EES is available for public review and comment, with submissions to be considered by an Independent Planning Panel. The Panel's report and the EES will inform the Minister for Planning's assessment of the project. Timelines as published by the MMRA are as follows:

1) Public Exhibition: Up to 6th of July 2016
2) Inquiry hearings: August/ September 2016
3) Final Assessment: Late 2016/ Early 2017

The alignment of the proposed Melbourne Metro is adjacent to, or in close proximity to many of RMIT's assets. The EES process provides an opportunity for RMIT to formally make its views known (noting that significant discussion and negotiation has occurred to date). Further information regarding the hearing can be obtained from: www.delwp.vic.gov.au/melbourne-metro-rail-hearing

1.3.1 Environmental Management Framework

The EES for the Melbourne Metro Rail Project includes an Environmental Management Framework (EMF), the purpose of which is to '*provide a transparent framework with clear accountabilities for managing environmental effects and hazards associated with construction and operation phases of the project, in order to achieve acceptable environmental outcomes'*.

Key components of the EMF include:

- Environmental Performance Requirements (EPRs);
- Construction Contractor's EMS documentation;
- Operator's EMS Documentation; and
- Other plans to comply with planning requirements.

Due to the nature of the project delivery approach, detailed environmental management documentation will not be prepared until contractor(s) have been appointed and the detailed design and construction methodology has been developed. As such, the EPRs are the key element of the EES for RMIT to review and assess whether adequate controls will be put in place to address the key risks and impacts of concern to the University.

1.3.2 Environmental Performance Requirements

The EPR have been developed based on the recommendations of the specialist reports, including an Environmental Risk Assessment. The project contractors will be required to adopt measures to avoid, manage or reduce the project's environmental impacts by defining the outcomes to be achieved rather than specifying the approach to be taken. A key focus of this peer review is on the EPR's. The figure below provides an overview of the Environmental Management Framework (EMF), including the EPRs.

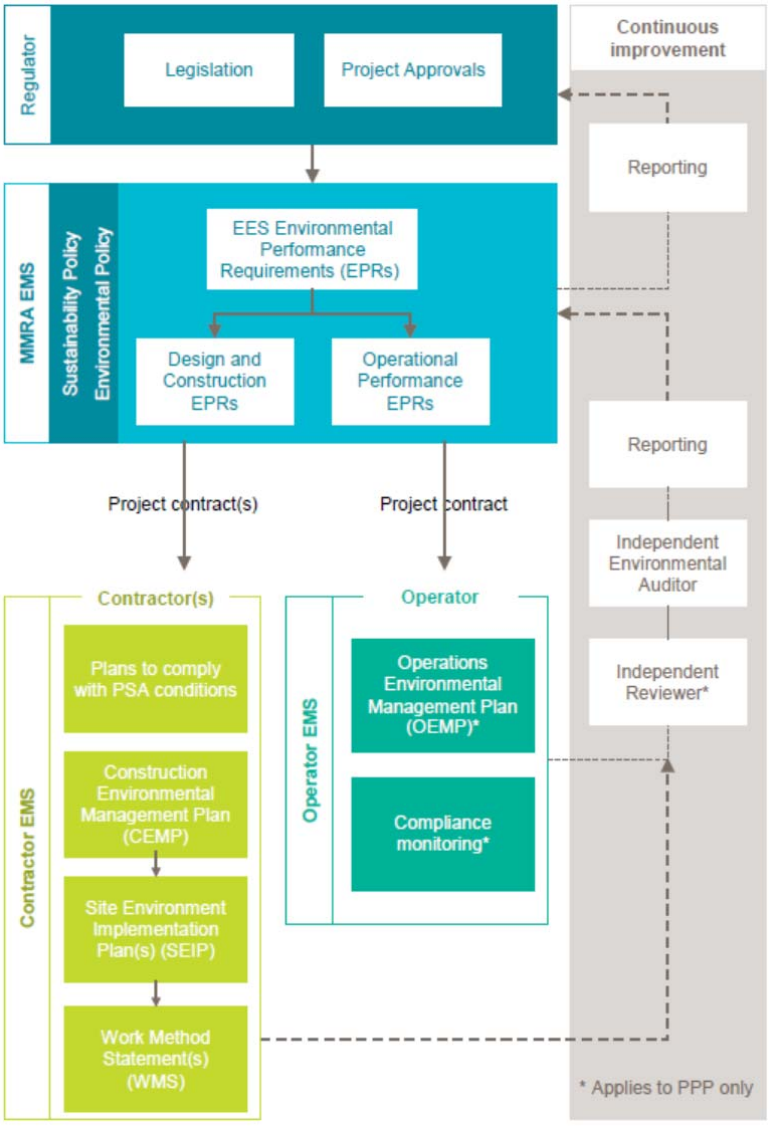


Figure 4: Environmental Management Framework

Source: Melbourne Metro EES

2 Methodology

2.1 EES

Our review was undertaken as follows:

1. Discussions and attendance at meetings with RMIT and the MMRA to understand project scope.
2. Review of information provided by RMIT.
3. Agreement to key area of focus around the City North Precinct where the bulk of RMIT's assets are located.
4. Establishment of a Zone of Influence.
5. Establishment of Project Team including consultant briefing workshop.
6. Review of EES Documentation by each technical discipline.
7. Selected field investigations (Structural, Access and Movement)
8. Project Team Meetings held to confirm process, reporting, timeframes and content.
9. Preparation of Technical Reports.
10. Summary report prepared.

Investigations were primarily of a desktop nature and conducted over a period of 3 weeks throughout June 2016. The timeframes established for this review are to enable RMIT to use technical findings to inform its EES submission due 6 July 2016.

3 Key Findings

Based on input from across the technical team, we summarise the key impacts of the Melbourne Metro Rail tunnel on RMIT to be as follows:

- **Lack of detail:** The EES process used is based on plans and assessments of a conceptual nature. There is a reliance on goodwill, further plans, and reports to be produced.

- **Evaluation of project risk:** The EES contains a risk assessment matrix based on key themes. We believe the level of risk to be underestimated in a number of areas. Non-identified risks are not afforded consideration or appropriate minimisation or mitigation measures (within the EPR's – see below).

- **Environmental Performance Requirements:** Environmental Performance Requirements (EPR) are key to the EES. Future design and construction must comply with the EPR's. The conceptual level of detail does not allow for an informed understanding of risk to be developed, nor for a sufficiently robust EPR's to be devised. We have made a number of comments and suggested improvements to the EPR's.

- **Restricted opportunities for future input:** The EES (including Draft Planning Scheme Amendment and Environmental Performance Requirements) provides flexibility for the Government and future contractor to determine design outcomes and undertake works without third party notice or review. Given the lack of detail within the EES documentation, it is considered this exemption from opportunities for meaningful input and consultation with RMIT is premature. While the MMRA advise that there is the "intent" for future consultation, this appears to be based on goodwill. In short, the EES documentation is considered to contain insufficient commitments to meaningful consultation.

  It would be desirable to provide RMIT and opportunity to review and comment on future management plans, designs and the like with MMRA, Contractors, Government and other bodies. This can be achieved via both statutory and non-statutory means, and it is noted the technical documents provide various suggestions for how this could be achieved.

- **Planning:**
  - There appears to be very little understanding within the EES regarding the current use of RMIT buildings and land.
  - A Design and Development Overlay (DDO) will be applied along the alignment of the proposed tunnel and to land adjacent (including RMIT land). A number of RMIT buildings would be included within the Overlay. The Overlay would trigger new requirements to obtain planning permits on RMIT land.
  - An Incorporated Document will be introduced and will have statutory weight within the Melbourne Planning Scheme. The Incorporated Document would approve development and land use which is yet to be identified and as such adequate considerations cannot reasonably be expected to occur. It is of concern that a number of planning permit exemptions which would enable an applicant (contractor) to undertake buildings and works without a planning permit and without notifying RMIT. We question as to what statutory rights RMIT would have to review and provide input into future proposals, having regard to RMIT interests.

- **Impacts on Property:** Impacts on property are significant:
  - The CBD North Station Precinct boundary is contestable on the grounds that it is arguably too conservative to account for other parts of the RMIT campus with the potential to be adversely impacted.
  - Numerous RMIT structures bordering Swanston Street, Franklin Street, A'Beckett Street Little La Trobe Street and La Trobe Street are partially or wholly within the Potential Zone of Influence. Given the preliminary nature of the settlement estimates, the estimates of impact (building damage) from ground movement are also preliminary, based on a limited sample of structures within the Potential Zone of influence.
  - The proposed MMR works will have a significant impact on the existing services infrastructure serving the RMIT campus. The works proposed will necessitate the temporary relocation of all major services infrastructure located within Franklin Street, A'Beckett Street and other areas impacted by the work zones. This has the potential to create significant disruption and risk to RMIT operations.
  - The inclusion of services plant areas forming part of the MMR project may present impact on amenity to existing RMIT buildings due to loss of parking, reduced access, increased noise, increased EMI emissions, and negative visual impact on the streetscape.
  - Blasting at CBD North station to be excluded unless MMRP can demonstrate an appropriate level of risk to be determined in consultation with RMIT.
  - The method and lengthy time of construction poses a variety of potential issues for the University's buildings, including access and movement (including safety concerns for students

and staff walking between the RMIT buildings across multiple construction zones), potential for impacts to building integrity (particularly sensitive or heritage buildings), impacts caused by the major infrastructure services relocation which will be required, and risks and disturbance associated with construction including blasting, noise and vibration impacts which may make some buildings unusable at periods of time. Furthermore, occupation during construction will impact development potential (such as at A'Beckett Square).

- RMIT land will be required for the project. This will involve acquisition or temporary occupation. The following assets are likely to be affected:

  i. Building 37 and Building 100 – Transfer of strata rights.
  ii. Building 38 – Acquisition.
  iii. A'Beckett Urban Square (part of) – Occupied for construction purposes (approx. 5 years).

- **Noise and vibration:** Airborne and groundborne construction noise will present significant impacts to RMIT.
  - Noise levels in excess of 80 dB(A) are predicted outside Buildings 9, 14, 36 and 83 for approximately three years of the construction period. The recommended Environmental Performance Requirements (EPRs) provide no fixed limit to the level of noise that can be generated by the works outside RMIT facilities at any time of day. It is strongly recommended that RMIT should seek additional limits on airborne construction noise emissions to limit noise levels emitted to RMIT buildings.
  - The likely ground-borne construction noise levels inside RMIT buildings have not been fully investigated in the EES. Based on predictions performed for nearby residential buildings, ground-borne construction noise is considered to be a high risk to RMIT, particularly for the buildings closest to the proposed station cavern. The EPR relating to ground-borne construction noise (EPR NV11) does not provide any protection to RMIT from the potential effects of ground borne construction noise, as it applies to residential dwellings only. It is recommended that RMIT should seek criteria to be included that would protect teaching spaces and other noise sensitive areas within RMIT buildings when in use
  - The construction vibration assessment presented in the EES predicts that there will be some short to medium term amenity impacts to RMIT at various stages of construction, and likely vibration impacts to vibration sensitive equipment contained in RMIT Building 14. Mitigation of the vibration impacts will be possible to a limited degree, but temporary rescheduling or relocation of sensitive equipment may be necessary. It is recommended that RMIT should ensure a mechanism is put in place to guarantee that any costs associated with temporary rescheduling or relocation of equipment are not borne by RMIT or are adequately compensated.
  - Mitigation measures outlined in the EES fail to reduce the residual risks of some items to low or very low. Alterations to the various Environmental Performance Requirements applicable to Noise and Vibration are required.

- **Environment & Safety During Construction**
  In addition to the impacts the construction may have on buildings and structures, the environment will also be impacted, with possible impacts including noise and vibration, dust, restrictions on access and movement and safety concerns. The EPR's identify a significant number of further studies to be undertaken which relate to Environment and Safety during construction, including:

  - Environmental Management System
  - Construction Environmental Management Plan (CEMP)
  - Site Environmental Implementation Plan
  - Work Method Statement
  - Traffic Management Plan (for construction)
  - Sustainability Management Plan
  - Business Disruption plan
  - Community and Business Involvement Plan
  - Dust Management and Monitoring Plan
  - Construction Noise and Vibration Management Plan
  - Communications Plan
  - Cultural heritage Management Plan
  - Archaeological Management Plan
  - Tree Protection Plan
  - Spoil Management Plan
  - Acid Sulphate Soil and Rock Management Sub-Plan
  - Health, safety and environmental [plan for the management of hazardous substances
  - Groundwater Management Plan

- Ground Movement Plan
- Translocation Plan for the Management of Listen Fauna Species

It has been recommended that RMIT seek to be recognised as a stakeholder and be formally involved in the development of these various management plans, as at present there is insufficient detail to consider the specifics of potential impacts.

It is noted that an Independent Reviewer will be appointed jointly the MMRA and the contractor to review the CEMP and approval conditions. The level of independent review and verification provides some surety to RMIT that the EMF will be implemented and controlled, however as identified with the technical reports, there are a number of improvements that could be made to the EMF.

- **Movement & Access:** RMIT will face significant disruption during the construction period, due to the proximity of RMIT buildings to the CBD North Station, tunnel and general construction activity. The Social Impact Assessment identified that the EPRs do not address the potential impact of the Concept Design on pedestrian safety, connectivity and legibility in the CBD North Precinct post construction, and given the expected high utilisation of the CBD North station by students and staff, these considerations are likely to be of relevance to the University.

  The EES contains a lack of understanding relating to pedestrian safety during construction. Given the way in which students and staff likely move from building to building, it is recommended practical and safe crossing points and thoroughfares, particularly access Swanston Stage be maintained, refer to the Traffic Review of a detailed understanding of the identified gaps and possible responses.

  RMIT is serviced by a number of loading / waste collection areas which are critical to the day-to-day operations of the University, which may be impacted by construction and post construction.
  Furthermore, ongoing accessibility to public transport for students and staff will be important to maintain ongoing accessibility during construction.

- **Business and Economic:** The effect of vibration and noise on sensitive research equipment is an important issue. This impact may include cancelling or deferring important research, and associated costs do not seem to be adequately considered in the EES. Consideration of other potential impacts are inadequate, including the possibility of a reduction in student demand and the extent to which commercial operations (event hosting and functions, access to research facilities etc.) may be impacted.

4 Summary of Technical Findings

The Executive Summary of each of the Technical Reports is replicated within this Section. The individual reports of each relevant discipline are Appendixes to this report, and we refer you to these for a detailed understanding of each topic.

4.1 Business and Economic Impacts

Essential Economics carried out a peer review of Business and Economic impacts. Key findings from this review of the analysis of business impacts on RMIT University resulting from the construction of the CBD North Station (Chapter 11 of the EES and Technical Appendix G) are summarised below.

The management measures proposed to meet required environmental performance standards are inadequate in a number of respects:

1. The CBD North Station Precinct boundary is contestable on the grounds that it is arguably too conservative to account for other parts of the RMIT campus with the potential to be adversely impacted.

2. The method for calculating Gross Value Added for non-commercial entities such as RMIT is acknowledged to be difficult. The lack of detail about how GVA has been calculated for these entities cast doubt over subsequent conclusions, such as impact assessments and risk analyses (based on consequences directly linked to GVA changes).

3. The effect of vibration and noise on sensitive research equipment is an important issue. This impact may include cancelling or deferring important research, and associated costs do not seem to be adequately considered in the EES.

4. Consideration of other potential impacts are inadequate, including the possibility of a reduction in student demand and the extent to which commercial operations (event hosting and functions, access to research facilities etc.) may be impacted. In contrast, the effect of closing the Oxford Scholar Hotel is explicitly considered.

RMIT Melbourne University is large and complex, and operationally and financially quite different from most strictly commercial businesses.

Not all environmental issues relating to operational and business impacts are fully considered in the EES. Consequently, it is strongly suggested that an RMIT specific reference group be established to consider business impact and other issues, given the importance of RMIT to the CBD.

Please refer to attached technical report.

4.2 Geological and Subterranean

CMW undertook a peer review of geological and subterranean documentation released for the Melbourne Metro Rail Project.

The report focusses on the impact of groundwater drawdown and ground movement on the Royal Melbourne Institute of Technology (RMIT) Assets near the proposed CBD North Station. We have also reviewed the Noise and Vibration Section of the EES and provide some comments in terms of proposed blasting, however in general, we defer to the acoustic consultant in these matters.

Although extensive investigation and analysis has already been completed, the project is still at the conceptual (or preliminary at best) stage. The impact and risk assessments carried out appear appropriate at this stage but there is much more investigation, analysis and design required before construction commences.

The assessment of ground movement is preliminary with a Potential Zone of Influence identified in plan.

Numerous RMIT structures bordering Swanston Street, Franklin Street, A'Beckett Street Little La Trobe Street and La Trobe Street are partially or wholly within the Potential Zone of Influence. Given the preliminary nature of the settlement estimates, the estimates of impact (building damage) from ground movement are also preliminary, based on a limited sample of structures within the Potential Zone of influence.

The Environmental Performance Requirements for ground movement are qualitative only, describing a mitigation process but falling short of targets for ground movement. The lack of quantitative targets is somewhat understandable for a project at this stage of development and the EES recognises this in several places committing to further analysis of groundwater drawdown, settlement analysis and the setting of appropriate levels of building impact in consultation with stakeholders.

In terms of vibration, encountering hard rock requiring blasting is identified as risk at CBD North Station. The use of blasting should be resisted unless the residual risk of damage can be reduced.

We believe it is too early in the design stage to recommend quantitative limits on ground movement. At this stage we believe RMIT can best protect it's assets by maintaining it's engagement with MMRP and trying to hold some influence on future decisions. We recommend that RMIT request the following undertakings from MMRP:

1. RMIT be specifically identified in EPR GM02 as a stakeholder.

2. As a stakeholder, RMIT to be engaged in good faith to set appropriate criteria for acceptable damage.

3. All RMIT assets partially or wholly within the final Potential Zone of Influence (or any other similar zone identified during detailed design) should be specifically identified within the Ground Movement Management Plan. They should be surveyed prior to construction and be monitored for deformation during construction.

4. As a stakeholder, RMIT to be engaged in good faith to set appropriate actions if settlement of RMIT land exceeds estimates.

5. Blasting at CBD North station to be excluded unless MMRP can demonstrate an appropriate level of risk to be determined in consultation with RMIT.

Please refer to attached technical report.

4.3 Building Structures

Meinhardt has undertaken a Structural Engineering review of the EES, having regard to RMIT's buildings.

The report relates to the impact on RMIT's building structures with respect to the following aspects of the EES:
EES Section 13 – Noise and Vibration
EES Section 18 – Groundwater
EES Section 19 – Ground Movement and Land Stability

Noise and Vibration – in relation to impact on RMIT's building structures

1. The EES adequately identifies the key issues associated with Noise and Vibration impacts that could potentially arise from the MMRP.

2. Of the 9 risk categories identified for the Construction Phase of MMRP, after the proposed Environmental Performance requirements are implemented:
    a. 5 risks have a residual classification of Low
    b. 1 risk has a residual classification of Medium
    c. 2 risks have a residual classification of High (vibration impacting on amenity, and ground bourne noise)
    d. 1 risk is unclassified (vibration impacting buried pipework)

3. Of 4 risk categories identified for the Operational Phase of MMRP, all risks have a residual risk classification of Low, after the proposed Environmental Performance Requirements are implemented.

4. Mitigation measures outlined in the EES fail to reduce the residual risks of some items to low or very low. Consequently Meinhardt recommends that RMIT requests **additions and alterations** to the various Environmental Performance Requirements applicable to Noise and Vibration, as described in section 5.5 of this report.

5. The EPR ***do not*** protect RMIT from ***air bourne construction noise*** as there are no applicable Guideline Noise Levels.

6. The EPR ***do not*** protect RMIT from ***ground bourne construction noise*** as there are no applicable Guideline Noise Levels for education facilities.

Groundwater – in relation to impact on RMIT's building structures

1. The EES adequately identifies the key issues associated with Groundwater impacts that could potentially arise from the MMRP.

2. Mitigation measures outlined in the EES reduce the residual risks of groundwater to low or very low.

3. Consequently Meinhardt recommends that RMIT accept the Environmental Performance Requirements for MMRP in relation to Groundwater.

Ground Movement and Land Stability– in relation to impact on RMIT's building structures

1. The EES adequately identifies the key issues associated with Ground Movement and Land Stability impacts that could potentially arise from the MMRP.

2. Mitigation measures outlined in the EES reduce the residual risks of ground movement to low or very low.

3. One of the EPRs specifically requires the GMP to undertake any required repair work for properties and assets affected by ground movement.

4. Meinhardt recommends that RMIT accept the Environmental Performance Requirements for MMRP in relation to Ground Movement and Land Stability, with modifications as described in section 7.5 of the report.

Enabling Works

1. Enabling works have been determined to not have significant effects on the environment and are therefore **not subject to the requirements of this EES,** even though these works will impact on RMIT.

Please refer to attached technical report.

4.4 Environmental Health and Safety

Meinhardt undertook a review of Environmental Health & Safety. Key findings may be summarised as follows:

1. The EES for the Melbourne Metro Rail Project includes an Environmental Management Framework (EMF), the purpose of which is to '*provide a transparent framework with clear accountabilities for managing environmental effects and hazards associated with construction and operation phases of the project, in order to achieve acceptable environmental outcomes'*.
2. Key components of the EMF include:
   - Environmental Performance Requirements (EPRs);
   - Construction Contractor's EMS documentation;
   - Operator's EMS Documentation; and
   - Other plans to comply with planning requirements.
3. Due to the nature of the project delivery approach, detailed environmental management documentation will not be prepared until contractor(s) have been appointed and the detailed design and construction methodology has been developed. As such, the EPRs are the key element of the EES for RMIT to review and assess whether adequate controls will be put in place to address the key risks and impacts of concern to the University.
4. Meinhardt considers that the EPRs are not adequate to ensure that RMIT will be actively involved in the development of the Construction Environmental Management Plan (CEMP), Operations Environmental Management Plan (OEMP) and associated documentation. As such, it is recommended that all EPRs which require the development of the CEMP, OEMP and specific sub-plans should list RMIT as a key stakeholder that must be consulted during development and implementation of these plans.
5. The proposed level of independent review and verification of the EMF implementation provides some surety to RMIT that the EMF will be implemented and controlled. However, as discussed above, there are a number of improvements that could be made to the EMF documentation and consultation process that should be pursued by RMIT in their submission to the EES and subsequent discussions with MMRA. Meinhardt also recommends that (with regard to document approvals) the Independent Reviewer should be required to review and approve the Contractor's EMS and CEMP.

Please refer to attached technical report.

4.5 Groundwater

Meinhardt undertook a peer review of groundwater impacts. A summary of key findings is as follows:

1. Groundwater drawdown associated with the CBD North station construction is the primary pathway for potential impacts to RMIT. At the proposed CBD North station location the EES has estimated that groundwater levels will need to be lowered approximately 22m to keep the excavation dry during construction.
2. The key potential risk identified for RMIT is the movement of existing contaminated groundwater plumes located near RMIT, to beneath RMIT properties. The potential impacts associated with the movement of contaminated groundwater include the preclusion of groundwater beneficial uses and potential vapour intrusion to existing structures.
3. The EES deemed the residual risk of movement of groundwater contaminant plumes onto third party properties as medium for the CBD North station, which Meinhardt considers acceptable.
4. The EPRs define the management requirements for impacts during the design, construction and operation of the Melbourne Metro, Meinhardt have recommended that RMIT request the following inclusions:
    a. EPR No. GW2 should assess the potential for groundwater contamination migration to third party sites (i.e. RMIT properties).
    b. EPR No. GW3 should include a site specific risk assessment for GQRUZs considered to be affected by drawdown (particularly GQRUZs located at 539 - 553 Swanston St Carlton and 28 – 44 Bouverie St Carlton). The Risk Assessment should assess if groundwater contamination migration will impact third party sites (i.e. RMIT properties).
    c. EPR No.GW3 should include provision for analysis of rock cores to assess the site specific risk of potential acid sulphate soils.
    d. EPR No. GW3 should include provision for RMIT to be advised of any findings in the GMP that may impact RMIT.
    e. EPR No. GW4 should include provision for RMIT to be advised on the final method for groundwater disposal and whether this may impact RMIT in any way.
    f. EPR No. GW5 should include provision for RMIT to be advised if contaminant migration is evident at third party properties and of the proposed course of action to ameliorate any potential impacts.

Please refer to attached technical report.

4.6 Land Use Planning

Meinhardt undertook a peer review of Land Use and Planning impacts. Key findings were as follows:

1. Application of the proposed planning framework and construction timeframe will impact future development projects and opportunities within RMIT.

2. RMIT will be impacted by the proposed planning framework, both during construction and following construction. Key impacts may be summarised as:
    a. A Design and Development Overlay (DDO) will be applied along the alignment of the proposed tunnel and to land adjacent (including RMIT land). A number of RMIT buildings would be included within the Overlay. The Overlay would trigger new requirements to obtain planning permits on RMIT land.
    b. An Incorporated Document will be introduced and will have statutory weight within the Melbourne Planning Scheme. The Incorporated Document would approve development and land use which is yet to be identified and as such adequate considerations cannot reasonably be expected to occur. It is of concern that a number of planning permit exemptions which would enable an applicant (contractor) to undertake buildings and works without a planning permit and without notifying RMIT. We question as to what statutory rights RMIT would have to review and provide input into future proposals, having regard to RMIT interests.

3. RMIT land will be required for the project. This will involve acquisition or temporary occupation. The following assets are likely to be affected:
    - Building 37 and Building 100 – Transfer of strata rights.
    - Building 38 – Acquisition.
    - A'Beckett Urban Square (part of) – Occupied for construction purposes (approx. 5 years).

4. There appears to be very little understanding within the EES regarding the use of RMIT buildings and land. RMIT has a number of sensitive land uses and activities in close proximity to the proposed tunnel alignment. This poses a risk to RMIT's business continuity and may have significant cost implications for RMIT as well as third parties who rely upon or derive benefit from RMIT activities. Statutory and non-statutory measures are required to ensure that sensitive land uses and activities within RMIT buildings are protected, or measures to properly mitigate impacts are ensured.

5. Environmental Performance Requirements ('EPRs') provide an opportunity to control future activities, processes and actions of the contractor. However, these are limited and proactive engagement with the MMRA must be undertaken to ensure RMIT interests are sufficiently considered. Additionally, the City of Melbourne ('CoM') is recognised as a key stakeholder in many sections of the EES and EPRs. Liaising with the CoM to make them cognisant of RMIT's requirements will be important for the protection of RMIT's interests.

Having regard to RMIT's interests, we would suggest the following:

Draft Planning Scheme Amendment

- Incorporated Document amended to:
    - Recognise RMIT as a key stakeholder with regard to:
        - Development Plans
        - Environmental Management Framework
        - Urban Design Strategy
    - Include a notification process for any *Preparatory works*

Environmental Performance Requirements

- The Environmental Performance Requirements should be strengthened to protect RMIT's interests. Refer to Table 2-2.

Please refer to attached technical report.

4.7 Noise and Vibration

Cogent Acoustics Pty Ltd undertook a noise and vibration review of the Environmental Effects Statement (EES) for the Melbourne Metro Rail Project (MMRP), as issued by the Melbourne Metro Rail Authority (MMRA) on 25 May 2016.

A desktop review has been performed with the objective of highlighting the predicted key noise and vibration impacts to RMIT facilities, informing RMIT of any risks and impacts that may not be adequately addressed by the EES, and providing recommendations on matters that should be given further consideration in the EES process in order to protect the interests of RMIT.

The key finding of the review are as follows:

1. Airborne construction noise will present significant impacts to RMIT. Noise levels in excess of 80 dB(A) are predicted outside Buildings 9, 14, 36 and 83 for approximately three years of the construction period. The recommended Environmental Performance Requirements (EPRs) provide no fixed limit to the level of noise that can be generated by the works outside RMIT facilities at any time of day. It is strongly recommended that RMIT should seek additional limits on airborne construction noise emissions to limit noise levels emitted to RMIT buildings.

2. The likely ground-borne construction noise levels inside RMIT buildings have not been fully investigated in the EES. Based on predictions performed for nearby residential buildings, ground-borne construction noise is considered to be a high risk to RMIT, particularly for the buildings closest to the proposed station cavern. The EPR relating to ground-borne construction noise (EPR NV11) does not provide any protection to RMIT from the potential effects of ground borne construction noise, as it applies to residential dwellings only. It is recommended that RMIT should seek criteria to be included that would protect teaching spaces and other noise sensitive areas within RMIT buildings when in use.

3. The construction vibration assessment presented in the EES predicts that there will be some short to medium term amenity impacts to RMIT at various stages of construction, and likely vibration impacts to vibration sensitive equipment contained in RMIT Building 14. Mitigation of the vibration impacts will be possible to a limited degree, but temporary rescheduling or relocation of sensitive equipment may be necessary. It is recommended that RMIT should ensure a mechanism is put in place to guarantee that any costs associated with temporary rescheduling or relocation of equipment are not borne by RMIT or are adequately compensated.

4. Noise due to the operation of fixed infrastructure such as the ventilation structures is unlikely to significantly impact RMIT, however, the relevant EPR (EPR NV16) for this source of noise does not apply to directly to RMIT, so does not guarantee that RMIT will be adequately protected. It is recommended that RMIT should seek a direct limitation to the ventilation plant noise levels at the façades of the RMIT buildings adjacent to the ventilation structures.

5. Noise and vibration due to the operation of trains when the project is complete is not predicted to present any significant adverse effects for RMIT. The EPRs proposed in relation to operational noise and vibration are considered to adequately protect RMIT's interests, subject to possible modifications to EPR NV17 to provide additional assurance around ground-borne noise levels.

Based on the above findings, it is considered noise and vibration will be key issues for RMIT if the project proceeds. It is recommended that RMIT should engage in the EES process to ensure that potential noise and vibration impacts to RMIT are adequately addressed by the final Environmental Performance Requirements for the project.

Please refer to attached technical report.

4.8 Services Infrastructure (Water, Sewer, Power, Communications)

Meinhardt undertook a peer review of Services Infrastructure impacts. Key findings were as follows:

The proposed MMR works will have a significant impact on the existing services infrastructure serving the RMIT campus. The works proposed will necessitate the temporary relocation of all major services infrastructure located within Franklin Street, A'Beckett Street and other areas impacted by the work zones. This has the potential to create significant disruption and risk to RMIT operations. The key findings of our review are summarised below:

1. Early works diversion of sewer services from Building 37 in A'Beckett Street will require re-routing of this piping within the building to connect to the sewer main in Literature Lane. This work will need to be investigated and agreed with the authority to ensure it does not create undue disruption and will not limit the future development potential of the building.

2. There will be a requirement for RMIT to undertake significant communications network re-routing of their own in-street communications network including identification of all assets potentially affected by the communications diversions undertaken by Telstra, Optus and other carriers. This will require significant time and resources for RMIT.

3. Diversion of HV power, water and sewer service by the authorities may cause disruption to service to RMIT buildings. RMIT has critical operations which can be significantly impacted by frequent or unscheduled service interruptions. In addition, where temporary diversions limit the ability of RMIT to undertake development projects to meet their campus growth master plan, this will have an operational, reputational and financial impact on RMIT.

4. The inclusion of services plant areas forming part of the MMR project may present impact on amenity to existing RMIT buildings due to loss of parking, reduced access, increased noise, increased EMI emissions, and negative visual impact on the streetscape.

Please refer to attached technical report.

4.10 Social and Community

Public Place undertook a peer review of Social and Community impacts. Key findings were as follows:

1. The Social and Community Impact Assessment (SIA) prepared by AJM was completed in a manner generally consistent with procedural best practice, involved consultation with potentially affected stakeholders including RMIT and reflects the directions set out in the EES Scoping Requirements.
2. The SIA report is structurally complex. To understand the SIA, readers must move between multiple report sections and also various sections of Technical Appendix B - Environmental Risk Register Report, which makes comprehending the SIA a challenge.
3. Notwithstanding, the SIA identifies most physical and social changes with the potential to cause negative impacts for RMIT, its staff and students. The potential displacement of users of RMIT's Urban Square is a notable exception.
4. However, the SIA does not provide sufficient detail to enable the reader to fully understand the nature and magnitude of the potential physical and social changes associated with the Concept Design, or what impact these would have for RMIT, its staff and students. As a result, it is unclear how the risk ratings presented in Section 6 of the SIA reflect risks for RMIT, its staff and students either pre or post mitigation.
5. The proposed EPRs and mitigation measures are not sufficient to adequately address potential impacts of the Concept Design for RMIT, its staff and students:
    a. The EPRs and mitigation measures are not always appropriately targeted. For example, the EPRs relating to amenity impacts do not refer to the management of construction noise or vibrations, even though the EES indicates that the vibration Guideline Targets would be exceeded for some vibration-sensitive equipment at RMIT.
    b. Some EPRs are framed in terms of minimising physical change rather than ensuring that associated impacts are contained within a tolerable range.
    c. The proposed EPRs do not address the potential displacement of recreational users from RMIT's Urban Square.
    d. The proposed EPRs do not address the potential impact of the Concept Design on pedestrian safety, connectivity and legibility in the CBD North Precinct post construction.

Please refer to attached technical report.

4.11 Surface Water

Meinhardt undertook a Surface Water review. Key findings were as follows:

1. Respond to the EES with a requirement that the detail design the MMR works include hydrologic, hydraulic and surface flow modelling to ensure and demonstrate that there is no detrimental effect to RMIT.

2. Detail drainage design and supporting documents should be provided to RMIT before MMR works are commenced.

3. Drainage works should not commence until RMIT acceptance of the MMR drainage design has been given.

4. Request that the MMRA and/or its contractor undertake dilapidation reports of RMIT works and services in the vicinity of the works, inclusive of CCTV inspection of RMIT drainage and sewerage, prior to works.

Please refer to attached technical report.

4.12 Traffic and Transport

Ratio Pty Ltd undertook a Traffic and Transport review. Key findings were as follows:

The Melbourne Metro Rail Project is a public infrastructure project which proposes new rail tunnels between Kensington to South Yarra and five new stations, including a new station (CBD North) directly adjacent to RMIT City Campus. An Environmental Effects Statement (EES) has been prepared by the Melbourne Metro Rail Authority (MMRA) which assesses the environmental effects of the works proposed to be carried out for the project.

The EES is on public exhibition from 25 May to 6 July 2016, during which time, stakeholders and members of the public can make written submissions. This report has been prepared to provide advice to RMIT with respect to the transport related considerations of the Melbourne Metro Rail Project for inclusion in the submission being made by RMIT on the EES. A significant component of this report reviews the Transport Impact Assessment (TIA) which was prepared as a technical appendix to the EES.

Risk Assessment
The risk assessment undertaken in the TIA identifies two risks which are relevant to the University. The identified risks are worded broadly and generally relate to congestion and reduced connectivity as a result of the construction works for all transport modes. Ratio Consultant's assessment also identifies that there are additional risks which have not been identified in the TIA.

Impact Assessment
The additional risks identified within this report have been assessed against the operational requirements of the University. Discussion is provided with regards to the key considerations relating to minimising any impact to the RMIT City Campus for the duration of the works.

Environmental Performance Requirements
Ratio Consultants have recommended a number of Environmental Performance Requirements in addition to those already recommended by the MMRA to reasonably protect the interests of RMIT, and ensure the University can continue to operate satisfactorily. These requirements are presented in detail later in this report, with the key considerations detailed below:

Key Considerations
— *Vehicle Access*
- RMIT is serviced by a number of loading / waste collection areas which are critical to the day-to-day operations of the University. Any impacts to vehicle access to these areas must be maintained during both the construction and legacy stages of the MMR project. RMIT must be consulted to find suitable alternative arrangements, if impacts are not avoidable.

— *Pedestrian Access*
- RMIT is serviced by a number of pedestrian access points which are critical for access and circulation of the University. These areas must be maintained during both the construction and legacy stages. Key pedestrian crossing points and thoroughfares, particularly across Swanston Street must be maintained to a safe standard throughout the construction stage of the MMR project.

— *Public Transport*
- Students and staff of RMIT rely heavily on the surrounding public transport network as their primary transport mode for access to the Campus. Public transport must be maintained during the construction and legacy stages of the MMR project. Regular monitoring of the surrounding public transport services must be undertaken to ensure that this critical transport mode continues to provide safe and efficient access to the Campus.

Please refer to attached technical report.

Appendix 1: Business and Economic Impacts

Prepared by Essential Economics Pty Ltd

ESSENTIAL ECONOMICS

Melbourne Metro EES

Peer Review - Economics and Business

Prepared for

RMIT University

by

Essential Economics Pty Ltd

June 2016

Authorship

Report stage	Author	Date	Review	Date
Draft report	Malcolm Spence & Sean Stephens	15 June	Sean Stephens	15 June
Final report	Malcolm Spence & Sean Stephens	20 June	Sean Stephens	20 June

Disclaimer

Contact details

For further details please contact Essential Economics Pty Ltd at one of our offices:

96 Pelham Street
Carlton
Victoria 3053
Australia
PH +61 3 9347 5255
FAX +61 3 9347 5355

Level 26 / 44 Market Street
Sydney
New South Wales 2000
Australia
PH +61 2 9089 8654

EMAIL mail@essentialeconomics.com
WEB www.essentialeconomics.com

ABN 92 079 850 427

Our Reference: 16094

Contents

EXECUTIVE SUMMARY

Key findings from this review of the analysis of business impacts on RMIT University resulting from the construction of the CBD North Station (Chapter 11 of the EES and Technical Appendix G) are summarised below.

The management measures proposed to meet required environmental performance standards are inadequate in a number of respects:

1. **The CBD North Station Precinct boundary** is contestable on the grounds that it is arguably too conservative to account for other parts of the RMIT campus with the potential to be adversely impacted.

2. **The method for calculating Gross Value Added** for non-commercial entities such as RMIT is acknowledged to be difficult. The lack of detail about how GVA has been calculated for these entities cast doubt over subsequent conclusions, such as impact assessments and risk analyses (based on consequences directly linked to GVA changes).

3. **The effect of vibration and noise on sensitive research equipment** is an important issue. This impact may include cancelling or deferring important research, and associated costs do not seem to be adequately considered in the EES.

4. **Consideration of other potential impacts** are inadequate, including the possibility of a reduction in student demand and the extent to which commercial operations (event hosting and functions, access to research facilities etc.) may be impacted. In contrast, the effect of closing the Oxford Scholar Hotel is explicitly considered.

RMIT Melbourne University is large and complex, and operationally and financially quite different from most strictly commercial businesses.

Not all environmental issues relating to operational and business impacts are fully considered in the EES. Consequently, it is strongly suggested that an RMIT specific reference group be established to consider business impact and other issues, given the importance of RMIT to the CBD.

1 INTRODUCTION

Overview

This report considers *'Chapter 11 – Business' of the 'Melbourne Metro Rail Project Environmental Effects Statement'* (MMRP EES) from the point of view of RMIT University.

Chapter 11 of the EES is based on work conducted by SGS Economics & Planning, detailed in *'MMRP Technical Appendix G Business'*.

The Technical Appendix is dated 20 April 2016. Documentation supplied to Essential Economics for the purposes of this peer review contains correspondence between RMIT and MMRA dated after the Technical Appendix was released. The difference in dates means that some design issues may have been resolved subsequent to the analysis contained in Technical Appendix G.

In reviewing the EES, reference is made to the relevant evaluation objective (MMRP EES Page 14):

> ***Social, community, land use and business*** *– To manage the effects on the social fabric of the community in the area of the project, including with regard to land use changes, community cohesion, business functionality and access to services and facilities, particularly during the construction phase.*

Specific Impacts Relevant to RMIT

Disruptions to normal RMIT operations will occur during the construction of CBD North Station beneath Swanston Street, between LaTrobe Street and just north of Franklin Street.

The CBD North Station will be constructed using a mined cavern technique, which will not require Swanston Street to be closed to trams, pedestrians, cyclists and commercial vehicles. However, to allow for a station entrance on Franklin Street, construction access to the station box, and long term ventilation and maintenance access, "cut and cover" construction along Franklin Street between Swanston Street and Bowen Street is proposed. This building phase, once complete, will result in this section of Franklin Street being closed to traffic permanently.

During and after construction, Franklin Street east of Swanston Street will need to permit access to RMIT loading points for restricted goods, chemicals and gases. Restricted goods access to loading points in Bowen Street may also be affected by construction.

Current plans suggest maintenance and construction access points to Metro Rail facilities in A'Beckett Street, which may result in: the temporary closure of the street; traffic diversions; the closure and redevelopment of the RMIT owned Oxford Scholar hotel; and temporary occupation of A'Beckett open space and basketball courts.

An estimated 150 average truck movements per day for 48 months will occur during 24/7 construction activity.

2 METHODOLOGY AND ASSUMPTIONS

The methodology used in Technical Appendix G and incorporated into the EES mainly focuses on the impacts upon businesses during the construction phases.

2.1 Definition of Precincts

The business impact assessment methodology is applied to each relevant geographic 'precinct' as identified in the EES. The methodology assesses risks and impacts on businesses within the specified precincts. An assumption is made that businesses outside these precincts will not be disrupted by construction of the MMRP.

The precinct relevant to RMIT is the CBD North Station Precinct, delineated in Figure 42 of Technical Appendix G.

The areas of RMIT within the CBD North Station Precinct include:

- East of Swanston Street, Buildings:
    - 14,12,10,8,28,16 (Storey Hall), 22 (Info Corner),24, 9,13
- West of Swanston Street, Buildings:
    - 39,49,80 (Swanston Academic Building), 81,37,38,83 (Campus Store), A'Beckett Urban Square)

A significant portion of the RMIT campus is outside the CBD North Station Precinct, including 12 buildings east of Swanston Street and 31 buildings north of Victoria Street. Accordingly these buildings are assumed in the EES not to be disrupted by construction.

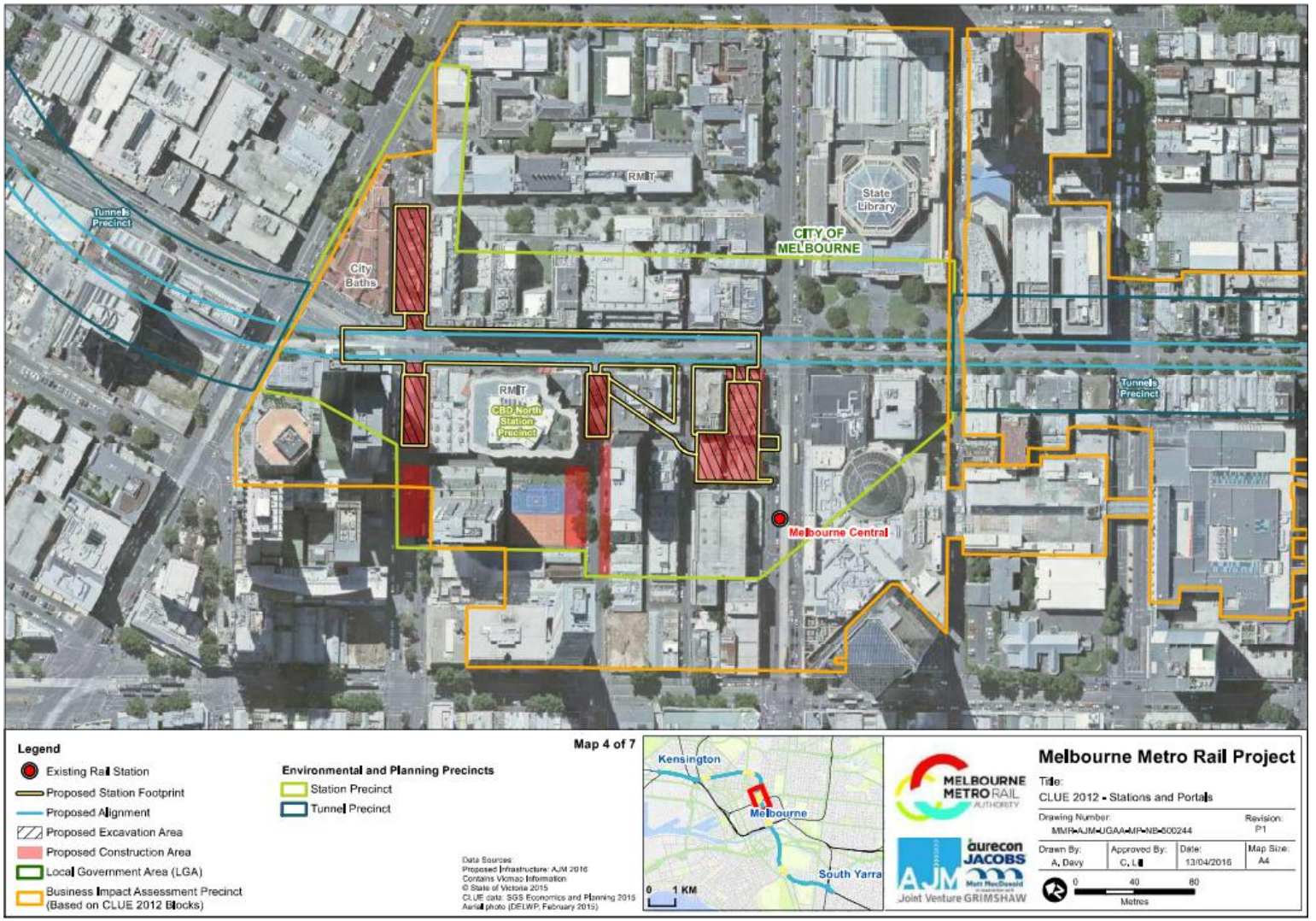
Note on Precinct Definition Used in EES

Delineating a precinct is a necessary part of a business impact assessment where a geographic distinction is required. However, this means there will always be some contention about whether or not the extent of a precinct is adequate to cover all of the potential businesses potentially affected.

In the case of an individual small business (e.g. a takeaway food shop), it is conceptually simple to determine whether it is inside or outside a precinct, and to subsequently assess an overall impact on the collection of small entities.

However, RMIT is a large and highly complex urban environment where parts of the campus are inside the CBD North Station Precinct boundary, and parts are outside. For this reason the question of what is reasonably within or outside the scope of business impacts is more difficult to determine.

Figure 42 of Technical Appendix G



For example, the CBD North Station Precinct may contain shared infrastructure that services the entire RMIT campus. Thus, any disruption or impact during construction may generate impacts in areas beyond the precinct, which are not explicitly accounted for in the impact assessment.

Accordingly, the key question arising from the delineation of the CBD North Station Precinct in the EES is:

> *Does the extent the CBD North Station Precinct adequately cover all business activity likely to be impacted by station construction, in particular, related parts of RMIT outside the precinct?*

2.2 Measurement of Business and Economic Activity

Technical Appendix G adopts 'Gross Value Added' (GVA) as the key measure of business and economic activity.

In broad terms, GVA is:

> *"A productivity metric that measures the difference between output and intermediate consumption. Gross value added provides a dollar value for the amount of goods and services that have been produced, less the cost of all inputs and raw materials that are directly attributable to that production."* Source: investopedia.com

In the business impact assessment, Value Added is the "total of profits and wages for a particular area or a particular industry". The term 'gross' is used to denote that consumption of fixed capital is not accounted for in the production of goods or services. (Technical Appendix G, pp32 & 33).

In general terms, GVA is an acceptable broad measure of economic activity, and is widely used.

However, the Technical Appendix G explicitly acknowledges that:

> *"Estimates of potential business impacts for non-market (where there is no direct financial transaction) businesses should be treated with caution, as it is very difficult to assess the business impact on organisations such as hospitals, universities and research facilities"* (Technical Appendix G, p52).

This acknowledgement directly raises significant issues with the assessment:

- The reliability of estimates of GVA generated by RMIT. The report does not go into detail on underlying data and the methodology used to estimate the GVA of RMIT.
- In view of the precinct boundary issues discussed above, how the methodology for calculating GVA for RMIT takes account of components inside and outside the CBD North Station Precinct.

Note on Measurement of Business and Economic Activity Used in EES

To illustrate the uncertainty about the GVA methodology as applied to RMIT, a 2015 baseline GVA was calculated for businesses in the CBD North Station Precinct (including RMIT) before any impacts. This baseline assessment showed the "Education and Training Sector" consisting of (Technical Appendix G, Table 53, p 141):

- 34 businesses (6.8% of precinct total)
- 3,701 staff (48.2% of precinct total)
- GVA $416 million (45.0% of precinct total)

The 2015 RMIT Annual Report (p25) shows total staff FTE of 4,947 in Melbourne. If the 3,701 staff in the Education and Training category are only RMIT staff, then the parts of RMIT outside the CBD North Station Precinct seem to have been included.

Another possibility is that the Education and Training category includes non-RMIT activities.

In any instance, more detail is required from the EES to clarify the basis of the baseline calculations, which are a critical input to the subsequent impact analysis.

2.3 Business Impact Calculations

Within Technical Appendix G, business impacts are divided into:

- Acquisition impacts
- Non-acquisition impacts, and
- Operational impacts.

A total of 10 properties will need to be acquired for works associated with CBD North Station, resulting in an estimated loss of 37 businesses, 385 staff and $60 million GVA. (Technical Appendix G, p149).

No RMIT property is proposed to be compulsorily acquired. However, the Technical Report G estimates one Education and Training business will be lost, with an associated loss of 57 staff and $20 million GVA.

Non-acquisition business construction impacts affecting RMIT include:

- Disruption from vibrations to sensitive equipment used in experiments. Even with mitigation, some equipment may not function properly, potentially delaying or cancelling research programs. (Technical Appendix G, p 150).
- Changes in road and pedestrian networks impacting the movements of staff and students.

- Amenity impacts, including access restrictions on A'Beckett Street that means the closure of the Oxford Scholar during construction and temporary occupation of outdoor basketball courts.

The 2020 GVA impact of changes are summarised in Technical Appendix G, Table 58, p155. The total GVA impact is estimated to be -$71.7 million, with business acquisitions contributing GVA of -$60 million.

Other significant assessed impacts include:

- Reduction in foot traffic is estimated to result in a GVA impact of -$10.6 million, although RMIT is not separately identified.
- A -$1.0 million GVA impact allowing for specific noise, amenity and access issues, further described as an "overall fall in gross value added for RMIT and cafes/restaurants with outdoor seating."

Note on Business Impact Calculations

While acknowledging that vibration during construction will directly limit the ability of RMIT to conduct experiments and research programs, the GVA reduction (less than $1 million) is not specifically justified.

Technical Report G provides sufficient detail to determine that at least some of the specific business impacts are expected to be borne by RMIT. However, the detail behind this calculation remains opaque because of uncertainty about:

- What parts of RMIT are included or excluded
- The basis for GVA baseline calculations
- The basis for estimating the GVA impact on RMIT, particularly on research programs dependent on sensitive equipment which will be disrupted by construction vibration.

Finally, the issue of the effect of construction on the ability of RMIT to attract students and staff during construction is not explicitly considered. This issue needs to be further explored in view of past RMIT experience and other factors influencing student demand.

2.4 Timing Profile of Impact

Business impacts on establishments within the CBD North Station Precinct are expressed as '% of maximum annual impact'. In 2017, for example, 50% of the maximum annual impact is expected, followed by maximum impacts for the next three years, as shown in the subsequent table. This indicative timing profile is subject to final design.

Table 2.1 Timing of Business Impacts

2017	2018	2019	2020	2021	2022	2023	2024
50%	100%	100%	100%	65%	65%	65%	65%

Source: Technical Appendix G, p155

Note on Timing Profile of Impact

The methodology is confusing when interpreting the GVA impacts assessed earlier. For example it was assessed that the 2020 GVA impact to allow for specific noise, amenity and access issues at RMIT -$1.0 million. Should this GVA cost be interpreted as:

- A once off expenditure?
- A cumulative GVA cost over the construction period?
- An annual GVA cost to be applied to the timing profile? If so, the total GVA cost over the period 2017-2024 would be around -$6.1 million GVA.

These issues need to be clarified, in particular, specific GVA impacts on RMIT.

2.5 Risk Assessment Methodology

All specialists were required to assess risks associated with the MMRP in accordance with AS/NZS ISO 31000:2009. (Technical Appendix G, Section 4.3 pp 28-32).

The risk evaluation involves assessing likelihood and consequence:

- Likelihood is categorised as one of: Rare, Unlikely, Possible, Likely, Almost Certain.
- Consequence is categorised as one of: Negligible, Minor, Moderate, Major, Severe.

Risk is then assessed as the combination of likelihood and consequence, for example, an event with Rare likelihood and Negligible consequence would be graded as a Very Low risk. In contrast, an event with Almost Certain likelihood and Severe consequence would be categorised as Very High risk.

A scale of net change to real business income is used to calibrate consequence for the precinct, as follows:

Level of Consequence	Net change in annual real business income
Negligible	0-5%
Minor	5-10%
Moderate	10-15%
Major	15-20%
Severe	20%+

(Technical Appendix G – Table 11, pp 31 & 32)

Note on Risk Assessment Methodology

This method is considered generally reasonable; however, given the uncertainty about calculating GVA (and business income) for non-commercial entities such as RMIT, it raises some doubt about the validity of the consequence ratings.

3 FINDINGS

The key findings of the Business Impact Assessment with particular reference to RMIT are now discussed.

3.1 Risk Assessment

The Risk Assessment for all precincts is presented in Section 6 of Technical Appendix G (pp 58-61. Risks identified for the CBD North Station Precinct are summarised as follows:

Category	Consequence	Likelihood	Risk Level
Construction activity impacting operations	Negligible	Likely	Low
Construction activity causing a reduction in amenity	Negligible	Likely	Low
Construction activity impacting access to businesses	Negligible	Likely	Low
Construction activities impacting business activity	Negligible	Likely	Low
Acquisition of businesses and properties	Negligible	Likely	Low
Construction activities leading to a reduction in public events affecting businesses indirectly	Negligible	Likely	Low
Cumulative impacts due to concurrent construction activities	Negligible	Likely	Low

All the risk assessments regard the likelihood of adverse events as Likely, and all consequences are assessed as are Negligible. A negligible consequence is one that changes net real annual business income between 0-5%.

All the resulting risks are classified as Low.

There are several concerns with the results of this risk assessment pertaining to RMIT:

- No events (and consequences/likelihood/risks) are directly identified as impacting RMIT
- Uncertainty about the calculation basis for GVA (and net real annual business income) for non-commercial bodies raises doubts about its validity.

Accordingly, more information and analysis about risks specific to RMIT is required.

3.2 Impact Assessment

The impact assessment on the CBD North Station Precinct has been largely discussed earlier in the Methodology and Assumptions section. Summarising the 2020 impacts, the table below is taken from Technical Appendix G, Table 58 (p155).

Event	GVA impact ($ million)
Business acquisition	-$60.0m
Residential acquisition	-$0.1m
Reduction in foot traffic	-$10.6m
Spending by construction workers	+0.3m
Specific noise, amenity and access issues	-$1.0m
TOTAL	**-$17.1m**

To re-iterate earlier points:

- Some impacts on RMIT are identified, while others are aggregated into broader categories.
- The overall methodology for calculating GVA for RMIT is unclear.
- Similarly, which components of RMIT are included/excluded from the calculation of GVA for RMIT is also unclear.
- How the timing profile of impacts is interpreted is unclear.

3.3 Environmental Performance Requirements

Table 85 (pp213-215) of Technical Appendix G presents proposed management measures proposed to counter events with an Environmental Performance impact. This table is reproduced below with an additional column commenting on the adequacy of proposed measures specific to RMIT.

In broad terms the management measure proposed will address environmental issues identified. However, it is possible that, given the complexity and size of RMIT that some important impacts will have been either underestimated or missed. Some measures need to be strengthened, as noted in the table.

Evaluation Objective: To manage the effects on the social fabric of the community in the area of the project, including with regard to land use changes, community cohesion, business functionality and access to services and facilities, especially during the construction phase.

Impact	Environmental Performance Requirements	Proposed management measure	Precinct	Timing/Risk no.	Comments relevant to RMIT
Relocation causing a disruption to business activity.	Reduce the disruption to businesses from direct acquisition or temporary occupation of land, and work with business and land owners to endeavor to reach agreement on the terms for possession of the land.	Early face-to-face engagement with acquired businesses (at least 6 to twelve months warning is preferable). Businesses given a single point of contact including a contact name and direct phone number where they can direct all enquiries. Where the program allows, businesses are given a minimum of six months' notice of acquisition, but preferably at least twelve months. Consider the early purchase of properties in consultation with businesses. Facilitate business relocation through providing assistance in finding sites for relocation, the logistics of relocation, and advertising and other requirements arising from changed location. Undertake business surveys before, during and after construction activity. Trigger levels identified in the traffic impact assessment, noise and vibration impact assessment and air quality impact assessment to be utilised to identify if there are impacts beyond those anticipated that could trigger the assistance identified in the business disruption strategy.	Tunnels, Western Portal, Arden, Parkville, CBD North and South	Design B006	Agree Agree Agree Agree, but need to strengthen. No RMIT property to be acquired, but substantial disruption in A'Beckett Street. Impacts on other parts of the campus need special consideration. Agree. If possible, relocate businesses that serve students and staff to locations where they are still able to serve that customer base. Agree Agree but need to strengthen. Must be done in conjunction with RMIT to ensure that noise and vibration impacts on sensitive equipment are properly considered. Very important issue for RMIT. Also need re-assessment of GVA impacts.

Impact	Environmental Performance Requirements	Proposed management measure	Precinct	Timing/Risk no.	Comments relevant to RMIT
Construction activity impacting operations (i.e. from noise, dust, vibration,construction materials).	Prepare a business disruption plan to manage impacts to non-acquired businesses and to engage with business, property owners and the community throughout construction. The plan shall include: – Timely information on key project milestones – Changes to traffic conditions and duration of impact – A project construction schedule developed in coordination with transport authorities and local councils and in consultation with businesses to minimize cumulative impacts of this and other projects – Plans for notifying customers of proposed changes to business operations, including the setting of suitable timeframes for notification prior to commencement of works – Measures to ensure access to businesses is maintained for customers, delivery and waste removal unless there has been prior engagement with affected businesses (including mutually agreed mitigation measures as required). This could include the installation of	Provide regular updates on the timing and duration of impacts to surrounding businesses. Mitigate against impacts in accordance with mitigation measures identified in Air Quality and Noise & Vibration Impact Assessments. Develop 'way finding programs' to establish pedestrian access patterns Establish consultation group including all major health care and research institutions to meet at regular intervals as jointly agreed.	All	Construction B001 B002 B004 B005 B007 B008 B009	Agree. Notices must be timely, widely distributed allow for feedback. Agree but need to strengthen. Vibration issues important for RMIT research programs, including in areas beyond CBD North Station Precinct. Consultation with RMIT and re-calculation of GVA impacts is needed. Agree. Agree. Consultation group for RMIT is ESSENTIAL.

Impact	Environmental Performance Requirements	Proposed management measure	Precinct	Timing/Risk no.	Comments relevant to RMIT
Construction activity causing a reduction in amenity (i.e. from noise, dust, vibration).	Following consultation with potentially affected businesses and prior to main works or shaft construction commencing, prepare management plans to minimise dust, noise and vibration impacts during construction, as per Environmental Performance Requirements for air quality and noise and vibration.	Provide regular updates on the timing and duration of impacts to surrounding businesses. Develop 'way finding programs' to establish pedestrian access patterns Mitigate against impacts in accordance with mitigation measures identified in Air Quality and Noise & Vibration Impact Assessments. Relocate the Fawkner Park Children's Centre and Kindergarten for the duration of the construction.	All	Construction B003	Agree but strengthen. Notices must be timely, widely distributed allow for feedback. Consideration of impacts on RMIT commercial activities and student demand also needed. Agree. Perhaps a smart phone app. Agree. Vibration and noise issues important for RMIT research programs. Significant consultation with RMIT required.
The day to day medical services provided could be compromised.	Maintain vehicular and pedestrian access to hospital emergency departments at all times during construction and to other key health and medical facilities where practicable.	Consult with all major health care and research institutions.	Parkville	Design and Construction B001 B004	NA

Impact	Environmental Performance Requirements	Proposed management measure	Precinct	Timing/Risk no.	Comments relevant to RMIT
Their emergency response role in Class 1 emergencies could be compromised.	Develop a stop work contingency plan for Class 1 emergencies (as defined in the Emergency Management Act 2013) in consultation with medical institutions in the Parkville precinct in the event that Melbourne Metro construction works are required to cease.	Consult with all major health care and research institutions.	Parkville	Design and Construction B001 B004	NA

4 CONCLUSION

The analysis of business impacts identified in the EES related to RMIT contains a number of issues which require addressing:

- The CBD North Station Precinct boundary is contestable on the grounds that it is arguably too conservative to account for parts of the RMIT campus with the potential to be adversely impacted.
- The method for calculating Gross Value Added for non-commercial entities such as RMIT is acknowledged to be difficult. The lack of detail about how GVA has been calculated for these entities cast doubt over subsequent conclusions, such as impact assessments and risk analyses (based on consequences directly linked to GVA changes).
- An issue of particular importance is the effect of vibration on sensitive research equipment, with this cost potentially not adequately considered in the EES
- The extent to which impacts on commercial operations associated with RMIT (event hosting and functions, access to research facilities etc) has not been reviewed in detail within the EES
- A potentially misleading overarching assumption is made that the MMRP will have no impact on the ability to attract and retain students.

Some of the proposed management measures to mitigate environmental issues relating to business impacts on the RMIT University, including parts not currently within the CBD North Station Precinct boundary, need to be strengthened to ensure that all relevant issues are properly considered.

It is strongly suggested that an RMIT specific reference group be established to consider business impact and other issues, given the size, complexity and importance of RMIT to the CBD.

Appendix 2: Geological and Subterranean

Prepared by CMW Geosciences Ltd

CMW Geosciences (NZ) Ltd
Chapman Morton Woodward

22nd June 2016

Melbourne Metro Rail Project:

Review of EES for Royal Melbourne Institute of Technology

Meinhardt Australia Pty Ltd

Level 12 501 Swanston St

Melbourne VIC 3000

Australia

Ref: AKL2016_0453AB Rev: 0

Executive Summary

CMW have carried out a review of the EES documentation released for the Melbourne Metro Rail Project. Our report focusses on the impact of groundwater drawdown and ground movement on the Royal Melbourne Institute of Technology (RMIT) Assets near the proposed CBD North Station. We have also reviewed the Noise and Vibration Section of the EES and provide some comments in terms of proposed blasting, however in general, we defer to the acoustic consultant in these matters.

Although extensive investigation and analysis has already been completed, the project is still at the conceptual (or preliminary at best) stage. The impact and risk assessments carried out appear appropriate at this stage but there is much more investigation, analysis and design required before construction commences.

The assessment of ground movement is preliminary with a Potential Zone of Influence identified in plan. Numerous RMIT structures bordering Swanston Street, Franklin Street, A'Beckett Street Little La Trobe Street and La Trobe Street are partially or wholly within the Potential Zone of Influence. Given the preliminary nature of the settlement estimates, the estimates of impact (building damage) from ground movement are also preliminary, based on a limited sample of structures within the Potential Zone of influence.

The Environmental Performance Requirements (EPR's) for ground movement are qualitative only, describing a mitigation process but falling short of targets for ground movement. The lack of quantitative targets is somewhat understandable for a project at this stage of development and the EES recognises this in several places committing to further analysis of groundwater drawdown, settlement analysis and the setting of appropriate levels of building impact in consultation with stakeholders.

In terms of vibration, encountering hard rock requiring blasting is identified as risk at CBD North Station. The use of blasting should be resisted unless the residual risk of damage can be reduced.

We believe it is too early in the design stage to recommend quantitative limits on ground movement. At this stage we believe RMIT can best protect it's assets by maintaining it's engagement with MMRA and trying to hold some influence on future decisions. We recommend that RMIT request the following undertakings from MMRA:

1. RMIT be specifically identified in EPR GM02 as a stakeholder.
2. As a stakeholder, RMIT's approval of criteria for estimated damage is secured prior to commencing excavation.
3. All RMIT assets partially or wholly within the final Potential Zone of Influence (or any other similar zone identified during detailed design) should be specifically identified within the Ground Movement Management Plan. They should be surveyed prior to construction and be monitored for deformation during construction.
4. As a stakeholder, RMIT's approval of contingency actions if settlement of UoM land exceeds estimates, is secured prior to commencing excavation.
5. Blasting at CBD North station to be excluded unless MMRA can demonstrate an appropriate level of risk to be determined in consultation with RMIT.

1 Introduction

This report outlines our review of the Melbourne Metro EES documentation related directly to effects on Royal Melbourne Institute of Technology (RMIT) assets. The elements of the project which are in proximity to, and likely to affect, RMIT assets are the CBD North Station (referred in the EES as Precinct 5) and the twin tunnels (referred to in the EES as Precinct 1).

The CBD North underground station will occupy the entire width of Swanston Street, excavated to a depth of approximately 35 to 40m depth between Franklin and La Trobe Streets. Entrances to the station and underground ancillary structures extend laterally from Swanston Street. The concept design currently envisages a "mined cavern" construction method using road headers to excavate the underground opening. The station is located within generally favourable geology comprising weathered siltstone and sandstone of the Melbourne Formation.

RMIT structures are located on both sides of Swanston Street with numerous structures shown partially or wholly within the Potential Zone of Influence (PZoI).

A large amount of investigation data along the 9km tunnel alignment has been compiled into a geological model (Technical Appendix P). The level of investigation and analysis is comprehensive for a conceptual design. However, progressing the project through to detailed design will require detailed investigation and design which will either confirm or change the basis of the impact assessment.

2 Methodology and Assumptions

2.1 Methodology

An extensive set of EES documentation has been released by the MMRA for the project.

In order to gain a general understanding of the entire project and the methodologies adopted by the EES we have reviewed the following documents:

- The Summary Document.
- The Executive Summary and Sections One through to Section Six of the Main Document.

In order to understand the effects related to the ground conditions we have then reviewed the following:

- Section 13, Noise and Vibration (and associated Technical Appendix I)
- Section 18 Groundwater (and associated Technical Appendix O)
- Section 19 Ground Movement and Land Stability (and associated Technical Appendix P).

2.2 Assumptions

Our review has been limited to the effects of the project related to construction within the geological conditions prevailing at Precinct 5.

We have reviewed the groundwater assessment in relation to the potential for groundwater drawdown and resulting consolidation settlement. Our assessment does not include effects such as migration of contamination plumes, estimated construction inflows and their treatment, etc.

Our review of the ground movement assessment includes review of the extent of investigations, the modelling methodologies to assess impacts, the risk assessment and the mitigation measures proposed by the Environmental Performance Requirements. We have not carried out any independent calculations.

We have reviewed the Noise and Vibration assessment and make limited comments on the vibration from any possible blasting. We generally defer to the acoustic consultant on these matters.

3 Findings

3.1 Impact Assessment

3.1.1 Groundwater.

Groundwater drawdown due to excavation of the CBD North station is expected to extend several hundred metres from the station unless mitigation measures are implemented. The tunnels west of the station will be driven by TBM with the liner installed close behind the excavation face. The tunnels east of the station will be excavated by road-header with a longer period to liner installation.

There are no groundwater users identified in the area of drawdown, so the impacts appear to be confined to ground settlement issues and migration of contaminants identified along the alignment towards/into the excavation. Given the favourable geology (Melbourne Formation Rock) the impact of settlement due to groundwater drawdown does not appear to be a significant issue. The impact due to drawdown is covered in the Ground Movement Section.

3.1.2 Ground Movement

The study correctly identifies the various sources of ground movement, including:

- Underground excavation-induced ground movement.
- Open-cut excavation induced ground movement.
- Primary Consolidation Settlement.

Ground movement due to the above mechanisms has been estimated along the entire alignment and summarised in plans showing the following boundaries:

- The 5 mm excavation-induced ground surface settlement contours
- The 10 mm consolidation settlement contours.

The above boundaries represent a PZoI, outside-of-which, in the experience of the designer, structures should not experience more than "negligible" effects from the movement. The term "negligible" is defined in Table 19-2 of the EES as "Aesthetic damage only comprising hairline cracks less than about 0.1 mm wide".

A sample of buildings within the Potential Zone of Influence has then been subject to an assessment of the impact of the ground movements, with additional levels of assessment if estimated impacts are more than negligible. The assessed damage to the sample of structures has then been used as inputs to the risk assessment.

The impact assessment indicates that Steel/concrete buildings and heritage structures may experience negligible to minor levels of damage and that masonry buildings may experience minor to moderate levels of damage. Moderate damage is defined in the EES as:

"Serviceability damage comprising cracks that require some opening up and can be patched by a mason. Repointing of external brickwork and possibly a small amount of brickwork to be replaced. Dors and windows sticking. Service pipes may fracture. Weather-tightness often impaired. Typical crack widths are 5-15 mm or several >3mm."

This EES qualifies the assessment with comments that the level of damage is assess as a risk and is not guaranteed to eventuate. Clearly, RMIT should consider the impact on their assets and operations if this level of damage is sustained in any of their structures.

The level of analysis appears adequate for conceptual design and it is difficult to envisage how more detail could be progressed at this stage. The methods of excavation and support are only assumptions until a main contractor is engaged. However, the impact on structures adjacent to Precinct 5 should be the subject of more in-depth analysis through the detailed design stage.

The EES appears to recognise the limitations of the impact assessment in Section 19.2 and in the last sentence of Section 19.4.3 acknowledges that "As noted in Section 19.2, further settlement assessments of all potentially affected structures, utilities and civil infrastructure would be undertaken during detailed design prior to construction." The continued refinement of ground movement estimates should allow more accurate assessment of the impact on the nearby structures.

3.1.3 Noise and Vibration

The methodology for assessment of noise and vibration appears to be robust with baseline measurements already established in the vicinity of Precinct 5. The modelling of noise and vibration at various receivers including RMIT structures is based on the US Federal Transit Administrations predictive methodology and is noted in the text as being independently peer reviewed.

At Precinct 5 the impacts on human comfort, sensitive receivers and specialised equipment within RMIT structures are the predominant drivers of risk with medium risk of exceeding limits adopted in the EPRs. We defer to the acoustic consultant for specialist advice on these matters.

The risk of damage to structures from vibration is assessed as low. This seems reasonable given the "mined cavern" construction method.

3.2 Risk Assessment

3.2.1 Methodology

The risk assessment process appears to be robust and appropriate at this stage of development. Likelihood and consequence have been estimated based on the various studies undertaken. The risks are then re-assessed based on adoption of mitigation measures embedded in the Environmental Performance Requirements.

The risk identification is variable across disciplines. For example the Groundwater section assesses many of the same risks individually for each Precinct, whereas the Ground Movement section has many risks relating to "all" precincts. These risks therefore appear somewhat generic. This aggregation of risk is understandable at this stage, but we would expect many of the risks relating to "all" precincts to be split into individual risks relating to individual precincts as more site-specific detail is developed. The Risk Register should be a live document, continually updated until the end of construction.

3.2.2 Groundwater

The groundwater risk assessment identifies fifty seven risks within the following nine groups:

1. Groundwater drawdown impacting on existing private bore users.
2. Groundwater drawdown impacting on surface water features.
3. Groundwater drawdown impacting on groundwater dependent vegetation.
4. Changing gradients causing contamination to migrate beneath third-party properties.
5. Generation of acidic groundwater.
6. Drawdown impacting City Link recharge scheme.
7. Stations and tunnels blocking existing aquifers
8. Drawdown causes settlement of the Coode Island Silt.
9. Discharge of groundwater inflows impacts on receiving environment.

The identification of risks appears to be robust at this stage. The risks associated with ground settlement in group eight have been referred in the EES for assessment in the ground movement section. Of the remaining residual risks, all those relating to Precinct 5 are assessed as very low to low except the risk of drawdown inducing migration of a contamination plume onto third-party property (GW030). We defer the assessment of this risk to the Contamination consultant.

3.2.3 Ground Movement

There are 25 ground movement risks evaluated, each recommending the same over-arching Environmental Performance Requirements requiring good design and construction management. Of the twenty five ground movement risks, only GM011 and GM021 is specific to Precinct 5. An additional 6 risks are relevant to Precinct 5 but are identified as pertaining to all Precincts. The risks relevant to Precinct 5 are summarised in the table below:

Risk No.	Category	Event	Project phase	Precinct
GM001	Construction stage excavations cause ground movement	Potential impacts on existing buildings and/or infrastructure	C	All
GM011	Construction stage excavations cause ground movement	Damage to City Loop Tunnels, resulting in disruption to operating rail lines.	C	5
GM015	Construction stage groundwater inflows to excavations result in ground movement (consolidation settlement)	Potential impacts on existing buildings, utilities and/or infrastructure	C	All
GM016	Combined effects of excavation induced ground movement and consolidation settlement	Potential impacts on existing buildings, utilities and/or infrastructure	C	All
GM019	Unexpected ground conditions or unexpected ground movement	Moderate or worse impacts to existing structures and/or infrastructure	C	All
GM021	Underground Excavations	Very high strength rock mass requires drilling and blasting as a method of excavation. This could result in delays in tanking of tunnels or underground excavations	C	5
GM022	Tunnel construction	Modelled levels of ground movement are underestimated as a consequence of unforeseen geology, groundwater conditions, surface conditions and unexpected building conditions or use of different equipment types	C	All
GM025	Ongoing leakage into tunnels and underground structures during operation	Depressurisation of compressible sediments resulting in consolidation settlement with subsequent unacceptable impacts on structures, utilities and/or infrastructure	O	All

Table 1. Ground movement risks related to RMIT assets

All of the risks in the table above, with the exception of GM025 are assessed as medium, reducing to low, after the mitigation measures embedded in the proposed EPRs. GM025 is assessed as high, reducing to low. The only risk items in the register with residual risks above low do not specifically relate to RMIT assets.

We cannot see how the estimated “moderate” impact on masonry structures shown in Table 19-12 of the EES is reflected in the low risk rankings. There appears to be no specific risk item treating this risk specifically. The low risk ratings are generally the result of “minor” consequences being “likely” to happen. The first three terms used to describe “consequence” in Table 4.2 are the same as those used in Table 19.2 to describe Potential Impact on Buildings (negligible, minor and moderate), but the definitions are not the same. It is unclear how the impact on buildings has been converted to consequence in the risk assessment. We would not recommend that RMIT accept “moderate” damage as an acceptable criteria for the excavations in Precinct 5, if that is what is implied by the risk assessment. The first paragraph of Section 19.7 acknowledges that “Further discussion with the relevant asset owners and stakeholders would be required to confirm appropriate acceptability Criteria.” We recommend that the EPRs acknowledge RMIT’s engagement in this process.

3.2.4 Noise and Vibration

The Noise and Vibration assessment uses baseline measurements already established in the vicinity of Precinct 5 with predictions of noise and vibration at various receivers including RMIT structures. The modelling appears to be based on well recognised methods. There are a total of thirty eight risks identified.

At Precinct 5 the impacts on human comfort, sensitive receivers and specialised equipment within RMIT structures are the predominant drivers of risk, with wo residual risks assessed as “medium” and one as “”High”. We defer to the Acoustic consultant for advice on these risks.

However, ground movement risk item GM021 indicates the low risk of blasting through hard rock at CBD North. The noise and vibration risks of this eventuality do not appear to have been assessed.

3.3 Environmental Performance Requirements

The table below summarises the proposed EPRs for Groundwater and Ground Movement. We have not summarised the Noise and Vibration EPRs as they will be summarised elsewhere by the acoustic specialist.

EPR No.	Impact	Environmental Performance Requirement	Timing	Comments
GW01	Project-wide EPRs to mitigate impacts on ground movement, contamination migration and any other "dependent values".	Design the tunnel and underground structures so that they minimise groundwater drawdown during construction and operation to minimise impacts on groundwater dependent values, ground movement and contamination plume migration.	Design	These EPRs respond to all of the groundwater risks within the risk register so are "all-encompassing". They describe process and are not linked to any performance criteria for ground settlement. We do not recommend any amendments to these EPRs with regard to ground movement as the management of groundwater will be driven by the EPRs for ground movement. See the EPRs for ground movement for our recommendations.
GW02		Develop a groundwater model for the detailed design phase to predict impacts associated with any changes to construction techniques or operational design features proposed during detailed design, and reconfirm that the Environmental Performance Requirements and mitigation measures are sufficient to mitigate impacts from changes in groundwater levels, flow and quality. Undertake monitoring during construction to ensure that predictions are accurate and mitigation measures are appropriate.	Design	
GW03		Develop and implement a Groundwater Management Plan (GMP) detailing groundwater management approaches to address the predicted impacts to groundwater dependent values during construction. (further detail not shown here).	Construction	
GW04	Project-Wide EPR related to discharge of tunnel inflows.	Use the Groundwater Disposal Strategy and GMP to obtain a Trade Waste Agreement with the relevant Water Retailers for groundwater disposal.	Construction Operation	Relates to risk (Risks GW55 and GW56) of discharging tunnel inflows. Not relevant to RMIT assets.
GW05	Project-wide EPR to mitigate impacts on ground movement, contamination migration and any other "dependent values".	Develop and implement a groundwater monitoring plan as part of the GMP that details sufficient monitoring of drawdown to verify that no significant impacts occur. (further detail not shown here)	Construction Operation	This is a necessary extension of GW03. The details do not mention the impact of ground settlement although for Precinct 5, there has been no soils identified which are susceptible to consolidation settlement.

EPR No.	Impact	Environmental Performance Requirement	Timing	Comments
GM01	Project-wide EPRs to mitigate impacts on ground movement.	Develop and maintain geological and groundwater models (as per the Environmental Performance Requirements GW2) which… (further detail not included here).	Design Construction	These EPRs have been developed to respond to all twenty five ground movement risks in the risk register so are "all-encompassing". They outline a process but do not propose any quantitative limits for ground movement. However, EPR GM02 commits to consultation with stakeholders in setting criteria for ground movement at design stage. Rather than setting any deflection limits we recommend that RMIT request that GM02 be amended to specifically identify RMIT as a stakeholder "…in consultation with RMIT and other relevant stakeholders….". RMIT can then request that design of Precinct 5 include limiting estimated damage to buildings to "negligible" levels in accordance with the methodologies already adopted in the concept design. The ground movement required to limit damage to negligible should then flow through to the ground movement plan during construction.
GM02		Design and construct the permanent structures and temporary works to limit ground movements to within appropriate acceptability criteria (to be determined in consultation with relevant stakeholders) for vertical, horizontal, and angular deformation as appropriate for project activities during the construction and operational phase.	Design	
GM03		Develop and implement a ground movement plan for construction and operational phases of the project that:… (further detail not included here).	Construction	
GM04		Conduct pre-construction condition surveys for the assets predicted to be affected by ground movement. Develop and maintain a data base of as built and pre construction condition information for each potentially affected structure, specifically including…. (further detail not included here).	Construction	
GM05		Adopt construction techniques for Melbourne Metro to limit ground movement to within appropriate acceptability criteria (to be determined in consultation with the relevant stakeholders).	Construction	
GM06		For properties and assets affected by ground movement, undertake any required repair works	Construction	

The EPRs for groundwater and ground movement define a process of investigation, analysis, design and construction management with the objective of mitigating impacts related to those two issues. At this stage in the project development, quantitative criteria are difficult to identify. The magnitude of settlement alone is not a good indicator of the risk of damage. Rather, the shape of the deflection bowl determines the distortion imposed on a structure and therefore the impact. This will be significantly determined by the excavation methods adopted by the selected PPP.

In order to protect it's assets we believe it will be essential for RMIT to maintain it's engagement with MMRA and be assured of some influence and make recommendations in the following section to effect this outcome.

4 Conclusion

The impact and risk assessments carried out appear appropriate for the current stage of the project but there is much more investigation, analysis and design required before construction commences.

The assessment of ground movement is based on estimates of groundwater drawdown, assumed methods of excavation and support, and water-proofing. The analysis is preliminary with a Potential Zone of Influence identified in Plan with RMIT structures partially or wholly within the Potential Zone of Influence around Swanston Street.

Given the preliminary nature of the settlement estimates, the estimates of impact (building damage) from ground movement are also preliminary. They are based on a limited sample of structures within the Potential Zone of Influence.

The EPRs for ground movement are qualitative only, describing a robust mitigation process but falling short of targets for ground movement. This is in contrast to the EPRs for noise and vibration which identify a range of quantitative targets. The lack of quantitative targets is somewhat understandable for a project at this stage of development and the EES recognises this is several places committing to further analysis of groundwater drawdown, settlement analysis and the setting of appropriate levels of building impact.

Blasting at CBD North Station is identified as low risk. The impacts of this risk should be assessed.

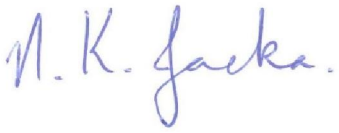
We recommend that RMIT request the following actions from MMRA:

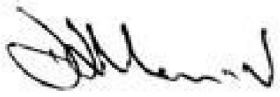
1. RMIT be specifically identified in EPR GM02 as a stakeholder.
2. As a stakeholder, RMIT's approval of criteria for estimated damage is secured prior to commencing excavation.
3. All RMIT assets partially or wholly within the revised Potential Zone of Influence be specifically identified within the Ground Movement Management Plan. They should be surveyed prior to construction and be monitored for deformation during construction.
4. As a stakeholder, RMIT's approval of contingency actions if settlement of RMIT land exceeds estimates, is secured prior to commencing excavation.
5. Blasting at CBD North station be excluded unless MMRA can demonstrate an appropriate level of risk to be determined in consultation with RMIT.

5 Closure

We trust this report meets your requirements. Should you require any further information or clarification please contact the undersigned.

For and on behalf of
CMW Geosciences (NZ) Ltd





Neil Jacka
Principal Geotechnical Engineer

Dave Morton
Principal Geotechnical Engineer

Appendix 3: Building Structures

Prepared by Meinhardt Australia Pty Ltd

Building Structures

Peer Review of Environmental Effects Statement for Melbourne Metro Rail Project on behalf of RMIT

Project Reference: 116092

June 2016

Prepared For:

RMIT
124 La Trobe Street
Melbourne 3000

Meinhardt

Level 12, 501 Swanston Street
Melbourne, Vic 3000

P. 03 8676 1200 | F. 03 8676 1201
www.meinhardtgroup.com

REV	DATE	WRITTEN BY	REVIEWED BY	APPROVED BY
A	19/06/16	Andrew Vangelista	James Hargreaves	Rennie Darmanin

TABLE OF CONTENTS

1 Executive Summary

Meinhardt was engaged by RMIT to undertake a peer review of the Environmental Effects Statement (EES) for the Melbourne Metro Rail Project. The purpose of this peer review is to inform RMIT's formal response to the EES.

This report relates to the impact on RMIT's building structures with respect to the following aspects of the EES:
EES Section 13 – Noise and Vibration
EES Section 18 – Groundwater
EES Section 19 – Ground Movement and Land Stability

The EES divides the MMRP into nine precincts, based on the location of the project components and construction works, the potential impacts on the local areas and the characteristics of the surrounding areas. For the RMIT peer review, only the EES sections relating to precincts likely to affect RMIT have been reviewed; these are
Precinct 1 - Tunnels
Precinct 5 – CBD North Station

Noise and Vibration – in relation to impact on RMIT's building structures

1. The EES adequately identifies the key issues associated with Noise and Vibration impacts that could potentially arise from the MMRP.

2. Of the 9 risk categories identified for the Construction Phase of MMRP, after the proposed Environmental Performance requirements are implemented:
    a. 5 risks have a residual classification of Low
    b. 1 risk has a residual classification of Medium
    c. 2 risks have a residual classification of High (vibration impacting on amenity, and ground bourne noise)
    d. 1 risk is unclassified (vibration impacting buried pipework)

3. Of 4 risk categories identified for the Operational Phase of MMRP, all risks have a residual risk classification of Low, after the proposed Environmental Performance Requirements are implemented.

4. Mitigation measures outlined in the EES fail to reduce the residual risks of some items to low or very low. Consequently Meinhardt recommends that RMIT requests **additions and alterations** to the various Environmental Performance Requirements applicable to Noise and Vibration, as described in section 5.5 of this report.

5. The EPR ***do not*** protect RMIT from ***air bourne construction noise*** as there are no applicable Guideline Noise Levels.

6. The EPR ***do not*** protect RMIT from ***ground bourne construction noise*** as there are no applicable Guideline Noise Levels for education facilities.

Groundwater – in relation to impact on RMIT's building structures

1. The EES adequately identifies the key issues associated with Groundwater impacts that could potentially arise from the MMRP.

2. Mitigation measures outlined in the EES reduce the residual risks of groundwater to low or very low.

3. Consequently Meinhardt recommends that RMIT accept the Environmental Performance Requirements for MMRP in relation to Groundwater.

Ground Movement and Land Stability– in relation to impact on RMIT's building structures

1. The EES adequately identifies the key issues associated with Ground Movement and Land Stability impacts that could potentially arise from the MMRP.

2. Mitigation measures outlined in the EES reduce the residual risks of ground movement to low or very low.

3. One of the EPRs specifically requires the GMP to undertake any required repair work for properties and assets affected by ground movement.

4. Meinhardt recommends that RMIT accept the Environmental Performance Requirements for MMRP in relation to Ground Movement and Land Stability, with modifications as described in section 7.5 of this report.

Enabling Works

1. Enabling works have been determined to not have significant effects on the environment and are therefore **not subject to the requirements of this EES,** even though these works will impact on RMIT.

2 Introduction

Meinhardt was engaged by RMIT to undertake a peer review of the Environmental Effects Statement (EES) for the Melbourne Metro Rail Project. The purpose of this peer review is to inform RMIT's formal response to the EES.

The findings of this report are for the RMIT's use in preparing its submission to Planning Panels Victoria.

This report relates to the impact on RMIT's building structures with respect to the following aspects of the EES:

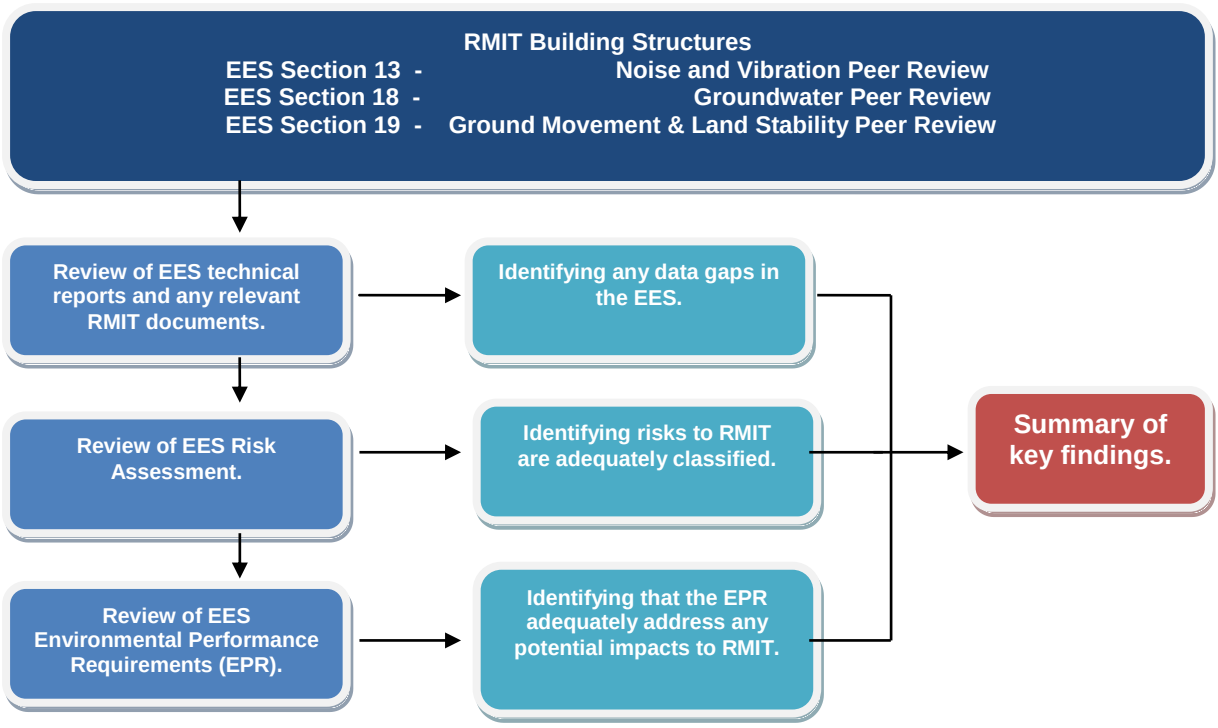
- EES Section 13 – Noise and Vibration
- EES Section 18 – Groundwater
- EES Section 19 – Ground Movement and Land Stability

3 Methodology and Assumptions

3.1 Methodology of this peer review

The ESS *"evaluates the potential effects of the project on a local and project-wide basis and recommends Environmental Performance Requirements that define the project-wide outcomes that must be achieved during the design, construction and operation of Melbourne Metro to avoid, manage or mitigate these impacts."*

To review the EES evaluation process and its subsequent recommendations and findings, Meinhardt has adopted the methodology detailed below.



3.2 Assumptions

- The EES divides the MMRP into nine precincts, based on the location of the project components and construction works, the potential impacts on the local areas and the characteristics of the surrounding areas.

- For the RMIT peer review, only the EES sections relating to precincts likely to affect RMIT have been reviewed; these are
  Precinct 1 - Tunnels
  Precinct 5 – CBD North Station

- Only the EES sections identified in section 2 of this report are addressed in this peer review.

4 MMRP – general implications for RMIT Building Structures

4.1 Summary of key EES statements

ITEM	EES Statement	EES/other page reference
1.	Overall, the EES has concluded that achieving the outcomes set by the recommended Environmental Performance Requirements would ensure MMRP achieves acceptable environmental, social and economic outcomes	EES summary report pg. 2
2.	The Concept Design within the EES has opted for mined cavern station construction for the CBD stations (rather than cut and cover) to remove the need to 'open up' Swanston Street	EES summary report pg. 8
3.	The Concept Design within the EES is not the final design for MMRP	EES summary report pg. 12
4.	The EPR are designed to ensure that the project's contractors adopt measures to avoid, manage or reduce the project's environmental impacts by defining the outcomes to be achieved rather than specifying the approach to be taken	EES summary report pg. 13
5.	The EES has identified proposed project boundaries that encompass all the key locations that would be used for permanent structures and temporary construction work sites, above and below ground.	EES summary report pg. 13
6.	MMRP includes twin tunnels each with a diameter of 7 to 7.5 metres	EES summary report pg. 17
7.	The new CBD North station would be located directly beneath Swanston Street, extending from La Trobe Street to north of Franklin Street.	EES summary report pg. 25
8.	A southern entrance would be located on the corner of Swanston Street and La Trobe Street, with a direct underground pedestrian link to Melbourne Central station. The northern entrance would be located on the east side of Franklin Street and extend to Bowen Street, with Franklin Street being closed east of Swanston Street.	EES summary report pg. 25
9.	The main construction activities at the site would be: Private property acquisition ▪ Early works, including the removal of trees, the relocation and protection of utilities, and land clearing ▪ Excavation of the twin interconnecting tunnels between the two CBD stations, CBD North, and CBD South located at Flinders Street ▪ Station structural works ▪ Construction of station entrances and connection to Melbourne Central station ▪ Station architectural, mechanical and electrical fit-out ▪ Track works and installation of rail systems ▪ Site remediation, including landscaping and tree re-planting along Swanston Street and Franklin Street.	EES summary report pg. 25 & 26
10.	Several areas adjacent to the station site would be used as construction work sites, including either part of the RMIT basketball courts or A'Beckett Street. During construction Franklin Street and A'Beckett Street would be closed to traffic at Swanston Street.	EES summary report pg. 26

11.	Enabling works are specific small scale works that would be initiated earlier than the major Melbourne Metro works (and potentially before the conclusion of the EES process) to minimise disruption to businesses and residents during construction of the project. These works include the protection and relocation of utilities in specified locations, such as telecommunications conduits, gas and water mains, sewers and stormwater drains. The Minister for Planning has determined that these specific works would not have significant effects on the environment and would not need an EES to proceed. MMRA would still need to obtain and comply with all required statutory approvals in undertaking these works	EES summary report pg. 26
12.	MMRP would provide opportunities to encourage walking and cycling. Improvements that would occur directly as a result of the project include a re-design of Franklin Street in the CBD to maximise pedestrian space and amenity	EES summary report pg. 35
13.	The new CBD North station would support efforts to encourage more intensive development in the northern part of the CBD and make the area a more lively and attractive destination for residents, students, businesses and visitors.	EES summary report pg. 37
14.	The main construction-related impacts on transport movements around RMIT would be: ▪ The temporary closure of a number of roads for extended periods, which would have an impact on local traffic patterns, walking and cycling routes, and some bus and tram services ▪ Construction activity generating truck movements for removing excavated material and delivering materials and equipment, which would add to existing local traffic ▪ The presence of a large construction workforce, which would generate additional traffic that could impact the local and wider road network at times.	EES summary report pg. 40
15.	The operation of Melbourne Metro would require permanent closure of part of Franklin Street between Swanston Street and Bowen Street.	EES summary report pg. 42

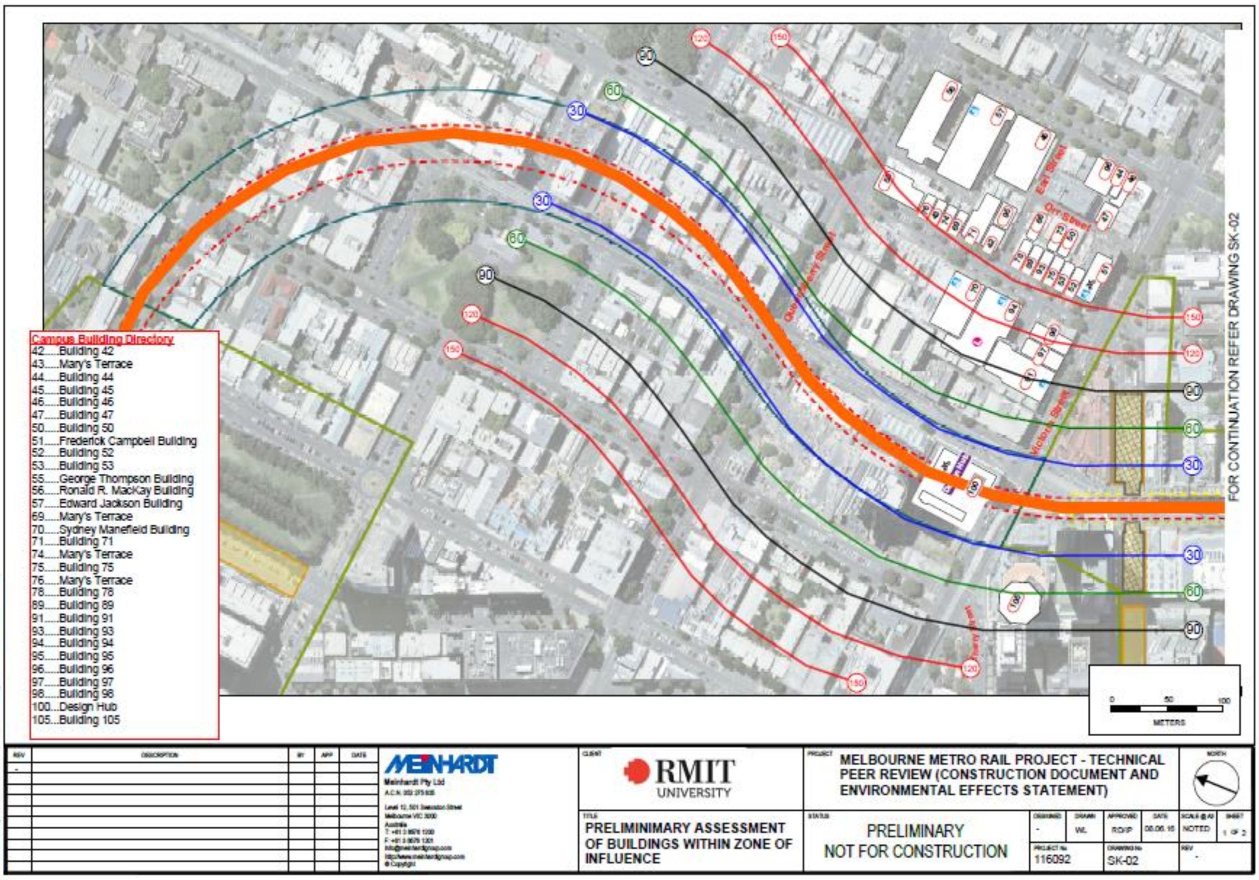
4.1.1 RMIT Building Assets within MMRP Zone of Influence

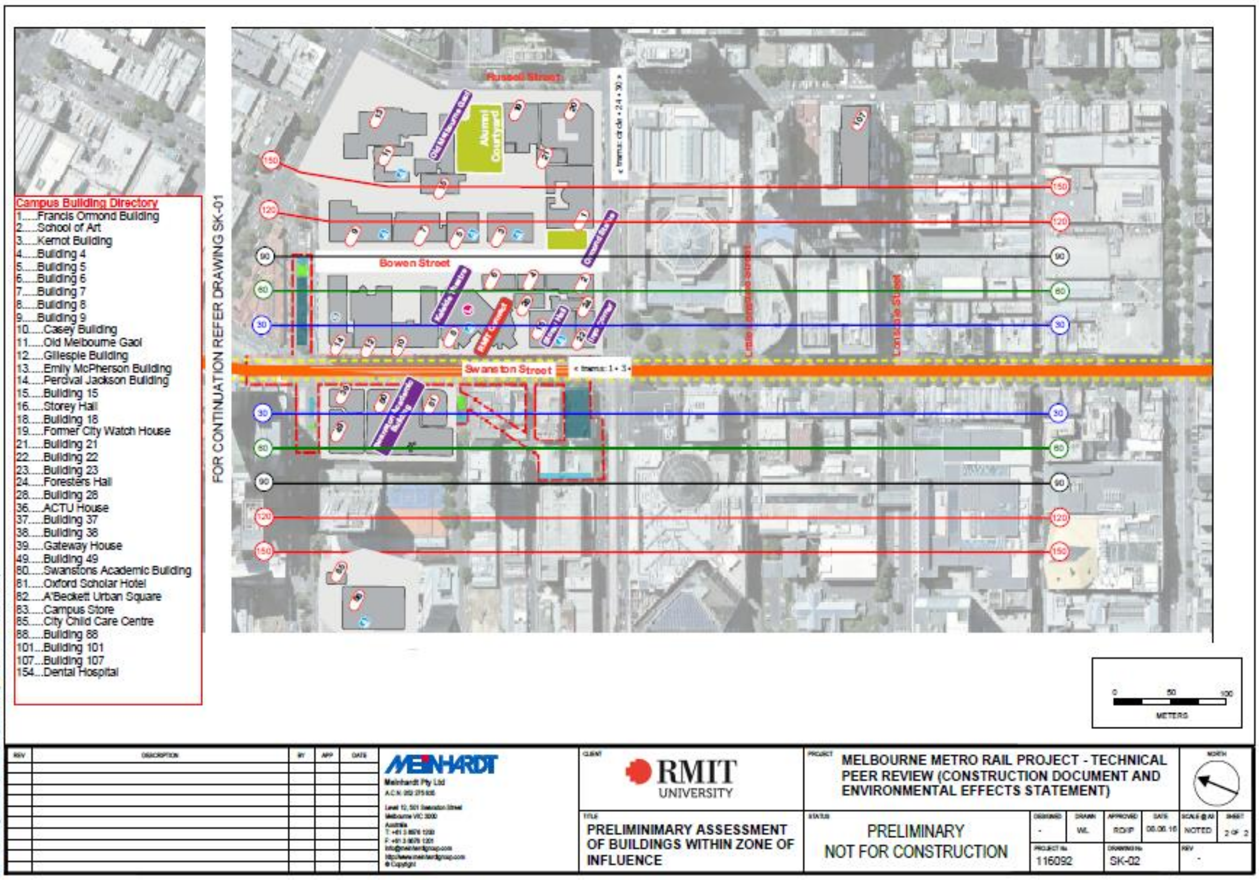
- Meinhardt has established a Zone of Influence being measured as 150 metres horizontally from the proposed tunnel alignment centreline.

- This was established using the following assumptions
  - the base of the works associated with the MMRP extends to approximately 40 metres below surface
  - a width of the CBD North Station cavern of 25 metres
  - a slope of influence of 1V:2H
  - a 50% buffer

  - so (0.5 X 25m) + (2 X 40m) = 92.5m , 92.5 X 1.5 = 138m, rounded up to 150m

- We have identified 29 Building assets within this zone, summarised as follows;
  - 10 buildings within 30m of the tunnel alignment centreline
  - 04 buildings between 30m and 60m from the tunnel alignment centreline
  - 04 buildings between 60m and 90m from the tunnel alignment centreline
  - 08 buildings between 90m and 120m from the tunnel alignment centreline
  - 03 buildings between 120m and 150m from the tunnel alignment centreline


Campus Building Directory
42.....Building 42
43.....Mary's Terrace
44.....Building 44
45.....Building 45
46.....Building 46
47.....Building 47
50.....Building 50
51.....Frederick Campbell Building
52.....Building 52
53.....Building 53
55.....George Thompson Building
56.....Ronald R. MacKay Building
57.....Edward Jackson Building
69.....Mary's Terrace
70.....Sydney Mansfield Building
71.....Building 71
74.....Mary's Terrace
75.....Building 75
76.....Mary's Terrace
78.....Building 78
89.....Building 89
91.....Building 91
93.....Building 93
94.....Building 94
95.....Building 95
96.....Building 96
97.....Building 97
98.....Building 98
100...Design Hub
105...Building 105
FOR CONTINUATION REFER DRAWING SK-02
METERS
MEINHARDT
RMIT UNIVERSITY
MELBOURNE METRO RAIL PROJECT - TECHNICAL PEER REVIEW (CONSTRUCTION DOCUMENT AND ENVIRONMENTAL EFFECTS STATEMENT)
PRELIMINIMARY ASSESSMENT OF BUILDINGS WITHIN ZONE OF INFLUENCE
PRELIMINARY
NOT FOR CONSTRUCTION
116092
SK-02


Russell Street
Bowen Street
Swanston Street
Campus Building Directory
1.....Francis Ormond Building
2.....School of Art
3.....Kernot Building
4.....Building 4
5.....Building 5
6.....Building 6
7.....Building 7
8.....Building 8
9.....Building 9
10....Casey Building
11....Old Melbourne Gaol
12....Gillespie Building
13....Emily McPherson Building
14....Percival Jackson Building
15....Building 15
16....Storey Hall
18....Building 18
19....Former City Watch House
21....Building 21
22....Building 22
23....Building 23
24....Foresters Hall
28....Building 28
36....ACTU House
37....Building 37
38....Building 38
39....Gateway House
49....Building 49
80....Swanstons Academic Building
81....Oxford Scholar Hotel
82....A'Beckett Urban Square
83....Campus Store
85....City Child Care Centre
88....Building 88
101...Building 101
107...Building 107
154...Dental Hospital
FOR CONTINUATION REFER DRAWING SK-01
METERS
MEINHARDT
RMIT UNIVERSITY
MELBOURNE METRO RAIL PROJECT - TECHNICAL PEER REVIEW (CONSTRUCTION DOCUMENT AND ENVIRONMENTAL EFFECTS STATEMENT)
PRELIMINIMARY ASSESSMENT OF BUILDINGS WITHIN ZONE OF INFLUENCE
PRELIMINARY
NOT FOR CONSTRUCTION
116092
SK-02

5 EES Section 13 – Noise and Vibration

5.1 EES evaluation objective against which the project is to be assessed

The Scoping Requirements issued by the Minister for Planning include evaluation objectives against which the project must be assessed.

In relation to ***Amenity,*** the evaluation objective is '***to minimise adverse air quality, noise and vibration effects on the amenity of nearby residents and local communities, as far as practicable, especially during the construction phase"***

5.2 Review of EES technical reports

5.2.1 Documents reviewed

- EES Summary Report
- EES Chapter 13 – Noise & Vibration
- EES Technical Appendix I – Noise and Vibration
- EES Technical Appendix I – Noise and Vibration – Appendix A
- EES Technical Appendix I – Noise and Vibration – Appendix B - Part 1
- EES Technical Appendix I – Noise and Vibration – Appendix B - Part 2
- EES Technical Appendix I – Noise and Vibration – Appendix C
- EES Technical Appendix I – Noise and Vibration – Appendix D
- EES Technical Appendix I – Noise and Vibration – Appendix E
- EES Technical Appendix I – Noise and Vibration – Appendix F
- EES Technical Appendix I – Noise and Vibration – Appendix G
- State Environment Protection Policy (Control of Noise from Commerce, Industry and Trade) No. N-1 (SEPP N-1)
- Environment Protection Authority Noise Control Guidelines Publication 1254 (EPA 1254)
- Victorian Passenger Rail Infrastructure Noise Policy (Victorian Government, 2013)
- EPA Publication 480, Environmental Guidelines for Major Construction Sites, 1996
- NSW Interim Construction Noise Guideline, Department of Environment and Climate Change, 2009
- Australian Standard AS2436-2010, Guide to noise and vibration control on construction, demolition and maintenance sites. (AS 2436)
- German Standard DIN 4150-3 Structural Vibration Part 3: Effects of vibration on structures (DIN 4150)
- American Society of Heating, Refrigeration and Air-conditioning Engineers (ASHRAE), Chapter 48, Sound and Vibration Control
- NSW Rail Infrastructure Noise Guideline, May 2013
- Australian Standard AS2187.2-2006 Explosives – Storage and Use Part 2: Use of explosives
- British Standard BS6472-1:2008. Guide to Evaluation of Human Exposure to Vibration in Buildings. Part 1: Vibration sources other than blasting
- NSW Assessing Vibration: a technical guideline, Department of Environment and Conservation, 2006

5.3 Risk Assessment

A risk assessment process was adopted in the EES that adopted the following methodology:

- Undertaking baseline measurements (noise and vibration)
- Determining appropriate criteria / Guideline Targets
- Undertaking predictions and determining if criteria / Guideline Targets would be met
- Identifying appropriate mitigation options where the assessment predicted an exceedance to a criterion or
  Guideline Target
- Evaluating residual risks

Meinhardt has reviewed the risk assessment in Chapter 6 of the MMRP Noise and Vibration Impact Assessment (Appendix I of the EES) and in Chapter 11, Precinct 5: CBD North Report (Appendix I of the EES). The risks identified, that impact on RMIT, are summarised as follows:

ITEM	CATEGORY	EVENT
construction		
C1	Airborne Noise Construction of Melbourne Metro – general construction activities	Noise levels exceeding relevant criteria
C2	Vibration Construction of Melbourne Metro - tunnelling	Vibration levels from tunnelling exceeding Guideline Targets for structural damage and resulting in structural damage
C3	Vibration Construction of Melbourne Metro – general construction activities (not including tunnelling)	Vibration levels from tunnelling exceeding Guideline Targets for structural damage
C4	Vibration Construction of Melbourne Metro - tunnelling	Vibration levels from tunnelling exceeding Guideline Targets for human comfort
C5	Vibration Construction of Melbourne Metro – general construction activities (not including tunnelling)	Vibration levels from tunnelling exceeding Guideline Targets for human comfort
C6	Vibration Construction of Melbourne Metro - tunnelling	Vibration levels from tunnelling exceeding Guideline Targets for vibration-sensitive equipment
C7	Vibration Construction of Melbourne Metro – general construction activities (not including tunnelling)	Vibration levels from tunnelling exceeding Guideline Targets for vibration-sensitive equipment
C8	Ground-borne noise and vibration Construction of Melbourne Metro - tunnelling	Ground-borne noise and vibration levels from tunnelling impacting on Highly Sensitive Areas (hospital wards, operating theatres)
C9	Ground-borne noise and vibration Construction of Melbourne Metro - Additional Construction Works	Ground-borne noise and vibration levels from general construction impacting on Highly Sensitive Areas (hospital wards, operating theatres)
C10	Ground-borne noise and vibration Construction of Melbourne Metro - tunnelling	Ground-borne noise and vibration levels from tunnelling impacting on Bio-resources
C11	Ground-borne noise and vibration Construction of Melbourne Metro - Additional Construction Works	Ground-borne noise and vibration levels from tunnelling impacting on Bio-resources
C12	Ground-borne noise and vibration Construction of Melbourne Metro - tunnelling	Ground-borne noise exceeds Guideline Targets
C13	Ground-borne noise and vibration Construction of Melbourne Metro – additional construction works (not including tunnelling)	Ground-borne noise exceeds Guideline Targets
	Ground-borne noise and vibration Construction of Melbourne Metro - tunnelling	Ground-borne noise and vibration levels from tunnelling impacting on Highly Sensitive Areas (hospital wards, operating theatres)

ITEM	CATEGORY	EVENT
operation		
O1	Airborne noise - trains Operation of passenger trains causes increase in airborne noise	Exceeds criteria
O2	Airborne noise – fixed Infrastructure Operation of fixed infrastructure causes increase in airborne noise	Exceeds criteria
O3	Vibration Operation of passenger trains generates vibration	Exceeds human comfort Guideline Targets (and building damage Guideline Targets)
O4	Vibration Operation of passenger trains generates vibration	Exceeds Guideline Targets for vibration-sensitive equipment
O5	Ground-bourne Noise Operation of passenger trains generates groundborne noise	Exceeds Guideline Targets

5.4 Impact Assessment

- The EES adequately identifies the key issues associated with Noise and Vibration.
- Of the 9 risk categories identified for the **Construction Phase** of MMRP, after the proposed Environmental Performance requirements are implemented:
  - 5 risks have a residual classification of **Low**
  - 1 risk has a residual classification of **Medium**
  - 2 risks have a residual classification of **High** (construction vibration impacting on amenity, and ground bourne noise)
  - 1 risk is unclassified (vibration impacting buried pipework)
- Of the 4 risk categories identified for the **Operational Phase** of MMRP, all risks have a residual risk classification of **Low**, after the proposed Environmental Performance Requirements are implemented.
- Mitigation measures outlined in the EES fail to reduce the residual risks of some items to low or very low.
- Consequently Meinhardt recommends that RMIT seek to amend the Environmental Performance Requirements for MMRP.

5.5 Environmental Performance Requirements

Draft EES evaluation objective:

Amenity: To minimise adverse noise or vibration effects on the amenity of nearby residents and local communities, as far as practicable, especially during the construction phase.

The following table summarises the EES recommended EPR for the Precinct 4: Parkville Station, together with our recommendations associated with each EPR.

<table>
<tr><th>Impact</th><th>Environmental Performance Requirements</th><th>Meinhardt comments</th></tr>
<tr><td>Noise and Vibration</td><td>Appoint an acoustic and vibration consultant to predict construction noise and vibration (through modelling) and update the modelling to reflect current construction methodology, site conditions and specific equipment noise and vibration levels (this would require noise and vibration measurements). The model would be used to determine appropriate mitigation to achieve the Environmental Performance Requirements.
The acoustic and vibration consultant would also be required to undertake noise and vibration monitoring to assess levels
with respect to Guideline Targets specified in the Environmental Performance Requirements.
Where monitoring indicates exceedances of Guideline Targets, apply appropriate management measures as a soon as possible.</td><td>Meinhardt believes this EPR is acceptable</td></tr>
<tr><td>Noise and Vibration</td><td>Develop and implement a communications plan to liaise with potentially affected community stakeholders and land owners regarding potential noise and vibration impacts. The plan shall include procedures for complaint management.</td><td>Meinhardt recommends this EPR should be modified so that the Communications Plan for the CBD North Precinct is developed in consultation and with the approval of RMIT as the significant stakeholder in the precinct.</td></tr>
<tr><td>Construction generated airborne noise</td><td>Develop and implement a plan to manage construction noise in accordance with EPA Publication 1254 Noise Control Guidelines.</td><td>This EPA publication provides no Guideline Noise levels in relation to construction during the day.

Consequently there is a significant risk that RMIT Buildings will be impacted adversely by airbourne construction noise for a significant period.

Meinhardt recommends RMIT seek additional limits on airbourne construction noise emissions to limit noise levels emitted to RMIT buildings.</td></tr>
<tr><td>Construction generated airborne noise</td><td>Implement management actions if construction noise exceeds the internal noise levels below for Highly Sensitive Areas
(based on AS/NZS 2107:2000) and a noise sensitive receptor is adversely impacted.
<table><tr><th>Highly Sensitive Area</th><th>Maximum Internal Construction Noise Level $L_{Aeq,\ 15\ mins}$</th></tr><tr><td>Intensive Care Wards</td><td>45</td></tr><tr><td>Operating Theatres</td><td>45</td></tr><tr><td>Surgeries</td><td>45</td></tr><tr><td>Wards</td><td>40</td></tr></table></td><td>Meinhardt recommends RMIT consider whether any of its Building Structures house Highly Sensitive Areas, and whether it wishes to have this EPR, used in the Parkville Precinct, included and amended to have them incorporated into this schedule, together with a maximum noise level.</td></tr>
<tr><td>Building damage</td><td>Implement management actions if due to construction activity, the following DIN 4150 Guideline Targets for structural damage to buildings (for short-term vibration or long-term vibration) are not achieved.</td><td>Meinhardt believes this EPR is acceptable. We further recommend that RMIT provide and have incorporated into the EPR a register of RMIT buildings within the zone of influence together with the building assets classification against this DIN standard. (Meinhardt can assist in the preparation of this register if required)

The use of this German standard is considered acceptable as there are no Victorian requirements for managing construction vibration.</td></tr>
</table>

Short-term vibration on structures

Type of structure	Vibration at the foundation, mm/s (Peak Component Particle Velocity)			Vibration at horizontal plane of highest floor at all frequencies
	1 to 10 Hz	10 to 50 Hz	50 to 100 Hz[1]	mm/s (Peak Component Particle Velocity)
Type 1: Buildings used for commercial purposes, industrial buildings and buildings of similar design	20	20 to 40	40 to 50	40
Type 2: Dwellings and buildings of similar design and/or occupancy	5	5 to15	15 to 20	15
Type 3: Structures that have a particular sensitivity to vibration e.g. heritage buildings	3	3 to 8	8 to 10	8

Notes:

1. At frequencies above 100 Hz, the values given in this column may be used as minimum values.
2. Vibration levels marginally exceeding those vibration levels in the table would not necessarily mean that damage would occur and further investigation would be required to determine if higher vibration levels can be accommodated without risk of damage.
3. For civil engineering structures (e.g. with reinforced concrete constructions used as abutments or foundation pads) the values for Type 1 buildings may be increased by a factor of 2.
4. Short-term vibration is defined as vibration which does not occur often enough to cause structural fatigue and which does not produce resonance in the structure being evaluated.

Long term vibration on structures

Type of structure	Vibration Velocity, mm/s (Peak Component Particle Velocity) in horizontal plane at all frequencies
Buildings used for commercial purposes, industrial buildings and similar design	10
Dwellings and buildings of similar design and/or occupancy	5
Structures that have a particular sensitivity to vibration e.g. heritage buildings	2.5

Notes:

1. Vibration levels marginally exceeding those in the table would not necessarily mean that damage would occur and further investigation would be required to determine if higher vibration levels can be accommodated without risk of damage.
2. Long-term vibration during construction to demonstrate compliance with agreed vibration guideline targets. Take remedial action if limits are not met.

We further recommend that all measurement and evaluation of effects of vibration on structures shall be carried out in accordance with DIN 4150.

Damage to underground infrastructure

Implement management actions if the following DIN 4150 Guideline Targets for buried pipework/underground infrastructure from construction are not achieved.

Pipe Material	Vibration Velocity, mm/s (PPV)
Steel	100
Clay, concrete, reinforced concrete, prestressed concrete, metal	80
Masonry, plastic	50

Notes:

1. These values may be reduced by 50% when evaluating the effects of long-term vibration on buried pipework.
2. It is assumed pipes have been manufactured and laid using current technology (however it is noted that this is not the case for the majority of buried pipework potentially affected by Melbourne Metro).
3. Compliance is to be achieved with asset owner's Utility Standards.

Meinhardt believes this EPR is acceptable. We further recommend that RMIT request that is EPR clearly states that it is applicable to both Authority Infrastructure as well as privately owned underground pipes and infrastructure.

The use of this German standard is considered acceptable as there are no Victorian requirements for managing construction vibration.

We further recommend that all measurement and evaluation of effects of vibration on underground infrastructure shall be carried out in accordance with DIN 4150.

Construction vibration impacting upon amenity

Implement Management Actions if the Guideline Targets (VDVs) (based on Table 1 in BS6472-1:2008) for continuous (as for TBMs and roadheaders), intermittent, or impulsive vibration are not achieved.

Location	Vibration Dose Value, VDV ($m/s^{1.75}$)			
	Day 7am to 10pm		Night 10pm to 7am	
	Preferred Value	Maximum Value	Preferred Value	Maximum Value
Residences	0.20	0.40	0.10	0.20
Offices, schools, educational institutions, places of worship	0.40	0.80	0.40	0.80
Workshops	0.80	1.60	0.80	1.60

Notes:

1. The Guideline Targets are non-mandatory; they are goals that should be sought to be achieved through the application of feasible and reasonable mitigation measures. If exceeded then management actions would be required.
2. The VDVs may be converted to PPVs within a future Noise and Vibration Construction Management Plan.

Meinhardt believes this EPR should be modified to remove Note 1.

Meinhardt recommends that RMIT request these Guideline Targets to be mandatory, otherwise this EPR may be ineffectual.

The use of this British standard is considered acceptable as there are no Victorian requirements for managing construction vibration.

We further recommend that all measurement and evaluation of effects of vibration impacting on amenity shall be carried out in accordance with BS6472-1:2008)

Structural damage, impact on amenity	Comply with Australian Standard AS2187.2-2006, Explosives – Storage and use Part 2 – Use of explosives for all blasting. For Highly Sensitive Areas, hospital wards, operating theatres and Bio-resources and areas with vibration-sensitive equipment which are not covered in AS2187.2-2006, develop a plan in consultation with facilities owners that: ▪ Avoids damage to vibration-sensitive equipment ▪ Minimises adverse impact on Highly Sensitive Areas and Bio-resources.	Rock blasting is indicated as a possibility in other sections of the EES. Meinhardt recommends RMIT request this EPR be **included** as being applicable to Precinct 5. Meinhardt further recommends RMIT consider whether any of its Building Structures house Highly Sensitive Areas, and whether it wishes to have this EPR amended to list all such RMIT areas. Meinhardt also recommends RMIT considers whether RMIT prefers to attempt to prohibit blasting within the CBD North Precinct.
Construction vibration causing disturbance to vibration sensitive equipment	Implement Management Actions if the ASHRAE equipment vibration Guideline Targets or measured background levels (whichever is higher) are exceeded for vibration-sensitive equipment during construction and operation at Parkville and CBD North stations. **Equipment requirements** / **Curve** Bench microscopes up to 100x magnification; laboratory robots — Operating Room Bench microscopes up to 400x magnification; optical and other precision balances; co-ordinate measuring machines; metrology laboratories; optical comparators; micro electronics manufacturing equipment; proximity and projection aligners, etc. — VC-A Microsurgery, eye surgery, neurosurgery; bench microscope at magnification greater than 400x; optical equipment on isolation tables; microelectronic manufacturing equipment such as inspection and lithography equipment (including steppers) to 3mm line widths — VC-B Electron microscopes up to 30,000x magnification; microtomes; magnetic resonance images; microelectronics manufacturing equipment such as lithography and inspection equipment to 1 mm detail size — VC-C Electron microscopes at magnification greater than 30,000x; mass spectrometers; cell implant equipment; microelectronics manufacturing equipment such as aligners, steppers and other critical equipment for photo-lithography with line widths of ½ micro m; includes electron beam systems — VC-D Unisolated laser and optical research systems; microelectronics manufacturing equipment such as aligners, steppers and other critical equipment for photolithography with line widths of ¼ micro m; includes electron beam systems — VC-E Note: 1. The Proponent may undertake consultation with the users and agree alternative Guideline Targets.	Meinhardt believes this EPR is acceptable Meinhardt recommends RMIT consider whether this schedule incorporates all its sensitive equipment, and whether it wishes to have this EPR amended to list all such RMIT sensitive equipment..
Construction ground-borne noise impacting upon amenity	Implement management actions as determined in consultation with potentially affected land owners to protect amenity at residences, sleeping areas in hospital wards, student accommodation and hotel rooms where the following ground-borne noise Guideline Targets (from the NSW Interim Construction Noise Guideline) are exceeded during construction. **Time Period** / **Internal Target, $L_{Aeq,15min}$ (dB)** Evening, 6pm to 10pm — 40 Night, 10 pm to 7am — 35 Note: 1. Levels are only applicable when ground-borne noise levels are higher than airborne noise levels. 2. The noise levels are assessed at the centre of the most affected habitable room. 3. Management Actions include extensive community consultation to determine acceptable level of disruption and provision of respite accommodation in some circumstances.	This EPR makes reference only to residences, and does not refer to other sensitive land uses such as educational institutions. Consequently there is a significant risk that RMIT Buildings will be impacted adversely by ground-bourne construction noise for a significant period. Meinhardt recommends RMIT seek additional limits on ground bourne construction noise emissions to limit noise levels emitted to RMIT buildings.
Construction Disturbance to Bio-resources	To protect the amenity of Bio-resources and sensitive research during construction and operation the following criteria apply: ▪ Background noise should be kept below 50 dB and should be free of distinct tones (internal). ▪ Short exposure should be kept to less than 85 dB (internal). Notes: 1. The levels above should take into consideration the frequency threshold for the Bio-resource under consideration. 2. Higher levels may be acceptable if it can be shown that the Bio-resource under consideration is exposed to higher levels and is not adversely impacted by them.	This EPR is included in the Parkville Precinct, but not in the CBD North Precinct. Meinhardt recommends RMIT assess whether it has any Bio-resources that may be impacted, and whether this EPR needs to be included.
Operational Noise and Vibration	Appoint an acoustic and vibration consultant to predict noise and vibration and determine appropriate mitigation to achieve the Environmental Performance Requirements. The acoustic and vibration consultant would also be required to undertake commissioning noise and vibration measurements to assess levels with respect to the Environmental Performance Requirements.	Meinhardt believes this EPR is acceptable

Operational airborne noise impacting on amenity

Avoid, minimise or mitigate rail noise where the following PRINP (Victorian Passenger Rail Infrastructure Noise Policy, April 2013) Investigation Thresholds are exceeded during operation.

Time	Type of Receiver	Investigation Thresholds
Day (6am – 10pm)	Residential dwellings and other buildings where people sleep including aged persons homes, hospitals, motels and caravan parks Noise sensitive community buildings, including schools, kindergartens, libraries	65 dBL_{Aeq} and a change in 3 dB(A) or more or 85 dBL_{Amax} and a change in 3 dB(A) or more
Night (10pm – 6am)	Residential dwellings and other buildings where people sleep including aged persons homes, hospitals, motels and caravan parks	60 dBL_{Aeq} and a change in 3 dB(A) or more or 85 dBL_{Amax} and a change in 3 dB(A) or more

Notes:

1. If an investigation shows that the thresholds are not exceeded, then no further action is considered under the PRINP
2. L_{Amax}, for this assessment, is defined as maximum A-weighted sound pressure level and is the 95 percentile of the highest value of the A-weighed sound pressure level reached within the day or night
3. For the Melbourne Metro the location of assessment is at 1 m from the centre of the window of the most exposed external façade

This EPR is included in the Parkville Precinct, but not in the CBD North Precinct.

Meinhardt recommends RMIT request inclusion of this EPR for the CBD North Precinct.

Operational airborne noise causing adverse impact on amenity

Comply with State Environment Protection Policy (Control of Noise from Commerce, Industry and Trade) No. N-1 (SEPP N-1). This does not apply to trains and trams.

Meinhardt believes this EPR is acceptable.

Operational ground-borne noise impacting upon amenity

Where operational ground-borne noise trigger levels are exceeded for sensitive occupancies as shown in the table below (trigger levels are based on the Rail Infrastructure Noise Guideline,17 May 2013 (RING(1)), assess feasible and reasonable mitigation to reduce noise towards the relevant ground-borne noise trigger level.

Sensitive land use	Time of day	Internal noise trigger levels
Residential	Day (7am-10pm)	40 dBL_{ASmax} and an increase in existing rail noise level by 3 dB(A) or more
	Night (10pm -7am)	35 dBL_{ASmax} and an increase in existing rail noise level by 3 dB(A) or more
Schools, educational institutions, places of worship	When in use	40-45 dBL_{ASmax} and an increase in existing rail noise level by 3 dB(A) or more
Hospitals (bed wards and operating theatres)	24 hours	35 dB(A) L_{ASMax}
Offices	When in use	45 dB(A) L_{ASMax}
Cinemas and Public Halls	When in use	30 dB(A) L_{ASMax}
Drama Theatres	When in use	25 dB(A) L_{ASMax}
Concert halls, Television and Sound Recording Studios	When in use	25 dB(A) L_{ASMax}

1. RING provides trigger levels for residential and schools, educational institutions and places of worship, but does not provide guidance on acceptable ground-borne noise levels for other types of sensitive receivers. Ground-borne noise trigger levels for other types of sensitive occupancies have been developed based on RING and industry knowledge.
2. Specified noise levels refer to noise from heavy or light rail transportation only (not ambient noise from other sources)
3. Assessment location is internal near to the centre of the most affected habitable room.
4. L_{ASmax} refers to the maximum noise level not exceeded for 95% of the rail pass-by events.
5. For schools, educational institutions, places of worship the lower value of the range is most applicable where low internal noise levels is expected.

This EPR is included in the Parkville Precinct, but not in the CBD North Precinct.

Meinhardt recommends RMIT request inclusion of this EPR for the CBD North Precinct.

Operational vibration impacting on amenity

During operation, achieve the Guideline Targets (based on Table 1 in BS6472-1:2008) or background levels (whichever is higher) for vibration as follows:

Location	VDV ($m/s^{1.75}$)			
	Day 7am to 10pm		Night 10pm to 7am	
	Preferred Value	Maximum Value	Preferred Value	Maximum Value
Residences	0.20	0.40	0.10	0.20
Offices, schools, educational institutions, places of worship	0.40	0.80	0.40	0.80
Workshops	0.80	1.60	0.80	1.60

Notes:

1. The Guideline Targets are non-mandatory, they are goals that should be sought to be achieved through the application of feasible and reasonable mitigation measures.
2. Compliance with these values implies no structural damage due to operation

Meinhardt believes this EPR is acceptable

Operational vibration causing disturbance to vibration sensitive equipment

Implement Management Actions if the ASHRAE equipment vibration Guideline Targets or measured background levels (whichever is higher) are exceeded for vibration-sensitive equipment during construction and operation at Parkville and CBD North stations.

Meinhardt believes this EPR is acceptable

Meinhardt recommends RMIT consider whether this schedule incorporates all its sensitive equipment, and whether it wishes to have this

	Equipment requirements / **Curve** Bench microscopes up to 100x magnification; laboratory robots / Operating Room Bench microscopes up to 400x magnification; optical and other precision balances; co-ordinate measuring machines; metrology laboratories; optical comparators; micro electronics manufacturing equipment; proximity and projection aligners, etc. / VC-A Microsurgery, eye surgery, neurosurgery; bench microscope at magnification greater than 400x; optical equipment on isolation tables; microelectronic manufacturing equipment such as inspection and lithography equipment (including steppers) to 3mm line widths / VC-B Electron microscopes up to 30,000x magnification; microtomes; magnetic resonance images; microelectronics manufacturing equipment such as lithography and inspection equipment to 1 mm detail size / VC-C Electron microscopes at magnification greater than 30,000x; mass spectrometers; cell implant equipment; microelectronics manufacturing equipment such as aligners, steppers and other critical equipment for photo-lithography with line widths of ½ micro m; includes electron beam systems / VC-D Unisolated laser and optical research systems; microelectronics manufacturing equipment such as aligners, steppers and other critical equipment for photolithography with line widths of ¼ micro m; includes electron beam systems / VC-E Note: 1. The Proponent may undertake consultation with the users and agree alternative Guideline Targets.	EPR amended to list all such RMIT sensitive equipment..
Operational Disturbance to Bio-resources	To protect the amenity of Bio-resources and sensitive research during construction and operation the following criteria apply: ▪ Background noise should be kept below 50 dB and should be free of distinct tones (internal). ▪ Short exposure should be kept to less than 85 dB (internal). Notes: 1. The levels above should take into consideration the frequency threshold for the Bio-resource under consideration. 2. Higher levels may be acceptable if it can be shown that the Bio-resource under consideration is exposed to higher levels and is not adversely impacted by them.	This EPR is included in the Parkville Precinct, but not in the CBD North Precinct. Meinhardt recommends RMIT assess whether it has any Bio-resources that may be impacted, and whether this EPR needs to be included

6 EES Section 18 – Groundwater

6.1 EES evaluation objective against which the project is to be assessed

The Scoping Requirements issued by the Minister for Planning include evaluation objectives against which the project must be assessed.

In relation to ***Hydrology, water quality and waste management***, the evaluation objective is '***To protect waterways and waterway function and surface water and groundwater quality in accordance with statutory objectives, to identify and prevent potential adverse environmental effects resulting from the disturbance of contaminated or acid-forming material and to manage excavation spoil and other waste in accordance with relevant best practice principles"***

6.2 Review of EES technical reports

6.2.1 Documents reviewed

- EES Summary Report
- EES Chapter 18 – Groundwater
- EES Technical Appendix O – Groundwater Part 1
- EES Technical Appendix O – Groundwater Part 2
- EES Technical Appendix O – Groundwater Part 3
- EES Technical Appendix O – Groundwater Part 4
- EES Technical Appendix O – Groundwater Part 5
- EES Technical Appendix O – Groundwater Part 6

6.2.2 Summary of key EES statements

ITEM	EES Statement	EES/other page reference
1.	Groundwater would be encountered across almost the entire Melbourne Metro alignment.	EES chapter 18 pg. 1
2.	The principal potential impacts of Melbourne Metro on groundwater arise because most of the tunnels, stations and other sub-surface infrastructure are located below the watertable.	EES chapter 18 pg. 1
3	Groundwater can seep into excavations that are below the watertable, which can result in groundwater drawdown around the structures during construction and operation.	EES chapter 18 pg. 1
4	Groundwater drawdown is the primary pathway for potential impacts on groundwater dependent assets to occur.	EES chapter 18 pg. 1
5	Tanking methods (sealing structures to minimise groundwater inflow) would reduce groundwater inflow to negligible rates during both construction and operation, and prevent impacts to these assets.	EES chapter 18 pg. 1
6	For the mined sections of tunnels and other excavations, (e.g. the construction of CBD North Station) the drawdown associated with construction would be short-term and groundwater levels would recover after tanking of the structures at the end of construction	EES chapter 18 pg. 1
7	As all structures associated with Melbourne Metro would be tanked for operation, drawdown would be insignificant post construction.	EES chapter 18 pg. 1

8	Temporary impacts to local groundwater dependent assets may occur during the construction of Melbourne Metro as a result of groundwater drawdown, but the use of standard design techniques and mitigation measures can minimise drawdown so that impacts are acceptable.	EES chapter 18 pg. 1
9	Construction activities that may influence groundwater impacts in Precinct 5 are associated with the mined cavern construction of CBD North station, including connections to Melbourne Central Station. The proposed construction methods mean that the structure would be drained during construction and groundwater inflows would occur	EES chapter 18 pg. 29
10	The lowest groundwater elevations coincide with groundwater sinks such as the North and South Yarra Main Sewers, the City Loop tunnels and the CityLink tunnels as well as deep basements in Parkville, the CBD and Southbank.	EES chapter 18 pg. 8
11	There is a possibility of activating potential acid sulfate soil (PASS) through lowering of the watertable in Coode Island Silt or in fresh to slightly weathered Melbourne Formation.	EES chapter 18 pg. 13
12	When the watertable fluctuates, acidic groundwater can be produced and heavy metals can be mobilised, causing corrosion of underground concrete and steel structures, foundations or services	EES chapter 18 pg. 13
13	Where the Melbourne Formation is fresh to slightly weathered, which typically occurs at depths greater than 24m, it has moderate to high potential to generate acidity. The degree of weathering of rock in the CBD North station excavation ranges from fresh to high weathered. The component of fresh rock presents a risk of acid formation.	EES Technical Appendix O – Groundwater Part 1, pg 160
15	The station cavern is located directly beneath Swanston Street, extending from La Trobe Street in the south to north of Franklin Street. The station cavern itself would be an approximate tube structure approximately 23 m in diameter (at the widest point) located at a maximum depth of 44 m.	EES Technical Appendix O – Groundwater Part 1, pg 158
16	In addition to the station cavern, there would be access shafts on the northern corners and south west corner of the station.	EES Technical Appendix O – Groundwater Part 1, pg 158
17	The North shaft (Franklin Street entrance) extends from the station to the east and west along Franklin Street and is excavated to a maximum depth of 45 m	EES Technical Appendix O – Groundwater Part 1, pg 158
18	The South West shaft (La Trobe Street entrance) extends from the station to the west just north of La Trobe Street. From the southern end of the shaft there would be a passenger underpass beneath La Trobe Street to Melbourne Central Station, excavated to a maximum depth of 45 m.	EES Technical Appendix O – Groundwater Part 1, pg 158
19	This station is proposed to be constructed using a mined cavern construction method. The shafts to the north-east and south-west are proposed to be used as access shafts to enable to construction of the cavern from underground. These shafts would be excavated using a retaining wall system such as king post piling.	EES Technical Appendix O – Groundwater Part 1, pg 158
20	The caverns, adits and shafts would be expected to act as drained structures during construction.	EES Technical Appendix O – Groundwater Part 1, pg 158
21	Depth to groundwater is shallowest at the northern end of the CBD North station precinct, where groundwater levels are within approximately 10 m of the surface, and deepest at the southern end of the station where they are approximately 25 m below the surface.	EES Technical Appendix O – Groundwater Part 1, pg 160

22	Groundwater inflows to the station during construction, requiring dewatering. Groundwater levels in the area could be up to approximately 13 m AHD, which would mean groundwater would have to be lowered by approximately 33 m to keep the excavation dry during construction.	EES Technical Appendix O – Groundwater Part 1, pg 164
22	During operation, it is planned that all underground structures in this precinct would be tanked to a tightness classification of Haack 2.	EES Technical Appendix O – Groundwater Part 1, pg 158
23	At the end of construction, the drawdown cone at CBD North station would be expected to propagate several hundred metres out from the station if no mitigation measures are implemented to prevent inflows.	EES chapter 18 pg. 29
24	During operation, it is planned that all underground structures in the CBD North Precinct would be tanked to a tightness classification of Haack 2, which limits inflow to 0.05 L/m2 per day per 100m length.	EES Technical Appendix O – Groundwater Part 1, pg 167
25	Minimal drawdown (less than 1m) is expected at the CBD North station precinct during operation since it is assumed inflows are largely prevented by constructing the tunnels to a Haack 2 tightness criteria. A shallow steady state drawdown immediately above the tunnels of less than 0.2m would extend out from the station.	EES Technical Appendix O – Groundwater Part 1, pg 165

6.3 Risk Assessment

A risk assessment process was adopted in the EES that adopted the following methodology:

- Setting of the context for the environmental risk assessment
- Development of consequence and likelihood frameworks and the risk assessment matrix
- Review of project description and identification of impact assessment pathways by specialists in each relevant discipline area
- Allocation of consequence and likelihood ratings and determination of preliminary initial risks
- Further investigation of impact pathways and presence of receptors to confirm or revise initial risk rankings
- Development of Environmental Performance Requirements and mitigation measures to reduce initial risks ranked moderate (or higher), to achieve residual risk rankings.

Meinhardt has reviewed the risk assessment in Chapter 6 of the MMRP Groundwater Impact Assessment (Appendix O of the EES) and in Chapter 11, Precinct 5: CBD North Station Report (Appendix O of the EES). The risks identified, that impact on RMIT, are summarised as follows:

ITEM	CATEGORY	EVENT
G1	Groundwater drawdown causing migration of contaminant plumes	Groundwater drawdown causing existing contaminant plumes to migrate to areas previously unaffected by Contamination. Pumping groundwater from excavations leads to drawdown that could cause contaminated groundwater to migrate to third party properties, and reduce current and future beneficial uses of groundwater at those properties. If the contaminant plume consists of volatile substances, there is the potential for vapour to enter structures on neighbouring properties as a result of the migration of contamination
G2	Groundwater drawdown oxidising Potential Acid Sulfate Soils (PASS) resulting in increased groundwater acidity	Groundwater drawdown may expose PASS to air causing oxidiation of sulfide minerals and impacts on groundwater quality, including increased acidity and heavy metal content, causing corrosion of underground concrete and steel structures, foundations or services.

6.4 Impact Assessment

- The EES adequately identifies the key issues associated with Groundwater.
- Mitigation measures outlined in the EES reduce the residual risks of groundwater to low or very low.
- Consequently Meinhardt recommends that RMIT accept the Environmental Performance Requirements for MMRP in relation to Groundwater.

6.5 Environmental Performance Requirements

Draft EES evaluation objective:

Hydrology, water quality and waste management:
To protect waterways and waterway function and surface water and groundwater quality in accordance with statutory objectives, to identify and prevent potential adverse environmental effects resulting from the disturbance of contaminated or acid-forming material and to manage excavation spoil and other waste in accordance with relevant best practice principles

The following table summarises the EES recommended EPR for the Precinct 1: Tunnels and Precinct 5: CBD North Station, together with our recommendations associated with each EPR.

Impact	Environmental Performance Requirements	Meinhardt comments
Groundwater	Design the tunnel and underground structures so that they minimise groundwater drawdown during construction and operation to minimise impacts on groundwater dependent values, ground movement and contamination plume migration.	Meinhardt believes this EPR is acceptable
Groundwater	Develop a groundwater model for the detailed design phase to predict impacts associated with any changes to construction techniques or operational design features proposed during detailed design, and reconfirm that the Environmental Performance Requirements and mitigation measures are sufficient to mitigate impacts from changes in groundwater levels, flow and quality. Undertake monitoring during construction to ensure that predictions are accurate and mitigation measures are appropriate.	Meinhardt believes this EPR is acceptable.
Groundwater	Develop and implement a Groundwater Management Plan (GMP) detailing groundwater management approaches to address the predicted impacts to groundwater dependent values during construction. The GMP must be based on the detailed design phase groundwater model, and should include the following details: ▪ Approach to collection, treatment and disposal of groundwater collected during construction in accordance with the MMRA Groundwater Disposal Strategy ▪ Identifying and if necessary, specifying mitigation measures to protect groundwater dependent vegetation during periods of drawdown ▪ An approach identified in consultation with the EPA so that contaminant migration causes no significant impacts on beneficial uses and vapour intrusion into underground structures, and establish appropriate monitoring networks to confirm effectiveness of approach ▪ Methods for minimising drawdown in areas of known PASS and establishing appropriate monitoring networks to confirm effectiveness of approach ▪ Methods for minimising drawdown at any existing recharge bores and establishing appropriate monitoring networks to confirm effectiveness of mitigation drawdown ▪ Groundwater drawdown trigger levels for groundwater dependant values at which additional mitigation measures must be adopted ▪ Design, operation and management of groundwater injection borefields ▪ Contingency measures if impacts occur at existing active groundwater bores and surface water bodies. The GMP must satisfy the EPA and relevant water authorities that groundwater dependent values will be protected. The groundwater management plan should also address MMRA's sustainability requirements where appropriate.	Meinhardt believes this EPR is acceptable
Groundwater	Use the Groundwater Disposal Strategy and GMP to obtain a Trade Develop a groundwater disposal All Construction / GW055 Waste Agreement with the relevant Water Retailers for groundwater strategy that confirms disposal Operation GW056 disposal.	Meinhardt believes this EPR is acceptable
Groundwater	Develop and implement a groundwater monitoring plan as part of the GMP that details sufficient monitoring of drawdown to verify that no significant impacts occur from potential: ▪ Contaminant migration on the beneficial uses of groundwater at third party properties caused by drawdown and vapour intrusion to underground structures • Activation of PASS and groundwater acidification ▪ Reduction in access to water for bore owners in the area around the project ▪ Reduction in access to groundwater for trees– particularly in the Tunnels precinct between CBD South and Domain stations, and the CBD South station and eastern portal precincts • Change in groundwater levels in any existing recharge bores that may be present in the area around the project.	Meinhardt believes this EPR is acceptable

7 EES Section 19 – Ground Movement and Land Stability

7.1 EES evaluation objective against which the project is to be assessed

The Scoping Requirements issued by the Minister for Planning include evaluation objectives against which the project must be assessed.

In relation to ***Land Stability***, the evaluation objective is ***'To avoid or minimise adverse effects on land stability that might arise directly or indirectly from project works"***

7.2 Review of EES technical reports

7.2.1 Documents reviewed

- EES Summary Report
- EES Chapter 19 – Ground Movement and Land Stability
- EES Technical Appendix P – Ground Movement and Land Stability Part 1
- EES Technical Appendix P – Ground Movement and Land Stability Part 2
- EES Technical Appendix P – Ground Movement and Land Stability Part 3
- EES Technical Appendix P – Ground Movement and Land Stability Part 4
- EES Technical Appendix P – Ground Movement and Land Stability Part 5
- EES Technical Appendix P – Ground Movement and Land Stability Part 6
- EES Technical Appendix P – Ground Movement and Land Stability Part 7

7.2.2 Summary of key EES statements

ITEM	EES Statement	EES/other page reference
1.	Ground movement is an expected outcome on any tunnelling project	EES chapter 19 pg. 1
2.	Predominantly, the tunnels alignment is located within favourable geological units for ground stability, while meeting the key requirement to achieve safe design gradients for rail operations.	EES chapter 19 pg. 1
3	Ground movements may occur above and adjacent to Melbourne Metro works due to the following mechanisms: ▪ Underground excavation-induced ground movement ▪ Open cut excavation-induced ground movement ▪ Primary consolidation settlement of soft soils, primarily Coode Island Silt ▪ Slope instability	EES chapter 19 pg. 1
4	Buildings, utilities and civil infrastructure – such as roads, tram lines, rail lines, bridges and pipes – would potentially be subjected to the effects of ground movement caused by excavation activities.	EES chapter 19 pg. 2
5	Excavation-induced ground movements would only occur during the construction phase.	EES chapter 19 pg. 2
6	The Potential Zone of Influence relating to ground movement has been defined by the estimated 5 mm excavation-induced ground surface settlement contours, together with areas potentially subject to primary consolidation settlement greater than 10 mm. Prior experience demonstrates that tunnelling projects have negligible impacts on structures outside these parameters. Structures and underground services within these parameters have been considered in the ground movement impact assessment conducted for the EES.	EES chapter 19 pg. 3

7	Predominantly, the project alignment would traverse bedded and folded sedimentary rock, the Melbourne Formation, which forms the rock beneath much of Melbourne. The tunnels within the CBD North Precinct, as well as the CDD station, would be located within Melbourne Formation.	EES chapter 19 pg. 5
8	The vertical extent of the study area is based on the vertical alignment of the tunnels: up to 40 m below ground level.	EES chapter 19 pg. 8
9	The cover over the proposed CBD North station cavern would be approximately 25 m, while at the proposed CBD South station, the cover would be approximately 15 m.	EES Technical Appendix P – Ground Movement and Land Stability Part 1, pg 15

7.3 Risk Assessment

A risk assessment process was adopted in the EES that adopted the following methodology:

- Development of preliminary assessment inputs
- Determination of the Potential Zone of Influence for ground movement
- Identification of impact assessment pathways
- Site specific assessment
- Investigation of impact pathways and presence of receptors to confirm or revise initial risk rankings
- Development of Environmental Performance Requirements and mitigation measures to reduce initial risks ranked moderate (or higher), to achieve residual risk rankings.

Meinhardt has reviewed the risk assessment in Chapter 7 of the MMRP Ground Movement and Land Stability Impact Assessment (Appendix P of the EES). The risks identified, that impact on RMIT, are summarised as follows:

ITEM	CATEGORY	EVENT
LS1	Construction stage excavations cause ground movement	Potential impacts on existing buildings and/or infrastructure
LS2	Construction stage groundwater inflows to excavations result in ground movement (consolidation settlement)	Potential impacts on existing buildings and/or infrastructure
LS3	Combined effects of excavation induced ground movement and consolidation settlement	Potential impacts on existing buildings and/or infrastructure
LS4	Unexpected ground conditions or unexpected ground movement	Moderate or worse impacts to existing structures and/or infrastructure.
LS5	Tunnel construction encountering rock with greater rock mass strength than expected	May necessitate a change in construction methods in a zone of mixed geological conditions leading to increased ground movement or cause TBM to go off-line. Requirement to change construction method or repair/retool TBM could result in project delay
LS6	Underground Excavations	Very high strength rock mass requires drilling and blasting as a method of excavation. This could result in delays in tanking of tunnels or underground excavations.
LS7	Tunnel construction	Modelled levels of ground movement are underestimated as a consequence of unforeseen geology, groundwater conditions, surface conditions and unexpected building conditions or use of different equipment types.
LS8	Ground heave as a result of excessive face pressure by the TBMs in shallow cover areas	Unacceptable ground movement.
LS9	Groundwater inflow to excavations much greater than that estimated due to interception of high permeability zones that are difficult to control.	Consolidation settlement magnitude and extents greater than that estimated resulting in moderate or worse impacts to existing structures and/or infrastructure.

LS10	Ongoing leakage into tunnels and underground structures during operation	Depressurisation of compressible sediments resulting in consolidation settlement with subsequent unacceptable impacts on structures, utilities and/or infrastructure.

7.4 Impact Assessment

- The EES adequately identifies the key issues associated with Ground Movement and Land Stability.
- The EES Impact Assessment has not considered individual impacts of settlement on all structures, utilities and infrastructure with the CBD North precinct.
- Mitigation measures outlined in the EES reduce the residual risks associated with Ground Movement and Land Stability to low or very low.
- Consequently Meinhardt recommends that RMIT accept the Environmental Performance Requirements for MMRP in relation to Groundwater.

7.5 Environmental Performance Requirements

Draft EES evaluation objective:

Land Stability: ***'To avoid or minimise adverse effects on land stability that might arise directly or indirectly from project works"***

The following table summarises the EES recommended EPR for the Precinct 4: Parkville Station, together with our recommendations associated with each EPR.

Impact	Environmental Performance Requirements	Meinhardt comments
Land Stability	Develop and maintain geological and groundwater models which: ▪ Use monitored ground movement and ground water levels prior to construction to identify pre-existing movement; ▪ Inform tunnel design and the construction techniques to be applied for thevarious geological and groundwater conditions; ▪ Assess potential drawdown and identify trigger levels for implementing additional mitigation measures to minimise potential primary consolidation settlement; and ▪ Assess potential ground movement effects from excavation and identify trigger levels for implementing additional mitigation measures to minimise potential ground movement effects	Meinhardt believes this EPR is acceptable
Land Stability	Design and construct the permanent structures and temporary works so as to limit ground movements to within appropriate acceptability criteria (to be determined in consultation with the relevant stakeholders) for vertical, horizontal, and angular deformation, as appropriate, for project activities during the construction and operational phase	Meinhardt recommends this EPR should be modified so that the acceptability criteria for the CBD North Precinct is developed in consultation and **with the approval** of RMIT as the significant stakeholder in the precinct.
Land Stability	Develop and implement a ground movement plan for construction and operational phases of the project that: ▪ Addresses the location of structures/assets which may be susceptible to damage by ground movement resulting from Melbourne Metro works; ▪ Identifies appropriate ground movement impact acceptability criteria for buildings, utilities, trains, trams and pavement in consultation with the various stakeholders; ▪ Identifies mitigation measures to ensure acceptability criteria can be met; ▪ Identifies techniques for limiting settlement of buildings and protecting buildings from damage; ▪ Addresses additional measures to be adopted if acceptability criteria are not met such as reinstatement of any property damage; ▪ Addresses monitoring ground movement surrounding proposed Melbourne Metro works and at the location of various structures/assets to measure consistency with the predicted model; ▪ Consult with land and asset owners that could potentially be affected and where mitigation measures would be required	Meinhardt believes this EPR is acceptable
Land Stability	Conduct pre-construction condition surveys for the assets predicted to be affected by ground movement. Develop and maintain a data base of as built and pre construction condition information for each potentially affected structure, specifically including: ▪ Identification of structures/assets which may be susceptible to damage resulting from ground movement resulting from Melbourne Metro works; ▪ Results of condition surveys of structures, pavements, significant utilities and parklands to establish baseline conditions and potential vulnerabilities; ▪ Records of consultation with landowners in relation to the condition surveys; ▪ Post construction stage condition surveys conducted, where required	Meinhardt believes this EPR is acceptable
Land Stability	Adopt construction techniques for Melbourne Metro to limit ground movement to within	Meinhardt recommends this

	appropriate acceptability criteria (to be determined in consultation with the relevant stakeholders).	EPR should be modified so that the acceptability criteria for the CBD North Precinct is developed in consultation and **with the approval** of RMIT as the significant stakeholder in the precinct.
Land Stability	For properties and assets affected by ground movement, undertake any required repair works	Meinhardt believes this EPR is acceptable

Appendix 4: Environmental Health and Safety

Prepared by Meinhardt Australia Pty Ltd

Environmental Management Framework

Peer Review of Environmental Effects Statement for the Melbourne Metro Rail Project on behalf of RMIT

Project Reference 116024

June 2016

Prepared For:

RMIT
124 La Trobe St
Melbourne VIC 3000

Meinhardt

Level 12, 501 Swanston Street
Melbourne, Vic 3000

P. 03 8676 1200 | F. 03 8676 1201
www.meinhardtgroup.com

REV	DATE	WRITTEN BY	REVIEWED BY	APPROVED BY
A	20/06/16	A. Russo	S. Ragusa	A. Russo

TABLE OF CONTENTS

Executive Summary

1. The EES for the Melbourne Metro Rail Project includes an Environmental Management Framework (EMF), the purpose of which is to '*provide a transparent framework with clear accountabilities for managing environmental effects and hazards associated with construction and operation phases of the project, in order to achieve acceptable environmental outcomes'*.
2. Key components of the EMF include:
   - Environmental Performance Requirements (EPRs);
   - Construction Contractor's EMS documentation;
   - Operator's EMS Documentation; and
   - Other plans to comply with planning requirements.
3. Due to the nature of the project delivery approach, detailed environmental management documentation will not be prepared until contractor(s) have been appointed and the detailed design and construction methodology has been developed. As such, the EPRs are the key element of the EES for RMIT to review and assess whether adequate controls will be put in place to address the key risks and impacts of concern to the University.
4. Meinhardt considers that the EPRs are not adequate to ensure that RMIT will be actively involved in the development of the Construction Environmental Management Plan (CEMP), Operations Environmental Management Plan (OEMP) and associated documentation. As such, it is recommended that all EPRs which require the development of the CEMP, OEMP and specific sub-plans should list RMIT as a key stakeholder that must be consulted during development and implementation of these plans.
5. The proposed level of independent review and verification of the EMF implementation provides some surety to RMIT that the EMF will be implemented and controlled. However, as discussed above, there are a number of improvements that could be made to the EMF documentation and consultation process that should be pursued by RMIT in their submission to the EES and subsequent discussions with MMRA. Meinhardt also recommends that (with regard to document approvals) the Independent Reviewer should be required to review and approve the Contractor's EMS and CEMP.

1 Introduction

The EES for the Melbourne Metro Rail Project includes an Environmental Management Framework (EMF). Consistent with the EES Scoping Requirements, the purpose of the EMF is '*To provide a transparent framework with clear accountabilities for managing environmental effects and hazards associated with construction and operation phases of the project, in order to achieve acceptable environmental outcomes*'.

The EMF outlines the key responsibilities, documentation and controls that are to be implemented during design, construction and operation of the project.

This is the key component of the EES for RMIT to review and verify whether appropriate procedures and controls will be implemented to ensure the protection of human health and the environment in the vicinity of and within University grounds.

2 Methodology and Assumptions

2.1 Methodology

The following methodology was adopted for this review:

- A review of the EES documentation, in particular:
  - Summary Report
  - Chapters 1 to 6, and Chapter 23
  - Technical Appendix B, Environmental Risk Register
- Review of the adequacy of the EMF outlined in the EES to assess whether this is robust enough to avoid or minimise potential environmental health and safety impacts to RMIT assets and users during construction and operation of Melbourne Metro.
- Preparation of this review report including recommendations.

2.2 Assumptions

The following assumptions were adopted for this review:

- This report provides a review of the structure and form of the proposed EMF, as it may apply to RMIT. It is assumed that the adequacy of the content of the EMF with regard to specific environmental impacts and mitigation measures has been reviewed via the separate specialist reviews (i.e. air quality, noise, groundwater etc.).

3 Findings

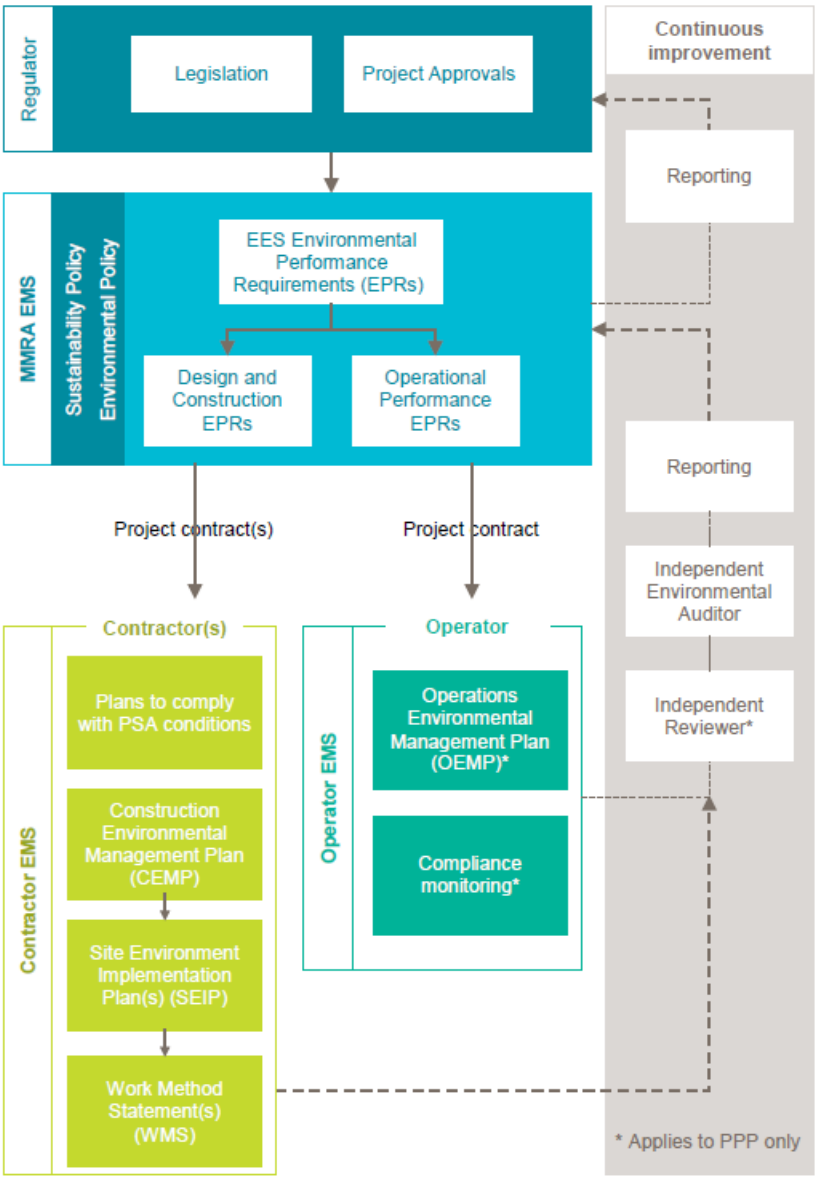
3.1 Overview of the EMF

The overall structure of the EMF is outlined in *Figure 23-3* of the EES, and is reproduced below for reference. Key components of the EMF include:

- **Environmental Performance Requirements (EPRs)** – which define mitigation measures or required outcomes to ensure protection of the environment during the design, construction and operation of the project. The EPRs have been developed through the risk and impact assessments conducted for each specialist area within the scope of the EES.
- **Construction Contractor's EMS documentation** – this includes an Environmental Management System (EMS), Construction Environmental Management Plan (CEMP), Site Environment Implementation Plan(s) (SEIP) and Work Method Statement(s) (WMS).
- **Operator's EMS Documentation** – this includes an EMS and Operations Environmental Management Plan (OEMP).
- **Other plans to comply with planning requirements** – including a Traffic Management Plan (TMP) for the construction phase.

MMRA will also develop an overarching EMS, Sustainability Policy and Environmental Policy which will set the requirements for the contractors' EMS documentation. Other than the EPRs and MMRA's Sustainability Policy, none of the above-mentioned environmental management documentation has been provided with the EES for public consideration. The EES states that the EMF, including all recommended EPRs, would be implemented through Project Contracts for the delivery of Melbourne Metro.

Figure 23-3 Environmental Management Framework



3.2 Adequacy of EMF Components

3.2.1 Environmental Performance Requirements (EPRs)

Due to the nature of the project delivery approach, detailed environmental management documentation (i.e. EMS, CEMP, OEMP and associated documents) will not be prepared until contractor(s) have been appointed and the detailed design and construction methodology has been developed. As such, the EPRs are the key element of the EES for RMIT to review and assess whether adequate controls will be put in place to address the key risks and impacts of concern to the University.

A detailed review of the key risks and impacts of relevance to RMIT has been conducted in relation to each specialist area, and the adequacy of proposed EPRs has been assessed (refer to Summary Document and other Appendices).

The EES states that (Chapter 23, pg. 23-9): "*As part of their EMS, the contractors would be required to develop a detailed environmental risk assessment based on the detailed design of the project and consider the risks identified in the EES… The contractors would be required to maintain a current risk register which would be 'live', adopting regular reviews and updating the register in response to changes to design, construction or operational activities, work methods, new technology, legislation and policy, or the occurrence of incidents or complaints.*"

Depending on the detailed design that is developed, and the extent to which it varies from the concept design presented in the EES, there may be additional risks relevant to RMIT which have not been considered in the current impact assessments and corresponding EPRs. As such, we consider it would be necessary for RMIT to be involved in ongoing consultation with MMRA and the appointed contractor(s) to ensure that the evolving assessment of risks is adequate and sufficient management measures are identified and implemented to protect

RMIT's assets and users. The mechanisms for this to occur are discussed further in Sections 3.2.2 and 3.2.3 below.

3.2.2 Construction EMS Documentation

Table 23–3 of the EES states that the Contractor's CEMP will reflect the requirements of the EMF and also EPA Publication No. 480, *Environmental Guidelines for Major Construction Management Sites*.

Specific management plans to be prepared in accordance with the EPRs for the construction (or pre-construction) phase include:

EPR No.	Management Plan Required
T1	Transport and traffic management plan(s)
G1	Sustainability management plan
B2	Business disruption plan
SC3	Community and business involvement plan
AQ1	Dust management and monitoring plan(s)
NV1	Construction noise and vibration management plan
NV4	Communications plan
AH1	Cultural Heritage Management Plan
CH6	Archaeological management plan(s)
AR4	Tree Protection Plan(s)
C1	Spoil Management Plan
C2	Acid Sulfate Soil and Rock Management Sub-Plan
C4	Health, safety and environmental plan for the management of hazardous substances
GW3	Groundwater Management Plan
GM3	Ground movement plan
FF3	Translocation plan for the management of listed fauna species (if encountered)

The above indicates that the CEMP and associated management plans will be a comprehensive set of documents which will address key construction risks.

However, Meinhardt considers that it will be critical for RMIT to be consulted in the preparation of relevant documents to ensure that site-specific risks, issues and opportunities during the construction process can be adequately considered and addressed. This is particularly important as the final design documentation and construction methodology may differ from the conceptual information provided with the EES, and will contain a greater level of detail. This could lead to the identification of issues/impacts that have not already been considered by the EES.

RMIT's opportunity to provide inputs to the CEMP and associated documents is embedded, to an extent, in the following EPRs:

EPR No.	Environmental Performance Requirement
EM1	*Develop a program to set out the process and timing for development of an Environmental Management System, Construction Environmental Management Plan (CEMP), Site Environment Implementation Plans, Operations Environmental Management Plan (OEMP) and other plans as required by the Environmental Performance Requirements and as relevant to any stage of the project.* *The program must include consultation with Councils, Heritage Victoria, the Roads Corporation, Melbourne Water, Public Transport Victoria, and the Environment Protection Authority and* ***other stakeholders as relevant.***

SC3	*Prior to main works or shaft construction, develop and implement a community and business involvement plan to engage potentially affected stakeholders and advise them of the planned construction activities and project progress. The plan must include:* • *Measures to minimise impacts to the development and/or operation of existing facilities* • *Measures for providing advance notice of significant milestones, changed traffic conditions, periods of predicted high noise and vibration activities* • *Process for registering and management of complaints* • *Measures to address any other matters which are of concern or interest to them.* *The plan would consider each precinct and station location in detail. Stakeholders to be considered in the plan include (but are not limited to):* • *Municipalities* • *Potentially affected residents* • *Potentially affected businesses* • *Recreation, sporting and community groups and facilities* • *Royal Melbourne Hospital, Victorian Comprehensive Cancer Centre, Peter Doherty Institute and other health and medical facilities* • *The University of Melbourne* • ***RMIT*** • *Fawkner Park Children's Centre and Kindergarten* • *South Yarra Senior Citizens Centre* • *Other public facilities in proximity.*
AQ1	*Develop and implement plan(s) for dust management and monitoring, in consultation with EPA, to minimise and monitor the impact of construction dust.* *The plan must address monitoring requirements for key sensitive receptors, including (but not limited) to:* • *Residential and commercial properties* • *Hospitals and research facilities within the Parkville precinct* • *Universities, including The University of Melbourne and* ***RMIT*** • *Schools, including Melbourne Grammar School (Wadhurst Campus) and Christ Church Grammar School* • *Public parks including the Shrine of Remembrance Reserve and JJ Holland Reserve.* *Undertake air modelling for construction to inform the dust management plan.*

Meinhardt considers that the above EPRs are not adequate to ensure that RMIT will be actively involved in the development of the CEMP and associated documentation. As such, it is recommended that all EPRs which require the development of the CEMP and specific sub-plans should list RMIT as a key stakeholder that must be consulted during development and implementation of these plans.

3.2.3 Operational EMS Documentation

The OEMP will be required to identify environmental issues to be managed during the operational phase, with consideration to the EPRs, approval conditions and legislation, as well as outline emergency and incident management procedures. Whilst the potential risks to RMIT during the operational phase are expected to be less significant than those encountered during construction, Meinhardt considers that it will be important for RMIT to be consulted in development and implementation of the OEMP. This should be reflected in the EPRs.

3.3 EMF Approvals and Controls

The approvals process for environmental management documentation is outlined in *Table 23-4* of the EES. It is noted that the Minister for Planning must approve:

1. Initial EMF and EPRs developed as part of the EES; and
2. Major revisions to the EMF or EPRs.

An Independent Reviewer will be appointed jointly by MMRA and the PPP contractor to review the CEMP, OEMP, contractor documentation and environmental audit reports, and to monitor the contractor's compliance with the EMF.

An Independent Environmental Auditor would also be appointed by the PPP contractor to undertake environmental audits of compliance with the approved CEMP, OEMP and approval conditions. The Independent Environmental Auditor would be required to prepare audit reports and provide these to MMRA, the Independent Reviewer, the Minister for Planning and other Regulators and agencies (as appropriate).

The level of independent review and verification provides some surety to RMIT that the EMF will be implemented and controlled. However, as per the discussion in Section 3.2 (above) there are a number of improvements that could be made to the EMF documentation and consultation process that should be pursued by RMIT in their submission to the EES and subsequent discussions with MMRA.

Meinhardt also suggests the following change to the proposed approvals process outlined in Table 23-4 of the EES:

- The Independent Reviewer should be required to review and approve the Contractor's EMS and CEMP (as opposed to just review these documents).

4 Conclusion and Recommendations

Based upon our review of the proposed EMF, the following recommendations are made:

- Meinhardt considers that the EPRs are not adequate to ensure that RMIT will be actively involved in the development of the CEMP and associated documentation. As such, it is recommended that all EPRs which require the development of the CEMP and specific sub-plans should list RMIT as a key stakeholder that must be consulted during development and implementation of these plans.
- Meinhardt considers that it will be important for RMIT to be consulted in development and implementation of the OEMP. This should be reflected in the EPRs.
- Meinhardt suggests the following change to the proposed approvals process outlined in Table 23-4 of the EES: The Independent Reviewer should be required to review and approve the Contractor's EMS and CEMP (as opposed to just review these documents).

Appendix 5: Groundwater

Prepared by Meinhardt Australia Pty Ltd

Groundwater

Peer Review of Environmental Effects Statement for Melbourne Metro Rail Project on behalf of RMIT

Project Reference: 116092

June 2016

Prepared For:

RMIT
124 La Trobe St
Melbourne VIC
3000

Meinhardt

Level 12, 501 Swanston Street
Melbourne, Vic 3000

P. 03 8676 1200 | F. 03 8676 1201
www.meinhardtgroup.com

REV	DATE	WRITTEN BY	REVIEWED BY	APPROVED BY
A	20/06/16	D. Quinn	S. Ragusa	A. Russo

TABLE OF CONTENTS

List of Tables

List of Figures

Executive Summary

1. Groundwater drawdown (lowering of groundwater levels) associated with the CBD North station construction is the primary pathway for potential impacts to RMIT. At the proposed CBD North station location the EES has estimated that groundwater levels will need to be lowered approximately 22m to keep the excavation dry during construction.
2. The key potential risk identified for RMIT is the movement of existing contaminated groundwater plumes located near RMIT, to beneath RMIT properties. The potential impacts associated with the movement of contaminated groundwater include the preclusion of groundwater beneficial uses and potential vapour intrusion to existing structures.
3. The EES deemed the residual risk of movement of groundwater contaminant plumes onto third party properties as medium for the CBD North station.
4. The EPRs define the management requirements for impacts during the design, construction and operation of the Melbourne Metro. Meinhardt have recommended that RMIT request the following inclusions:
    a. EPR No. GW2 should assess the potential for groundwater contamination migration to third party sites (i.e. RMIT properties).
    b. EPR No. GW3 should include a site specific risk assessment for GQRUZs considered to be affected by drawdown (particularly GQRUZs located at 539 - 553 Swanston St Carlton and 28 – 44 Bouverie St Carlton). The Risk Assessment should assess if groundwater contamination migration will impact third party sites (i.e. RMIT properties).
    c. EPR No.GW3 should include provision for analysis of rock cores to assess the site specific risk of potential acid sulphate soils.
    d. EPR No. GW3 should include provision for RMIT to be consulted in the development the GMP, particularly in relation to any activities that may potentially impact RMIT.
    e. EPR No. GW4 should include provision for RMIT to be advised on the final method for groundwater disposal and whether this may impact RMIT in any way.
    f. EPR No. GW5 should include provision for RMIT to be advised if contaminant migration is evident at third party properties and of the proposed course of action to ameliorate any potential impacts.

1 Introduction

Meinhardt was engaged by the Royal Melbourne Institute of Technology (RMIT) to conduct a peer review of the groundwater assessment conducted as part of the Melbourne Metro Rail Project EES. Meinhardt have conducted the peer review to identify any potential risks or liabilities that will impact the RMIT during the construction and operation of the Melbourne Metro.

The majority of the Melbourne Metro tunnels will be located below the groundwater table. Consequently during excavation of the tunnels and underground stations there is potential for groundwater to seep into excavations below the watertable. This can lead to groundwater drawdown (i.e. lowering of groundwater levels) in the areas surrounding the excavations. Groundwater drawdown is the primary pathway for potential impacts to third parties surrounding the Melbourne Metro. At the proposed CBD North station location, the EES has estimated that groundwater levels will need to be lowered approximately 22m to keep the excavation dry during construction.

2 Methodology and Assumptions

2.1 Methodology

The ESS objective for hydrology, water quality and waste management is:
To protect waterways and waterway function and surface water and groundwater quality in accordance with statutory objectives, to identify and prevent potential adverse environmental effects resulting from the disturbance of contaminated or acid-forming material and to manage excavation spoil and other waste in accordance with relevant best practice principles.

To address the above objective, the EES groundwater assessment (Chapter 18 and Appendix O) has broadly adopted the following approach:

- Assessment of the existing groundwater conditions through a baseline assessment;
- Environmental Risk Assessment (ERA) based on AS/NZS ISO 31000:2009 Risk management – Principles and guidelines;
- Environment Impact Assessment (EIA); and
- Recommendation of Environmental Performance Requirements (EPRs) and proposed mitigation measures.

To review the EES groundwater assessment, Meinhardt have adopted the methodology detailed in **Figure 1** below.

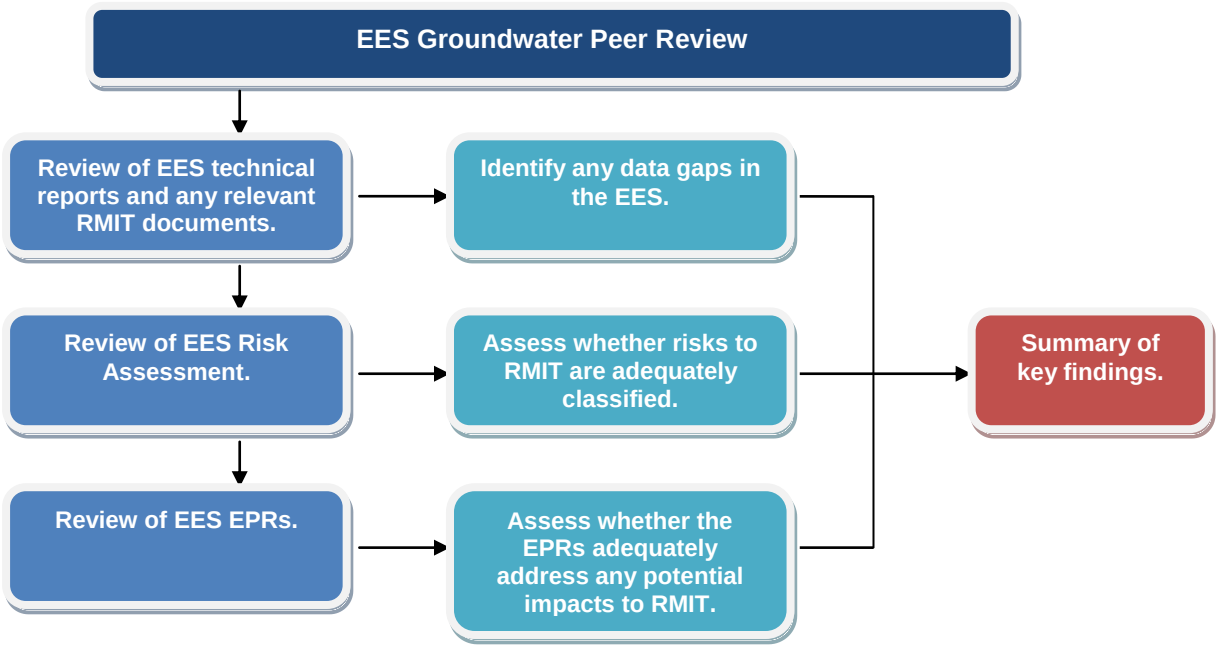


Figure 1 Peer Review Methodology

2.2 Assumptions

To identify potential risks or liabilities associated with groundwater that will impact RMIT, Meinhardt has reviewed the following documents:

- Chapter 18 Groundwater (EES document);
- Chapter 23 Environmental Management Framework (EES document);
- Groundwater Impact Assessment Melbourne Metro Rail Authority (Appendix O, Part 1 & Part 2);
- Interpreted Hydrogeological Setting – EES summary report (Appendix O, Part 3); and
- Interpreted Hydrogeological Setting – Longitudinal Geological Cross Sections (Appendix O, Part 4, 5, 6).

It should be noted that RMIT has not supplied any documents relevant to the assessment of groundwater for Meinhardt to review.

3 Findings

Based upon the methodology outlined in **Figure 1**, Meinhardt's findings are outlined below.

3.1 Review of EES Technical Reports

Meinhardt have conducted a review of the EES technical reports to identify key issues relevant to RMIT and identify any data gaps in the EES assessment.

The EES Groundwater Impact Assessment technical report (Appendix O) adopts a source-pathway-receptor model to identify potential impacts associated with the Melbourne Metro construction and operation. The source of groundwater impacts is due to constructing tunnels, shafts, portals and station boxes below the groundwater table. Meinhardt have identified that the following pathways and receptors represent the key risks to RMIT:

- Change in groundwater flow direction and or gradient leading to the movement of existing contaminated groundwater, which can potentially cause vapour intrusion to third party underground structures; and
- Reduction in groundwater levels leading to the generation of acidic groundwater, which can impact on groundwater beneficial uses and potentially corrode underground concrete or steel structures

Figure 2 provides a flowchart of the source pathway receptor model relevant to RMIT.

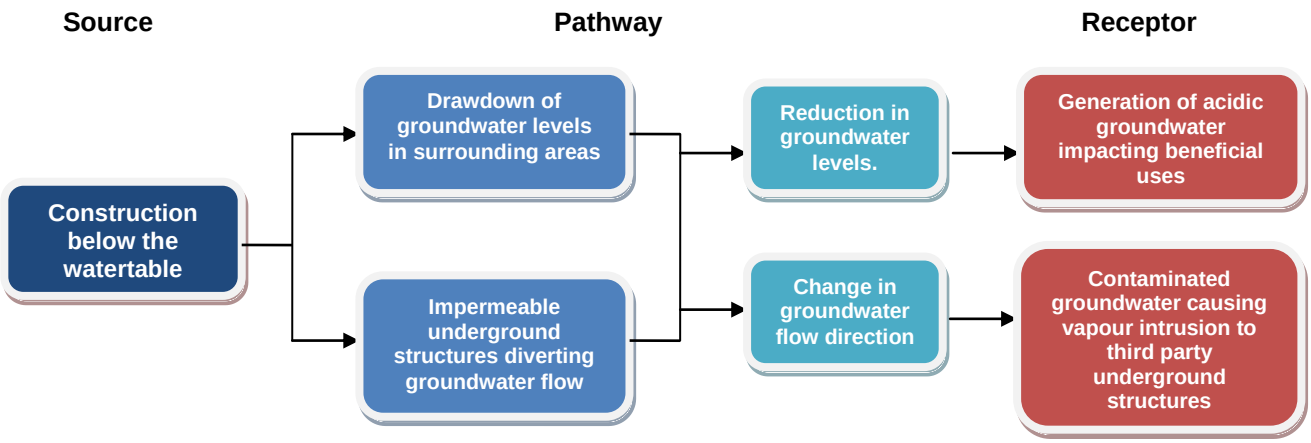


Figure 2 Potential groundwater impacts to RMIT

It should be noted that groundwater drawdown can cause ground movement, which can impact on surrounding infrastructure. Risks and potential impacts associated with ground movement have been peer reviewed by CMW Geosciences.

Additionally reduction in groundwater levels can cause impacts to groundwater dependent vegetation (i.e. large trees). Trees along the CBD North station alignment were reviewed as part of the EES Arboriculture Assessment and are not considered to be groundwater dependent as depth to watertable at the proposed CBD North station is >10 m.

3.1.1 Groundwater Contamination Affecting Third Parties

Groundwater drawdown from dewatering and inflows to the tunnels may change groundwater flow direction, causing movement of contaminants towards the tunnels/stations. Three groundwater quality restricted use zones (GQRUZs) are located within a 1 km radius of the CBD North station. These are sites where groundwater contamination restricts certain uses of the groundwater. Meinhardt have identified that two of the GQRUZs located at 539 - 553 Swanston St Carlton (former brewery site) and 28 - 44 Bouverie St Carlton are located within approximately 100 m of the proposed CBD North station. The former brewery site is contaminated with volatile contaminants TCE, cis-1,2-dichloroethene, tetrachloroethene and vinyl chloride, which can have adverse health effects. Groundwater drawdown modelling for the CBD North station indicates that drawdown at these two GQRUZs could be several metres which would likely cause migration of contaminants towards neighbouring properties. If groundwater contamination migrates to previously uncontaminated areas the presence of volatile contaminants raises the risk of vapour intrusion to underground structures. The EES states that discussions with the EPA are underway to develop an approach for managing the risk and establishing appropriate mitigation measures. Meinhardt considers that any mitigation measures must address the risk to third parties such as RMIT, who will be potentially impacted by the movement of the contaminated groundwater plume.

3.1.2 Potential Acid Sulphate Soils

Acid sulphate soils (or rock) are naturally occurring and contain elevated concentrations of iron sulphides. If the watertable is lowered or soil is excavated the iron sulphides can react with oxygen, which produces acid and can release heavy metals bound in the soils. When the watertable then recovers to its original level the acidic groundwater and heavy metals can mobilise causing impacts to underground concrete or steel structures. Consequently, following construction of the Melbourne Metro, when groundwater levels recover, there is potential for impacts to the foundations of surrounding buildings and underground carparks from the acidification of groundwater.

The EES identified that the highest risk units for activation of potential acid sulphate soils (PASS) through lowering of the watertable are the Coode Island Silt and fresh to slightly weathered Melbourne Formation. The EES indicates that approximately half of the CBD North station is to be excavated in slightly weathered to fresh Melbourne Formation. The EES states that soil analysis to date indicates the presence of PASS at the CBD North station cavern. Consequently, there is a potential risk of acid generation from rock exposed during construction of CBD North station. Potential for acid sulphate soils should be monitored and assessed during the construction phase of the project.

3.2 Risk Assessment

3.2.1 Groundwater Contamination Affecting Third Parties

Table 3-1 below summarises the potential risks associated with groundwater contamination affecting third parties. The table summarises the residual risk classifications relevant to RMIT. The residual risks assume the EPRs specified in the EES (refer to Table 3-3 below) are implemented.

Table 3-1 Review of Risk Register (Groundwater Contamination Affecting Third Parties)

Impact	Project Phase – Precinct	Residual Risk	Meinhardt Comment
Changing groundwater gradients results in movement of groundwater contaminant plumes onto third party properties with potential impacts to beneficial uses of groundwater and potential for vapour intrusion to existing structures.	Construction – Precinct 1	**Low (moderate / unlikely)**	Tunnelling will cause minimal groundwater drawdown as during construction the tunnels will be tanked almost immediately. Hence, Meinhardt considers the risk classification to be adequate.
	Construction & operation – Precinct 5	**Medium (minor / unlikely)**	The risk consequence of medium is considered appropriate considering that two GQRUZs are located within approximately 100 m of the site. Further investigation and mitigation is required to address the potential migration of contaminated groundwater due to dewatering.
Note: Precinct 1 – Refers to the tunnels (i.e. Parkville station to CBD North station, CBD North station to CBD South station) Precinct 5 – CBD North station.			

3.2.2 Potential Acid Sulphate Soils

Table 3-2 below summarises the potential risks associated with PASS. The table summarises the risk classifications relevant to RMIT. The residual risks assume the EPRs specified in the ESS (refer to Table 3-3 below) are implemented.

Table 3-2 Review of Risk Register (Acidic Groundwater)

Impact	Project Phase – Precinct	Residual Risk	Meinhardt Comment
Generation of acidic groundwater due to dewatering of acid sulphate soils and/or rock.	Construction – Precinct 1	**Low (moderate / unlikely)**	Tunnelling will cause minimal groundwater drawdown as during construction the tunnels will be tanked almost immediately. Hence Meinhardt considers the risk classification to be adequate.
	Construction & operation – Precinct 4	**Low (moderate / unlikely)**	The EES classified the residual risk of offsite impacts as low, considering that regional groundwater gradients in this area are dominated by the City Loop tunnel. Meinhardt considers the risk classification to be adequate; however appropriate precautionary measures will need to be undertaken during excavation of areas of PASS.

3.3 Environmental Performance Requirements

Table 3-3 details the EPRs that the EES has adopted for management of groundwater impacts during the design, construction and operation of the Melbourne Metro. Meinhardt have included EPRs that are relevant to RMIT and provided comments on whether the EPRs adequately address the potential risks and liabilities to RMIT. If the EPR is not considered sufficient, Meinhardt have provided a recommended action for RMIT to follow up on during the EES consultation process.

Table 3-3 Environmental Performance Requirements for Groundwater

EPR No.	Impact	Environmental Performance Requirement	Timing	Meinhardt Comments	RMIT Recommended Action
GW1	Detailed design does not adopt design features that minimise groundwater drawdown.	Design the tunnel and underground structures so that they minimise groundwater drawdown during construction and operation to minimise impacts on groundwater dependent values, ground movement and contamination plume migration.	Design	Meinhardt considers that the EPR is appropriate.	No action required.
GW2	Alterations to design features of tunnels, stations, shafts and portals proposed during detailed design result in different levels of impact than the design features specified in the Concept Design.	Develop a groundwater model for the detailed design phase to predict impacts associated with any changes to construction techniques or operational design features proposed during detailed design, and reconfirm that the Environmental Performance Requirements and mitigation measures are sufficient to mitigate impacts from changes in groundwater levels, flow and quality. Undertake monitoring during construction to ensure that predictions are accurate and mitigation measures are appropriate.	Design	The groundwater model for the detailed design phase should also assess if drawdown will affect GQRUZs located at 539 - 553 Swanston St Carlton and 28 - 44 Bouverie St Carlton. These GQRUZs will potentially impact RMIT assets during groundwater dewatering.	RMIT to request that EPR No. GW2 assess the potential for groundwater contamination migration to third party sites (i.e. RMIT properties).
GW3	Changing groundwater gradients results in movement of groundwater contaminant plumes onto third party properties with potential impacts to beneficial uses of groundwater and potential for vapour intrusion to existing structures.	Develop and implement a Groundwater Management Plan (GMP) detailing groundwater management approaches to address the predicted impacts to groundwater dependent values during construction. The GMP must be based on the detailed design phase groundwater model, and should include the following details: • Approach to collection, treatment and disposal of groundwater collected during construction in accordance with the MMRA Groundwater Disposal Strategy • Identifying and if necessary, specifying mitigation measures to protect groundwater dependent vegetation during periods of drawdown • An approach identified in consultation with the EPA so that contaminant migration causes no significant impacts on beneficial uses and vapour intrusion into underground structures, and establish appropriate monitoring networks to confirm effectiveness of approach • Methods for minimising drawdown in areas of known PASS and establishing appropriate monitoring networks to confirm effectiveness of approach • Methods for minimising drawdown at any existing recharge bores,	Construction	As part of the GMP the EPR should specify that a site specific risk assessment should be adopted for GQRUZs considered to be affected by drawdown. The risk assessment should identify contaminants of concern and potential for contaminant migration during construction. Additionally it also recommended that the GMP specify that rock cores are analysed to assess the site specific risk of potential acid sulphate soils.	RMIT to request that EPR No.GW3 include a site specific risk assessment for GQRUZs considered to be affected by drawdown (particularly GQRUZs located at 539 - 553 Swanston St Carlton and 28 – 44 Bouverie St Carlton). The Risk Assessment should assess if groundwater contamination migration will impact third party sites (i.e. RMIT properties). RMIT to request that EPR No.GW3 includes the analysis of rock cores to assess the site specific risk of potential acid sulphate soils.

EPR No.	Impact	Environmental Performance Requirement	Timing	Meinhardt Comments	RMIT Recommended Action
		and establishing appropriate monitoring networks to confirm effectiveness of mitigation • Groundwater drawdown trigger levels for groundwater dependant values at which additional mitigation measures must be adopted • Design, operation and management of groundwater injection borefields • Contingency measures if impacts occur at existing active groundwater bores and surface water bodies.			RMIT should be consulted in the development the GMP, particularly in relation to any activities that may potentially impact RMIT.
GW4	During construction and operation there is potential for unexpected groundwater contamination to result in release of groundwater that is not treated to agreed levels.	Use the Groundwater Disposal Strategy and GMP to obtain a Trade Waste Agreement with the relevant Water Retailers for groundwater disposal.	Construction / Operation	The groundwater disposal strategy is still to be determined. The EES specifies that a Trade Waste Agreement with the relevant Water Retailers is the preferred method for groundwater disposal.	RMIT should be advised on the final method for groundwater disposal and whether this may impact RMIT in any way.
GW5	Changing groundwater gradients results in movement of groundwater contaminant plumes onto third party properties with potential impacts to beneficial uses of groundwater and potential for vapour intrusion to existing structures.	Develop and implement a groundwater monitoring plan as part of the GMP that details sufficient monitoring of drawdown to verify that no significant impacts occur from potential: • Contaminant migration on the beneficial uses of groundwater at third party properties caused by drawdown and vapour intrusion to underground structures • Activation of PASS and groundwater acidification • Reduction in access to water for bore owners in the area around the project • Reduction in access to groundwater for trees– particularly in the Tunnels precinct between CBD South and Domain stations, and the CBD South station and eastern portal precincts • Change in groundwater levels in any existing recharge bores that may be present in the area around the project.	Construction	Contingency measures should be put in place if contaminant migration is evident at third party properties. Meinhardt recommends that RMIT be advised if contaminant migration is evident at third party properties and of the proposed course of action to ameliorate any potential impacts.	RMIT should be advised if contaminant migration is evident at third party properties and of the proposed course of action to ameliorate any potential impacts.

4 Conclusion and Recommendations

4.1 Conclusions

Meinhardt have conducted a review of the groundwater documents in the EES in accordance with our methodology set out in Section 2. In reviewing the documents the following conclusions have been determined:

- Groundwater drawdown associated with the CBD North station construction is the primary pathway for potential impacts to RMIT. At the proposed CBD North station location the EES has estimated that groundwater levels will need to be lowered approximately 22m to keep the excavation dry during construction.
- The key potential risk identified for RMIT is the movement of existing contaminated groundwater plumes located near RMIT, to beneath RMIT properties. The potential impacts associated with the movement of contaminated groundwater include the preclusion of groundwater beneficial uses and potential vapour intrusion to existing structures.
- The EES deemed the residual risk of movement of groundwater contaminant plumes onto third party properties as medium for the CBD North station, which Meinhardt considers acceptable.

4.2 Recommendations

In reviewing the EPRs defined to manage groundwater impacts during the design, construction and operation of the Melbourne Metro, Meinhardt have recommended that RMIT request the following inclusions:

- EPR No. GW2 should assess the potential for groundwater contamination migration to third party sites (i.e. RMIT properties).
- EPR No. GW3 should include a site specific risk assessment for GQRUZs considered to be affected by drawdown (particularly GQRUZs located at 539 - 553 Swanston St Carlton and 28 – 44 Bouverie St Carlton). The Risk Assessment should assess if groundwater contamination migration will impact third party sites (i.e. RMIT properties).
- EPR No.GW3 should include provision for analysis of rock cores to assess the site specific risk of potential acid sulphate soils.
- EPR No. GW3 should include provision for RMIT to be consulted in the development the GMP, particularly in relation to any activities that may potentially impact RMIT.
- EPR No. GW4 should include provision for RMIT to be advised on the final method for groundwater disposal and whether this may impact RMIT in any way.
- EPR No. GW5 should include provision for RMIT to be advised if contaminant migration is evident at third party properties and of the proposed course of action to ameliorate any potential impacts.

Appendix 6: Land Use Planning

Prepared by Meinhardt Australia Pty Ltd

Land Use Planning

Peer Review of the Melbourne Metro Rail Project - Environmental Effects Statement on behalf of the Royal Melbourne Institute of Technology (RMIT)

June 2016

Prepared For:

Royal Melbourne Institute of Technology
GPO Box 2476
Melbourne VIC 3000

Meinhardt

Level 12, 501 Swanston Street
Melbourne, Vic 3000

P. 03 8676 1200 | F. 03 8676 1201
www.meinhardtgroup.com

REV	DATE	WRITTEN BY	REVIEWED BY	APPROVED BY
A	31/05/2016	H. Hughes	A. Burnett	T. Harrington
B	17/06/2016	H. Hughes	A. Burnett	T. Harrington

TABLE OF CONTENTS

Executive Summary

Meinhardt Planning has undertaken a peer review of the Environmental Effects Statement ('EES') relating to the Melbourne Metro Rail Project on behalf of the Royal Melbourne Institute of Technology ('RMIT').

The following key issues with regard to Land Use and Planning have been identified:

1. Application of the proposed planning framework and construction timeframe will impact future development projects and opportunities within RMIT.

2. RMIT will be impacted by the proposed planning framework, both during construction and following construction. Key impacts may be summarised as:
    a. A Design and Development Overlay (DDO) will be applied along the alignment of the proposed tunnel and to land adjacent (including RMIT land). A number of RMIT buildings would be included within the Overlay. The Overlay would trigger new requirements to obtain planning permits on RMIT land.
    b. An Incorporated Document will be introduced and will have statutory weight within the Melbourne Planning Scheme. The Incorporated Document would approve development and land use which is yet to be identified and as such adequate considerations cannot reasonably be expected to occur. It is of concern that a number of planning permit exemptions which would enable an applicant (contractor) to undertake buildings and works without a planning permit and without notifying RMIT. We question as to what statutory rights RMIT would have to review and provide input into future proposals, having regard to RMIT interests.

3. RMIT land will be required for the project. This will involve acquisition or temporary occupation. The following assets are likely to be affected:
    - Building 37 and Building 100 – Transfer of strata rights.
    - Building 38 – Acquisition.
    - A'Beckett Urban Square (part of) – Occupied for construction purposes (approx. 5 years).

4. There appears to be very little understanding within the EES regarding the use of RMIT buildings and land. RMIT has a number of sensitive land uses and activities in close proximity to the proposed tunnel alignment. This poses a risk to RMIT's business continuity and may have significant cost implications for RMIT as well as third parties who rely upon or derive benefit from RMIT activities. Statutory and non-statutory measures are required to ensure that sensitive land uses and activities within RMIT buildings are protected, or measures to properly mitigate impacts are ensured.

5. Environmental Performance Requirements ('EPRs') provide an opportunity to control future activities, processes and actions of the contractor. However, these are limited and proactive engagement with the MMRA must be undertaken to ensure RMIT interests are sufficiently considered. Additionally, the City of Melbourne ('CoM') is recognised as a key stakeholder in many sections of the EES and EPRs. Liaising with the CoM to make them cognisant of RMIT's requirements will be important for the protection of RMIT's interests.

Having regard to RMIT's interests, we would suggest the following:

Draft Planning Scheme Amendment

- Incorporated Document amended to:
    - Recognise RMIT as a key stakeholder with regard to:
        - Development Plans
        - Environmental Management Framework
        - Urban Design Strategy
    - Include a notification process for any *Preparatory works*

Environmental Performance Requirements

- The Environmental Performance Requirements should be strengthened to protect RMIT's interests. Refer to Table 2-2.

1 Methodology and Assumptions

1.1 Methodology

Meinhardt Planning has undertaken a peer review of Environmental Effects Statement relating to the Melbourne Metro Rail Project on behalf RMIT.

Key documents reviewed:

- Chapter 3 – Legislative Framework and Approval Requirements
- Chapter 4 – EES Assessment Framework and Approach
- Chapter 9 – Land Use and Planning
- Chapter 23 – Environmental Management Framework
- Technical Appendix A – Planning Scheme Amendment and Associated Documents
- Technical Appendix E – Land Use and Planning, Part 1 and Part 2
- Environmental Performance Requirements; LU1, LU2, LU4, B1, SC2, SC4 and LV2

Key plans reviewed:

- EES Map Book
- Incorporated Document Project Land maps
- Design and Development Overlay maps

Source: http://melbournemetro.vic.gov.au/ees/documents

1.2 Assumptions

This review was of a desktop nature of secondary information produced to inform the Melbourne Metropolitan Rail EES. In compiling this report, discussions were also held with both RMIT and the MMRA. No detailed field checking was undertaken.

2 Review of Land Use and Planning Report

The Melbourne Metro would significantly improve access and transport within Melbourne. The proposed CBD North Train Station would significantly improve access to RMIT for students, staff and other visitors. These changes are broadly consistent with high level strategic planning policies which affect Melbourne and in some instances Victoria. While there may be some elements where additional work is required to ensure policies are consistent (such as the current process of *Plan Melbourne Refresh*), there is no doubt the overarching intent of the Melbourne Metro is positively viewed by macro planning policies. Given this, we offer no additional commentary on the appropriateness of the project as a whole and consider it consistent with objectives of Planning in Victoria.

However, some concerns arise at the micro level, when considering the potential for impacts on RMIT land use, buildings and operations; both now and in the future. Furthermore, due to the conceptual stage of the project, many details are currently unknown, and as such the potential for impact can be reasonably considered. There is concern that the utilisation of an Incorporated Document effectively approves these changes prior to the details being adequately understood. Meinhardt recognise the Environmental Management Plan ('EMP') structure within the EES seeks to mitigate these impacts. It is questioned if this is sufficient and the lack of further consultation provided within the EMP structure is recognised as a key issue. This is discussed in further detail below.

2.1 Planning Approval Mechanism and Draft Planning Scheme Amendment

There are several amendments proposed to the Melbourne Planning Scheme. In short, the Planning Scheme Amendment would apply a DDO to protect the ongoing integrity of the tunnel, and utilise an Incorporated Document to approve the Melbourne Metro, and exempt the need for planning permits.

The amendments are as follows:

- Insert a new Schedule to Clause 43.02 - Design and Development Overlay – entitled 'Melbourne Metro Rail Project – Infrastructure Protection Areas'.
- Amend the Schedule to Clause 52.03 – Specific Sites and Exemptions – to include the *Melbourne Metro Rail Project Incorporated Document, April 2016.*
- Amend the Schedule to Clause 61.01 – Administration and Enforcement of this Scheme – to make the Minister for Planning the Responsible Authority for administering and enforcing the *Melbourne Metro Rail Project Incorporated Document, April 2016* and any other provision of the scheme that applies to the development or use of land for the Melbourne Metro Rail Project.
- Amend the Schedule to Clause 66.04 – Referral and Notice Provisions - to make the Secretary of the Department of Economic Development, Jobs, Transport and Resources a determining referral authority for any permit application within the area defined by the Schedule to the Design and Development Overlay.
- Amend the Schedule to Clause 81.01 – Table of Documents Incorporated in this Scheme – to include the *Melbourne Metro Rail Project Incorporated Document, April 2016.*

2.1.1 Incorporated Document

The Incorporated Document is the principal planning tool proposed to allow for the Melbourne Metro project.

The Incorporated Document will apply to all land described as 'Project Land' for the Melbourne Metro Rail Project. A portion of RMIT's landholdings and surrounding roads are within the 'Project Land', including part of A'Beckett Square. Much of the RMIT land is adjacent.

The Incorporated Document has been designed to provide flexibility for future detailed design and remains at a high level. It may prematurely approve land uses and development without comprehensive assessment. At this stage there are no plans which show what the Incorporated Document is currently approving.

Figure 1: Incorporated Document Project Land in CBD North Station precinct

Conditions

The Incorporated Document includes a list of conditions which must be met, including the more detailed Development Plans, which include requirement for consultation with identified stakeholders and which must be approved by the Minister for Planning.

The Incorporated Document also includes a requirement for an Environmental Management Framework ('EMF') to be prepared and approved by the Minister for Planning. It stipulates that the use and development of the project must meet the EMF and EPRs. In this regard, much of the detailed design considerations for the project have been deferred to the Development Plan stage, and the EMF will provide a new framework for guiding use and development. Much of the detail of the Incorporated Document will not be known for some time.

Due to the exemptions of permit requirements in the Incorporated Document, there will be no opportunity for revisiting the detail design utilising a standard planning approach. Rather, the approach will be articulated by the conditions in the Incorporated Document. These conditions of the Incorporated Document perform as secondary level requirements which must be met by a contractor in future.

The extent to which the Incorporated Document exempts certain uses, buildings and works from requiring permits without detailed understanding of what these elements may be is of some concern. This is particularly the case as the Incorporated Document does not provide a mechanism for formal consultation with RMIT, whom we consider are a major stakeholder in the project.

The framework of conditions which have been provided is not commensurate with the extent of investigations and considerations which have occurred, and which are prescribed under the EMF. The potential for adverse impacts caused by permit exemptions have not been adequately considered due to a lack of detailed design, and a lack of recognition within the Risk Assessment (refer to Section 2.2 of this Report).

Recognising the scope and broad level support for the project, on balance it is considered that many of the concern relating to exemptions and lack of detail provided by the Incorporated Document can be overcome by articulating within the Incorporated Document that RMIT is a major stakeholder with which meaningful engagement should occur.

By allowing RMIT to have input into the design outcomes and land uses there will be an overall benefit to the project. It will also ensure continuity of RMIT's business approach and operational standards which are highly relevant given the extent to which the Melbourne Metro is to affect their land and operations. Furthermore, providing meaningful opportunity for consultation with RMIT as a major stakeholder will assist in mitigating some of the concerns which are identified relating to the lack of understanding RMIT's land uses and operations.

Early works and Preparatory works

Early works in accordance with Clause 5.4 of the Incorporated Document may be carried out before a development plan is approved. Early works include utility service and relocation, site preparation works and works for construction shafts at the CBD North and CBD South Stations. An early works plan must be accompanied by a summary of consultation, however there is no explicit requirement that consultation with surrounding land owners be undertaken.

Pursuant to Clause 5.6 of the Incorporated Document, preparatory works may commence before any of the required plans and other matters in the documents are approved. A non-exhaustive list is provided as to what works are permissible under this clause and include construction access points, fencing, investigations, surveys, testing, construction or relocation of utility services and vegetation removal and relocation.

Establishing an effective system of communication is required to ensure RMIT is informed of potential impacts associated with any early and preparatory works. We have proposed this within the revised Incorporated Document. We note that previous preparatory works which resulted in impacts to RMIT operations have occurred without notification.

Project Land Area

A'Beckett Square has been identified as an area to be occupied for construction purposes. As such, A'Beckett Square is included as being within the Project Land for the purposes of the Incorporated Document, which would exempt the need for a planning permit for any activities relating to the Melbourne Metro, including construction.

If RMIT object to the use (partial or otherwise) of A'Beckett Square for construction, it is critical to have the Project Land amended to exclude those areas and ensure that the Incorporated Document ceases to affect the land.

To address the above, we recommend the following changes to the Incorporated Document:

- Modifications to the document to recognise RMIT as a key stakeholder with regard to:
    - Development Plans
    - Environmental Management Framework
    - Urban Design Strategy
- Include a notification process for any *Preparatory works*

2.1.2 Design and Development Overlay

The planning scheme amendment will apply a Design and Development Overlay (DDO) to the tunnel and surrounding land to protect the structural integrity of the tunnel and maintain effective and ongoing operation of the tunnels.

The DDO triggers a planning assessment to ensure that development not associated with the MMR project is appropriately managed to mitigate its potential effects on MMR infrastructure.

The DDO will have three fundamental features:

1. A planning permit will be triggered for the construction of buildings and carrying out works
2. All planning applications must be accompanied by a detailed technical assessment of the impacts on the tunnel infrastructure
3. All planning applications will be referred to the Secretary to the Department of Economic Development, Jobs, Transport and Resources who will be a determining authority pursuant to Section 55 of the *Planning and Environment Act 1987*

We consider the DDO will have the following impacts on RMIT:

- The DDO will affect RMIT land and buildings. A planning permit may now be required for RMIT projects that currently do not require a planning permit (refer to map overleaf).
- This will incur additional time and costs for future projects, including introducing a need for specialist technical reporting, which currently does not exist.
- Some projects (particularly where there is requirement for construction of basements and footings, civil infrastructure etc.) may not be able to proceed.

Each of these factors may compromise current and future planned development activities. RMIT should review the map overleaf showing the alignment of DDO67 having regard to its future development plans.

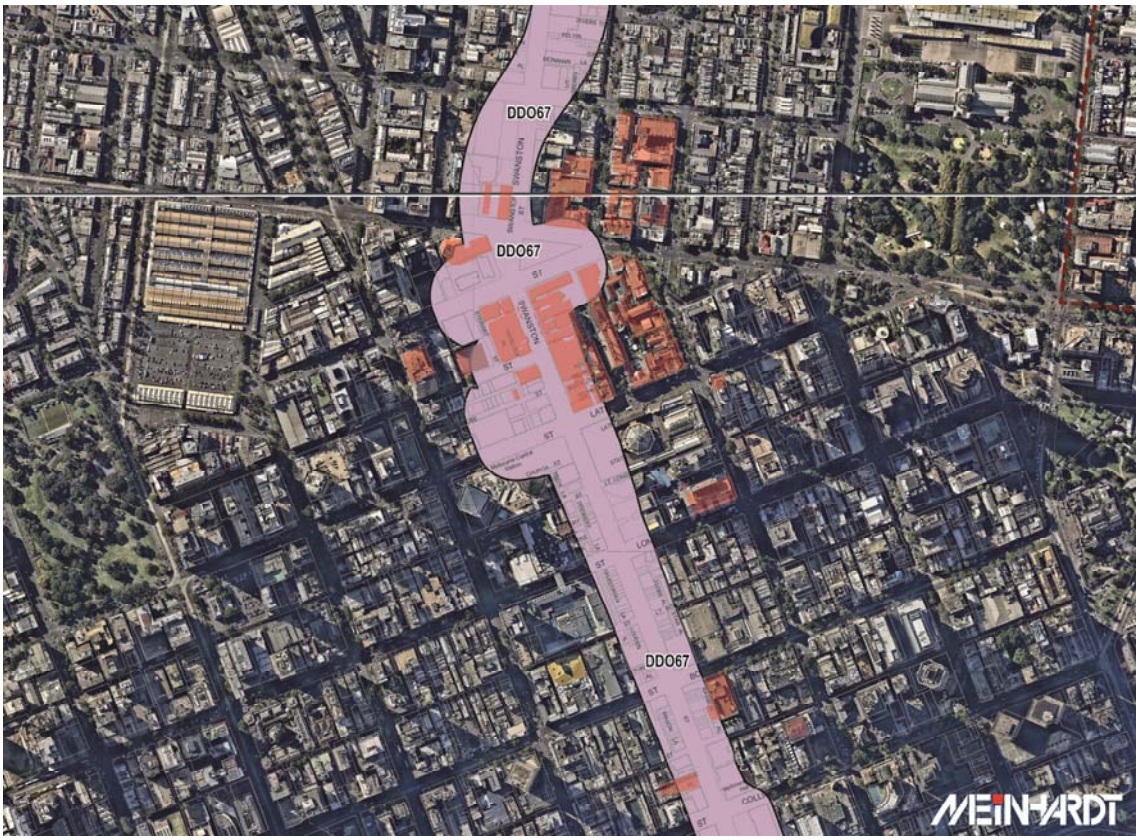


Figure 2: DDO extent
Source: Meinhardt

The ability to change DDO67 is considered low. Consideration should therefore be given to possible compensation for approved or planned projects in this area which may be impacted.

2.1.3 Other - Land Acquisition

The legal basis for land acquisitions is within statute. The *Major Transport Projects Facilitation Act 2009* provides that certain government authorities (including the MMRA) can compulsorily acquire land that is included in an area which is formally designated as the 'project area' for the Melbourne Metro Rail Project. The *Land Acquisition and Compensation Act 1986* determines how compensation is assessed when land is compulsorily acquired.

The MMRA have indicated that there are RMIT buildings and land that may be affected by land acquisition or occupation. If any acquisitions are to take place, it is recommended that when determining land values and compensation, consideration be given to the following factors:

- Obtaining independent valuations of the land
- Impact of acquisition on redevelopment opportunities of adjoining and nearby land remaining in RMIT ownership

2.2 Risk Assessment

Environmental risk is a function of the likelihood of an adverse event occurring and the consequence of the event. The environmental risk assessment is an integral component of the EES, with the key output being a reduction in risks through the deployment of activities which would lower the potential impacts. These recommended Environmental Performance Requirements are embedded in the Environmental Management Framework which will guide the design, construction and operation of Melbourne Metro. Therefore, it is crucial that risks are appropriately identified and characterised.

The table overleaf summarises the potential risks associated with land use and planning. The table summarises the risk classifications relevant to RMIT. Overall, it has been found that the level of planning risk associated with the project has been understated.

Table 2-1 Review of Risk Register (Land Use and Planning)

Impact	Risk No.	Initial Risk	Meinhardt Comment
The acquisition of residential, commercial and retail titles for the project	LU001	**High (moderate / almost certain)**	The acquisition of titles for the project will result in changes in land use. The impacts associated with the project will be significant and there will be potential for long-term change in the quality of economic, cultural, recreational, aesthetic or social values in the local setting. Meinhardt deem a **high risk** categorisation is appropriate.
The acquisition of properties	LU002 LU004	**Medium (minor / almost certain) [applies to each Risk No.]**	The risk consequence of *minor* is considered inappropriate. The change resulting from the acquisitions will be significant and there will be potential for long-term change in the quality of economic, cultural, recreational, aesthetic or social values in the local setting. Therefore, Meinhardt deem a **high risk** categorisation more appropriate.
The proposed construction methodology for the project	LU006	**Medium (minor / almost certain)**	This impact event specifically relates to public open spaces being used for construction purposes and this not being consistent with the intended use of the land. Despite the extended timeframes for construction proposed, due to the temporary nature of the works Meinhardt deem a **medium risk** is the appropriate categorisation.
Changes in access to properties	LU007	**Medium (minor / almost certain)**	Meinhardt consider the minor consequence rating inaccurate. There is potential for access to be limited and for some land uses to not be able to operate efficiently, or land be accessed appropriately for extended periods due to the lengthy construction periods projected. Meinhardt deem a *moderate* consequence category and a **high risk** category more appropriate.
Change to future development of the land	LU008	**Medium (moderate / possible)**	There is significant potential for the design and development of the project to impact the future development potential of nearby and adjoining land. The impacts associated with the project will be significant and there will be potential for long-term change in the quality of economic, cultural, recreational, aesthetic or social values in the local setting. Given this Meinhardt consider a *moderate* consequence category more appropriate and an *almost certain* likelihood category more appropriate Therefore, Meinhardt deem a **high risk** is a more appropriate categorisation.
Note: The EES determined risk categories with a risk matrix that included *consequence* and *likelihood*, indicated in parentheses above.			

2.3 Environmental Management Framework

The overall structure of the EMF is outlined in *Figure 23-3* of the EES, and is reproduced below for reference. Key components of the EMF include:

- **Environmental Performance Requirements (EPRs)** – which define mitigation measures or required outcomes to ensure protection of the environment during the design, construction and operation of the project. The EPRs have been developed through the risk and impact assessments conducted for each specialist area within the scope of the EES.
- **Construction Contractor's EMS documentation** – this includes an Environmental Management System (EMS), Construction Environmental Management Plan (CEMP), Site Environment Implementation Plan(s) (SEIP) and Work Method Statement(s) (WMS).
- **Operator's EMS Documentation** – this includes an EMS and Operations Environmental Management Plan (OEMP).
- **Other plans to comply with planning requirements** – including a Traffic Management Plan (TMP) for the construction phase.

MMRA will also develop an overarching EMS, Sustainability Policy and Environmental Policy which will set the requirements for the contractors' EMS documentation. Other than the EPRs and MMRA's Sustainability Policy, none of the above-mentioned environmental management documentation has been provided with the EES for public consideration. The EES states that the EMF, including all recommended EPRs, would be implemented through Project Contracts for the delivery of Melbourne Metro.

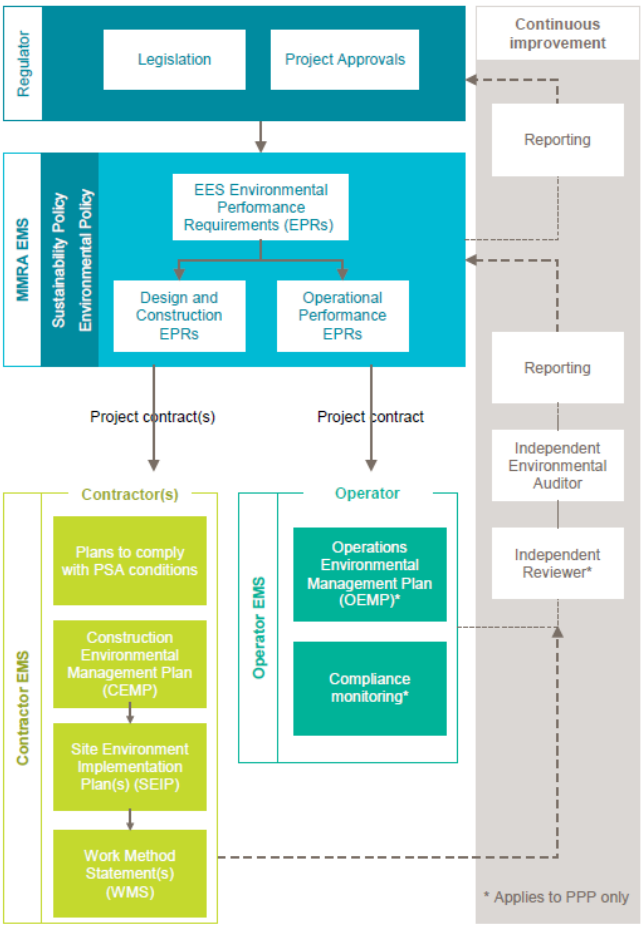


Figure 3: Environmental Management Framework

2.4 Environmental Performance Requirements

A number of Environmental Performance Requirements (EPRs) are proposed. We have reviewed those EPRs relevant to 'Land Use and Planning'. Please refer to the table overleaf.

Table 2-2 Environmental Performance Requirements for Land Use and Planning (relevant to RMIT)

EPR No.	Impact	Environmental Performance Requirement	Timing	Meinhardt Comments
LU1	Construction activities inhibit future development above and below ground	Develop and implement measures for construction and operation of Melbourne Metro that aim to minimise impacts to the development and/or operation of existing land uses, including: • Limiting the permanent change of use within existing public open space • Minimising footprints of construction sites and permanent infrastructure on public land • Minimising impacts to existing public open spaces and recreational facilities and the users of these facilities Such measures must be developed in consultation with affected land managers for public land.	Construction/ operation	This section seeks to reduce impacts on existing land uses, however it only explicitly mentions public land. The wording of the section as 'including', as opposed to 'including, but not limited to', is considered unsatisfactory. The wording provides no guaranteed protection of mitigating measures on private land including land held by RMIT. Greater emphasis on mitigating impacts of **all** affected land should be specified to adequately protect RMIT land from impacts associated with the project. The draft EES evaluation objective which the EPR seeks to achieve - 'to protect and enhance…buildings **within and adjacent** to the project alignment and particularly **in the vicinity of** project surface structures'. It is noted that EPR SC3 relates to preparing a community and business involvement plan to engage potentially affected stakeholders more generally with regard to **construction activities only**. Therefore, the preparation of a community and business and development plan regarding **operation** has not been acknowledged. This presents substantial risks to RMIT. Notably, a specified mitigation measure for this EPR is to incorporate the proposed works with the planned future development of the University of Melbourne and not RMIT. **Recommended Actions:** 1. That RMIT be engaged as a stakeholder in a community and business involvement plan regarding operational project impacts. 2. Given the extent of future development planned for University of Melbourne land and its proximity to the project area, Meinhardt considers requesting the MMRA to include a similar mitigation measure specifically referring to RMIT future development appropriate. 3. The EPR must explicitly refer to all land managers not only public land managers. 4. The mitigation measure '*selection of construction equipment/construction methodology*' be adhered to and the

EPR No.	Impact	Environmental Performance Requirement	Timing	Meinhardt Comments
				proposed cut and cover construction method for the station entrances and the proposed timeframes that these will be left 'open' (approximately 2 years) be re-evaluated.
LU2	Construction activities and permanent structures minimise land to be used for public open space and reduce quality of open space	Development of the project is to have regard to the relevant Open Space Master Plans (including but not limited to, the Domain Parklands and Fawkner Park Master Plans) in designing and constructing above- ground infrastructure for the tunnels. Consultation must occur with land managers and/or agencies responsible for the implementation of the relevant Open Space Master Plans.	Construction / operation	Meinhardt considers the general intent of this EPR appropriate. **Recommended Actions:** 1. Wording be altered to cover **all existing or proposed** open spaces that are affected by a high level plan, regardless of its staging. This would allow formal consideration of the *Franklin Street Urban Design Proposal* prepared by RMIT and CoM. 2. RMIT be consulted throughout the development of the plan to achieve their desired outcomes with regard to Franklin Street and any other public spaces. 3. Consult with CoM to determine mutual interests with regard to MMR project impacts on A'Beckett Square, Franklin Street and any other public spaces.
LU4	Permanent structures and fixtures will impact existing land uses	Prior to the development of the detailed design of all permanent structures, prepare and implement strategies in accordance with the Urban Design Strategy and relevant planning schemes that cover: • Public arts and cultural strategy • Wayfinding, signage and advertising The strategies must be developed in consultation with relevant local Councils and land managers.	Design	Meinhardt consider the inclusion of each of these strategies within an EPR appropriate. **Recommended Actions:** 1. That RMIT be actively involved in the development of these strategies from the outset given their proximity to station entrances and the significant potential for impacts on their land.
B1	Privately owned land will require acquisition and temporary	Reduce the disruption to businesses from direct acquisition or temporary occupation of land, and work with business and land owners to endeavour to reach agreement on the terms	Design	Meinhardt consider the EPR is appropriate. It will provide an appropriate platform for RMIT to promote its position

EPR No.	Impact	Environmental Performance Requirement	Timing	Meinhardt Comments
	occupation	for possession of the land.		with regard to A'Beckett Square and other potentially impacted areas. **Recommended Actions:** *Temporary occupation* 1. Establish with the MMRA the extent of any proposed occupation of project land within the campus and timeframes. 2. Reiterate that occupation of A'Beckett Square will not be accepted given the amenity the area provides for its students and the general public in addition to the lack of open space in the area. 3. Notify the MMRA that occupation of A'Beckett Square will significantly limit development potential of the site currently being proposed in Planning Application No. TPM-2016-3. 4. Assist MMRA in determining alternatives to the occupation – e.g. a length of the A'Beckett Street road reserve as suggested by the MMRA in correspondence to RMIT. *Acquisition* 5. Initiate discussions with MMRA promptly to determine exact extent of RMIT land to be acquired. 6. Negotiate alternative acquisition arrangements or locations with MMRA if desired. 7. Determine the impact acquisitions will have on RMIT interests including business continuity and future development projects. 8. If notice of acquisition is received, commission independent valuations of the land.
SC2	Construction activities inhibit access to residences	Prior to main works or shaft construction in areas affected, develop a relocation management framework that allows for a	Pre-construction	Meinhardt consider the EPR is appropriate.

EPR No.	Impact	Environmental Performance Requirement	Timing	Meinhardt Comments
		uniform approach across the project for the voluntary (temporary) relocation of households subject to: • Construction activities likely to unduly affect their amenity (e.g. out of hours works or sustained loss of amenity during the day for shift workers) • Loss of access		It is noted that EPR SC3 relates to preparing a community and business involvement plan to engage potentially affected stakeholders more generally with regard to construction activities. RMIT is mentioned specifically as a stakeholder to be considered. **Recommended Actions:** Nil.
SC4	Temporary occupation of public open space minimise land to be used and reduce quality of space	Prior to main works or shaft construction commencing, work with the City of Melbourne to identify possible alternative areas of public open space for community use during the construction phase to minimise the impacts of loss of existing public open space that are to be utilised as construction worksites.	Pre-construction	Meinhardt consider the EPR presents substantial risks to RMIT open spaces. MMRA have indicated through the proposed use of A'Beckett Square as a construction site, they intend to make use of open space areas as constructions sites, regardless of public or private ownership. **Recommended Actions:** 1. Notify the MMRA and CoM that the use of A'Beckett Square, Bowen Lane and any other publicly accessible RMIT open spaces may not be used for general community use due to the potential detrimental impacts on RMIT operations and student experience. 2. Consider if Swanston Street, A'Beckett Urban Square or any other open space intended to be used for University events (e.g. Open Day) will be affected by construction. If so, establish whether contingency measures or alternative locations will be required. Provide details of events and requirements to the MMRA to determine alternatives and reduce impacts.
LV2	Construction activities and permanent structures require the loss of land to be used for public open space resulting in a change of land use	Develop and implement a plan in consultation with the Office of Victorian Government Architect, local councils and other land managers to comply with the Melbourne Metro Urban Design Strategy to re-establish public open space, recreation reserves and other valued places disturbed by temporary works.	Construction/ Operation	Meinhardt consider the EPR is appropriate particularly with regard to RMIT's interests in: • A'Beckett Urban Square • Franklin Street closure and urban green space project **Recommended Actions:**

EPR No.	Impact	Environmental Performance Requirement	Timing	Meinhardt Comments
				1. RMIT to request they be consulted throughout the development of the plan to achieve their desired outcomes with regard to urban design initiatives for A'Beckett Square, Franklin Street and any other public spaces. 2. Engage in discussions with CoM who are recognised as a key stakeholder to further advocate RMIT interests in each area. 3. Ensure the *Franklin Street Urban Design Proposal* prepared by RMIT and CoM is appropriately considered by the MMRA addressed in the development of the plan.

3 Conclusion

Meinhardt have conducted a review of the Land Use and Planning documents prepared through the EES phase. We would suggest RMIT protect its interests through changes to the planning scheme amendment and Environmental Performance Requirements as follows:

Planning Scheme Amendment

Provision

Incorporated Document

Action

1. See amendments attached at Appendix A.

Environmental Performance Requirements

No.	***Action***
LU1	1. That RMIT be engaged as a stakeholder in a community and business involvement plan regarding operational project impacts.
	2. Given the extent of future development planned for the University of Melbourne land and its proximity to the project area, Meinhardt considers requesting the MMRA to include a similar mitigation measure specifically referring to RMIT future development appropriate.
	3. The EPR must explicitly refer to all land managers not only public land managers.
	4. The mitigation measure 'selection of construction equipment/construction methodology' be adhered to and the proposed cut and cover construction method of the station entrances and the proposed timeframes that these will be left 'open' (approximately 2 years) be reconsidered.
LU2	1. Wording be altered to cover all existing or proposed open spaces that are affected by a high level plan, regardless of its staging. This would allow formal consideration of the Franklin Street Urban Design Proposal prepared by RMIT and CoM.
	2. RMIT be consulted throughout the development of the plan to achieve their desired outcomes with regard to Franklin Street and any other public spaces.
	3. Consult with CoM to determine mutual interests with regard to MMR project impacts on A'Beckett Square, Franklin Street and any other public spaces.
LU4	1. That RMIT be actively involved in the development of these strategies from the outset given their proximity to station entrances and the significant potential for impacts on their land.

B1 *Temporary occupation*

1. Establish with the MMRA the extent of any proposed occupation of project land within the campus and timeframes.

2. Reiterate that occupation of A'Beckett Square will not be accepted given the amenity the area provides for its students and the general public in addition to the lack of open space in the area.

3. Notify the MMRA that occupation of A'Beckett Square will significantly limit development potential of the site currently being proposed in Planning Application No. TPM-2016-3.

4. Assist MMRA in determining alternatives to the occupation – e.g. a length of the A'Beckett Street road reserve as suggested by the MMRA in correspondence to RMIT.

Acquisition

5. Initiate discussions with MMRA promptly to determine exact extent of RMIT land to be acquired.

6. Negotiate alternative acquisition arrangements or locations with MMRA if desired.

7. Determine the impact acquisitions will have on RMIT interests including business continuity and future development projects.

8. If notice of acquisition is received, commission independent valuations of the land.

SC4

1. Notify the MMRA and CoM that the use of A'Beckett Square, Bowen Lane and any other publicly accessible RMIT open spaces may not be used for general community use due to the potential detrimental impacts on RMIT operations and student experience.

2. Consider if Swanston Street, A'Beckett Urban Square or any other open space intended to be used for University events (e.g. Open Day) will be affected by construction. If so, establish whether contingency measures or alternative locations will be required. Provide details of events and requirements to the MMRA to determine alternatives and reduce impacts.

LV2

1. That RMIT be consulted throughout the development of the plan to achieve their desired outcomes with regard to urban design initiatives for A'Beckett Square, Franklin Street and any other public spaces.

2. Engage in discussions with CoM who are recognised as a key stakeholder to further advocate RMIT interests in each area.

3. Ensure the Franklin Street Urban Design Proposal prepared by RMIT and CoM is appropriately considered by the MMRA addressed in the development of the plan.

APPENDIX A

Suggested Incorporated Document Format

RMIT
Peer Review of the Melbourne Metro Rail Project
Land Use and Planning

Melbourne Metro Rail Project

Incorporated Document

April 2016

Incorporated Document in the Melbourne, Port Phillip, Stonnington and Maribyrnong Planning Schemes pursuant to section 6(2)(j) of the *Planning and Environment Act 1987* (Vic).

1. INTRODUCTION

This document is an Incorporated Document in the Schedule to Clause 81 of each of the Melbourne, Port Phillip, Stonnington and Maribyrnong Planning Schemes (**Planning Schemes**) and is made pursuant to section 6(2)(j) of the Planning and Environment Act 1987 (Vic).

This document gives effect to specific controls for the Melbourne Metro Rail Project (**Project**) pursuant to Clause 52.03 in the Planning Schemes.

The controls in this Incorporated Document prevail over any contrary or inconsistent provisions in the Planning Schemes.

2. PURPOSE

The purpose of this Incorporated Document is to permit and facilitate the use and development of the Project Land described in Clause 3 below for the purposes of the Project, in accordance with the controls in clauses 4, 5 and 6 of this Incorporated Document.

3. LAND DESCRIPTION

This Incorporated Document applies to the land described as Project Land for the Melbourne Metro Rail Project on Maps 1 to 16 (**Project Land**).

4. CONTROL

Despite any provision to the contrary or any inconsistent provision in the Planning Schemes, no planning permit is required for, and no provision in the Planning Schemes operates to prohibit, control or restrict:

- the use or development of the Project Land, including any ancillary activities described below; and
- the creation, variation or removal of an easement or covenant within or over the Project Land

for the purposes of, or related to, constructing or maintaining the Project and using any aspect of the Project infrastructure to operate passengers train and tram services. The Project infrastructure to which this control applies includes, but is not limited to:

- Railway, including twin railway tunnels, about 9km long, between South Kensington and South Yarra, and tunnel portals at those locations
- Underground and above ground railway lines between and adjacent to the tunnel portals
- Underground *railway stations*, retail premises and support structures at Arden, Parkville, CBD North, CBD South and Domain
- Above ground *railway station* works and modifications at West Footscray railway station
- Ventilation structures and systems
- *Utility installation* and services to construct and operate any aspect of the Project, including any Project infrastructure and the operation of passenger trains or trams. Such services include traction energy, communications and rail operating systems
- *Tramway*
- Emergency and maintenance access shafts and infrastructure
- Bridges, transport interchanges and road works

- Earthworks and related structures, kerbs, channels, water quality and soil treatment structures or works, retaining walls, noise and screening barriers, cuttings, batters and fill associated with the Project

- Any works or Project infrastructure described in the Environment Effects Statement for the Project.

Ancillary activities to the use and development of the Project Land for the purpose of, or related to, the Project include, but are not limited to:

- Development and use of construction laydown areas for construction purposes

- Removing, destroying and lopping trees and vegetation

- Demolishing and removing buildings, fixtures, structures and infrastructure

- Constructing or carrying out works for excavation, fences, temporary barriers, noise

- attenuation walls, stabilisation, creating bunds or mounds, landscaping, shared use paths, wetlands or ground treatment

- Creating or altering access to a road in a Road Zone, Category 1 to the satisfaction of the relevant road authority

- Constructing and using temporary site workshops and storage, administration and amenities buildings

- Manufacturing any materials required for the Project within the Arden precinct

- Constructing and using temporary access roads, diversion roads and vehicle parking areas

- Displaying construction, directional and business identification signage

- Carrying out of preparatory works including, but not limited to, those set out in clause 5.6 of this Incorporated Document

- Subdividing and consolidating land

- Altering or relocating rail lines, tram lines and *Utility installations*

- Any activity which the Minister for Planning confirms in writing is ancillary for the purposes of the Project or use of Project infrastructure.

Land uses in italics have the same meaning as in Clause 74 of the Planning Schemes.

This control is subject to the conditions in clause 5 of this Incorporated Document.

5. CONDITIONS

The use and development of the Project Land permitted by this Incorporated Document must be undertaken in accordance with the following conditions:

Development Plans

5.1 Subject to clause 5.6, a Development Plan must be prepared to the satisfaction of the Minister for Planning for development relating to each of:
- Western tunnel portal
- Eastern tunnel portal

- Arden Station
- Parkville Station
- CBD North Station
- CBD South Station
- Domain Station
- Rail turnback at West Footscray Station
- Any other above-ground tunnel access and / or ventilation structures

A Development Plan must address surface works of each item listed above. A Development Plan for a station must address underground areas from the station entrance to the ticket gate.

A Development Plan must include:

- A site layout plan/s
- Architectural, landscape and public realm plans and elevations including lighting, signage, pedestrian access, bicycle access and other ancillary facilities
- A response to the Urban Design Strategy;

A Development Plan must be accompanied by a summary of consultation undertaken with the Office of the Victorian Government Architect, relevant Council/s and where relevant, the Roads Corporation, Public Transport Development Authority, Melbourne Water ~~and~~ Heritage Victoria and RMIT. The summary of consultation must show the issues raised during the consultation and the consideration and response provided to each identified issue.

A Development Plan must be approved by the Minister for Planning prior to the commencement of any development to which that Development Plan relates.

Approval may be granted by the Minister for Planning to demolish, construct a building or construct or carry out works associated with the Project before a Development Plan or other requirement is approved.

For land to which a Development Plan applies, development must be carried out generally in accordance with an approved Development Plan.

A Development Plan may be prepared and approved in stages or parts, and may be amended from time to time to the satisfaction of the Minister for Planning.

Environmental Management Framework

5.2 Prior to the commencement of any buildings or works associated with the Project, an Environmental Management Framework (**EMF**) must be prepared for the Project or any stage or part of the Project. The EMF must include Environmental Performance Requirements addressing the following areas and any other relevant matters:

- Transport
- Land use and planning
- Social and community
- Business
- Air quality
- Aboriginal heritage
- Surface water
- Ground water
- Ground movement
- Contaminated land and spoil

management

- Noise and vibration
- Historical cultural heritage
- Biodiversity
- Greenhouse gas

The EMF must set out the process and timing for development of a Construction Environment Management Plan, Site Environment Implementation Plan and Traffic Management Plan as relevant to any stage or part of the Project, including process and timing for consultation with relevant Council/s, Heritage Victoria, the Roads Corporation, Melbourne Water, Public Transport Development Authority, ~~and~~ the Environment Protection Authority and RMIT as relevant.

The EMF must be submitted to and endorsed by the Minister for Planning and may be prepared and endorsed in stages or parts and may be amended from time to time to the satisfaction of the Minister for Planning.

The use and development for the Project must be carried out generally in accordance with the endorsed EMF and the Environmental Performance Requirements.

Urban Design Strategy

5.3 Prior to the submission of Development Plans, an Urban Design Strategy must be submitted to and endorsed by the Minister for Planning. The Urban Design Strategy may be prepared and endorsed in stages or parts and may be amended from time to time to the satisfaction of the Minister for Planning.

The Urban Design Strategy must be accompanied by a summary of consultation undertaken with relevant Government bodies and major stakeholders, including RMIT. The summary of consultation must show the issues raised during the consultation and the consideration and response provided to each identified issue.

The use and development for the Project must be carried out generally in accordance with the endorsed Urban Design Strategy.

Early Works Plans

5.4 Early Works identified in the Environment Effects Statement for the Project as Early Works may be carried out before a Development Plan is approved, provided that the Minister for Planning has endorsed an Early Works Plan for such works.

Early works for the Project identified in the Environment Effect Statement include:

- Utility service relocation and protection of utility assets;
- Site preparation works, including demolition works, removal or relocation of trees and monuments, minor road / transport network changes; and
- Works for construction of shafts at CBD North and CBD South station precincts.

An Early Works Plan must be endorsed by the Minister for Planning prior to the commencement of works to which that Early Works Plan relates. It must include site layout plan/s. An Early Works Plan may be prepared and approved in stages or parts and may be amended from time to time to the satisfaction of the Minister for Planning.

For land to which an Early Works Plan applies, development must be carried out generally in accordance with an approved Early Works Plan.

An Early Works Plan must be accompanied by a summary of consultation undertaken with relevant Council/s and where relevant, the Roads Corporation, Public Transport

Development Authority, Melbourne Water, Heritage Victoria ~~and~~ affected utility service providers and RMIT. It must also show how issues have been addressed.

Native Vegetation

5.5 Native vegetation offsets for the removal of native vegetation to construct the Project must be provided in accordance with the *Permitted Clearing of Native Vegetation - Biodiversity Assessment Guidelines* (Department of Environment and Primary Industries, September 2013).

Preparatory Works

5.6 Preparatory works for the Project may commence before the plans and other matters listed in sub-clauses 5.1 - 5.5 are approved.

- The preparatory works permissible under this sub-clause for the Project include, but are not limited to:
- Works, including vegetation removal, not requiring a permit under the provisions of the relevant Planning Scheme
- Investigations, surveys, testing and preparatory works to determine the suitability of land
- Construction, protection, modification, removal or relocation of existing utility services and infrastructure
- Creation of construction access points
- The removal or relocation of road, railway or tramway services and infrastructure
- The removal or relocation of vegetation (including native vegetation) to the minimum extent necessary to enable such preparatory works.

  Any native vegetation removed to enable preparatory works forms part of the total extent of native vegetation removal necessary for the construction of the project and native vegetation offsets must be provided in accordance with the *Permitted Clearing of Native Vegetation - Biodiversity Assessment Guidelines* (Department of Environment and Primary Industries, September 2013)

- Establishment of environmental and traffic controls
- Fencing and temporary barriers to enable preparatory works

The process and timing for Preparatory Works must be provided to major stakeholders, including RMIT, at least four weeks prior to the commencement of works approved under this sub-clause.

6. EXPIRY

The control in this Incorporated Document expires if any of the following circumstances applies:

- The development allowed by the control is not started by 31 December 2018
- The development allowed by this control is not completed by 31 December 2028
- The use allowed by the control is not started by 31 December 2028.

The Minister for Planning may extend these periods if a request is made in writing before the expiry date or within three months afterwards.

Appendix 7: Noise and Vibration

Prepared by Cogent Acoustics Pty Ltd

Cogent Acoustics

Melbourne Metro Rail – EES Peer Review

RMIT Noise and Vibration

Melbourne Metro Rail – EES Peer Review

RMIT Noise and Vibration

Prepared for:

RMIT
c/- Meinhardt
Level 11, 501 Swanston Street
Melbourne VIC 3000

Prepared by:

Cogent Acoustics Pty Ltd
ABN: 13 610 344 986
11/27 Thornton Crescent,
Mitcham VIC 3132
03 9874 1371

Project Number: 16046

Prepared by **Andrew Mitchell**
BE(Hons) Mech, ME
MAAS MASNZ
andrew@cogentacoustics.com.au

Signature

Reviewed by **Kieran Doherty**
BE(Mech),
Grad. Dip. Building Fire Safety & Risk Engineering
RBP (Vic) EM-32714,
RBP (Vic) EF-32715
kieran@cogentacoustics.com.au

Signature

Revision History

Rev.	Date	Purpose	Prepared by:	Reviewed by:
0	15/06/2016	Draft	Andrew Mitchell	Kieran Doherty
1	21/06/2016	For issue to RMIT	Andrew Mitchell	Kieran Doherty

Executive Summary

Meinhardt has appointed Cogent Acoustics Pty Ltd on behalf of RMIT to undertake a noise and vibration review of the Environmental Effects Statement (EES) for the Melbourne Metro Rail Project (MMRP), as issued by the Melbourne Metro Rail Authority (MMRA) on 25 May 2016.

A desktop review has been performed with the objective of highlighting the predicted key noise and vibration impacts to RMIT facilities, informing RMIT of any risks and impacts that may not be adequately addressed by the EES, and providing recommendations on matters that should be given further consideration in the EES process in order to protect the interests of RMIT.

The key finding of the review are as follows:

- Airborne construction noise will present significant impacts to RMIT. Noise levels in excess of 80 dB(A) are predicted outside Buildings 9, 14, 36 and 83 for approximately three years of the construction period. The recommended Environmental Performance Requirements (EPRs) provide no fixed limit to the level of noise that can be generated by the works outside RMIT facilities at any time of day. It is strongly recommended that RMIT should seek additional limits on airborne construction noise emissions to limit noise levels emitted to RMIT buildings. It is suggested that guidance on appropriate criteria should be taken from the NSW Interim Construction Noise Guideline (ICNG) (DECC, 2009).
- The likely ground-borne construction noise levels inside RMIT buildings have not been fully investigated in the EES. Based on predictions performed for nearby residential buildings, ground-borne construction noise is considered to be a high risk to RMIT, particularly for the buildings closest to the proposed station cavern. The EPR relating to ground-borne construction noise (EPR NV11) does not provide any protection to RMIT from the potential effects of ground borne construction noise, as it applies to residential dwellings only. It is recommended that RMIT should seek criteria to be included that would protect teaching spaces and other noise sensitive areas within RMIT buildings when in use. The maximum noise levels recommended by AS/NZS 2107:2000 (Standards Australia, 2000) should be used as guidance for the ground-borne construction noise criteria.
- The construction vibration assessment presented in the EES predicts that there will be some short to medium term amenity impacts to RMIT at various stages of construction, and likely vibration impacts to vibration sensitive equipment contained in RMIT Building 14. Mitigation of the vibration impacts will be possible to a limited degree, but temporary rescheduling or relocation of sensitive equipment may be necessary. It is recommended that RMIT should ensure a mechanism is put in place to guarantee that any costs associated with temporary rescheduling or relocation of equipment are not borne by RMIT or are adequately compensated.

- Noise due to the operation of fixed infrastructure such as the ventilation structures is unlikely to significantly impact RMIT, however, the relevant EPR (EPR NV16) for this source of noise does not apply to directly to RMIT, so does not guarantee that RMIT will be adequately protected. It is recommended that RMIT should seek a direct limitation to the ventilation plant noise levels at the façades of the RMIT buildings adjacent to the ventilation structures. It is considered that either the extending the SEPP N-1 noise limits to apply at the façade of the RMIT buildings, or applying a fixed noise limit of approximately 60 dB L_{Aeq}, would provide satisfactory protection to the spaces within the adjacent RMIT buildings.
- Noise and vibration due to the operation of trains when the project is complete is not predicted to present any significant adverse effects for RMIT. The EPRs proposed in relation to operational noise and vibration are considered to adequately protect RMIT's interests, subject to possible modification of EPR NV17, or an additional EPR, to provide additional assurance around ground-borne noise levels.

Based on the above findings, it is considered noise and vibration will be key issues for RMIT. It is recommended that RMIT should engage in the EES process to ensure that potential noise and vibration impacts to RMIT are adequately addressed by the final Environmental Performance Requirements for the project.

Contents

1 Introduction

1.1 Purpose

Meinhardt has appointed Cogent Acoustics Pty Ltd on behalf of RMIT to undertake a noise and vibration review of the Environmental Effects Statement (EES) for the Melbourne Metro Rail Project (MMRP), as issued by the Melbourne Metro Rail Authority (MMRA) on 25 May 2016.

The objectives of the review were:

- To consider the findings of the EES with respect to potential noise and vibration impacts to RMIT City Campus facilities and operations;
- To inform RMIT of any risks and impacts that may not be adequately addressed by the recommended Environmental Performance Requirements (EPRs) for the project;
- To provide recommendations to RMIT on matters that should be given further consideration in the EES process in order to protect the interests of RMIT.

This report documents the methodology and findings of the above review.

A glossary of the acoustic nomenclature used in this report is presented in Appendix A.

1.2 Reference Documentation

This report is based on information contained in the following documents and drawings:

Table 1 Reference Documentation

Document	Prepared by	Issue
Melbourne Metro Rail Project Environmental Effects Statement	Melbourne Metro Rail Authority	25/5/2016
Melbourne Metro Rail Project Environmental Effects Statement - Summary Document	Melbourne Metro Rail Authority	25/5/2016
Melbourne Metro Rail Project Environmental Effects Statement - Map Book	Melbourne Metro Rail Authority	25/5/2016
RMIT City Campus Map	RMIT	26/5/2016

1.3 Report Limitations

The following limitations are applicable with respect to the acoustic advice presented in this report:

- Cogent Acoustics has prepared this document for the sole use of the Client and for the specific purpose expressly stated in the document. No other party should rely on this document without the prior written consent of Cogent Acoustics. Cogent Acoustics undertakes no duty, nor accepts any responsibility, to any third party who may rely upon or use this document.

- The information contained in this document provides advice in relation to acoustics and vibration only. No claims are made and no liability is accepted in respect of design and construction issues falling outside of the specialist field of acoustics and vibration engineering including and not limited to structural integrity, fire rating, architectural buildability and fitness-for-purpose, waterproofing and the like. Supplementary professional advice should be sought in respect of these issues.
- Reports marked 'Not for Construction' or 'Draft' may be subject to change and are not released as final reports. Cogent Acoustics accepts no liability pending release of the final version of the report.
- In preparing this document Cogent Acoustics may have relied upon information provided by the client and other third parties, some of which may not have been verified. Cogent Acoustics accepts no responsibility or liability for any errors or omissions which may be incorporated into this document as a result.
- The recommendations, data and methodology documented in this assessment are based on the listed reference documentation. The recommendations apply specifically to the project under consideration, and must not be utilised for any other purpose. Any modifications or changes to the project from that described in the listed reference documentation may invalidate the advice provided in this document, necessitating a revision.
- Subject to the above conditions, this document may be transmitted, reproduced or disseminated only in its entirety.

2 Methodology and Assumptions

2.1 Methodology

Cogent Acoustics has performed a desktop review of the noise and vibration aspects of the EES. The review focused on the methodology and findings of the noise and vibration impact assessment contained in Chapter 13 and Technical Appendix I of the EES, along with the risk assessment presented in Technical Appendix B of the EES, and the recommended Environmental Performance Requirements presented in Chapter 23. Where appropriate, high level calculations have been performed, based on available information, to check the general order of magnitude of the noise and vibration levels predicted in the EES.

In conducting the review, consideration has been given to:

1. Whether the risks identified comprehensively cover the potential noise and vibration risks to RMIT, and whether the levels of risk as they relate to RMIT have been appropriately quantified;

2. The likely effectiveness of proposed measures to mitigate the noise and vibration impacts, and the level of residual impact to RMIT after mitigation; and

3. Whether the recommended Environmental Performance Requirements (EPRs) for the project will provide appropriate protection of RMIT assets in light of the risks and required mitigation measures identified.

Where relevant, recommendations have been provided in relation to modifications to the EPRs to better protect RMIT from impacts due to noise and vibration.

2.2 Assumptions

- The review is based on the background information contained in the EES along with other freely available information related to the project.
- Detailed review of noise models and mathematical calculations has not been undertaken. It is assumed that the modelling and calculations have been undertaken to the standard that could normally be expected of a competent professional.

3 Findings

3.1 Categories of Noise and Vibration Impact

The EES has considered the potential noise and vibration impacts from the project broadly in terms of the following categories:

- Construction Noise – Airborne Noise
- Construction Noise – Ground-borne Noise
- Construction Vibration
- Operational Noise – Airborne Noise due to Trains
- Operational Noise – Airborne Noise due to Fixed Infrastructure
- Operational Noise – Ground-borne Noise
- Operational Vibration

It is considered that the above categories cover the range of noise and vibration impacts that could potentially arise from the project. A review of the findings of the EES for each of these categories, as they pertain to RMIT, is presented in the following subsections.

3.2 Construction Noise – Airborne Noise

The risk assessment and airborne construction noise predictions presented in the EES indicate that airborne construction noise will have significant impacts to RMIT. The buildings potentially most affected by airborne construction noise would be Buildings 9, 14, 36 and 83, however surrounding buildings would also be affected.

At each of these buildings the EES predicts construction noise levels in excess of 80 dB(A) outside the building during demolition works and shaft construction works, which are indicated to be up to 3 years in duration. After shaft construction works, the EES shows that the shaft roof slab and/or acoustic construction sheds built around the main works zones would significantly reduce airborne construction noise impacts.

Likely areas of work adjacent to RMIT Building 39 and 49, and between RMIT Building 37 and 81, do not appear to have been included in the airborne construction noise modelling, however, in general it is considered that the modelling provides a reasonable representation of the likely airborne construction noise levels.

The primary EPR that has been proposed to mitigate and manage airborne construction noise impacts (EPR NV1) requires that construction work be undertaken in compliance with the EPA Noise Control Guidelines (EPA Victoria, 2008). The EPA Noise Control Guidelines essentially provide a list of good construction practices to minimise noise emissions and impacts, and specify construction noise limits for residential dwellings during the evening and night.

A significant short-coming of this EPR with respect to RMIT is that it provides no fixed limit to the level of noise that can be generated by the works outside RMIT facilities at any time of day, since the Noise Control Guidelines do not prescribe noise limits for the day period (when construction noise would have most impact on RMIT), and the night or evening limits only apply to residential premises. As such, there is considered to be a high risk that activities inside the RMIT buildings will be severely impacted by airborne construction noise for a significant duration, even if 'good construction practices' are followed.

Additional airborne construction noise limits are prescribed for specific types of highly noise sensitive spaces in EPR NV5, however, all of these spaces are hospital related, and the limits of EPR NV5 would therefore not afford protection to RMIT in their present form.

It is strongly recommended that RMIT should seek additional limits on airborne construction noise emissions to limit noise levels emitted to RMIT buildings, similar to those provided in EPR NV5, or a condition that requires upgrades to the sound insulation of the affected RMIT building facades to achieve satisfactory indoor noise levels.

It is suggested that the construction noise limits adopted by the NSW Interim Construction Noise Guideline (ICNG) (DECC, 2009) should be considered as a guideline to what may be appropriate. The NSW ICNG recommends construction noise levels to be limited to 45 dB(A) $L_{Aeq,15min}$ inside classrooms and teaching spaces. It is suggested that similar limits would also be appropriate for other potentially noise-sensitive spaces in RMIT buildings, such as offices. Lower limits may be appropriate in spaces containing highly noise sensitive equipment or facilities (e.g. acoustic laboratories), and guidance for such spaces could be taken from AS/NZS 2107:2000 (Standards Australia, 2000).

3.3 Construction Noise – Ground-borne Noise

The EES assesses the potential ground-borne noise due to construction of the project in relation to the ground-borne noise criteria recommended by the NSW Interim Construction Noise Guideline (ICNG). The criteria only apply to ground-borne noise received at residences, and only during the evening and night time. The EES therefore does not specifically consider the potential ground-borne noise impacts to RMIT.

The EES identifies ground-borne noise due to tunnelling and excavation of the CBD North Station cavern as a high risk for residential buildings in the vicinity of RMIT. Even with mitigation, the ground-borne construction noise levels are predicted to exceed the assessment criteria on up to three occasions of up to two weeks in duration. The potential mitigation measures identified to reduce ground-borne noise are limited, and primarily involve reducing the speed of tunnelling / excavation during the evening and night periods, which may extend the duration of impacts to RMIT during the day.

Given the above, ground-borne construction noise is considered to be a high risk to RMIT, particularly for the buildings closest to the proposed station cavern. However, further information in relation to the potential ground-borne construction noise levels is required to determine the full extent of impacts to RMIT.

It is also noted that the tunnel will run almost directly under Building 100 (Design Hub), and that this building has basement levels that could potentially be significantly affected by ground-borne noise from tunnelling in close proximity.

The EPR relating to ground-borne construction noise (EPR NV11) does not provide any protection to RMIT from the potential effects of ground borne construction noise, as it applies to residential dwellings only. It is recommended that RMIT should seek criteria to be included that would protect teaching spaces and other noise sensitive areas within RMIT buildings when in use. It is considered that the maximum noise levels recommended by AS/NZS 2107:2000 (Standards Australia, 2000) should be used as guidance for the ground-borne construction noise criteria.

It should also be noted that the mitigation measures available to reduce the levels of ground-borne noise generated may be quite limited. As such, if ground-borne noise levels received by RMIT are found to be of unacceptable duration and level, affected noise sensitive facilities may need to be relocated to less affected areas of the campus or off-site locations. It is recommended that RMIT should consider the potential cost and operational implications of such requirements in the event that future negotiations are undertaken with respect to EPRs or terms for compensation.

3.4 Construction Vibration

The EES assesses the potential vibration due to construction in terms of amenity impacts, impacts to vibration sensitive equipment and facilities, and impacts on structures.

For amenity, the recommended Vibration Dose Values (VDV) prescribed by Table 1 of BS 6472-1:2008 (BSI, 2008) are used for the assessment. For vibration sensitive equipment and facilities, the vibration criteria curves recommended by ASHRAE (ASHRAE, 2011) are used, and for assessment of the potential for damage to structures the guidelines recommended by DIN 4150-3 (DIN, 1999) are adopted. It is considered that compliance with the construction vibration criteria used in the EES would adequately protect amenity and vibration sensitive facilities within the RMIT buildings from the effects of construction vibration.

It is considered that a robust methodology has been used to predict the construction vibration levels.

The EES predicts that the structural vibration criteria will be satisfied for all buildings within the CBD North Station precinct, except where excavation using a rockbreaker is to be undertaken within 1.5m of a building. The only location where this is identified to occur is outside RMIT building 36 at 393-397 Swanston Street, where such works may be required as part of excavating the southern station entrance. The EES cites alternative methods of excavation that could be used to comply with the structural vibration criteria, and it is considered that the criteria would be achievable with the proposed methods.

It is understood that there have been previous issues with shattering of the glass disks on the façade of Building 100 (Design Hub). Special consideration may need to be given to vibration impacts on this building in order to avoid further shattering i.e. additional investigations may need to be carried out to determine if the structural vibration criteria are appropriate for this building, and if not, what level of vibration is acceptable.

The amenity criteria are predicted to be exceeded at the worst affected RMIT buildings on Franklin Street for periods of up to 5 weeks on three occasions during the expected 18-month excavation of the CBD North Station cavern. Levels of vibration that would be likely to result in adverse comment are predicted for 10 days of those periods. Additionally, the predictions in the EES suggest than vibration due to tunnelling could exceed the amenity criteria for up to 15 days on one occasion at the most affected RMIT buildings.

The potential mitigation measures identified to reduce vibration due to cavern excavation and tunnelling are limited, and primarily involve reducing the speed of tunnelling / excavation, which may extend the duration of impacts to RMIT, albeit at a less intrusive level.

Vibration associated with ripping and rock-breaking in the vicinity of RMIT building 14 is predicted to exceed the sensitive equipment criteria for the electron microscope on Level 7 and the confocal microscope on Level 5. The key mitigation measures proposed include:

- Temporarily rescheduling the use of the vibration sensitive equipment, which would have a potential impact on RMIT operations;
- Temporarily relocating the equipment to other non-affected facilities, which again may have implications for RMIT operations;
- Scheduling the use of the rockbreaker to reduce impact, which would rely on the cooperation of the proponent and would assume that there is a suitable proportion of times when the affected sensitive equipment is not utilised.

Provided that a high level of cooperation is maintained between the proponent and RMIT, it is considered that the above mitigation measures may be reasonable. It is recommended that RMIT should ensure a mechanism is put in place to guarantee that any costs associated with temporary rescheduling or relocation of equipment are not borne by RMIT or are adequately compensated.

Subject to the above point, the EPRs that have been recommended in the EES to address construction vibration (EPRs NV6 to NV10) are considered to provide a reasonable level of protection to RMIT interests, given the limited durations and impacts of construction vibration predicted.

3.5 Operational Noise - Airborne Noise due to Trains

The EES identifies airborne noise due to the operation of trains as a low risk for the project in the area of the RMIT Campus.

For the section of the project in the vicinity of the RMIT campus, the trains are proposed to operate entirely in underground tunnels, and airborne noise emissions to the RMIT facilities would therefore be negligible.

It is considered that the EES appropriately addresses the potential operational airborne noise impacts due to trains, and that the recommended EPRs relating to operational airborne noise due to trains will provide adequate protection to RMIT.

3.6 Operational Noise - Airborne Noise due to Fixed Infrastructure

The potential sources of operational airborne noise due to fixed infrastructure that are identified by the EES are the ventilation structures associated with the CBD North Station. The potential for noise from the public address (PA) system at the CBD North Station is not mentioned in the EES, however, it is assumed that the PA system would be contained in the underground station and any noise impacts would therefore be negligible.

The proposed CBD North ventilation structures are located adjacent to RMIT Building 49, RMIT Building 14 and between RMIT Buildings 37 and 81.

These structures will be the ventilation air intakes and outlets for the CBD North Station, and fan noise and other plant noise associated with the ventilation system may be emitted from these openings. If noise levels are high enough, noise from the ventilation structures could potentially impact on spaces within the adjacent RMIT buildings.

The EPR that has been recommended to address this source of noise (EPR NV16) requires that the ventilation system be designed to comply with State Environment Protection Policy (Control of Noise from Commerce, Industry and Trade) No. N-1 (SEPP N-1) (State of Victoria, 1989).

SEPP N-1 prescribes the procedures for determining the statutory noise limits that apply to commercial mechanical plant noise in metropolitan Melbourne, and compliance with SEPP N-1 would generally result in acceptable noise levels at locations where the limits apply. However, the noise limits apply only to defined Noise Sensitive Areas, which in broad terms are dwellings and other places where people may sleep (see Appendix A for full definition). As such, the requirement to comply with SEPP N-1 does not necessarily provide protection to the adjacent RMIT buildings, which may include noise sensitive spaces that are not defined as Noise Sensitive Areas by SEPP N-1.

It is however noted that there are residential buildings nearby to the proposed locations of the ventilation structures (see Figure 11-2, on Page 194 of Technical Appendix I) and it is likely that, in order to comply with SEPP N-1 at the nearby residences, the noise levels due to the ventilation structures would need to be controlled to levels that are also reasonable at the RMIT buildings.

Nevertheless, it is recommended that RMIT should seek a limitation to the noise levels at the façade of the RMIT buildings adjacent to the ventilation structures. It is considered that either the extending the SEPP N-1 noise limits to apply at the façade of the RMIT buildings, or applying a fixed noise limit of approximately 60 dB L_{Aeq}, would provide satisfactory protection to the spaces within the adjacent RMIT buildings.

3.7 Operational Noise - Ground-borne Noise

The EES assesses the potential ground-borne noise due to the operation of trains in relation to the ground-borne noise criteria prescribed by the NSW Rail Infrastructure Noise Guideline (RING), with the addition of supplementary criteria for building types not addressed by the RING. It is considered that compliance with the ground-borne noise criteria used in the EES would adequately protect amenity within the RMIT buildings from the effects of ground-borne noise.

The assessment presented in the EES predicts that without mitigation, the ground-borne noise levels in many of the RMIT buildings would exceed the assessment criteria. Typically, the predicted level of exceedance is 5-10 dB(A), however, ground-borne noise levels in the Kaleide Theatre could potentially exceed the criteria by more than 10 dB(A) (as the criterion for theatres is lower than other spaces). This level of exceedance would be significant if not mitigated. The EES states that a 'high attenuation' track form will be required in order to comply with the ground-borne noise criteria in the area of RMIT. This would include measures such as vibration isolated rails and tracks slab / sleepers.

It is considered that the methodology used to predict the ground borne noise levels is robust, and it is agreed that compliance with the ground-borne noise criteria is likely to be achievable using the mitigation measures proposed.

The EPR that has been recommended in the EES to address this source of noise requires that the proponent "assess feasible and reasonable mitigation to reduce noise towards the relevant ground-borne noise trigger level", with the trigger levels being the same as the ground-borne noise criteria used for the EES assessment. The EPR does not however strictly require the ground-borne noise levels due to the project to be less than the trigger levels.

It is suggested that RMIT should seek some form of guarantee or assurance (potentially through an additional EPR) that the project will be designed and operated such that ground-borne noise levels do not exceed the trigger levels within the RMIT buildings.

3.8 Operational Vibration

The EES assesses the potential vibration due to the operation of trains in terms of both amenity impacts, and potential impacts to vibration sensitive equipment and facilities, such as electron microscopes. For amenity, the recommended Vibration Dose Values (VDV) prescribed by Table 1 of BS 6472-1:2008 (BSI, 2008) are used for the assessment. For vibration sensitive equipment and facilities, the vibration criteria curves recommended by ASHRAE (ASHRAE, 2011) are used. It is considered that compliance with the vibration criteria used in the EES would adequately protect amenity and vibration sensitive facilities within the RMIT buildings from the effects of operational vibration. Compliance with these criteria would also protect from structural damage.

The assessment presented in the EES predicts that the amenity criteria will be satisfied without mitigation for all RMIT buildings.

The vibration levels in some of the vibration sensitive facilities at RMIT, in particular, the FIB in Building 7 and the Electron Microscope in Building 14, are predicted to exceed the vibration criteria for sensitive facilities without mitigation. The EES proposes vibration isolated tracks as a possible mitigation measure, and predicts vibration levels within the criteria with this mitigation measure implemented.

The predicted vibration levels with the proposed mitigation measures implemented also suggest that vibration due to the operation of trains is unlikely to restrict the ability of RMIT to locate vibration sensitive facilities in other parts of the campus in future, as the mitigated levels of vibration would typically be less than the ambient vibration due to street traffic and trams.

It is considered that the methodology used to predict the operational vibration is robust, and it is agreed that compliance with the vibration criteria for vibration sensitive facilities is likely to be achievable using the mitigation measures proposed.

The EPRs that have been recommended in the EES to address operational vibration are considered to provide adequate protection to RMIT interests.

4 Conclusions

A review of the EES for the Melbourne Metro Rail Project has been undertaken with respect to the potential noise and vibration impacts to RMIT.

The key finding of the review are as follows:

- Airborne construction noise will present significant impacts to RMIT. The recommended EPRs provides no fixed limit to the level of noise that can be generated by the works outside RMIT facilities at any time of day. It is strongly recommended that RMIT should seek additional limits on airborne construction noise emissions to limit noise levels emitted to RMIT buildings.
- Ground-borne construction noise levels at RMIT buildings have not been fully investigated in the EES but are considered to be a high risk to RMIT. The EPR relating to ground-borne construction noise (EPR NV11) does not provide any protection to RMIT from the potential effects of ground borne construction noise, as it applies to residential dwellings only. It is recommended that RMIT should seek criteria to be included that would protect teaching spaces and other noise sensitive areas within RMIT buildings when in use.
- The construction vibration assessment presented in the EES predicts that there will be some short to medium term amenity impacts to RMIT at various stages of construction, and likely vibration impacts to vibration sensitive equipment contained in RMIT Building 14. It is recommended that RMIT should ensure a mechanism is put in place to guarantee that any costs associated with temporary rescheduling or relocation of equipment are not borne by RMIT or are adequately compensated.
- Noise due to the operation of fixed infrastructure such as the ventilation structures is unlikely to significantly impact RMIT, however, the relevant EPR (EPR NV16) for this source of noise does not apply to directly to RMIT, so does not guarantee that RMIT will be adequately protected. It is recommended that RMIT should seek a direct limitation to the noise levels at the façade of the RMIT buildings adjacent to the ventilation structures.
- Noise and vibration due to the operation of trains when the project is complete is not predicted to present any significant adverse effects for RMIT. The EPRs proposed in relation to operational noise and vibration are considered to adequately protect RMIT's interests, subject to possible modifications to EPR NV17, or an additional EPR, to provide additional assurance around ground-borne noise levels.

Based on the above findings, it is considered noise and vibration will be key issues for RMIT. It is recommended that RMIT should engage in the EES process to ensure that potential noise and vibration impacts to RMIT are adequately addressed by the final Environmental Performance Requirements for the project.

5 References

ASHRAE. (2011). ASHRAE Handbook - 2011 HVAC Applications, Chapter 48 - Noise and Vibration Control. American Society of Heating, Refigeration and Air-conditioning Engineers.

BSI. (2008). BS 6472-1:2008 Guide to Evaluation of Human Exposure to Vibration in Buildings - Part 1: Vibration Sources other than Blasting.

DECC. (2009). Interim Construction Noise Guideline. Sydney: Department of Environment and Climate Change NSW.

DIN. (1999). DIN 4150-3:1999 Structural Vibration - Part 3: Effects of Vibration on Structures. Deutsches Institut für Normug, translation by DIN-Sprachendienst.

EPA Victoria. (2008). Noise Control Guidelines, Publication 1254. Melbourne.

Standards Australia. (2000, December). AS/NZS 2107:2000 Acoustics - Recommended Design Sound Levels and Reverberation Times for Building Interiors.

State of Victoria. (1989, June 15). State Environment Protection Policy (Control of Noise from Commerce, Industry and Trade) No. N-1. *Victoria Government Gazette No. S31 as varied No. G37, Gazette 23/9/1992 and No. S183, Gazette 31/10/2001*. Melbourne.

Appendix A Glossary of Acoustic Terms

Airborne Noise — Noise that is transmitted through the air.

dB / dB(A) — Decibels or 'A'-weighted Decibels, the units of Sound Pressure Level and Sound Power Level. 'A'-weighting adjusts the levels of frequencies within the sound spectrum to better reflect the sensitivity of the human ear to different frequencies. [Unit: dB / dB(A)]

The following are examples of the decibel readings of every day sounds;

- 0 dB The faintest sound we can hear
- 30 dB A quiet library or in a quiet location in the country
- 45 dB Typical office space. Ambience in the city at night
- 60 dB The sound of a vacuum cleaner in a typical lounge room
- 70 dB The sound of a car passing on the street
- 80 dB Loud music played at home
- 90 dB The sound of a truck passing on the street
- 100 dB The sound of a rock band
- 115 dB Limit of sound permitted in industry
- 120 dB Deafening

Ground-borne Noise — Noise that is radiated from a structure as a result of vibration transmitted via the ground.

$L_{Aeq,T}$ — The Equivalent Continuous A-weighted Sound Pressure Level measured over the period T (also known as Time-Average Sound Pressure Level). The Equivalent Continuous A-weighted Sound Pressure Level is the constant value of A-weighted Sound Pressure Level for a given period that would be equivalent in sound energy to the time-varying A-Weighted Sound Pressure Level measured over the same period. In simple terms, this can be thought of as the average sound pressure level. [Unit: dB / dB(A)]

Noise Sensitive Area — For the purposes of assessment of noise levels in relation to *State Environment Protection Policy (Control of Noise from Commerce Industry and Trade) No. N-1*, *State Environment Protection Policy (Control of Music Noise from Public Premises) No. N-2*, or the I*nterim Guidelines for Control of Noise from Industry in Country Victoria*, a Noise Sensitive Area is defined as:

a) That part of the land within the apparent boundaries of any piece of land which is within 10 metres outside the external walls of any of the following buildings:

- A dwelling (except Caretaker's House)
- Residential Building

b) That part of the land within the apparent boundaries of any piece of land on which is situated any of the following buildings which is within a distance of 10 metres outside the external walls of any dormitory, ward or bedroom of such buildings:

- Caretakers house
- Hospital
- Hotel
- Institutional home
- Motel
- Reformative institution
- Tourist establishment
- Work release hostel

Appendix 8: Services Infrastructure (Water, Sewer, Power, Communications)

Prepared by Meinhardt Australia Pty Ltd

Infrastructure Services

Peer Review of Environmental Effects Statement for Melbourne Metro Rail Project on behalf of RMIT University

Project Reference 116092

June 2016

Prepared For:

RMIT University
124 La Trobe Street
Melbourne VIC 3000

Meinhardt

Level 12, 501 Swanston Street
Melbourne, Vic 3000

P. 03 8676 1200 | F. 03 8676 1201
www.meinhardtgroup.com

REV	DATE	WRITTEN BY	REVIEWED BY	APPROVED BY
00	JUN 2016	S Dunstone	B Weston	S Dunstone

TABLE OF CONTENTS

Executive Summary

The proposed MMR works will have a significant impact on the existing services infrastructure serving the RMIT campus. The works proposed will necessitate the temporary relocation of all major services infrastructure located within Franklin Street, A'Beckett Street and other areas impacted by the work zones. This has the potential to create significant disruption and risk to RMIT operations. The key findings of our review are summarised below:

- Early works diversion of sewer services from Building 37 in A'Beckett Street will require re-routing of this piping within the building to connect to the sewer main in Literature Lane. This work will need to be investigate d and agreed with the authority to ensure it does not create undue disruption and will not limit the future development potential of the building.
- There will be a requirement for RMIT to undertake significant communications network re-routing of their own in-street communications network including identification of all assets potentially affected by the communications diversions undertaken by Telstra, Optus and other carriers. This will require significant time and resources for RMIT.
- Diversion of HV power, water and sewer service by the authorities may cause disruption to service to RMIT buildings. RMIT has critical operations which can be significantly impacted by frequent or unscheduled service interruptions. In addition, where temporary diversions limit the ability of RMIT to undertake development projects to meet their campus growth master plan, this will have an operational, reputational and financial impact on RMIT.
- The inclusion of services plant areas forming part of the MMR project may present impact on amenity to existing RMIT buildings due to loss of parking, reduced access, increased noise, increased EMI emissions, and negative visual impact on the streetscape.

1 Introduction

Meinhardt has been engaged by the RMIT University Melbourne (RMIT) to conduct a peer review of the Melbourne Metro Rail (MMR) project Environment Effects Statement and Constructability Report to identify implications of the on the services infrastructure to the university and within the university confines.

MMR works directly impacting RMIT will involve the construction of the CBD North train station, construction of tunnels in a north and south direction away for the station, the use of Franklin Street and A'Beckett Street as construction work sites.

Enabling works have been identified by the Melbourne Metro Rail Authority (MMRA) to ensure the continued provision of essential services to the university during and after completion of the MMR.

2 Methodology and Assumptions

2.1 Methodology

Meinhardt carried out a site inspection of the RMIT buildings and paved areas located along the Swanston Street and Franklin Street frontages on 14 June 2016 to visually confirm the extent of existing services infrastructure. Existing conditions along the frontages has been concealed largely by the building modification works currently being undertaken by the university.

A Dial Before You Dig (DBYD) enquiry has been made to identify the relevant services stakeholders and services infrastructure that is located in close proximity to RMIT. The existing services stakeholders are listed below as identified on the DBYD database for future reference:

Service	Authority Name	Phone
Communications	AAPT / PowerTel, VIC	1800786306
Communications	AARNet Pty Ltd, Vic	1300275662
Gas & Petroleum	APA Group Networks, Thomastown	08 81591644
Electricity	Citipower – House	132206
Council/Shire	City of Melbourne	03 96589127
Water 53643297	City West Water Ltd.	03 93138379
Communications	NBN Co, VicTas	1800626762
Communications	Nextgen, NCC – VIC	1800032532
Communications	Optus and/or Uecomm, Vic	1800505777
Communications	PIPE Networks, Vic	1800201100
Communications	RMIT University	03 99253889
Communications	Telstra VICTAS	1800653935
Communications	Verizon Business (Vic)	02 94345856
Communications	Vocus Communications	08 92446114
Communications	Vocus Fibre Pty Ltd (VIC)	07 31770796

Electricity	Yarra Trams	03 86683380

2.2 Assumptions

Location and type of services assets identified by the DBYD enquiry are to be confirmed by others.

Essential services are to be maintained by the MMRA to RMIT and adjacent stakeholders in accordance with the Essential Services Act 2002 (ESA). Further details of the ESA can be found at Essential Services Commission web page http://www.esc.vic.gov.au/.

3 Findings

The objectives of the MMR are to provide uninterrupted essential services to stakeholders during the construction and operational phases of the project. Assessment of the Infrastructure Services has been based on the EES objectives and the Early Works Planning for the proposed CBD North Station.

We understand the MMRA has prepared an early works enabling strategy that identifies the broad scope of services relocation and tram track works that are intended to be carried out during the second half of 2016 and the first half of 2017 prior to the major train station and track construction.

At the time of preparation of this report very few details of the enabling works have been provided by the MMRA for evaluation. We assume that RMIT will be kept fully informed of works that will impact the operation of the university and that RMIT will have the opportunity to provide comment and recommendations regarding timing of the proposed works.

The following are items which we understand will impact on the University and will therefore need to be carefully addressed by the MMRA and negotiated and agreed with RMIT.

3.1 Early Work Services Diversion

The MMR has identified a number of authority services and assets at and around the station box that will be affected by the works.

The available MMRA documents indicate that sewer piping within A'Beckett Street serving Building 37 will need to be diverted and that some of the existing sewer services serving Building 37 will need to be re-routed to the sewer main in Literature Lane. Further investigation will need to be undertaken to ensure that the proposed rerouting is viable, does not cause undue disruption to RMIT operations and does not restrict future development of Building 14 and associated buildings.

RMIT communications owned assets may not be identified by the MMRA as they do not fall under the scope of the communications carriers such as Telstra and Optus. RMIT will need to undertake their own tracing and identification of assets and will need to ensure these are advised to the MMRA for potential impact with the MMR works.

3.2 Communications Network

It is likely that RMIT will have some telecommunication assets locate within Telstra/Optus assets, without permission. This can occur where private contractors have undertaken works and in our experience this is more likely than not. Whilst Telstra/Optus/Comms carriers will be relocating their communications assets, any RMIT owned assets required to be relocated due to the MMR works, will not be moved and will require RMIT to undertake this work..

It is likely that RMIT will have a number of communications links which will be directly affected by the works in Franklin Street, A'Beckett Street and other areas impacted by the work zones. The diversion of these communications pathways will require significant planning and engineering as well as a process to obtain permits for new pathways through Melbourne City Council.

The relocation of non-authority communications assets such as RMIT communications fibre network, does not appear to have been addressed in the ESS document and may create a gap in scope if not included as part of the works requirements.

3.3 HV power

It is understood that diversion of HV power as a response to the MMR works, will be undertaken by the Power Authority. The ESS document does not state performance requirements for continuity of supply of power. RMIT have a significant number of facilities which would be significantly impacted by disruption to power supply. In particular, there are a number of laboratories which undertake experimental work which requires 24/7 power to avoid loss of research experiments.

Provision of temporary power may not be feasible for some buildings due to difficulty in locating power generation units and connection of temporary power supply to building switchboards.

Capacity of HV power network supplying the RMIT campus is critical to future development of the RMIT buildings and facilities to achieve target growth figures. Any limitation on provision of additional or new power supply to the campus due to temporary relocation of the HV power assets will impact on RMIT ability to meet its growth and development plans.

The location of new substations to service the MMR project has not been defined in the documentation made available by the MMRA. The location of these authority assets may introduce additional EMI risk, fire hazard, noise, 24/7 access requirements and authority easement requirements which may have an impact on the surrounding areas of the RMIT campus and buildings.

3.4 Domestic Water and Sewer Infrastructure

It is understood that diversion of domestic water and sewer infrastructure as a response to the MMR works, will be undertaken by the Water Authority. The ESS document does not state performance requirements for continuity of service. RMIT have a significant number of facilities which would be significantly impacted by disruption to water supply. In particular, there are a number of laboratories which undertake experimental work which requires 24/7 water for air conditioning systems to avoid loss of research experiments.

Capacity of water and sewer infrastructure serving the RMIT campus is critical to future development of the RMIT buildings and facilities to achieve target growth figures. Any limitation on provision of additional or new water or sewer services to the campus due to temporary relocation of these assets will impact on RMIT ability to meet its growth and development plans.

4 Conclusion and Recommendations

The MMRA intentions are that the proposed enabling works are to be carried out in a sensitive manner so as to minimise disruption to the school operations. Refer to the Essential Services Commission for relevant service authority obligations.

The MMRA has committed to keeping RMIT informed of the extent and timing of enabling works to minimise disruption to university operations.

Dilapidation investigations carried out by the successful MMR construction contractor are to include the following:

1. CCTV of internal storm water and sewer infrastructure
2. Accurate records of paved areas, traffic access ways and landscaped surfaces

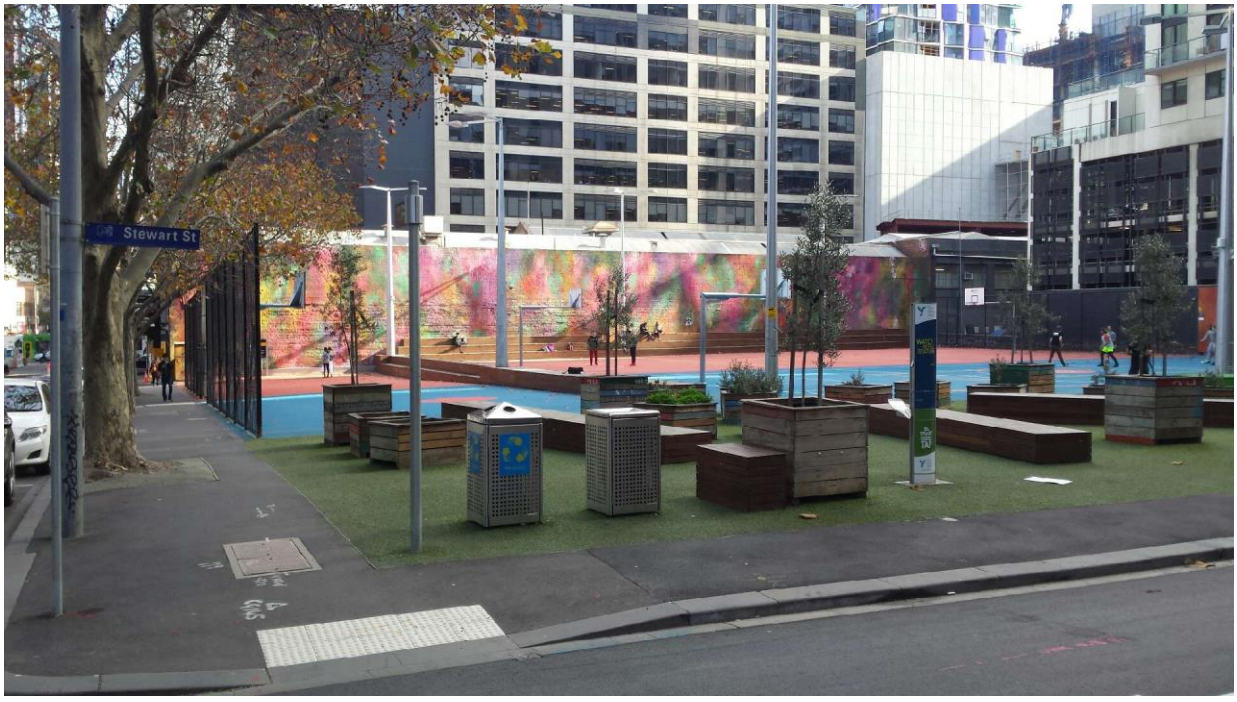
RMIT is advised to negotiate the optimum location for the future station access points to ensure future building options are not compromised.

The temporary and permanent design of the MMR should include the following:

1. RMIT provide to the MMR all available details of their fibre optic and communication assets in public roads
2. Clarify MMR's intent regarding access to the University drive ways and access paths, both temporary and permanent.
3. Confirm what RMIT asserts are located with Telstra/Optus/Comms Carrier assets and, where not so located by agreement, arrange for their relocation.
4. Ensure that any proposed interruption to services supply does not impact on RMIT teaching functions and does not lead to loss of research due to unplanned loss of service.
5. Ensure that the HV power and services relocation works do not restrict the ability for RMIT to develop their buildings and services infrastructure to meet growth targets of their masterplan.

Appendix 9: Social and Community

Prepared by Public Place Melbourne Pty Ltd



MELBOURNE METRO RAIL PROJECT

SIA PEER REVIEW - RMIT

Prepared for Meinhardt Australia Pty Ltd

June 2016

REPORT AUTHORS

Glenn Weston – Director

Public Place Melbourne Pty Ltd
ABN 45 165 088 951

Tel: 03 9078 4607

Website: www.public-place.com.au

Executive Summary

- The Social and Community Impact Assessment (SIA) prepared by AJM was completed in a manner generally consistent with procedural best practice, involved consultation with potentially affected stakeholders including RMIT and reflects the directions set out in the EES Scoping Requirements.
- The SIA report is structurally complex. To understand the SIA, readers must move between multiple report sections and also various sections of *Technical Appendix B - Environmental Risk Register Report*, which makes comprehending the SIA a challenge.
- Notwithstanding, the SIA identifies most physical and social changes with the potential to cause negative impacts for RMIT, its staff and students. The potential displacement of users of RMIT's Urban Square is a notable exception.
- However, the SIA does not provide sufficient detail to enable the reader to fully understand the nature and magnitude of the potential physical and social changes associated with the Concept Design, or what impact these would have for RMIT, its staff and students. As a result, it is unclear how the risk ratings presented in Section 6 of the SIA reflect risks for RMIT, its staff and students either pre or post mitigation.
- The proposed EPRs and mitigation measures are not sufficient to adequately address potential impacts of the Concept Design for RMIT, its staff and students:
  - The EPRs and mitigation measures are not always appropriately targeted. For example, the EPRs relating to amenity impacts do not refer to the management of construction noise or vibrations, even though the EES indicates that the vibration Guideline Targets would be exceeded for some vibration-sensitive equipment at RMIT.
  - Some EPRs are framed in terms of minimising physical change rather than ensuring that associated impacts are contained within a tolerable range.
  - The proposed EPRs do not address the potential displacement of recreational users from RMIT's Urban Square.
  - The proposed EPRs do not address the potential impact of the Concept Design on pedestrian safety, connectivity and legibility in the CBD North Precinct post construction.

Contents

1 Introduction

Public Place was engaged by Meinhardt Australia Pty Ltd to undertake a review of the Environmental Effect Statement (EES) prepared for the Melbourne Metro Rail Project (MMR) Concept Design. The specific focus of the review was to determine whether relevant potential social and community impacts of concern to RMIT have been identified and adequately assessed and whether suitable mitigation measures are proposed.

1.1 Methodology and Assumptions

1.1.1 Introduction

Social Impact Assessment (SIA) is an approach to understanding and assessing the impacts of change on individuals, families, communities and society. SIA is a best practice framework comprising conceptual and procedural elements, rather than a detailed methodology.

In the context of a major infrastructure project such as the MMR Project, an SIA describes physical change associated with the project and predicts the effect of these changes for individuals and groups in the community (the social changes). Subsequently, how predicted social changes would be experienced by individuals and groups (the social receptors) and the acceptability of the predicted changes is considered to establish impacts. Impacts are distinct from social changes because different receptors can experience change differently depending on their circumstances (see Rowan 2009 and Van Schooten *et al.,* 2003).

1.1.2 Method

The section of the EES that relates to potential social and community impacts is based on an assessment prepared by Aurecom, Jacobs, Mott, Macdonald in association with Grimshaw (AJM) (Technical Appendix F). Accordingly, the AJM assessment was reviewed to determine whether:

- an appropriate methodology was employed;
- potential social changes relating to RMIT, its staff and students were identified and adequately described; and
- potential impacts for RMIT, its staff and students were identified and adequately assessed.

1.1.3 Assumptions

The AJM assessment includes all information and analysis the authors considered relevant.

2 Findings

2.1 General

The SIA was completed in a manner generally consistent with procedural best practice, involved consultation with potentially affected stakeholders including RMIT and reflects the directions set out in the EES Scoping Requirements. Also, the reporting of results is organised around a number of geographical precincts, a useful approach given the scale and complexity of the Concept Design and the fact that physical changes with the potential to cause impacts would be contained within a number of discrete areas.

However, much of the information required to understand the social changes that may arise as a result of the Concept Design and the sensitivity of various social receptors to these changes, is not presented in the SIA report. It is therefore unclear whether this information informed the SIA's conclusions. The following discussion describes in more detail the risk assessment and precinct level impact assessment sections of the SIA.

2.2 Risk Assessment

Section 6 of SIA presents an assessment of 'social and community risks' associated with the Concept Design. The Risk Assessment combines information about the potential consequences of various 'events' (termed 'impacts' in Section 10 of the SIA) with information about the likelihood of each 'event', to establish an initial risk rating. The Risk Assessment then considered the potential effectiveness of Environmental Performance Requirements (EPR) and proposed mitigation measures outlined elsewhere in the SIA before determining a 'residual risk rating'.

In order to understand the Risk Assessment and the implications for RMIT, the reader must move between Section 4 (Method), Section 6 (Risk Assessment) and Section 10 (Precinct Level Impact Assessment) within the SIA and also various sections of *Technical Appendix B - Environmental Risk Register Report*, which makes comprehending the SIA a challenge. Of greater concern:

- The output of the Risk Assessment is one rating of risk for each 'event' by Precinct. However, it is unlikely that all social receptors in a Precinct would be affected in the same way by an event, or have equivalent capacity to cope with the change.
- The risk assessment procedure requires information regarding the nature and magnitude of social change associated with the 'events' and the ability of partualr receptors to cope with the changes. However, as discussed in Section 2.3 below, the SIA provides only limited detail regarding how the 'events' would affect RMIT, its staff and students, or the impact of the 'events' for RMIT, it staff and students.
- The 'event' *construction activities act as a barrier to social infrastructure or recreational assets* is assigned the likelihood rating 'Possible' (i.e. the event may occur once within a five-year timeframe). However, Section 11.5 of the SIA gives the impression that altered access to

RMIT's facilities for pedestrians will be an almost certain and ongoing feature of the CBD North Precinct as the Concept Design is constructed.

- Social and community risks relating to the potential displacement of recreational users from RMIT's Urban Square are not assessed. As noted in the SIA, RMIT has plans to develop a building on the square and if this development proceeds, it would displace existing recreational users. However, this does not negate potential negative impacts associated with the Concept Design, which may result in displacement occurring earlier. Also, the assessment does not consider if RMIT intends to replace the existing square, if/when the site is developed for other purposes.
- Social and community risks relating to pedestrian safety and efficiency of movement post construction have not been assessed.
- Residual risk ratings indicate proposed EPRs and mitigation measures would reduce social and community risks in the CBD North Precinct Study Area. However, as discussed in Section 2.3.5 below, the proposed EPRs and mitigation measures do not necessarily guarantee that impacts for RMIT, it staff or students would be contained within a tolerable range.

The above considered, it unclear whether the risk ratings accurately reflect risks for RMIT, its staff and students.

Table 2-1: Comments on the Risk Assessment

Event	Initial Risk			Residual Risk		
	C	L	Risk Level	C	L	Risk Level
Construction activities act as a barrier to social infrastructure or recreational assets	Major	Possible	High	Moderate	Unlikely	Medium
COMMENTS ▪ The magnitude of the event is not well established (how many RMIT staff/students would be affected, what would be length of delays, etc.) pre-or post-mitigation. ▪ The sensitivity of RMIT, its staff and students to the 'event' is not well established. ▪ Altered access to RMIT facilities for students and staff appears to be an almost certain ongoing feature of the construction phase, rather than a one off event. ▪ None of the suggested EPRs respond directly to the 'event'. EPRs and mitigation measures suggested with relation to other 'events' refer to the minimization of severance rather than provision of a level of access that would contain impacts for RMIT, it staff and students within a tolerable range.						
Sustained amenity impacts on RMIT, affects staff or users.	Moderate	Almost certain	High	Moderate	Possible	Medium
COMMENT ▪ The magnitude of the event is not well established (where would amenity impacts occur, how frequent would they be, what buildings would be affected, who uses these buildings, etc.) pre-or post-mitigation. ▪ The sensitivity of RMIT, its staff and students to the 'event' is not well established. ▪ Suggested EPRs and mitigation measures do not explicitly refer to noise and vibration.						
Truck movements and changes to local access sever existing community networks and disrupt access patterns particularly for families with young children, those with mobility impairments or the elderly.	Moderate	Possible	Medium	Moderate	Unlikely	Low
COMMENT ▪ The magnitude of the event is not well established (how many RMIT staff/students would be affected, etc.) pre-or post-mitigation. ▪ The sensitivity of RMIT, its staff and students to the 'event' is not well established. ▪ An altered pedestrian environment appears to be an almost certain and ongoing feature of the construction phase, rather than a one off event. ▪ Suggested EPRs and mitigation measures refer to the minimization of severance rather than provision of a level of access that would contain impacts within a tolerable range.						
Construction activities displace passive recreation in an area with limited alternatives, reducing recreational opportunities for the community and potentially severing social networks.	Minor	Almost Certain	Medium	Minor	Possible	Low
COMMENT ▪ Social and community risks relating to the potential displacement of recreational users from RMIT's Urban Square have not been assessment.						

2.3 Impact Assessment

Section 11 of the SIA describes the Concept Design and existing conditions in the two CBD Precincts (CBD North and CBD South), and identifies precinct specific issues, impacts and mitigation measures. Each part of Section 10 is discussed below.

2.3.1 Existing Conditions

Section 11.2 provides a description of existing conditions in the CBD North Precinct Study Area, which contains RMIT. The description correctly identifies RMIT as being potentially affected by the Concept Design. It is also recognises that the distribution of RMIT facilities results in 'large' flows of students and staff across Swanton, Franklin and Bowen Streets, and that existing class timetables account for these movements. Notwithstanding, the description of RMIT is brief and qualitative in nature. For example, no estimate of the number of pedestrian movements is provided.

The description of existing conditions also notes that residential development to the north of Latrobe Street is generating a need and desire among new residents for open space in the area. In this context, is explained that RMIT provides a 'temporary' urban square on A'Beckett Street which includes a multiuse court and passive recreational spaces. The discussion notes that the urban square is 'highly utilised', but does not quantify usage. It is also indicated that RMIT has plans to build on the space which would displace the current recreational users. While Public Place understands this to be correct, the discussion does not indicate when RMIT plans build, or whether RMIT intends to provide an alternative for the displaced recreational uses.

2.3.2 Key Issues

Section 11.3 of the SIA presents the key issues associated with the Concept Design in the CBD North Precent Study Area. The potential for construction activity to reduce amenity within RMIT's educational and recreational facilities is acknowledged as an issue. The potential for construction activities to interfere with community access patterns, potentially limiting access to social infrastructure and recreational assets, is also acknowledged.

The potential for the displacement of current recreational users from RMIT's Urban Square if the site is used as a construction worksite area is not identified, even though the EES Summary Report indicates that s*everal areas adjacent to the station site would be used as construction work sites, including either part of the RMIT basketball courts or A'Beckett Street (pg. 26.).*

2.3.3 Benefits and Opportunities

Section 11.4 of the SIA outlines potential benefits and opportunities associated with the Concept Design. The listed benefits include improved access to RMIT, a benefit which RMIT acknowledges. Under the heading 'opportunities' the SIA lists *partner with RMIT to identify opportunities to integrate construction activities with existing and future courses enhancing the opportunities available to students*; *reinstate Franklin and A'Beckett Streets as recreational*

spaces for the community; and *engage the community on the proposed treatments for surface level infrastructure*. The recognition of these opportunities in the SIA is positive.

2.3.4 Impact Assessment

Section 11.5 of the SIA presents an assessment of potential (negative) social impacts associated with the Concept Design. To guide the assessment, a set of Assessment Criteria were developed, which relate to Draft Evaluation Objectives contained in the EES Scoping Requirements. The Assessment Criteria cover all issues of concern to RMIT. However, commentary relating to each of the Assessment Criteria is brief and lacking in detail. For example:

- RMIT is discussed as a single entity, even though the institution comprises various faculties, departments, staff and students that/who occupy different sections of the City campus, and may have differing sensitivities to physical change associated with the Concept Design.
- Locations within RMIT where changes to amenity may occur (for example due to noise or vibration) are not identified, nor are the buildings that would be affected, what functions these buildings currently support, the importance of the existing functions, the extent to which existing functions could continue during construction or ultimately what the impacts of altered amenity would be for various receptors.
- The assessment indicates that during construction pedestrian movement between RMIT's buildings may be disrupted and travel times increased. However, no information is provided regarding the likely magnitude of the delays or how many pedestrians would be affected. It is also indicated that changed access may mean that RMIT will need to alter timetables, but not how many classes/students would be affected, or how this may affect the integrity of the RMIT's educational programs. The assessment explains that RMIT has used timetable changes to manage disruptions to pedestrian movement in the context of other large developments. However, whether the nature and magnitude of the previous disruptions is comparable with that which would arise in association with the Concept Design, is not clear.
- The potential displacement of recreational users from RMIT's Urban Square and impacts for users such as lowered engagement in physical or social activity, are not acknowledged in the assessment. Relatedly, potential implications of the closure of A'Beckett Street in terms of generating traffic movements on Stewart Street, which is currently partially closed and forms the eastern boundary of the urban square, are not assessed.

In addition to a lack of detail, at times there is there is a poor differentiation in the commentary between physical changes (e.g. increased vibration levels) social changes (e.g. sensitive equipment cannot be used) and impacts (e.g. educational outcomes compromised).

Overall the impact assessment does not give the reader a good sense of the magnitude of the potential social changes with the potential to cause negative social impacts, the sensitivity of RMIT, its students and staff to these changes, or what the impact of the changes would be for RMIT, its students and staff.

2.3.5 Environmental Performance Requirements

Section 11.6 provides a set of EPRs and proposed mitigation measures to address social impacts in the CBD North Precinct Study Area. Section 11.6 comprises primarily of Table 11.7, which includes the columns 'Impact', 'EPR' and 'Proposed Mitigation Measures'.

The 'impacts' identified in the Table 11.7 are, strictly speaking, not impacts, but rather social changes (the same 'impacts' are described as 'events' in the Risk Assessment section of the SIA). Of greater concern, no information is provided which enables the magnitude of each 'impact' to be determined (spatial scale, number receptors affected, etc.). Furthermore, how the predicted changes would be experienced by different receptors (the impact) is not explained.

The above would be of little consequence for RMIT if the proposed EPRs and mitigation measures were sufficient in scope and detail to adequately address potential impacts of the Concept Design for RMIT, its staff and students. However:

- The EPRs and mitigation measures are not always appropriately targeted. For example, the EPR relating to amenity impacts does not refer to noise or vibrations, even though Section 13 of the EES indicates that the vibration Guideline Targets would be exceeded for some vibration-sensitive equipment at RMIT.
- Some EPRs are framed in terms of minimising physical change rather than ensuring that associated impacts are contained within a tolerable range.
- The proposed EPRs do not address the potential displacement of users of RMIT's Urban Square, or the potential for increased traffic on Stewart Street.
- The proposed EPRs do not address the potential impact of the Concept Design on pedestrian safety, connectivity and legibility post construction.

The above should be of concern to RMIT, particularly given that the SIA provides only limited information about the magnitude of potential social changes associated with the Concept Design and the severity of associated impacts for RMIT, its staff and students.

Revisions to the EPRs and mitigation measures are proposed in the Table below (in red). The changes are provided for illustrative purposes, and RMIT may prefer different or additional revisions. Ultimately, RMIT should seek to ensure that proposed EPRs and mitigation measures enable management of physical changes associated with the Concept Design so that RMIT, its staff and students can continue in their endeavours without undue disruption, and/or that RMIT is assisted to find alternative arrangements to avoid the exposure of sensitive receptors to changes which they cannot be reasonably expected to tolerate.

Table 2-2: Proposed Revision to EPRs and Proposed Mitigation Measures.

Impact	EPR	Proposed Mitigation Measures	Comments
Construction activities act as a barrier to social infrastructure or recreational assets	Prior to main works or shaft construction, develop and implement a community and business involvement plan to engage potentially affected stakeholders and advise them of the planned construction activities and project progress. Develop and implement a transport management plan(s) in consultation with the relevant road management authorities and potentially affected stakeholders to minimise disruption to traffic, car parking, pedestrian and bicycle movements during construction and ensure business continuity for businesses/ institutions operating within the Precinct.	▪ Consult with managers of key facilities so that impacts on their operations do not compromise business continuity or the wellbeing of their users and to ensure that notification timeframes are agreed. ▪ Provide adequate advance warning of out of hours works and consult closely with the institutional stakeholders during their planning to determine times that must be avoided. ▪ Provide a forum in which key facilities can provide feedback on the construction approach ▪ Determine alternative access methods in conjunction businesses/institutions operating within the Precinct and communicate to the community in advance of works in a manner consistent with MMRA's Community and Stakeholder Engagement Plan ▪ Ensure that the relevant plan(s) allow for existing pedestrian access patterns and consider the needs of businesses/ institutions operating within the Precinct and vulnerable people such as children and those with mobility impairments. ▪ Develop appropriate community information tools – website, on site boards, brochures etc. to update community on changed access arrangements.	▪ The magnitude of potential social changes and the sensitivity of RMIT, its students and staff to these changes has not been documented comprehensively. ▪ The EPRs and proposed mitigation measures do not ensure that outcomes in terms of ensuring access to social infrastructure or recreational assets are consistent with RMIT needs or expectations.
Sustained amenity impacts affects the ability of staff or users to continue to use these facilities	Design permanent and temporary works in consultation with local councils and the Office of Victorian Government Architect to comply with the MMRA Urban Design Strategy. The design shall avoid or minimise visual impacts on sensitive receptors and maintain broader landscape character values. Design the construction program to minimise reductions in amenity within RMIT facilities resulting from construction noise and vibration. If adequate amenity cannot be guaranteed, employ attenuation, or facilitate alternative accommodation.	▪ Consult with managers of key facilities so that impacts on their operations do not compromise business continuity or the wellbeing of their users and to ensure that notification timeframes are agreed. ▪ Where required, relocate functions affected by construction noise and vibrations to ensure business continuity and the well-being of staff/users. ▪ Provide adequate advance warning of out of hours works and consult closely with the institutional stakeholders during their planning to determine times that must be avoided. ▪ Provide a forum in which key facilities can provide feedback on the construction approach.	▪ The magnitude of potential social changes and the sensitivity of RMIT, its students and staff to these changes has not been documented comprehensively. ▪ The proposed EPR does not deal with construction noise or vibrations. ▪ The proposed mitigation measures do not ensure that amenity within RMIT's facilities is consistent with the needs of all receptors.
Construction activities displace active and passive recreation in an area with limited alternatives	Develop and implement measures for construction and operation of Melbourne Metro that avoid the displacement of active and passive recreational uses, such as those associated with RMIT's Urban Square. Prior to main works or shaft construction commencing, work with the City of Melbourne and RMIT to identify possible alternative areas of public open space for community use during the construction phase to minimise the impacts of loss of existing public open space that are to be utilised as construction worksites In consultation with key stakeholders and in accordance with the Urban Design Strategy, relevant statutory approvals and other relevant requirements, re-establish sites impacted by construction works In consultation with the City of Melbourne, develop a plan to utilise part of the Franklin Street road reserve for public open space post-construction. Plans must be in accordance with the Melbourne Metro Urban Design Strategy	▪ Consult early with open space users on project timelines and likely impacts. ▪ Identify alternative open space areas to support displaced active and passive recreational uses. ▪ Develop public open space on the eastern portion of the St Pauls Cathedral site to ameliorate the loss of the City Square during project construction. Development would include removing the current surface car park and installing hard and soft landscaping, paths, lighting and structures. The space would allow informal recreation and potentially support public events ▪ In consultation with the City of Melbourne develop a plan to utilise part of the Franklin Street Road Reserve for public open space post construction.	▪ The magnitude of potential social changes and the sensitivity of RMIT, its students and staff to these changes has not been documented comprehensively. ▪ The proposed EPRs do not address potential displacement of users of the RMIT's Urban Square
Truck movements and changes to local access sever existing community networks and disrupt access patterns particularly for families with young children, those with mobility impairments or the elderly Construction workforce demand for parking could result in a reduction in parking available for residents, workers or other visitors to the area	Prior to main works or shaft construction, develop and implement a community and business involvement plan to engage potentially affected stakeholders and advise them of the planned construction activities and project progress. Develop and implement a transport management plan(s) in consultation with the relevant road management authorities and potentially affected stakeholders to minimise disruption to traffic, car parking, pedestrian and bicycle movements during construction and ensure business continuity for businesses/ institutions operating within the Precinct. In consultation with key stakeholders and in accordance with the Urban Design Strategy, relevant statutory approvals and other relevant requirements, re-establish sites impacted by construction works	▪ Determine alternative access methods in conjunction businesses/institutions operating within the Precinct and communicate to the community in advance of works in a manner consistent with MMRA's Community and Stakeholder Engagement Plan ▪ Ensure that the relevant sub plan allows for existing pedestrian access patterns and considers the needs of businesses/ institutions operating within the Precinct and vulnerable people such as children and those with mobility impairments ▪ Develop appropriate community information tools – website, on site boards, brochures etc. to update community on changed access arrangements. ▪ Target of no net loss of public parking outside the construction zone ▪ Management of workforce car parking to include subcontractors.	▪ The magnitude of potential social changes and the sensitivity of RMIT, its students and staff to these changes has not been documented comprehensively. ▪ The EPRs and proposed mitigation measures do not ensure that outcomes in terms of minimising disruption to traffic, car parking, pedestrian and bicycle movements during construction, are consistent with RMIT's needs or expectations.

Impact	EPR	Proposed Mitigation Measures	Comments
Changes to pedestrian environment limit pedestrian safety, connectivity and legibility in the Precinct	Design permanent works in consultation with local councils, the Office of Victorian Government Architect and businesses /institutions operating within the Precinct to ensure high levels of natural surveillance and pedestrian permeability.	▪ Station Precinct designed in accordance with CPTED principles. ▪ Station Precinct designed to complement existing RMIT campus layout and usage patterns and reflect future plans for redevelopment and expansion of RMIT.	▪ The potential impact of the Concept Design on pedestrian safety, connectivity and legibility in the Precinct post construction is not addressed by any of the proposed EPRs or mitigation measures.

3 Conclusion

The SIA identifies most physical and social changes with the potential cause negative impacts for RMIT, its staff and students (the potential displacement of users of RMIT's Urban Square is a notable exception). However, the SIA Report does not provide sufficient detail to enable the reader to fully understand the nature and magnitude of the potential physical and social changes, or what impact these would have for RMIT, its staff and students.

The proposed EPRs and proposed mitigation measures are insufficient in scope and detail to ensure potential impacts of the Concept Design for RMIT, its staff and students are contained within a tolerable range.

4 References

Rowan, M. (2009). Refining the attribution of significance in social impact assessment, Impact Assessment and Project Appraisal. In *Refining the attribution of significance in social impact assessment, Impact Assessment and Project Appraisal* (pp. 185-191).

Van Schooten, M. V. (2003). Conceptualising social change processes and social impacts. *The International Handbook of Social Impact Assessment: Conceptual and Methodological Advances*, 6:74-91.

Appendix 10: Traffic and Transport

Prepared by Ratio Consultants Pty Ltd

ratio:

Prepared for
RMIT

Our reference: 13525REP01D03

21 June 2016

Melbourne Metro Rail Project

Traffic Review of EES on Behalf of RMIT

traffic:review

r:

ratio:consutants

9 Clifton Street
Richmond VIC 3121
ABN 93 983 380 225

Prepared for:

RMIT

Our reference 13525REP01D03

Table of contents:

Executive Summary:

The Melbourne Metro Rail Project is a public infrastructure project which proposes new rail tunnels between Kensington to South Yarra and five new stations, including a new station (CBD North) directly adjacent to RMIT City Campus. An Environmental Effects Statement (EES) has been prepared by the Melbourne Metro Rail Authority (MMRA) which assesses the environmental effects of the works proposed to be carried out for the project.

The EES is on public exhibition from 25 May to 6 July 2016, during which time, stakeholders and members of the public can make written submissions. This report has been prepared to provide advice to RMIT with respect to the transport related considerations of the Melbourne Metro Rail Project for inclusion in the submission being made by RMIT on the EES.

A significant component of this report reviews the Transport Impact Assessment (TIA) which was prepared as a technical appendix to the EES.

Risk Assessment

The risk assessment undertaken in the TIA identifies two risks which are relevant to the University. The identified risks are worded broadly and generally relate to congestion and reduced connectivity as a result of the construction works for all transport modes.

Ratio Consultant's assessment also identifies that there are additional risks which have not been identified in the TIA.

Impact Assessment

The additional risks identified within this report have been assessed against the operational requirements of the University. Discussion is provided with regards to the key considerations relating to minimising any impact to the RMIT City Campus for the duration of the works.

Environmental Performance Requirements

Ratio Consultants have recommended a number of Environmental Performance Requirements in addition to those already recommended by the MMRA to reasonably protect the interests of RMIT, and ensure the University can continue to operate satisfactorily. These requirements are presented in detail later in this report, with the key considerations detailed below:

Key Considerations

— *Vehicle Access*
  - RMIT is serviced by a number of loading / waste collection areas which are critical to the day-to-day operations of the University. Any impacts to vehicle access to these areas must be maintained during both the construction and legacy stages of the MMR project. RMIT must be consulted to find suitable alternative arrangements, if impacts are not avoidable.

— *Pedestrian Access*
  - RMIT is serviced by a number of pedestrian access points which are critical for access and circulation of the University. These areas must be maintained during both the construction and legacy stages. Key pedestrian crossing points and thoroughfares, particularly across Swanston Street must be maintained to a safe standard throughout the construction stage of the MMR project.

— *Public Transport*
  - Students and staff of RMIT rely heavily on the surrounding public transport network as their primary transport mode for access to

the Campus. Public transport must be maintained during the construction and legacy stages of the MMR project. Regular monitoring of the surrounding public transport services must be undertaken to ensure that this critical transport mode continues to provide safe and efficient access to the Campus.

1 Introduction:

Ratio Consultants Pty Ltd was commissioned by RMIT to review the traffic considerations within the Environment Effects Statement (EES) prepared for the Melbourne Metro Rail Project and provide advice for the submission being made by RMIT on the EES.

The Melbourne Metro Rail Project is a public infrastructure project which proposes new rail tunnels connecting the Sunbury and Cranbourne / Pakenham lines between Kensington to South Yarra and five new stations, including a new station (CBD North) directly adjacent to the RMIT City Campus. Works on the project are anticipated to last for at least a 5 year period, with 2026 earmarked as the year when the new services will be operational.

Some of the key points relating to the constructions of the CBD North Station Precinct are as follows:

— The station is proposed to be constructed beneath Swanston Street, adopting the mined cavern construction method using road header machines.
— The construction methodology allows Swanston Street to remain open to trams, cyclists and pedestrians (whilst also accommodating some construction vehicle activity related to the MMR project).
— Franklin Street is proposed to be closed between Victoria Street and Swanston Street. A stub of Franklin Street will remain accessible via Victoria Street, with a turnaround area and limited on-street parking provided.
— Franklin Street west of Swanston Street is proposed to be reduced to one lane in each direction.
— A'Beckett Street is proposed to be closed east of Stewart Street, and will also be closed to pedestrians during the construction stage.

In September 2015, the Minister for Planning determined that the Melbourne Metro Rail Authority (MMRA), as the project proponent, must prepare an Environment Effects Statement (EES) to assess the environmental effects of the works proposed to be carried out for the project.

As part of the EES, a number of technical appendices were prepared. Of particular relevance to this report is the Transport Impact Assessment (TIA) prepared as a joint venture between Aurecon, Jacobs and Mott MacDonald in association with Grimshaw (AJMJV).

The EES recommends a number of Environmental Performance Requirements (EPRs) that define the project-wide environmental outcomes that must be achieved by the contractor during design, construction and operation of Melbourne Metro (irrespective of the design solutions adopted).

The project has been divided into nine precincts, with Precinct 5 – CBD North of most relevance to this report, being located directly adjacent to RMIT City Campus.

The EES is on public exhibition from 25 May to 6 July 2016, during which time, stakeholders and members of the public can make written submissions.

This report has been prepared to provide advice to RMIT with respect to the transport related considerations of the EES for the submission being made by RMIT on the EES.

2 Methodology and Assumptions:

2.1 Methodology

The following methodology was adopted in the preparation of this report:

— Develop an understanding of existing site operations and requirements of RMIT during and after construction of the Melbourne Metro Rail Project, including the following:
  - Undertake a tour of RMIT to gain an understanding of the site geometry, access requirements and travel patterns of staff, students and visitors.
  - Liaison and discussions with staff of RMIT.
  - Review the RMIT Integrated Sustainable Transport Plan (January 2015) to determine prevailing travel modes and travel patterns of RMIT students.

— Review the EES documents with respect to the impacts to RMIT and the requirements of RMIT. Particular attention was provided to the TIA prepared by the AJMJV and the CBD North Precinct, including the:
  - Risk Assessment in Section 6.4 of the TIA.
  - Construction Activity Assessment for CBD North Station Precinct in Section 8.8 of the TIA.
  - Operational Phase Impact Assessment for CBD North Station Precinct in Section 9.8 of the TIA.
  - Recommended Environmental Performance Requirements (EPR) in Section 23.6 of the EES.

— Identify necessary refinements to the proposed Environmental Performance Requirements and note any additional EPRs that would be needed to enable the University to continue to operate as normal as possible throughout the construction period.

2.2 Existing Operation

Map

A figure of the key RMIT City Campus loading access points has been prepared by Ratio Consultants, which details the key considerations with respect to commercial / emergency vehicle access including key waste collection / loading points and critical fire booster locations. The map is attached in Appendix A.

University Operations

RMIT University was established in 1887, and now has 45,000 students in the City Campus. The RMIT City Campus is located to the north of the CBD and comprises a number of buildings both east and west of Swanston Street, as well as buildings in Carlton accessible via Cardigan Street and Lygon Street.

A number of potential traffic and access related impacts to the RMIT University City Campus as a result of the Melbourne Metro Rail Project have been identified:

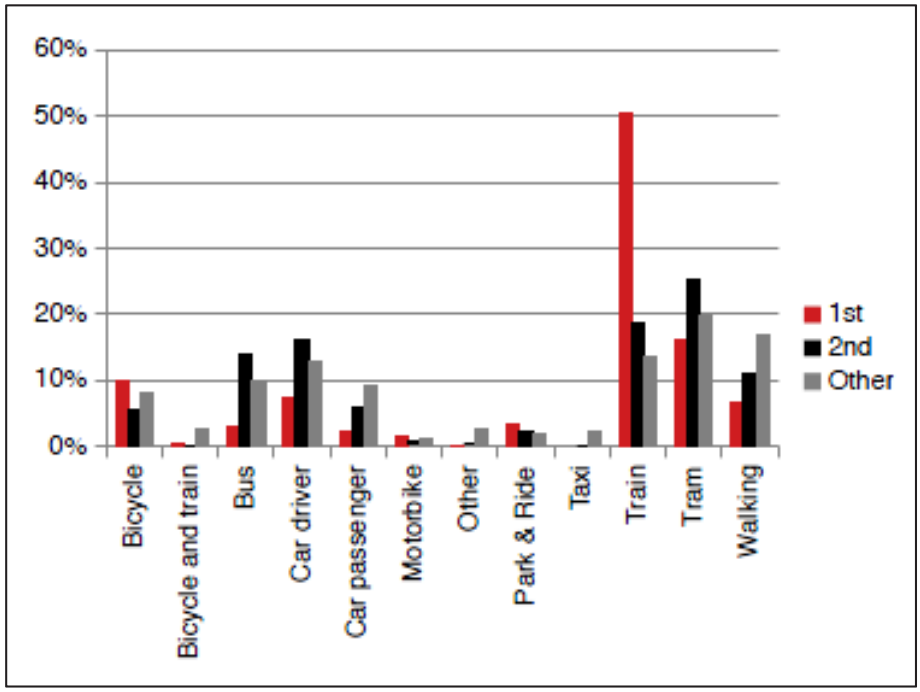
— A number of waste collection and loading points are located around the University which require access by commercial vehicles. The main loading point to the Campus is via the Building 14 access crossovers onto Franklin Street, which must be accessible at all times. These are shown in the map in Appendix A.
— Fire boosters located around the University as well as the fire control centre to which emergency vehicles require access in the event of an emergency. These locations are illustrated on the map in Appendix A.
— Potential impacts to the safety and convenience of pedestrian travel across the Swanston Street / LaTrobe Street intersection and the Swanston Street / Franklin Street intersection during the construction stage, as well as pedestrian travel between key University Buildings 8 and 10 to the Swanston Academic Building on the other side of Swanston Street.

The operation of a number of RMIT parking facilities are not anticipated to be directly impacted as a result of the Melbourne Metro Rail Project, namely the Building 91 commercial car park (110 Victoria Street) and the main Campus bicycle parking facility within the Building 51 basement car park (80-92 Victoria Street). Both of these facilities are situated north of Victoria Street, and are located outside of the station precinct.

Prevailing Travel Modes

The 'RMIT Integrated Sustainable Transport Plan, January 2015' includes details of how students and staff get to and from the Campus. The results of this study quantify respondents' preferred and secondary travel modes to the Campus, and also capture any other travel modes utilised as illustrated in Figure 2.1.

Figure 2.1: RMIT Integrated Sustainable Transport Plan, City Campus Travel Patterns



Based on the travel patterns detailed in Figure 2.1, it is evident that RMIT University relies heavily on public transport (especially train), cycling and pedestrian infrastructure for access, and is less reliant on private passenger vehicles for access, reflecting its CBD location.

It is vital that the MMR project does not impact on public transport services to and from the Campus, as well as pedestrian and cyclist infrastructure during the construction stage.

3.1 Risk Assessment

Introduction

Section 6.4 of the TIA contains the transport Risk Assessment undertaken by AJMJV.

The assessment identifies risks for each precinct and assigns a risk rating derived from a matrix of the likelihood of the risk occurring and the consequence of the risk occurring. The risk matrix is reproduced in Table 3.1, whilst the likelihood rating criteria and consequence rating criteria are reproduced in Table 3.2 and Table 3.3.

Table 3.1: Risk Matrix (Source: TIA prepared by AJMJV)

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

Table 3.2: Likelihood Rating Criteria (Source: TIA prepared by AJMJV)

Level	Description
Rare	The event is very unlikely to occur but may occur in exceptional circumstances.
Unlikely	The event may occur under unusual circumstances but is not expected.
Possible	The event may occur once within a 5 year timeframe.
Likely	The event is likely to occur several times within a 5 year timeframe.
Almost Certain	The event is almost certain to occur one or more times a year.

Table 3.3: Consequence Rating Criteria (Source: TIA prepared by AJMJV)

Level of Consequence	Consequence criteria
Negligible	No detectable change in a local transport operational setting.
Minor	Short term, reversible changes in a local transport operational setting.
Moderate	Long term but limited changes to transport operational setting that are able to be managed.
Major	Long term, significant changes resulting in risks to human health and/or the functioning of the transport network beyond the project area.
Severe	Irreversible, significant changes resulting in widespread risks to human health and/or the functioning of the transport network at a regional scale.

The assessment also identifies an initial risk and a residual risk, with the following definitions provided:

— **Initial risk:** Describes the potential risk associated with Melbourne Metro if tailored, project-specific mitigation and Environmental Performance Requirements are not deployed.
— **Residual risk:** The post-mitigation risk rating, assuming the achievement of the Environmental Performance Requirements (EPR).

Risks Identified in the TIA Prepared by AJMJV

The risks identified in the TIA prepared by AJMJV for the CBD North Station Precinct are listed below.

Risk No. T004

Construction activities impeding traffic flow - Increased congestion and reduced connectivity for transport modes within the vicinity of Melbourne Metro.

- **Initial risk:** 'High' (based on 'Major' consequence and 'Likely' likelihood)
- **Residual risk:** 'Medium' (based on 'Moderate' consequence and 'Likely' likelihood)

Risk No. T0010

Legacy transport network outcomes reduce network connectivity or increase congestion – Increased congestion and reduced connectivity for transport modes within the vicinity of Melbourne Metro and across the broader transport network.

- **Initial risk:** 'Medium' (based on 'Moderate' consequence and 'Possible' likelihood)
- **Residual risk:** 'Low' (based on 'Minor' consequence and 'Possible' likelihood)

Ratio Review of Risk Assessment

Ratio Consultants has reviewed the above risks in the context of RMIT.

The risk to RMIT as a result of increased congestion and reduced connectivity is the impacts to:

- Staff and students travelling to the Campus by car
- Emergency vehicle access;
- Loading vehicles access;
- Waste collection vehicles access;

The identified risks are high level and are worded broadly, with the use of the term 'transport modes' encompassing all relevant transport modes, including car, public transport, cycling and walking.

In the case of **Risk T004**, it is considered that the risk level as determined by the AJMJV risk assessment has been understated.

This risk is expected to occur on a regular basis and based on the definitions provided in Table 3.2, it is considered that the likelihood is 'Almost Certain' to occur which is defined as 'The event is almost certain to occur one or more times a year'.

Against the risk matrix provided in Table 3.1, this would result in the risk being upgraded to 'Very High' for Risk T004.

The risk rating for **Risk T0010** as determined by the AJMJV risk assessment is considered appropriate, with traffic congestion and reduced connectivity less likely to occur post construction.

Whilst the risk assessment undertaken by AJMJV has identified the risks of the project in relation to increased congestion and reduced connectivity for all transport modes, there has been no consideration of the risks associated with crucial property access points being impeded.

Additional Risks Not Identified in the EES

The following additional risks are considered relevant to RMIT in addition to those identified by the AJMJV risk assessment:

— Access to properties by pedestrians, cyclists and vehicles restricted by construction activities and road closures.
— Pedestrian safety and amenity concerns relating to the proposed opening of Stewart Street. This would coincide with the closure of A'Beckett Street to pedestrians near Swanston Street, which will result in a large increase of students travelling to/from A'Beckett Square via the Swanston Academic Building.
— Impact on current and future RMIT development activities associated with the City Campus.

3.2 Impact Assessment

Section 8 of the TIA prepared by AJMJV provides an assessment of the traffic impacts of construction activity (at least 5 years in duration), whilst Section 9 of the TIA prepared by AJMJV provides an assessment of the traffic impacts of the operational phase.

Both assessments identify the key traffic issues for each precinct based on the risks identified in the risk assessment, along with a detailed assessment of the key traffic issues which are identified.

In consultation with RMIT, Ratio Consultants has identified the key traffic issues as they relate to the University and undertaken a review of the level of consideration given to these issues in the TIA prepared by AJMJV.

The key traffic issues as they relate to RMIT are listed in **bold**. Ratio Consultant's assessment of these issues against the TIA prepared by AJMJV follows, with a conclusion and action items provided in *italics*.

The impacts of access to waste collection / loading areas associated with Franklin Street and A'Beckett Street construction activity.

Assessment

The Franklin Street construction sites could restrict access to waste collection / loading bays at University Way, Bowen Street, Building 14 and Building 39 which are crucial to University operations.

The A'Beckett Street construction site could restrict access to the waste collection / loading bay area at Building 37.

The TIA indicates that "access to businesses and residences at station construction locations would be maintained where possible but for some access would be severely restricted.

Ratio Consultants have been informed that RMIT and MMRA have attended a number of workshop sessions in relation to maintaining convenient vehicle access to these areas during the construction works.

It is understood that MMRA have confirmed that convenient access to critical access points along Franklin Street (east of Swanston Street), namely University Way, Bowen Street and the Building 14 vehicle crossovers is to be maintained at all times. The only exception to this would be necessary critical construction activities (such as station piling), which may restrict access to these areas during selected weekend and University off-peak periods only.

These outcomes need to be incorporated in the EPR recommendations.

Conclusions

- *Detailed traffic management plans must be developed in consultation with RMIT ensuring satisfactory access to RMIT waste / loading facilities at all times throughout the construction period.*
- *Construction activities restricting access to RMIT loading facilities must only do so in extreme and unavoidable circumstances. Sufficient notice must be provided to RMIT and such construction activities shall be limited to University off-peak periods only (i.e. holidays, evenings and weekends).*

The impacts of access to waste collection / loading areas associated with the legacy operation (ultimate, post-construction configuration) of the CBD North Station and associated road network modifications.

Assessment

The 'CBD North Road Functional Layout Sheet 2' drawing prepared by the MMRA illustrates informal vehicle access to the waste collection / loading bay area at Building 37.

The 'CBD North Road Functional Layout Sheet 3' drawing makes provision for vehicle access to Stewart Street via Franklin Street, however does not address access to the existing waste collection / loading bay area at Building 39.

The 'CBD North Road Functional Layout Sheet 4' drawing makes provision for vehicle access to University Way and Bowen Street via the Franklin Street stub (accessed via Victoria Street prior to the proposed closure of Franklin Street up to Swanston Street), and also illustrates informal vehicle access to the critical Building 14 vehicle crossovers.

Conclusions

- *The above mentioned loading / waste collection points must be accessible to service vehicles in the legacy configuration, and these outcomes need to be incorporated in the EPR recommendation.*

Retention of access to all fire boosters and emergency access points by emergency vehicles.

Assessment

24x7 access to Campus fire boosters by emergency vehicles must be maintained, with particular consideration given to the fire boosters in the vicinity of the construction zones (including the fire boosters along Franklin Street). There is no discussion of this in the TIA.

Conclusions

- *Maintenance of access to all fire boosters within RMIT University by emergency vehicles must be included as a performance requirement, in consultation with MFB and RMIT.*

The accessibility of the site by public transport needs to be preserved.

Assessment

Preserving public transport access to the University is important for the large number of staff, students and visitors currently relying on public transport.

The TIA states that "the relocation of services and ancillary works associated with the construction of CBD North station would result in disruptions to tram services on Swanston Street and La Trobe Street although this would be short term occupations (approximately three weekends)". RMIT University staff and students must be made aware of any disruptions to nearby public transport services with sufficient notice to plan alternative transport.

The potential for mode shift of private vehicle drivers to public transport (due to delays associated with construction) may impact on tram capacity. The capacity of Swanston Street tram lines is to be monitored to ensure adequate service for patrons.

Conclusions

- *Maintaining tram services along the Swanston Street corridor must be included as a performance requirement.*
- *Confirmation or otherwise must be provided that there will be no impacts to train services.*
- *Any disruptions to tram services and tram shut down periods must be outside of peak University operating times (i.e. holidays, evenings and weekends). This must be included as a performance requirement.*

Retention of pedestrian access to all University entrances, particularly those in the vicinity of the construction zone.

Assessment

It is important to ensure that pedestrian access to the University is maintained. This includes all access points relating to the 'New Academic Street' development which is currently under construction and will upgrade the lower levels of Buildings 8, 10, 12 and 14 and open these levels to the surrounding city.

The TIA indicates that pedestrian footpaths will be maintained on both sides of Franklin Street and Swanston Street throughout the construction period.

Conclusions

- *Retention of access to all University pedestrian entrances must be included as a performance requirement.*

Provision of appropriate pedestrian links at key locations.

Assessment

It is considered that pedestrian access across the Swanston Street / Franklin Street intersection and the Swanston Street / LaTrobe Street intersection must be maintained without impacting on the safety and efficiency of the existing signalised crossings.

The TIA indicates that the existing signalised pedestrian crossing points at the Swanston Street / Franklin Street intersection will be maintained throughout construction.

The safety of pedestrians crossing Swanston Street midblock (particularly with additional construction vehicles using Swanston Street during the construction stage) is a key consideration.

Temporary pedestrian fencing at the Swanston Street tram stops (near Franklin Street) should be considered to discourage mid-block crossings, and to encourage the use of designated crossing points at the Franklin Street and LaTrobe Street signalised crossings.

The introduction of an additional controlled crossing of Swanston Street should also be considered to minimise the safety risk to pedestrians.

Conclusions

- *The maintenance of safe pedestrian crossing facilities at the Swanston Street / Franklin Street intersection and the Swanston Street / LaTrobe Street intersection must be included as a performance requirement.*
- *An assessment of the safety of pedestrians crossing Swanston Street midblock must be included as a performance requirement.*

The impacts of MMR project construction activity impeding approved and planned RMIT development / construction projects.

Assessment

RMIT has a number of approved and planned developments which are likely to be constructed concurrently with the MMR project (such as A'Beckett Square). As such, it is imperative that the MMRA continue to liaise with RMIT regarding detailed staging and timing information of the proposed early (enabling) works and major construction.

Early consultation and input from RMIT with regards to surrounding MMR project construction sites will avoid arrangements which may inhibit RMIT development of the City Campus.

This will ensure an equitable opportunity for RMIT to progress their development objectives for the City Campus.

Conclusions

- *MMRA must continue to liaise with RMIT regarding detailed staging and timing information of the proposed MMR project early (enabling) works and major construction. This will ensure development and construction activities of both parties are undertaken with mutual understanding of the implications of such works.*

The availability of on-street parking in the vicinity of RMIT University.

Assessment

The availability of on-street parking in the vicinity of Melbourne Grammar is important for staff and students of the university.

The availability of parking is not discussed in the TIA, however there will be a reduction as a result of reduced parking supply due to construction zones and increased parking demands associated with construction workers.

Measures must be put in place to discourage construction workers driving, such as the provision of on-site tool storage and

the preparation of a Green Travel Plan for distribution to construction workers.

Construction workers should be discouraged from parking on-street, with alternative arrangements provided, such as leasing a car park nearby, park and ride to a remote car park and/or the preparation of an enforceable parking management plan for construction workers. These requirements should extend to night time.

Conclusions

- *On-site tool storage must be included as a performance requirement.*
- *Preparation of a Green Travel Plan to discourage construction workers from driving to the worksite must be included as a performance requirement.*
- *Provision of alternative parking arrangements for construction workers must be included as a performance requirement.*

3.3 Environmental Performance Requirements

Chapter 23 of the EES prepared by the MMRA presents the Environmental Management Framework that has been developed for Melbourne Metro. Included in this chapter are recommended Environmental Performance Requirements (EPR) which define the project-wide environmental outcomes that must be achieved during design, construction and operation of Melbourne Metro.

The recommended transport EPRs are detailed and assessed against the requirements of RMIT in Table 3.4.

For reference, each of the additional recommended EPRs have been labelled as RT (i.e. RMIT Traffic).

Table 3.4: Review of Relevant Environmental Performance Requirements

EPR No.	Impact	Environmental Performance Requirement	Timing	Comments
T1	This EPR is relevant to a number of the impacts related to RMIT, including: — Retention of access for waste collection / loading vehicles to RMIT — Retention of access for emergency vehicles to RMIT	**Road Transport (Construction Phase)** Develop and implement a transport management plan(s) in consultation with the relevant road management authorities to minimise disruption to traffic, car parking, pedestrian and bicycle movements during construction, including but not limited to: — Management of any temporary or permanent full or partial closure of traffic lanes including (but not limited to): • Childers Street, Kensington • Royal Parade, Grattan Street and Barry Street, Parkville • Franklin Street, A'Beckett Street and Little La Trobe Street at CBD North • Flinders Street and Flinders Lane at CBD South • Linlithgow Avenue, Melbourne • St Kilda Road, Domain Road, Albert Road at Domain • Toorak Road at Fawkner Park • Osborne Street, William Street in South Yarra — Monitoring of travel behaviour changes caused by construction works, including pre-construction baseline data and periodic reporting on behaviour change. Use this data as an input to the design of transport networks following construction — Traffic management plan(s) must be developed recognising other projects operating concurrently, where relevant — Provision for a minimum of one lane of traffic in each direction on St Kilda Road to be maintained throughout the construction within the Domain Station Precinct. — Potential routes for construction vehicles travelling to and from all Melbourne Metro construction work sites, recognising sensitive receptors. — Provision of suitable routes for vehicles to maintain connectivity for road users to JJ Holland Park, South Kensington station and to the medical and education facilities adjacent to the Parkville construction work site — Provision of alternative routes for trucks accessing the 50 Lloyd Street Business Estate, Kensington — Provision of alternate parking where possible to replace parking lots from Childers Street, Laurens Street, Grattan Street, Domain Road, St Kilda Road and Albert Road during construction and preventing parking at undesignated locations on local roads — Provision of car parking for construction workers where possible — Provision of suitable routes for cyclists and pedestrians to maintain connectivity and safety for roads and shared paths to provide continued access, including (but not limited to): Childers Street, JJ Holland Park, South Kensington Station, Laurens Street, Grattan Street, Swanston Street, Franklin Street, Flinders Street, St Kilda Road, Albert Road, Domain Road, Toorak Road and Fawkner Park — Provision of complementary improvements to Kings Way, Canterbury Road and other roads to accommodate additional traffic that may use these roads and to assist traffic flow in St Kilda Road for the duration of the works — In consultation with emergency services, develop suitable measures to ensure emergency service access is not inhibited as a result of Melbourne Metro construction worksites — Special arrangements for delivery or removal of large roads	Construction	<u>Construction Worker Parking</u> The EPR states that there should be the provision of car parking for construction workers where possible. This requirement needs to be stronger and more specific, with the following recommended requirements: — **<u>RT1</u>: Off-street car parking for construction workers must be provided, with potential options being leasing a car park nearby, park and ride to a remote car park and/or preparation of an enforceable parking management plan for construction workers. This is to be extended to night time.** — **<u>RT2</u>: On-site tool storage to be provided to reduce the number of construction workers driving to the worksite.** — **<u>RT3</u>: Prepare a Green Travel Plan to discourage construction workers from driving to the worksite.** <u>Accessibility</u> The EPR states that suitable measures should be taken to ensure emergency service access is not inhibited. There is no mention however of maintaining accessibility for waste collection / loading vehicles to RMIT's on-site facilities. These should be included as follows: — **<u>RT4: A</u>ccess to all RMIT waste collection / loading points to be maintained.** — **<u>RT5:</u> Works which restrict access to RMIT must be avoided if possible, and be undertaken outside of peak University times (i.e. holidays, weekends and evenings).** <u>Stakeholder Engagement</u> Whilst the EPR states that the traffic management plan be prepared in consultation with the relevant authorities, there should also be engagement with the relevant stakeholders as follows: — **<u>RT6</u>: Relevant stakeholders (including RMIT) to be consulted during the preparation of the traffic management plan**
T2	This EPR is relevant to a number of the impacts related to RMIT, including: — Travel time impacts by public transport — Maintaining public transport accessibility	**Public Transport (Construction Phase)** — Develop and implement a plan for occupying railway land and tracks at the western portal, eastern portal and western turnback that minimises the disruption to railway services during construction. Plan to be developed to the satisfaction of VicTrack and MTM — Provide suitable routes for pedestrians to maintain connectivity, including DDA access, for users of South Kensington station, Melbourne Central station, Flinders Street Station and around all construction sites generally — Develop and implement measures to minimise disruption to the tram and bus networks resulting from the construction of Melbourne Metro in consultation with the relevant road management authorities and to the satisfaction of PTV, including (but not limited to): • Options to divert the 401, 402, 403, 505 and 546 bus services • Tram routes on La Trobe Street and Swanston Street • Tram routes on Flinders Street and Swanston Street • Tram operations on Toorak Road and the diversion of the No. 8 tram route • Periodic closures of Royal Parade tram route • Tram routes on St Kilda Road • Disruption to other tram routes through Domain tram stop • Bus replacement services for disrupted rail customers.	Construction	<u>Public Transport Capacity</u> There is no consideration of the capacity of public transport services to accommodate a potential mode shift during construction. As such, the following requirement is recommended: — **<u>RT7</u>: Monitor the increase in public transport use as a result of the construction activities, with a plan prepared for the provision of additional or replacement services in consultation with PTV where capacity is being exceeded.** <u>Train Services</u> There is no mention of train services in the EPR. As such, the following is recommended: — **<u>RT8: Ensure there is no impact to existing train services.</u>**

T3	This EPR is relevant to a number of the impacts related to RMIT, including: — Retention of pedestrian access to RMIT — Retention of cyclist access to RMIT	**Active Transport (Construction Phase)** — Develop and implement transport management measures in consultation with relevant authorities for cyclists and pedestrians to maintain connectivity throughout construction for road and shared path users including (but not limited to): JJ Holland Park, South Kensington station, Laurens Street, Grattan Street, Franklin Street (including RMIT facilities), Swanston Street, Flinders Street, St Kilda Road, Domain Road, Domain Parklands, Albert Road, Toorak Road, Fawkner Park, Osborne Street, William Street and Chapel Street — Implement active control at construction work site access points to maintain safety by avoiding potential conflicts between trucks, pedestrians and cyclists — In consultation with the City of Melbourne, provide suitable routes for cyclists and pedestrians throughout construction to and maintain connectivity for road and shared path users around JJ Holland Park and South Kensington station.	Construction	Pedestrian Access The EPR states that pedestrian connectivity should be maintained but does not provide specifics. The requirements should be more specific as follows: — **RT9: All pedestrian access to RMIT entrances must be maintained (including those associated with the 'New Academic Street' development).** — **RT10: Footpaths along both sides of Swanston Street and Franklin Street must be maintained throughout construction.** — **RT11: An assessment of the safety of pedestrians crossing Swanston Street midblock must be undertaken as part of the detailed construction traffic management plan.** Bicycle Access The EPR states that bicycle connectivity should be maintained but does not provide specifics. The requirements should be more specific as follows: — **RT12: Existing bicycle lanes provided in each direction along Swanston Street must be maintained throughout construction.**
T4	This EPR is primarily relevant to the expected travel time impacts and route/travel mode choice during construction.	**Travel Demand Strategy** — In advance of construction works, MMRA to develop and implement a travel demand management strategy and appropriate tools to promote specific transport behaviour changes in response to road, bicycle and pedestrian paths closures/modifications and to reduce traffic congestion around construction sites, particularly in the vicinity of the Parkville and Domain precincts where road closures and restrictions are proposed. The strategy must be consistent with the MMRA Community and Stakeholder Engagement Plan.	Construction	This EPR is generally acceptable, however as part of this there should be additional information provided to help inform route and travel mode choice as follows: — **RT13: Provide real time travel time information through areas affected by the construction for both car and public transport travel to assist in determining which route/travel mode to use.**
T5	This EPR is primarily relevant to the operation of the roads which were affected during construction after the completion of the project.	**Road Transport (Operational Phase)** — Design all roadworks and shared path works to relevant design standards to maintain safety of movement in consultation with the relevant road management authorities as required — Develop and implement a plan to reinstate car parking on Childers Street, Kensington and Laurens Street, North Melbourne in consultation with the relevant road management authorities that: • Minimises the permanent loss of parking where possible • Ensures re-instated car parking does not encroach on JJ Holland Park • Considers opportunities for replacement of any net loss of parking at nearby locations • Reduces the risk of overflow parking in local streets from South Kensington station and activities at JJ Holland Park • Replaces loading zones to service the needs of the existing businesses in the precinct where disrupted during construction — Develop and implement a plan for the reinstatement of Grattan Street, Parkville in consultation with the relevant road management authorities that includes: • Optimal replacement of car parking spaces along Grattan Street to service the needs of the hospitals and the university, including the retention or replacement of specific short-term and DDA compliant parking • Optimal design of the road network around Grattan Street associated with the changed demands and network changes on Grattan Street and Royal Parade/Elizabeth Street — Develop and implement a plan for the future use of the Franklin Street road reserve in consultation with the relevant road management authorities that includes: • Optimising the design of the road network following the closure of Franklin Street between Swanston Street and Bowen Street • Monitoring the change in travel patterns around the area associated with the closure of Franklin Street — Optimise the design of the reinstated St Kilda Road and apply the road users hierarchy in consultation with the relevant road management authorities to: • Reduce delays and congestion • Maintain safe operations through the precinct • Determine the optimal parking provision in the area and replace any lost parking where possible.	Operation	— This EPR is considered satisfactory.

T6	This EPR is primarily relevant to the operation of the public transport network after the completion of the project.	**Public Transport (Operational Phase)** — Review, with PTV, the bus services in the areas around Arden, Parkville, CBD North, CBD South and Domain stations including a review of the route 401 bus frequency that will have reduced demand following implementation of Melbourne Metro — Optimise the design of Melbourne Metro stations to ensure integration with existing and planned future uses and so that they will provide connections: • Between the new Parkville station and the new tram stop on Royal Parade • For interchange between the new CBD North station and the existing tram and bus services along La Trobe Street and Swanston Street • For interchange between the new CBD South station and the existing tram services along Flinders Street and Swanston Street • Between the new Domain station and the new island platform trams stop in the centre of St Kilda Road and connections to the tram services along Domain Road — Review, with PTV and Yarra Trams, the bus and tram services in the area to optimise the functionality of the CBD North and South stations and to reduce the reliance on the Swanston Street tram corridor.	Operation	This EPR is considered satisfactory.
T7	This EPR is primarily relevant to the operation of the pedestrian and bicycle network after the completion of the project.	**Active Transport (Operational phase)** — Develop and implement a permanent shared use path along the northern side of Childers Street, Kensington in conjunction with the relevant road management authority and the land manager prior to the removal of the shared use path on the southern side — Where practicable to do so, re-instate on-road bicycle lanes and bicycle parking provisions removed during construction in cooperation with the relevant road management authority and the local council — Review the provision of safe and effective bicycle lanes in and around the Melbourne Metro station sites in cooperation with the road authority and the local council — Provide wayfinding information to enhance connectivity for pedestrians and public transport users including (but not limited to) the following locations: • Between Melbourne Central station and the new CBD North station • The underground connection between Flinders Street Station and the new CBD South station.	Operation	This EPR is considered satisfactory.

4 Conclusions:

Based on the foregoing analysis, the following additional Environmental Performance Requirements must be provided to ensure RMIT University (City Campus) can continue to operate satisfactorily:

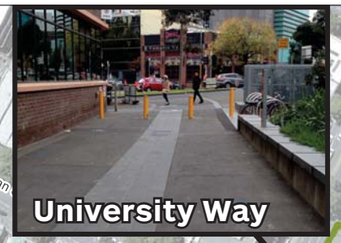
- RT1: Off-street car parking for construction workers must be provided, with potential options being leasing a car park nearby, park and ride to a remote car park and/or preparation of an enforceable parking management plan for construction workers. This is to be extended to night time.
- RT2: On-site tool storage to be provided to reduce the number of construction workers driving to the worksite.
- RT3: Prepare a Green Travel Plan to discourage construction workers from driving to the worksite.
- RT4: Access to all RMIT waste collection / loading points to be maintained.
- RT5: Works which restrict access to RMIT must be avoided if possible, and be undertaken outside of peak University times (i.e. holidays, weekends and evenings).
- RT6: Relevant stakeholders (including RMIT) to be consulted during the preparation of the traffic management plan
- RT7: Monitor the increase in public transport use as a result of the construction activities, with a plan prepared for the provision of additional or replacement services in consultation with PTV where capacity is being exceeded.
- RT8: Ensure there is no impact to existing train services.
- RT9: All pedestrian access to RMIT entrances must be maintained (including those associated with the 'New Academic Street' development).
- RT10: Footpaths along both sides of Swanston Street and Franklin Street must be maintained throughout construction.
- RT11: An assessment of the safety of pedestrians crossing Swanston Street midblock must be undertaken as part of the detailed construction traffic management plan.
- RT12: Existing bicycle lanes provided in each direction along Swanston Street must be maintained throughout construction.
- RT13: Provide real time travel time information through areas affected by the construction for both car and public transport travel to assist in determining which route/travel mode to use.

Appendix A **University Loading Points**

Project : **13525** June 2016

RMIT CITY CAMPUS - Service Vehicle Access Points

- Fire Boosters
- Waste Collection Points
- Loading Access Points



CBD North Station Precinct

Tunnels Precinct

Tunnels Precinct

Alternative construction work site options

Underground connection to Melbourne Central station

CARLTON

MELBOURNE

State Library of Victoria

QV Building

Melbourne City Baths

RMIT

Melbourne Central

Swanston St

Bowen St

Stewart St

Elizabeth St

Leicester St

Franklin St

Abeckett St

Knox Ln

Knox Pl

Drewery Ln

Caledonian Ln

Lygon St

Mackenzie St

Hayward Ln

Golden Fleece Al

Waratah Pl

Bullens Ln

Dean Al

Hughs Al

Heffernan Ln

Constance Stone Ln

Russell Pl

Latrobe Pl

Celestial Av

Royal Ln

Shilling Ln

Tattersalls Ln

Globe Al

Star Al

Bourke St

Louden Pl

Albion Al

Turner Al

Union Ln

Lynch Pl

Staughton Pl

Angel Ln

Driver Ln

Somerset Pl

Jane Bell Ln

Artemis Ln

Albert Coates Ln

Lonsdale St

Little Lonsdale St

La Trobe St

Little Bourke St

Red Cape Ln

Shiders Ln

Drewery Al

Drewery Pl

Queensberry Pl

Cardigan

Cornell Pl

Anna Pl

Bouverie St

Bouverie Pl

Victoria St

Data Sources:
Proposed Infrastructure: AJM 2016 - Alignment: Revision P2.4
Stations (CONTEXT ONLY): Revision 4.3
Contains Vicmap Information
© State of Victoria 2016
Construction and Excavation data: Advisian 2016
Aerial photo: DELWP, February 2015

CONCEPT DESIGN - CONSTRUCTION

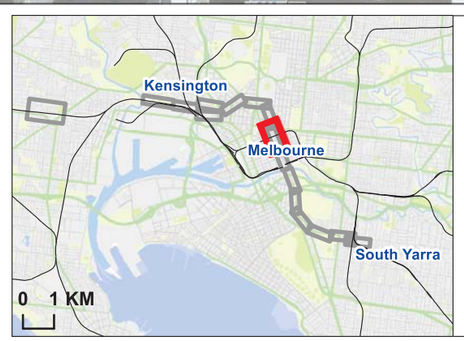
Legend

Proposed Concept Design
- Proposed rail alignment

Precinct Boundaries
- Tunnels Precinct
- Station Precinct

- Proposed temporary construction work site
- Proposed excavation area - from surface
- Proposed sub-surface excavation

Note: Proposed footprint of construction areas is indicative only and may be subject to change



MELBOURNE METRO RAIL AUTHORITY

AJM Joint Venture GRIMSHAW

aurecon JACOBS Mott MacDonald in association with

Melbourne Metro Rail Project

Title: **Environmental and Planning Precincts - Construction** **Map 7 of 15**

Drawing Number:	Drawing Revision:
MMR-AJM-UGAA-MP-NN-500295	C1

Drawn By:	Approved By:	Date:
A. Berman	M. Tansley	20 April 2016

0 50 100
Metres

G:\MMR-AJM\01_WIP\PW-1-AA-KG_GIS\640_Site_plans\MMR_0384_EES_Mapbook\MMR_0384_Planning_Construction_C1.mxd

Attachment D – Summary of Recommended Amendments to the EPRs

Summary of Recommended Amendments to the EPRs

The following tables provide a summary of recommended amendments to the EPRs as evaluated by technical specialists as part of the EES peer review conducted for RMIT. The tables also include additional EPRs, additional risks and data gaps for further consideration where these were identified.

Table	Specialist Area
Table 1	Business and Economic
Table 2	Ground Movement and Land Stability
Table 3	Building Structures
Table 4	Environmental Management Framework
Table 5	Groundwater
Table 6	Contaminated Land and Spoil Management
Table 7	Land Use Planning
Table 8	Noise and Vibration
Table 9	Services Infrastructure
Table 10	Social and Community
Table 11	Surface Water
Table 12	Traffic and Transport

It should be noted that some EPRs may be duplicated in whole or in part. This is due to:

- The EPR being relevant to multiple subject areas; and/or
- The EPR relating to multiple timing stages of the project and being accordingly subdivided to properly consider these impacts.

Table 1 Recommended Amendments to EPRs – Business and Economic

EPR No.	Impact	Environmental Performance Requirement	Timing	Essential Economics Recommended Amendments / Comments (NB specifically relating to proposed management measures)
B1	Relocation causing a disruption to business activity.	Reduce the disruption to businesses from direct acquisition or temporary occupation of land, and work with business and land owners to endeavour to reach agreement on the terms for possession of the land.	Design	**Management Measure:** Consider the early purchase of properties in consultation with businesses. **Comment:** Agree, but need to strengthen. No RMIT property to be acquired, but substantial disruption in A'Beckett Street. Impacts on other parts of the campus need special consideration. **Management Measure:** Facilitate business relocation through providing assistance in finding sites for relocation, the logistics of relocation, and advertising and other requirements arising from changed location. **Comment:** Agree. If possible, relocate businesses that serve students and staff to locations where they are still able to serve that customer base. **Management Measure:** Trigger levels identified in the traffic impact assessment, noise and vibration impact assessment and air quality impact assessment to be utilised to identify if there are impacts beyond those anticipated that could trigger the assistance identified in the business disruption strategy. **Comment:** Agree but need to strengthen. Must be done in conjunction with RMIT to ensure that noise and vibration impacts on sensitive equipment are properly considered. Very important issue for RMIT. Also need re-assessment of GVA impacts.
B2	Construction activity impacting operations (i.e. from noise, dust, vibration, construction	Prepare a business disruption plan to manage impacts to non-acquired businesses and to engage with business, property owners and the community throughout construction.	Construction	**Management Measure:** Provide regular updates on the timing and duration of impacts to surrounding businesses. **Comment:** Agree. Notices must be timely, widely distributed allow for feedback.

EPR No.	Impact	Environmental Performance Requirement	Timing	Essential Economics Recommended Amendments / Comments (NB specifically relating to proposed management measures)
	materials).			**Management Measure:** Mitigate against impacts in accordance with mitigation measures identified in Air Quality and Noise & Vibration Impact Assessments. **Comment:** Agree but need to strengthen. Vibration issues important for RMIT research programs, including in areas beyond CBD North Station Precinct. Consultation with RMIT and re-calculation of GVA impacts is needed. **Management Measure:** Establish consultation group including all major health care and research institutions to meet at regular intervals as jointly agreed. **Comment:** Agree. Consultation group for RMIT is essential.
B3	Construction activity causing a reduction in amenity (i.e. from noise, dust, vibration).	Following consultation with potentially affected businesses and prior to main works or shaft construction commencing, prepare management plans to minimise dust, noise and vibration impacts during construction, as per Environmental Performance Requirements for air quality and noise and vibration.	Construction	**Management Measure:** Provide regular updates on the timing and duration of impacts to surrounding businesses. **Comment:** Agree but strengthen. Notices must be timely, widely distributed allow for feedback. Consideration of impacts on RMIT commercial activities and student demand also needed. **Management Measure:** Develop 'way finding programs' to establish pedestrian access patterns **Comment:** Agree. Perhaps a smart phone app. **Management Measure:** Mitigate against impacts in accordance with mitigation measures identified in Air Quality and Noise & Vibration Impact Assessments. **Comment:** Agree. Vibration and noise issues important for RMIT research programs. Significant consultation with RMIT required.

Additional EPRs / Additional Risks Identified by Essential Economics		
	Business impacts on RMIT	The management measures proposed to meet required environmental performance standards are inadequate in a number of respects: • The CBD North Station Precinct boundary is contestable on the grounds that it is arguably too conservative to account for other parts of the RMIT campus with the potential to be adversely impacted. • The method for calculating Gross Value Added for non-commercial entities such as RMIT is acknowledged to be difficult. The lack of detail about how GVA has been calculated for these entities cast doubt over subsequent conclusions, such as impact assessments and risk analyses (based on consequences directly linked to GVA changes). • The effect of vibration and noise on sensitive research equipment is an important issue. This impact may include cancelling or deferring important research, and associated costs do not seem to be adequately considered in the EES. • Consideration of other potential impacts are inadequate, including the possibility of a reduction in student demand and the extent to which commercial operations (event hosting and functions, access to research facilities etc.) may be impacted. In contrast, the effect of closing the Oxford Scholar Hotel is explicitly considered. RMIT is large and complex, and operationally and financially quite different from most strictly commercial businesses. Not all environmental issues relating to operational and business impacts are fully considered in the EES. Consequently, it is strongly suggested that an RMIT specific reference group be established to consider business impact and other issues, given the importance of RMIT to the CBD.

Table 2 Recommended Amendments to EPRs – Ground Movement and Land Stability

EPR No.	Impact	Environmental Performance Requirement	Timing	Recommended Amendments
GM1	Land Stability	Develop and maintain geological and groundwater models which: • Use monitored ground movement and ground water levels prior to construction to identify pre-existing movement; • Inform tunnel design and the construction techniques to be applied for the various geological and groundwater conditions; • Assess potential drawdown and identify trigger levels for implementing additional mitigation measures to minimise potential primary consolidation settlement; and • Assess potential ground movement effects from excavation and identify trigger levels for implementing additional mitigation measures to minimise potential ground movement effects.	Design / Construction	The peer review did not suggest specific amendments to this EPR.
GM2	Land Stability	Design and construct the permanent structures and temporary works so as to limit ground movements to within appropriate acceptability criteria (to be determined in consultation with the relevant stakeholders) for vertical, horizontal, and angular deformation, as appropriate, for project activities during the construction and operational phase.	Design/ Construction/ Operation	It is recommended that this EPR be modified so that the acceptability criteria for Precinct 5 are developed in consultation and with the approval of RMIT as the significant stakeholder in the precinct.
GM3	Land Stability	Develop and implement a ground movement plan for construction and operational phases of the project that: • Addresses the location of structures/assets which may be susceptible to damage by ground movement resulting from Melbourne Metro works; • Identifies appropriate ground movement impact acceptability criteria for buildings, utilities, trains, trams and pavement in consultation with the various stakeholders; • Identifies mitigation measures to ensure acceptability criteria can be met; • Identifies techniques for limiting settlement of buildings and protecting buildings from damage; • Addresses additional measures to be adopted if acceptability criteria are not met such as reinstatement of any property damage; • Addresses monitoring ground movement surrounding proposed Melbourne Metro works and at the location of various structures/assets to measure consistency with the predicted model;	Construction / operation	The peer review did not suggest specific amendments to this EPR.

EPR No.	Impact	Environmental Performance Requirement	Timing	Recommended Amendments
		• Consult with land and asset owners that could potentially be affected and where mitigation measures would be required.		
GM4	Land Stability	Conduct pre-construction condition surveys for the assets predicted to be affected by ground movement. Develop and maintain a data base of as built and pre construction condition information for each potentially affected structure, specifically including: • Identification of structures/assets which may be susceptible to damage resulting from ground movement resulting from Melbourne Metro works; • Results of condition surveys of structures, pavements, significant utilities and parklands to establish baseline conditions and potential vulnerabilities; • Records of consultation with landowners in relation to the condition surveys; • Post construction stage condition surveys conducted, where required.	Construction	The peer review did not suggest specific amendments to this EPR.
GM5	Land Stability	Adopt construction techniques for Melbourne Metro to limit ground movement to within appropriate acceptability criteria (to be determined in consultation with the relevant stakeholders).	Construction	It is recommended that this EPR be modified so that the acceptability criteria for Precinct 5 are developed in consultation and with the approval of RMIT as the significant stakeholder in the precinct.
GM6	Land Stability	For properties and assets affected by ground movement, undertake any required repair works.	Construction	The peer review did not suggest specific amendments to this EPR.
Additional EPRs / Additional Risks Identified by CMW Geosciences				
	Land Stability	All RMIT assets partially or wholly within the revised Potential Zone of Influence should be specifically identified within the Ground Movement Plan. They should be surveyed prior to construction and be monitored for deformation during construction. RMIT's approval of contingency actions if settlement of RMIT land exceeds estimates should be secured prior to commencing excavation. Blasting at CBD North station should be excluded unless MMRA can demonstrate an appropriate level of risk to be determined in consultation with RMIT.		

Table 3 Recommended Amendments to EPRs – Building Structures

Additional EPRs / Additional Risks Identified by Meinhardt	
Structural damage to RMIT buildings from vibration during construction	The EPRs should incorporate a register of RMIT buildings within the zone of influence together with the building assets classification against the DIN 4150 Guideline Targets for structural damage to buildings. All measurement and evaluation of effects of vibration on structures should be carried out in accordance with DIN 4150.
Damage to underground infrastructure from vibration during construction	The relevant EPR should clearly states that it is applicable to both Authority infrastructure as well as privately owned underground pipes and infrastructure. All measurement and evaluation of effects of vibration on underground infrastructure should be carried out in accordance with DIN 4150.
Construction vibration impacting upon amenity	The Guideline Targets (based on Table 1 in BS6472-1:2008) should be mandatory. All measurement and evaluation of effects of vibration impacting on amenity should be carried out in accordance with BS6472-1:2008.
Construction ground-borne noise impacting upon amenity	The EPRs set noise Guideline Targets for residences, and do not refer to other sensitive land uses such as educational institutions. Consequently there is a significant risk that RMIT buildings will be impacted adversely by ground-borne construction noise for a significant period. Additional limits for ground-borne construction noise emissions should be included to limit noise levels emitted to RMIT buildings.

Table 4 Recommended Amendments to EPRs – Environmental Management Framework

EPR No.	Impact	Environmental Performance Requirement	Timing	Meinhardt Recommended Amendments
EM1	Environmental effects and hazards associated with construction and operation phases of the project	Develop a program to set out the process and timing for development of an Environmental Management System, Construction Environmental Management Plan (CEMP), Site Environment Implementation Plans, Operations Environmental Management Plan (OEMP) and other plans as required by the Environmental Performance Requirements and as relevant to any stage of the project. The program must include consultation with Councils, Heritage Victoria, the Roads Corporation, Melbourne Water, Public Transport Victoria, and the Environment Protection Authority and other stakeholders as relevant.	Design / Construction / Operation	Meinhardt considers that this EPR is not adequate to ensure that RMIT will be actively involved in the development of the CEMP and associated documentation. As such, it is recommended that the EPR list RMIT as a key stakeholder that must be consulted during development and implementation of the CEMP and specific sub-plans plans.
Additional EPRs / Additional Risks Identified by Meinhardt				
	Environmental effects and hazards associated with construction and operation phases of the project	It is recommended that all EPRs which require the development of the CEMP and specific sub-plans should list RMIT as a key stakeholder that must be actively engaged during development and implementation of these plans. This includes (but is not limited to): **EPR** **Management Plan Required** T1 Transport and traffic management plan(s) G1 Sustainability management plan B2 Business disruption plan SC3 Community and business involvement plan AQ1 Dust management and monitoring plan(s) NV1 Construction noise and vibration management plan NV4 Communications plan AH1 Cultural Heritage Management Plan CH6 Archaeological management plan(s) AR4 Tree Protection Plan(s) C1 Spoil Management Plan C2 Acid Sulfate Soil and Rock Management Sub-Plan C4 Health, safety and environmental plan for the management of hazardous substances GW3 Groundwater Management Plan GM3 Ground movement plan FF3 Translocation plan for the management of listed fauna species (if encountered)		

	Environmental effects and hazards associated with operation phase of the project	Meinhardt considers that it will be important for RMIT to be consulted in development and implementation of the OEMP. This should be reflected in the EPRs.
	Environmental documentation approval requirements	Meinhardt also recommends that (with regard to document approvals) the Independent Reviewer should be required to review and approve the Contractor's EMS and CEMP.

Table 5 Recommended Amendments to EPRs – Groundwater

EPR No.	Impact	Environmental Performance Requirement	Timing	Meinhardt Recommended Amendments
GW1	Detailed design does not adopt design features that minimise groundwater drawdown.	Design the tunnel and underground structures so that they minimise groundwater drawdown during construction and operation to minimise impacts on groundwater dependent values, ground movement and contamination plume migration.	Design	The peer review did not suggest specific amendments to this EPR.
GW2	Alterations to design features of tunnels, stations, shafts and portals proposed during detailed design result in different levels of impact than the design features specified in the Concept Design.	Develop a groundwater model for the detailed design phase to predict impacts associated with any changes to construction techniques or operational design features proposed during detailed design, and reconfirm that the Environmental Performance Requirements and mitigation measures are sufficient to mitigate impacts from changes in groundwater levels, flow and quality. Undertake monitoring during construction to ensure that predictions are accurate and mitigation measures are appropriate.	Design	The groundwater model for the detailed design phase should also assess if drawdown will affect GQRUZs located at 539 - 553 Swanston St Carlton and 28 - 44 Bouverie St Carlton. These GQRUZs will potentially impact RMIT assets during groundwater dewatering. This EPR should be amended to require the groundwater model to assess the potential for groundwater contamination migration to third party sites (i.e. RMIT properties).
GW3	Changing groundwater gradients results in movement of groundwater contaminant plumes onto third party properties with potential impacts to beneficial uses of groundwater and potential for vapour intrusion to existing structures.	Develop and implement a Groundwater Management Plan (GMP) detailing groundwater management approaches to address the predicted impacts to groundwater dependent values during construction. The GMP must be based on the detailed design phase groundwater model, and should include the following details: • Approach to collection, treatment and disposal of groundwater collected during construction in accordance with the MMRA Groundwater Disposal Strategy • Identifying and if necessary, specifying mitigation measures to protect groundwater dependent vegetation during periods of drawdown • An approach identified in consultation with the EPA so that contaminant migration causes no significant impacts on beneficial uses and vapour intrusion into underground structures, and establish appropriate monitoring networks to confirm effectiveness of approach • Methods for minimising drawdown in areas of known PASS and establishing appropriate monitoring	Construction	As part of the GMP the EPR should specify that a site specific risk assessment is adopted for GQRUZs considered to be affected by drawdown (this will apply to GQRUZs located at 539 - 553 Swanston St Carlton and 28 – 44 Bouverie St Carlton in the vicinity of RMIT). The risk assessment should identify contaminants of concern and potential for contaminant migration during construction. It is also recommended that the GMP specify that rock cores are analysed to assess the site specific risk of potential acid sulphate soils. RMIT should be actively engaged in the development the GMP, particularly in relation to any activities that may potentially impact RMIT.

EPR No.	Impact	Environmental Performance Requirement	Timing	Meinhardt Recommended Amendments
		networks to confirm effectiveness of approach • Methods for minimising drawdown at any existing recharge bores, and establishing appropriate monitoring networks to confirm effectiveness of mitigation • Groundwater drawdown trigger levels for groundwater dependant values at which additional mitigation measures must be adopted • Design, operation and management of groundwater injection borefields • Contingency measures if impacts occur at existing active groundwater bores and surface water bodies.		
GW4	During construction and operation there is potential for unexpected groundwater contamination to result in release of groundwater that is not treated to agreed levels.	Use the Groundwater Disposal Strategy and GMP to obtain a Trade Waste Agreement with the relevant Water Retailers for groundwater disposal.	Construction / Operation	The groundwater disposal strategy is still to be determined. The EES specifies that a Trade Waste Agreement with the relevant Water Retailers is the preferred method for groundwater disposal. RMIT should be advised on the final method for groundwater disposal and whether this may impact RMIT in any way.
GW5	Changing groundwater gradients results in movement of groundwater contaminant plumes onto third party properties with potential impacts to beneficial uses of groundwater and potential for vapour intrusion to existing structures.	Develop and implement a groundwater monitoring plan as part of the GMP that details sufficient monitoring of drawdown to verify that no significant impacts occur from potential: • Contaminant migration on the beneficial uses of groundwater at third party properties caused by drawdown and vapour intrusion to underground structures • Activation of PASS and groundwater acidification • Reduction in access to water for bore owners in the area around the project • Reduction in access to groundwater for trees– particularly in the Tunnels precinct between CBD South and Domain stations, and the CBD South station and eastern portal precincts	Construction	Contingency measures should be put in place if contaminant migration is evident at third party properties. RMIT should be advised if contaminant migration is evident at third party properties and of the proposed course of action to ameliorate any potential impacts.

EPR No.	Impact	Environmental Performance Requirement	Timing	Meinhardt Recommended Amendments
		• Change in groundwater levels in any existing recharge bores that may be present in the area around the project.		

Table 6 Recommended Amendments to EPRs – Contaminated Land and Spoil Management

EPR No.	Impact	Environmental Performance Requirement	Timing	Meinhardt Recommended Amendments
C1	Bulk earthworks and spoil management	Prior to construction of main works or shafts, prepare and implement a Spoil Management Plan (SMP) in accordance with MMRA's Spoil Management Strategy and relevant regulations, standards and best practice guidance. The SMP shall be developed in consultation with and to the satisfaction of the EPA. The SMP would include but is not limited to the following: • Applicable regulatory requirements • Identifying nature and extent of spoil (clean fill and contaminated spoil) across all precincts • Roles and responsibilities • Identification of management measures for handling and transport of spoil for the protection of health and the environment • Identification, design and development of specific environmental management plans for temporary stockpile areas • Identifying suitable sites for re-use, management or disposal of any spoil • Monitoring and reporting requirements • Identifying locations and extent of any Prescribed Industrial Waste and characterising Prescribed Industrial Waste spoil prior to excavation • Identifying suitable sites for disposal of any Prescribed Industrial Waste. The SMP shall include sub-plans as appropriate, including but not limited to an Acid Sulfate Soil and Rock (ASS/ASR) Management Sub-Plan (Refer to C2).	Construction	Meinhardt recommend that RMIT is consulted during the development of the site SMP and CEMP, to confirm the location of TSAs is suitable and appropriate management procedures are in place to ensure RMIT is not impacted by stockpiling activities.
C2	Bulk earthworks and spoil management	Prepare and implement an Acid Sulfate Soil and Rock (ASS/ASR) Management Sub-Plan prior to construction of the project as a Sub-Plan of an overarching SMP in accordance with the Regulations, Standards and best practice guidance and to the satisfaction of EPA. This sub-plan would include the general requirements of the SMP and also: • Identifying locations and extent of any potential ASS/ASR • Characterising ASS/ASR spoil prior to excavation • Identification and implementation of measures to prevent oxidation of ASS/ASR wherever possible Identifying suitable sites for re-use, management or disposal of any	Construction	Meinhardt recommend that RMIT is consulted during the development of the site SMP and ASS/ASR Management Sub-Plan to ensure the location of TSAs is suitable and appropriate management procedures are in place.

EPR No.	Impact	Environmental Performance Requirement	Timing	Meinhardt Recommended Amendments
		ASS/ASR.		
C3	Below ground structures	Prior to construction of main works or shafts, undertake a remedial options assessment (ROA) for contaminated land. The assessment must: • Consider the outcomes of further investigations • Interpret of groundwater permeation and VOC result • Present and take account of the outcomes of risk assessments • If required, identify remedial options in accordance with relevant regulations, standards and best practice guidance and to the satisfaction of EPA. If required, as an outcome of the ROA, prepare a remedial action plan and integrate the remediation approach into the design in accordance with relevant regulations, standards and best practice guidance and to the satisfaction of EPA.	Construction / Operation	Meinhardt recommend that RMIT is consulted during the ROA process. If high levels of ground gasses and/or vapours are detected in the vicinity of RMIT during the ROA, Meinhardt recommend vapour bores are installed on the RMIT boundary and monitored before, during and after construction works. Monitoring the gas/vapour bores will ensure construction works have not caused potential ground gases/vapours to migrate towards RMIT.
C4	Construction safety hazards	Prior to construction of main works or shafts commencing, prepare and implement a health, safety and environmental plan for the management of hazardous substances. The plan must include but not be limited to: • Consideration of the risks associated with exposure to hazardous substances for employees, visitors and general public • The identification of methods to control such exposure in accordance with relevant regulations, standards and best practice guidance and to the satisfaction of WorkSafe and the EPA • Method statements detailing monitoring and reporting.	Construction	Meinhardt recommend that MMRA provide training/education to RMIT staff and students on the Health Safety and Environment Management Plan, to ensure they are aware of the potential risks affecting the general public surrounding the construction site. Meinhardt recommend that RMIT is consulted during the development of the Health Safety Environment Management Plan of Hazardous Substances, to ensure that any potential risks to users of RMIT are adequately addressed.

Table 7 Recommended Amendments to EPRs – Land Use Planning

EPR No.	Impact	Environmental Performance Requirement	Timing	Meinhardt Recommended Amendments
LU1	Construction activities inhibit future development above and below ground	Develop and implement measures for construction and operation of Melbourne Metro that aim to minimise impacts to the development and/or operation of existing land uses, including: • Limiting the permanent change of use within existing public open space • Minimising footprints of construction sites and permanent infrastructure on public land • Minimising impacts to existing public open spaces and recreational facilities and the users of these facilities, including (but not limited to): JJ Holland Park, University Square, City Baths, City Square, Federation Square, the Shrine of Remembrance and the Shrine Reserve, Domain Parklands, Edmund Herring Oval, Fawkner Park and the Albert Road Reserve. Such measures must be developed in consultation with affected land managers for public land.	Construction / Operation	This section seeks to reduce impacts on existing land uses, however it only explicitly mentions public land. The wording of the section as 'including', as opposed to 'including, but not limited to', is considered unsatisfactory. The wording provides no guaranteed protection of mitigating measures on private land including land held by RMIT. Greater emphasis on mitigating impacts of **all** affected land should be specified to adequately protect RMIT land from impacts associated with the project. The draft EES evaluation objective which the EPR seeks to achieve - 'to protect and enhance…buildings **within and adjacent** to the project alignment and particularly **in the vicinity of** project surface structures'. It is noted that EPR SC3 relates to preparing a community and business involvement plan to engage potentially affected stakeholders more generally with regard to **construction activities only**. Therefore, the preparation of a community and business and development plan regarding **operation** has not been acknowledged. This presents substantial risks to RMIT. Notably, a specified mitigation measure for this EPR is to incorporate the proposed works with the planned future development of the University of Melbourne and not RMIT. **Recommended Actions:** 1. That RMIT be engaged as a stakeholder in a community and business involvement plan regarding operational project impacts. 2. Given the extent of future development planned for University of Melbourne land and its proximity to the project area, Meinhardt considers the inclusion of a similar mitigation measure specifically referring to RMIT future development appropriate. 3. The EPR must explicitly refer to all land managers not only public land managers. 4. The mitigation measure '*selection of construction equipment/construction methodology'* be adhered to and the proposed cut and cover construction method for the station entrances and the proposed timeframes that these will be left

EPR No.	Impact	Environmental Performance Requirement	Timing	Meinhardt Recommended Amendments
				'open' (approximately 2 years) be re-evaluated.
LU2	Construction activities and permanent structures minimise land to be used for public open space and reduce quality of open space	Development of the project is to have regard to the relevant Open Space Master Plans (including but not limited to, the Domain Parklands and Fawkner Park Master Plans) in designing and constructing above-ground infrastructure for the tunnels. Consultation must occur with land managers and/or agencies responsible for the implementation of the relevant Open Space Master Plans.	Construction / Operation	Meinhardt considers the general intent of this EPR appropriate. **Recommended Actions:** 1. Wording be altered to cover **all existing or proposed** open spaces that are affected by a high level plan, regardless of its staging. This would allow formal consideration of the *Franklin Street Urban Design Proposal* prepared by RMIT and CoM. 2. RMIT be consulted throughout the development of the plan to achieve their desired outcomes with regard to Franklin Street and any other public spaces. 3. Consult with CoM to determine mutual interests with regard to MMR project impacts on A'Beckett Square, Franklin Street and any other public spaces.
LU4	Permanent structures and fixtures will impact existing land uses	Prior to the development of the detailed design of all permanent structures, prepare and implement strategies in accordance with the Urban Design Strategy and relevant planning schemes that cover: • Public arts and cultural strategy • Wayfinding, signage and advertising The strategies must be developed in consultation with relevant local Councils and land managers.	Design	Meinhardt consider the inclusion of each of these strategies within an EPR appropriate. **Recommended Actions:** 1. That RMIT be actively involved in the development of these strategies from the outset given their proximity to station entrances and the significant potential for impacts on their land.
B1	Privately owned land will require acquisition and occupation	Reduce the disruption to businesses from direct acquisition or temporary occupation of land, and work with business and land owners to endeavour to reach agreement on the terms for possession of the land.	Design	The peer review did not suggest specific amendments to this EPR.
SC2	Construction activities inhibit access to residences	Prior to main works or shaft construction in areas affected, develop a relocation management framework that allows for a uniform approach across the project for the voluntary (temporary) relocation of households subject to: • Construction activities likely to unduly affect their amenity (e.g. out of hours works or sustained loss of amenity during the day for shift workers) • Loss of access	Pre-construction	The peer review did not suggest specific amendments to this EPR.

EPR No.	Impact	Environmental Performance Requirement	Timing	Meinhardt Recommended Amendments
SC4	Temporary occupation of public open space minimise land to be used and reduce quality of space	Prior to main works or shaft construction commencing, work with the City of Melbourne to identify possible alternative areas of public open space for community use during the construction phase to minimise the impacts of loss of existing public open space that are to be utilised as construction worksites.	Pre-construction	Meinhardt consider the EPR presents substantial risks to RMIT open spaces. MMRA have indicated through the proposed use of A'Beckett Square as a construction site, they intend to make use of open space areas as constructions sites, regardless of public or private ownership. **Recommended Actions:** 1. The use of A'Beckett Square, Bowen Lane and any other publicly accessible RMIT open spaces may not be used for general community use due to the potential detrimental impacts on RMIT operations and student experience.
LV2	Construction activities and permanent structures require the loss of land to be used for public open space resulting in a change of land use	Develop and implement a plan in consultation with the Office of Victorian Government Architect, local councils and other land managers to comply with the Melbourne Metro Urban Design Strategy to re-establish public open space, recreation reserves and other valued places disturbed by temporary works.	Construction / Operation	The peer review did not suggest specific amendments to this EPR.
Additional EPRs / Additional risks Identified by Meinhardt				
	Incorporated Document	<u>Incorporated document</u> The Incorporated Document should be amended to: • Recognise RMIT as a key stakeholder with regard to: – Development Plans – Environmental Management Framework – Urban Design Strategy • Include a notification process for any *Preparatory works*		

Table 8 Recommended Amendments to EPRs – Noise and Vibration

<table>
<tr><th>EPR No.</th><th>Impact</th><th>Environmental Performance Requirement</th><th>Timing</th><th>Cogent Acoustics Recommended Amendments</th></tr>
<tr><td>NV1</td><td>Construction generated airborne noise</td><td>Develop and implement a plan to manage construction noise in accordance with EPA Publication 1254 Noise Control Guidelines.</td><td>Construction</td><td>Appropriate limits on airborne construction noise emissions should be devised to limit noise levels emitted to RMIT buildings (similar to those provided in EPR NV5) or a condition that requires upgrades to the sound insulation of the affected RMIT building facades to achieve satisfactory indoor noise levels.</td></tr>
<tr><td>NV3</td><td>Noise and Vibration</td><td>Appoint an acoustic and vibration consultant to predict construction noise and vibration (through modelling) and update the modelling to reflect current construction methodology, site conditions and specific equipment noise and vibration levels (this would require noise and vibration measurements). The model would be used to determine appropriate mitigation to achieve the Environmental Performance Requirements.
The acoustic and vibration consultant would also be required to undertake noise and vibration monitoring to assess levels with respect to Guideline Targets specified in the Environmental Performance Requirements. Where monitoring indicates exceedances of Guideline Targets, apply appropriate management measures as a soon as possible.</td><td>Construction</td><td>The peer review did not suggest specific amendments to this EPR.</td></tr>
<tr><td>NV4</td><td>Noise and Vibration</td><td>Develop and implement a communications plan to liaise with potentially affected community stakeholders and land owners regarding potential noise and vibration impacts. The plan shall include procedures for complaint management.</td><td>Construction</td><td>Meinhardt recommends this EPR should be modified so that the Communications Plan for the Precinct 5 is developed in consultation and with the approval of RMIT as the significant stakeholder in the precinct.</td></tr>
<tr><td>NV5</td><td>Construction generated airborne noise</td><td>Implement management actions if construction noise exceeds the internal noise levels below for Highly Sensitive Areas (based on AS/NZS 2107:2000) and a noise sensitive receptor is adversely impacted.
<table>
<tr><th>Highly Sensitive Area</th><th>Maximum Internal Construction Noise Level $L_{Aeq, 15\ mins}$</th></tr>
<tr><td>Intensive Care Wards</td><td>45</td></tr>
<tr><td>Operating Theatres</td><td>45</td></tr>
<tr><td>Surgeries</td><td>45</td></tr>
<tr><td>Wards</td><td>40</td></tr>
</table></td><td>Construction</td><td>The peer review did not suggest specific amendments to this EPR.</td></tr>
<tr><td>NV6</td><td>Building damage</td><td>Implement management actions if due to construction activity, the following DIN 4150 Guideline Targets for structural damage to buildings (for short-term vibration or long-term vibration) are not achieved.</td><td>Construction</td><td>The potential mitigation measures identified to reduce vibration due to cavern excavation and tunnelling are limited, and primarily involve reducing the speed of</td></tr>
</table>

<table>
<tr><th>EPR No.</th><th>Impact</th><th>Environmental Performance Requirement</th><th>Timing</th><th>Cogent Acoustics Recommended Amendments</th></tr>
<tr><td></td><td></td><td>
Short-term vibration on structures
<table>
<tr><th rowspan="2">Type of structure</th><th colspan="3">Vibration at the foundation, mm/s (Peak Component Particle Velocity)</th><th rowspan="2">Vibration at horizontal plane of highest floor at all frequencies
mm/s (Peak Component Particle Velocity)</th></tr>
<tr><th>1 to 10 Hz</th><th>10 to 50 Hz</th><th>50 to 100 Hz[1]</th></tr>
<tr><td>Type 1: Buildings used for commercial purposes, industrial buildings and buildings of similar design</td><td>20</td><td>20 to 40</td><td>40 to 50</td><td>40</td></tr>
<tr><td>Type 2: Dwellings and buildings of similar design and/or occupancy</td><td>5</td><td>5 to15</td><td>15 to 20</td><td>15</td></tr>
<tr><td>Type 3: Structures that have a particular sensitivity to vibration e.g. heritage buildings</td><td>3</td><td>3 to 8</td><td>8 to 10</td><td>8</td></tr>
</table>
Notes:
1. At frequencies above 100 Hz, the values given in this column may be used as minimum values.
2. Vibration levels marginally exceeding those vibration levels in the table would not necessarily mean that damage would occur and further investigation would be required to determine if higher vibration levels can be accommodated without risk of damage.
3. For civil engineering structures (e.g. with reinforced concrete constructions used as abutments or foundation pads) the values for Type 1 buildings may be increased by a factor of 2.
4. Short-term vibration is defined as vibration which does not occur often enough to cause structural fatigue and which does not produce resonance in the structure being evaluated.

Long term vibration on structures
<table>
<tr><th>Type of structure</th><th>Vibration Velocity, mm/s (Peak Component Particle Velocity) in horizontal plane at all frequencies</th></tr>
<tr><td>Buildings used for commercial purposes, industrial buildings and similar design</td><td>10</td></tr>
<tr><td>Dwellings and buildings of similar design and/or occupancy</td><td>5</td></tr>
<tr><td>Structures that have a particular sensitivity to vibration e.g. heritage buildings</td><td>2.5</td></tr>
</table>
Notes:
1. Vibration levels marginally exceeding those in the table would not necessarily mean that damage would occur and further investigation would be required to determine if higher vibration levels can be accommodated without risk of damage.
2. Long-term vibration during construction to demonstrate compliance with agreed vibration guideline targets. Take remedial action if limits are not met.
</td><td></td><td rowspan="3">tunnelling / excavation, which may extend the duration of impacts to RMIT, albeit at a less intrusive level.
Vibration associated with ripping and rock-breaking in the vicinity of RMIT building 14 is predicted to exceed the sensitive equipment criteria for the electron microscope on Level 7 and the confocal microscope on Level 5. The key mitigation measures proposed include:
• Temporarily rescheduling the use of the vibration sensitive equipment, which would have a potential impact on RMIT operations;
• Temporarily relocating the equipment to other non-affected facilities, which again may have implications for RMIT operations;
• Scheduling the use of the rockbreaker to reduce impact, which would rely on the cooperation
of the proponent and would assume that there is a suitable proportion of times when the
affected sensitive equipment is not utilised.
Provided that a high level of cooperation is maintained between the proponent and RMIT, it is considered that the above mitigation measures may be reasonable. It is recommended that a mechanism is put in place to guarantee that any costs associated with temporary rescheduling or relocation of equipment are not borne by RMIT.
Subject to the above point, the EPRs that have been recommended in the EES to address construction vibration (EPRs NV6 to NV10) are considered to provide a reasonable level of protection to RMIT interests, given the limited durations and impacts of construction vibration predicted.</td></tr>
<tr><td>NV7</td><td>Damage to infrastructure above and below ground</td><td>Undertake condition assessments of above and below ground utility assets and establish construction vibration limits with asset owners.
Monitor vibration during construction to demonstrate compliance with agreed vibration guideline targets. Take remedial action if limits are not met.</td><td>Construction</td></tr>
<tr><td>NV8</td><td>Damage to underground</td><td>Implement management actions if the following DIN 4150 Guideline Targets for buried pipework/underground infrastructure from construction are not</td><td>Construction</td></tr>
</table>

<table>
<tr><th>EPR No.</th><th>Impact</th><th>Environmental Performance Requirement</th><th>Timing</th><th>Cogent Acoustics Recommended Amendments</th></tr>
<tr><td></td><td>infrastructure</td><td>achieved.
<table><tr><th>Pipe Material</th><th>Vibration Velocity, mm/s (PPV)</th></tr><tr><td>Steel</td><td>100</td></tr><tr><td>Clay, concrete, reinforced concrete, prestressed concrete, metal</td><td>80</td></tr><tr><td>Masonry, plastic</td><td>50</td></tr></table>Notes:
1. These values may be reduced by 50% when evaluating the effects of long-term vibration on buried pipework.
2. It is assumed pipes have been manufactured and laid using current technology (however it is noted that this is not the case for the majority of buried pipework potentially affected by Melbourne Metro).
3. Compliance is to be achieved with asset owner's Utility Standards.</td><td></td><td rowspan="3"></td></tr>
<tr><td>NV9</td><td>Construction vibration impacting upon amenity</td><td>Implement Management Actions if the Guideline Targets (VDVs) (based on Table 1 in BS6472-1:2008) for continuous (as for TBMs and roadheaders), intermittent, or impulsive vibration are not achieved.
<table><tr><th rowspan="2">Location</th><th colspan="4">Vibration Dose Value, VDV (m/s$^{1.75}$)</th></tr><tr><th colspan="2">Day
7am to 10pm</th><th colspan="2">Night
10pm to 7am</th></tr><tr><th>Preferred Value</th><th>Maximum Value</th><th>Preferred Value</th><th>Maximum Value</th></tr><tr><td>Residences</td><td>0.20</td><td>0.40</td><td>0.10</td><td>0.20</td></tr><tr><td>Offices, schools, educational institutions, places of worship</td><td>0.40</td><td>0.80</td><td>0.40</td><td>0.80</td></tr><tr><td>Workshops</td><td>0.80</td><td>1.60</td><td>0.80</td><td>1.60</td></tr></table>Notes:
1. The Guideline Targets are non-mandatory; they are goals that should be sought to be achieved through the application of feasible and reasonable mitigation measures. If exceeded then management actions would be required.
2. The VDVs may be converted to PPVs within a future Noise and Vibration Construction Management Plan.</td><td>Construction</td></tr>
<tr><td>NV10</td><td>Construction and operation vibration causing disturbance to vibration sensitive</td><td>Implement Management Actions if the ASHRAE equipment vibration Guideline Targets or measured background levels (whichever is higher) are exceeded for vibration-sensitive equipment during construction and operation at Parkville and CBD North stations.</td><td>Construction / Operation</td></tr>
</table>

<table>
<tr><th>EPR No.</th><th>Impact</th><th>Environmental Performance Requirement</th><th>Timing</th><th>Cogent Acoustics Recommended Amendments</th></tr>
<tr><td></td><td>equipment</td><td>
<table>
<tr><th>Equipment requirements</th><th>Curve</th></tr>
<tr><td>Bench microscopes up to 100x magnification; laboratory robots</td><td>Operating Room</td></tr>
<tr><td>Bench microscopes up to 400x magnification; optical and other precision balances; co-ordinate measuring machines; metrology laboratories; optical comparators; micro electronics manufacturing equipment; proximity and projection aligners, etc.</td><td>VC-A</td></tr>
<tr><td>Microsurgery, eye surgery, neurosurgery; bench microscope at magnification greater than 400x; optical equipment on isolation tables; microelectronic manufacturing equipment such as inspection and lithography equipment (including steppers) to 3mm line widths</td><td>VC-B</td></tr>
<tr><td>Electron microscopes up to 30,000x magnification; microtomes; magnetic resonance images; microelectronics manufacturing equipment such as lithography and inspection equipment to 1 mm detail size</td><td>VC-C</td></tr>
<tr><td>Electron microscopes at magnification greater than 30,000x; mass spectrometers; cell implant equipment; microelectronics manufacturing equipment such as aligners, steppers and other critical equipment for photo-lithography with line widths of ½ micro m; includes electron beam systems</td><td>VC-D</td></tr>
<tr><td>Unisolated laser and optical research systems; microelectronics manufacturing equipment such as aligners, steppers and other critical equipment for photolithography with line widths of ¼ micro m; includes electron beam systems</td><td>VC-E</td></tr>
</table>
Note:
1. The Proponent may undertake consultation with the users and agree alternative Guideline Targets.
</td><td></td><td></td></tr>
<tr><td>NV11</td><td>Construction ground-borne noise impacting upon amenity</td><td>Implement management actions as determined in consultation with potentially affected land owners to protect amenity at residences, sleeping areas in hospital wards, student accommodation and hotel rooms where the following ground-borne noise Guideline Targets (from the NSW Interim Construction Noise Guideline) are exceeded during construction.
<table>
<tr><th>Time Period</th><th>Internal Target, $L_{Aeq,15min}$ (dB)</th></tr>
<tr><td>Evening, 6pm to 10pm</td><td>40</td></tr>
<tr><td>Night, 10 pm to 7am</td><td>35</td></tr>
</table>
Note:
1. Levels are only applicable when ground-borne noise levels are higher than airborne noise levels.
2. The noise levels are assessed at the centre of the most affected habitable room.
3. Management Actions include extensive community consultation to determine acceptable level of disruption and provision of respite accommodation in some circumstances.</td><td>Construction</td><td>This EPR does not provide any protection to RMIT from the potential effects of ground borne construction noise, as it applies to residential dwellings only.
Additional criteria should be included that would protect teaching spaces and other noise sensitive areas within RMIT buildings when in use. It is considered that the maximum noise levels recommended by AS/NZS 2107:2000 (Standards Australia, 2000) should be used as guidance for the ground-borne construction noise criteria.</td></tr>
<tr><td>NV13</td><td>Operational Disturbance to Bio-resources</td><td>To protect the amenity of Bio-resources and sensitive research during construction and operation the following criteria apply:
• Background noise should be kept below 50 dB and should be free of distinct tones (internal).
• Short exposure should be kept to less than 85 dB (internal).</td><td>Operation</td><td>The peer review did not suggest specific amendments to this EPR.</td></tr>
</table>

<table>
<tr><th>EPR No.</th><th>Impact</th><th>Environmental Performance Requirement</th><th>Timing</th><th>Cogent Acoustics Recommended Amendments</th></tr>
<tr><td></td><td></td><td>Notes:
1. The levels above should take into consideration the frequency threshold for the Bio-resource under consideration.
2. Higher levels may be acceptable if it can be shown that the Bio-resource under consideration is exposed to higher levels and is not adversely impacted by them.</td><td></td><td></td></tr>
<tr><td>NV14</td><td>Operational Noise and Vibration</td><td>Appoint an acoustic and vibration consultant to predict noise and vibration and determine appropriate mitigation to achieve the Environmental Performance Requirements. The acoustic and vibration consultant would also be required to undertake commissioning noise and vibration measurements to assess levels with respect to the Environmental Performance Requirements.</td><td>Operation</td><td>The peer review did not suggest specific amendments to this EPR.</td></tr>
<tr><td>NV15</td><td>Operational airborne noise impacting on amenity</td><td>Avoid, minimise or mitigate rail noise where the following PRINP (Victorian Passenger Rail Infrastructure Noise Policy, April 2013) Investigation Thresholds are exceeded during operation
<table>
<tr><th>Time</th><th>Type of Receiver</th><th>Investigation Thresholds</th></tr>
<tr><td>Day
(6am – 10pm)</td><td>Residential dwellings and other buildings where people sleep including aged persons homes, hospitals, motels and caravan parks
Noise sensitive community buildings, including schools, kindergartens, libraries</td><td>65 dBL_{Aeq} and a change in 3 dB(A) or more
or
85 dBL_{Amax} and a change in 3 dB(A) or more</td></tr>
<tr><td>Night
(10pm – 6am)</td><td>Residential dwellings and other buildings where people sleep including aged persons homes, hospitals, motels and caravan parks</td><td>60 dBL_{Aeq} and a change in 3 dB(A) or more
or
85 dBL_{Amax} and a change in 3 dB(A) or more</td></tr>
</table>
Notes:
1. If an investigation shows that the thresholds are not exceeded, then no further action is considered under the PRINP
2. L_{Amax}, for this assessment, is defined as maximum A-weighted sound pressure level and is the 95 percentile of the highest value of the A-weighed sound pressure level reached within the day or night
3. For the Melbourne Metro the location of assessment is at 1 m from the centre of the window of the most exposed external façade</td><td>Operation</td><td>The peer review did not suggest specific amendments to this EPR.</td></tr>
<tr><td>NV16</td><td>Operational airborne noise causing adverse impact on</td><td>For operation, comply with State Environment Protection Policy (Control of Noise from Commerce, Industry and Trade) No. N-1 (SEPP N-1). This does not apply to trains and trams.</td><td>Design / Operation</td><td>The requirement to comply with SEPP N-1 does not necessarily provide protection to the adjacent RMIT buildings, which may include noise sensitive spaces that are not defined as Noise Sensitive Areas by SEPP N-1.
It is considered that either the extending the SEPP N-1</td></tr>
</table>

<table>
<tr><th>EPR No.</th><th>Impact</th><th>Environmental Performance Requirement</th><th>Timing</th><th>Cogent Acoustics Recommended Amendments</th></tr>
<tr><td></td><td>amenity</td><td></td><td></td><td>noise limits to apply at the façade of the RMIT buildings, or applying a fixed noise limit of approximately 60 dB LAeq, would provide satisfactory protection to the spaces within the adjacent RMIT buildings.</td></tr>
<tr><td>NV17</td><td>Operational ground-borne noise impacting upon amenity</td><td>Where operational ground-borne noise trigger levels are exceeded for sensitive occupancies as shown in the table below (trigger levels are based on the Rail Infrastructure Noise Guideline,17 May 2013 (RING(1)), assess feasible and reasonable mitigation to reduce noise towards the relevant ground-borne noise trigger level.
<table>
<tr><th>Sensitive land use</th><th>Time of day</th><th>Internal noise trigger levels</th></tr>
<tr><td rowspan="2">Residential</td><td>Day (7am-10pm)</td><td>40 dBL_{ASmax} and an increase in existing rail noise level by 3 dB(A) or more</td></tr>
<tr><td>Night (10pm -7am)</td><td>35 dBL_{ASmax} and an increase in existing rail noise level by 3 dB(A) or more</td></tr>
<tr><td>Schools, educational institutions, places of worship</td><td>When in use</td><td>40-45 dBL_{ASmax} and an increase in existing rail noise level by 3 dB(A) or more</td></tr>
<tr><td>Hospitals (bed wards and operating theatres)</td><td>24 hours</td><td>35 dB(A) L_{ASMax}</td></tr>
<tr><td>Offices</td><td>When in use</td><td>45 dB(A) L_{ASMax}</td></tr>
<tr><td>Cinemas and Public Halls</td><td>When in use</td><td>30 dB(A) L_{ASMax}</td></tr>
<tr><td>Drama Theatres</td><td>When in use</td><td>25 dB(A) L_{ASMax}</td></tr>
<tr><td>Concert halls, Television and Sound Recording Studios</td><td>When in use</td><td>25 dB(A) L_{ASMax}</td></tr>
</table>
1. RING provides trigger levels for residential and schools, educational institutions and places of worship, but does not provide guidance on acceptable ground-borne noise levels for other types of sensitive receivers. Ground-borne noise trigger levels for other types of sensitive occupancies have been developed based on RING and industry knowledge.
2. Specified noise levels refer to noise from heavy or light rail transportation only (not ambient noise from other sources)
3. Assessment location is internal near to the centre of the most affected habitable room.
4. L_{ASmax} refers to the maximum noise level not exceeded for 95% of the rail pass-by events.
5. For schools, educational institutions, places of worship the lower value of the range is most applicable where low internal noise levels is expected.</td><td>Operation</td><td>The peer review did not suggest specific amendments to this EPR.</td></tr>
<tr><td>NV18</td><td>Operational vibration impacting on amenity</td><td>During operation, achieve the Guideline Targets (based on Table 1 in BS6472-1:2008) or background levels (whichever is higher) for vibration as follows:</td><td>Operation</td><td>The peer review did not suggest specific amendments to this EPR.</td></tr>
</table>

<table>
<tr><th>EPR No.</th><th>Impact</th><th>Environmental Performance Requirement</th><th>Timing</th><th>Cogent Acoustics Recommended Amendments</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><th rowspan="3">Location</th><th colspan="4">VDV (m/s$^{1.75}$)</th></tr>
<tr><th colspan="2">Day
7am to 10pm</th><th colspan="2">Night
10pm to 7am</th></tr>
<tr><th>Preferred Value</th><th>Maximum Value</th><th>Preferred Value</th><th>Maximum Value</th></tr>
<tr><td>Residences</td><td>0.20</td><td>0.40</td><td>0.10</td><td>0.20</td></tr>
<tr><td>Offices, schools, educational institutions, places of worship</td><td>0.40</td><td>0.80</td><td>0.40</td><td>0.80</td></tr>
<tr><td>Workshops</td><td>0.80</td><td>1.60</td><td>0.80</td><td>1.60</td></tr>
</table>
Notes:
1. The Guideline Targets are non-mandatory; they are goals that should be sought to be achieved through the application of feasible and reasonable mitigation measures.
2. Compliance with these values implies no structural damage due to operation
</td><td></td><td></td></tr>
</table>

Table 9 Recommended Amendments to EPRs – Services Infrastructure

Additional EPRs / Additional Risks Identified by Meinhardt	
Early Work Services Diversion	The available MMRA documents indicate that sewer piping within A'Beckett Street serving Building 37 will need to be diverted and that some of the existing sewer services serving Building 37 will need to be re-routed to the sewer main in Literature Lane. Further investigation will need to be undertaken to ensure that the proposed rerouting is viable, does not cause undue disruption to RMIT operations and does not restrict future development of Building 14 and associated buildings.
Communications Network	The relocation of non-authority communications assets such as RMIT communications fibre network, does not appear to have been addressed in the EES document and may create a gap in scope if not included as part of the works requirements.
HV Power	It is understood that diversion of HV power as a response to the Melbourne Metro works will be undertaken by the Power Authority. The EES document does not state performance requirements for continuity of supply of power. RMIT have a significant number of facilities which would be significantly impacted by disruption to power supply. In particular, there are a number of laboratories which undertake experimental work which requires 24/7 power to avoid loss of research experiments. Capacity of HV power network supplying the RMIT campus is critical to future development of the RMIT buildings and facilities to achieve target growth figures. Any limitation on provision of additional or new power supply to the campus due to temporary relocation of the HV power assets will impact on RMIT ability to meet its growth and development plans. The location of new substations to service the MMR project has not been defined in the documentation made available by the MMRA. The location of these authority assets may introduce additional EMI risk, fire hazard, noise, 24/7 access requirements and authority easement requirements which may have an impact on the surrounding areas of the RMIT campus and buildings.
Domestic Water and Sewer Infrastructure	It is understood that diversion of domestic water and sewer infrastructure as a response to the MMR works, will be undertaken by the Water Authority. The ESS document does not state performance requirements for continuity of service. RMIT have a significant number of facilities which would be significantly impacted by disruption to water supply. In particular, there are a number of laboratories which undertake experimental work which requires 24/7 water for air conditioning systems to avoid loss of research experiments. Capacity of water and sewer infrastructure serving the RMIT campus is critical to future development of the RMIT buildings and facilities to achieve target growth figures. Any limitation on provision of additional or new water or sewer services to the campus due to temporary relocation of these assets will impact on RMIT ability to meet its growth and development plans.

Table 10 Recommended Amendments to EPRs – Social and Community

Additional EPRs / Additional Risks Identified by Public Place	
Social and community impacts to RMIT	• The EES provides only limited information about the magnitude of potential social changes associated with the Concept Design and the severity of associated impacts for RMIT, its staff and students. • The EPRs and mitigation measures are not always appropriately targeted. For example, the EPR relating to amenity impacts does not refer to noise or vibrations, even though Section 13 of the EES indicates that the vibration Guideline Targets would be exceeded for some vibration-sensitive equipment at RMIT. • Some EPRs are framed in terms of minimising physical change rather than ensuring that associated impacts are contained within a tolerable range. • The proposed EPRs do not address the potential displacement of users of RMIT's Urban Square, or the potential for increased traffic on Stewart Street. • The proposed EPRs do not address the potential impact of the Concept Design on pedestrian safety, connectivity and legibility post construction. • The EPRs and mitigation measures should be amended to enable management of physical changes associated with the Concept Design so that RMIT, its staff and students can continue in their endeavours without undue disruption, and/or that RMIT is assisted to find alternative arrangements to avoid the exposure of sensitive receptors to changes which they cannot be reasonably expected to tolerate.

Table 11 Recommended Amendments to EPRs – Surface Water

Additional EPRs / Additional Risks Identified by Meinhardt	
Rainfall/overland flow resulting in flooding	• The detailed design for the MMRP should include hydrologic, hydraulic and surface flow modelling to ensure and demonstrate that there is no detrimental effect to RMIT. • Detailed drainage design and supporting documents should be provided to RMIT before MMRP works are commenced. • Drainage works should not commence until RMIT acceptance of the MMRP drainage design has been given. • The MMRA and/or its contractor should undertake dilapidation reports of RMIT works and services in the vicinity of the works, inclusive of CCTV inspection of RMIT drainage and sewerage, prior to works.

Table 12 Recommended Amendments to EPRs – Traffic and Transport

EPR No.	Impact	Environmental Performance Requirement	Timing	Ratio Recommended Amendments
T1	This EPR is relevant to a number of the impacts related to RMIT, including: • Retention of access for waste collection / loading vehicles to RMIT • Retention of access for emergency vehicles to RMIT	**Road Transport (Construction phase)** Develop and implement a transport management plan(s) in consultation with the relevant road management authorities to minimise disruption to traffic, car parking, pedestrian and bicycle movements during construction, including but not limited to: • Management of any temporary or permanent full or partial closure of traffic lanes including (but not limited to): – Childers Street, Kensington – Royal Parade, Grattan Street and Barry Street, Parkville – Franklin Street, A'Beckett Street and Little La Trobe Street at CBD North – Flinders Street and Flinders Lane at CBD South – Linlithgow Avenue, Melbourne – St Kilda Road, Domain Road, Albert Road at Domain – Toorak Road at Fawkner Park – Osborne Street, William Street in South Yarra • Monitoring of travel behaviour changes caused by construction works, including pre-construction baseline data and periodic reporting on behaviour change. Use this data as an input to the design of transport networks following construction • Traffic management plan(s) must be developed recognising other projects operating concurrently, where relevant • Provision for a minimum of one lane for traffic in each direction on St Kilda Road to be maintained throughout the construction within the Domain station precinct • Potential routes for construction vehicles travelling to and from all Melbourne Metro construction work sites,	Construction	<u>Construction Worker Parking</u> The EPR states that there should be the provision of car parking for construction workers where possible. This requirement needs to be stronger and more specific, with the following recommended requirements: • Off-street car parking for construction workers must be provided, with potential options being leasing a car park nearby, park and ride to a remote car park and/or preparation of an enforceable parking management plan for construction workers. This is to be extended to night time. • On-site tool storage to be provided to reduce the number of construction workers driving to the worksite. • Prepare a Green Travel Plan to discourage construction workers from driving to the worksite. <u>Accessibility</u> The EPR states that suitable measures should be taken to ensure emergency service access is not inhibited. There is no mention however of maintaining accessibility for waste collection / loading vehicles to RMIT's on-site facilities. These should be included as follows: • Access to all RMIT waste collection / loading points to be maintained. • Works which restrict access to RMIT must be avoided if possible, and be undertaken outside of peak University times (i.e. holidays, weekends and evenings). <u>Stakeholder Engagement</u> Whilst the EPR states that the traffic management plan be prepared in consultation with the relevant authorities, there should also be engagement with the relevant stakeholders as follows: • Relevant stakeholders (including RMIT) to be

EPR No.	Impact	Environmental Performance Requirement	Timing	Ratio Recommended Amendments
		recognising sensitive receptors • Provision of suitable routes for vehicles to maintain connectivity for road users to JJ Holland Park, South Kensington station and to the medical and educational facilities adjacent to the Parkville construction work site		consulted during the preparation of the traffic management plan
T2	This EPR is relevant to a number of the impacts related to RMIT, including: • Travel time impacts by public transport • Maintaining public transport accessibility	**Public Transport (Construction phase)** • Develop and implement a plan for occupying railway land and tracks at the western portal, eastern portal and western turnback that minimises the disruption to railway services during construction. Plan to be developed to the satisfaction of VicTrack and MTM • Provide suitable routes for pedestrians to maintain connectivity, including DDA access for users around all construction sites generally. • Develop and implement measures to minimise disruption to the tram and bus networks resulting from the construction of Melbourne Metro in consultation with the relevant road management authorities and to the satisfaction of PTV, including (but not limited to): – Options to divert the 401, 402, 403, 505 and 546 bus services – Tram routes on La Trobe Street and Swanston Street – Tram routes on Flinders Street and Swanston Street – Tram operations on Toorak Road and the diversion of the No. 8 tram route – Periodic closures of Royal Parade tram route – Tram routes on St Kilda Road – Disruption to other tram routes through Domain tram stop – Bus replacement services for disrupted rail customers.	Construction	<u>Public Transport Capacity</u> There is no consideration of the capacity of public transport services to accommodate a potential mode shift during construction. As such, the following requirement is recommended: • Monitor the increase in public transport use as a result of the construction activities, with a plan prepared for the provision of additional or replacement services in consultation with PTV where capacity is being exceeded. <u>Train Services</u> There is no mention of train services in the EPR. As such, the following is recommended: • Ensure there is no impact to existing train services.
T3	This EPR is relevant to a number of the impacts related to	**Active Transport (Construction phase)** • Develop and implement transport management measures in consultation with relevant authorities for	Construction	<u>Pedestrian Access</u> The EPR states that pedestrian connectivity should be maintained but does not provide specifics. The

EPR No.	Impact	Environmental Performance Requirement	Timing	Ratio Recommended Amendments
	RMIT, including: • Retention of pedestrian access to RMIT • Retention of cyclist access to RMIT	cyclists and pedestrians to maintain connectivity throughout construction for road and shared path users including (but not limited to): JJ Holland Park, South Kensington station, Laurens Street, Grattan Street, Franklin Street (including RMIT facilities), Swanston Street, Flinders Street, St Kilda Road, Domain Road, Domain Parklands, Albert Road, Toorak Road, Fawkner Park, Osborne Street, William Street and Chapel Street • Implement active control at construction work site access points to maintain safety by avoiding potential conflicts between trucks, pedestrians and cyclists • In consultation with the City of Melbourne, provide suitable routes for cyclists and pedestrians throughout construction to and maintain connectivity for road and shared path users around JJ Holland Park and South Kensington station.		requirements should be more specific as follows: • All pedestrian access to RMIT entrances must be maintained (including those associated with the 'New Academic Street' development). • Footpaths along both sides of Swanston Street and Franklin Street must be maintained throughout construction. • An assessment of the safety of pedestrians crossing Swanston Street midblock must be undertaken as part of the detailed construction traffic management plan. <u>Bicycle Access</u> The EPR states that bicycle connectivity should be maintained but does not provide specifics. The requirements should be more specific as follows: • Existing bicycle lanes provided in each direction along Swanston Street must be maintained throughout construction.
T4	This EPR is primarily relevant to the expected travel time impacts and route/travel mode choice during construction.	**Travel Demand Strategy** In advance of construction works, MMRA to develop and implement a travel demand management strategy and appropriate tools to promote specific transport behaviour changes in response to road, bicycle and pedestrian paths closures/modifications and to reduce traffic congestion around construction sites, where road closures and restrictions are proposed. The strategy must be consistent with the MMRA Community and Stakeholder Engagement Plan.	Construction	This EPR is generally acceptable, however as part of this there should be additional information provided to help inform route and travel mode choice as follows: • Provide real time travel time information through areas affected by the construction for both car and public transport travel to assist in determining which route/travel mode to use.
T5	This EPR is primarily relevant to the operation of the roads which were affected during construction after the completion of the project.	**Road Transport (Operational phase)** • Design all roadworks and shared path works to relevant design standards to maintain safety of movement in consultation with the relevant road management authorities as required • Develop and implement a plan to reinstate car parking on Childers Street, Kensington and Laurens Street, North Melbourne in consultation with the relevant road management authorities that:	Operation	The peer review did not suggest specific amendments to this EPR.

EPR No.	Impact	Environmental Performance Requirement	Timing	Ratio Recommended Amendments
		– Minimises the permanent loss of parking where possible – Ensures re-instated car parking does not encroach on JJ Holland Park – Considers opportunities for replacement of any net loss of parking at nearby locations – Reduces the risk of overflow parking in local streets from South Kensington station and activities at JJ Holland Park – Replaces loading zones to service the needs of the existing businesses in the precinct where disrupted during construction • Develop and implement a plan for the reinstatement of Grattan Street, Parkville in consultation with the relevant road management authorities that includes: – Optimal replacement of car parking spaces along Grattan Street to service the needs of the hospitals and the university, including the retention or replacement of specific short-term and DDA compliant parking – Optimal design of the road network around Grattan Street associated with the changed demands and network changes on Grattan Street and Royal Parade/Elizabeth Street • Develop and implement a plan for the future use of the Franklin Street road reserve in consultation with the relevant road management authorities that includes: – Optimising the design of the road network following the closure of Franklin Street between Swanston Street and Bowen Street – Monitoring the change in travel patterns around the area associated with the closure of Franklin Street • Optimise the design of the reinstated St Kilda Road and apply the road users hierarchy in consultation with the relevant road management authorities to: – Reduce delays and congestion – Maintain safe operations through the precinct – Determine the optimal parking provision in the area		

EPR No.	Impact	Environmental Performance Requirement	Timing	Ratio Recommended Amendments
		and replace any lost parking where possible.		
T6	This EPR is primarily relevant to the operation of the public transport network after the completion of the project.	**Public Transport (Operational phase)** • Review, with PTV, the bus services in the areas around Arden, Parkville, CBD North, CBD South and Domain stations including a review of the route 401 bus frequency that will have reduced demand following implementation of Melbourne Metro • Optimise the design of Melbourne Metro stations to ensure integration with existing and planned future uses and so that they will provide connections: – Between the new Parkville station and the new tram stop on Royal Parade – For interchange between the new CBD North station and the existing tram and bus services along La Trobe Street and Swanston Street – For interchange between the new CBD South station and the existing tram services along Flinders Street and Swanston Street – Between the new Domain station and the new island platform trams stop in the centre of St Kilda Road and connections to the tram services along Domain Road • Review, with PTV and Yarra Trams, the bus and tram services in the area to optimise the functionality of the CBD North and South stations and to reduce the reliance on the Swanston Street tram corridor.	Operation	The peer review did not suggest specific amendments to this EPR.
T7	This EPR is primarily relevant to the operation of the pedestrian and bicycle network after the completion of the project.	**Active Transport (Operational phase)** • Develop and implement a permanent shared use path along the northern side of Childers Street, Kensington in conjunction with the relevant road management authority and the land manager prior to the removal of the shared use path on the southern side • Where practicable to do so, re-instate on-road bicycle lanes and bicycle parking provisions removed during construction in cooperation with the relevant road management authority and the local council • Review the provision of safe and effective bicycle lanes	Operation	The peer review did not suggest specific amendments to this EPR.

EPR No.	Impact	Environmental Performance Requirement	Timing	Ratio Recommended Amendments
		in and around the Melbourne Metro station sites in cooperation with the road authority and the local council • Provide wayfinding information to enhance connectivity for pedestrians and public transport users including (but not limited to) the following locations: – Between Melbourne Central station and the new CBD North station – The underground connection between Flinders Street Station and the new CBD South station.		
Additional EPRs / Additional Risks Identified by Ratio				
	Construction activities impeding traffic flow	In the case of Risk T004, it is considered that the risk level as determined by the EES risk assessment has been understated. This risk is expected to occur on a regular basis and based on the definitions provided in Table 3.2, it is considered that the likelihood is 'Almost Certain' to occur which is defined as 'The event is almost certain to occur one or more times a year'. Against the risk matrix provided in Table 3.1, this would result in the risk being upgraded to 'Very High' for Risk T004.		
	Traffic and transport risks	The following additional risks are considered relevant to RMIT in addition to those identified by the EES risk assessment: • Access to properties by pedestrians, cyclists and vehicles restricted by construction activities and road closures. • Pedestrian safety and amenity concerns relating to the proposed opening of Stewart Street. This would coincide with the closure of A'Beckett Street to pedestrians near Swanston Street, which will result in a large increase of students travelling to/from A'Beckett Square via the Swanston Academic Building. • Impact on current and future RMIT development activities associated with the City Campus.		